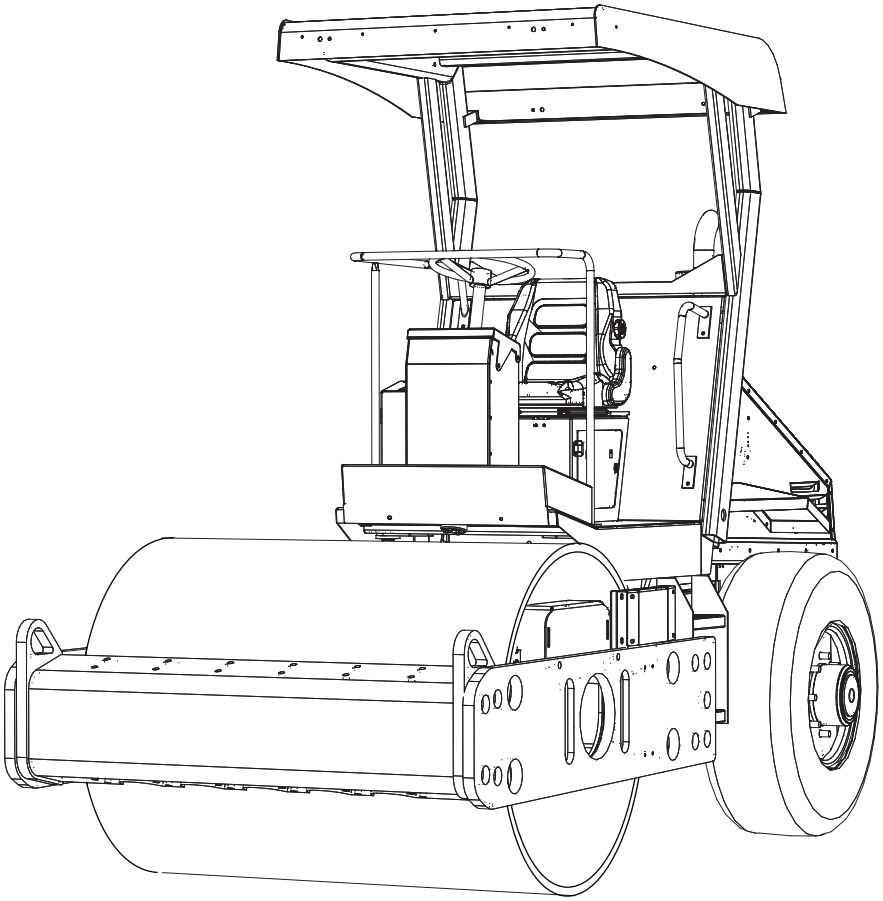
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BOMAG

Instructions for repair

BW 145 DH-3 / PDH-3

S/N 901581481003 >
S/N 901581491016 >



Single drum roller

Catalogue number
0852789

01/2010

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1 General

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Introduction

These repair instructions contain all necessary information for training and repair work.

Notes on maintenance, care and trouble shooting can be found in the operating and maintenance instructions.

1 **General**
2 **Tests and adjustments**
3 **Flushing**
4 **Perform**
5 **Drum**
6 **Articulated joint**
7 **Components**

This instruction manual contains only assembly groups needed for this type of machine.

The repair instructions describe the removal or dismantling and assembly of components and assembly groups.

The repair of disassembled assembly groups is described as far as this makes sense with respect to available tools and spare parts supply and as far as it can be understood by a skilled mechanic.

⚠ Danger

Danger of injury

Please observe strictly the safety regulations in these operating instructions and the applicable accident prevention regulations.

Spare parts needed for repairs can be taken from the spare parts catalogue for the machine.

You should only use genuine BOMAG spare parts.

These repair instructions are not subject of an updating service; for this reason we would like to draw your attention to our additional technical service bulletins.

In case of a new release all necessary changes will be included.

In the course of technical development we reserve the right for technical modifications without prior notification.

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Important notes

These safety regulations must be read and applied by every person involved in the repair of this machine. The applicable accident prevention instructions and the safety regulations in the operating and maintenance instructions must be additionally observed.

Repair work shall only performed by appropriately trained personnel or by the after sales service of BOMAG.

These repair instructions contain headers like „Note“, „Attention“, „Danger“ and „Environment“, which must be strictly complied with in order to avoid dangers for health and for the environment.

⚠ Danger

Paragraphs marked like this highlight possible dangers for persons.

⚠ Caution

Paragraphs marked like this highlight possible dangers for machines or parts of the machine.

i Note

Paragraphs marked like this contain technical information for the optimal economical use of the machine.

Environment

Paragraphs marked like this point out practices for safe and environmental disposal of fuels and lubricants as well as replacement parts.

Observe the regulations for the protection of the environment.

General

- Before starting repair work stand the machine on level and solid ground.
- Always secure the machine against unintended rolling.
- Secure the engine reliably against unintentional starting.
- Mark a machine that is defective or being repaired by attaching a clearly visible warning tag to the steering wheel.
- On machines with articulated joint keep the articulated joint locked during work.
- Use protective clothes like hard hat, safety boots and gloves.
- Keep unauthorized persons away from the machine during repair work.
- Tools, lifting gear, lifting tackle, supports and other auxiliary equipment must be fully functional and in safe condition.
- Use only safe and approved lifting gear of sifficient load bearing capacity to remove and install parts or components from and to the machine.
- Be careful with cleansing agents. Do not use easily inflammable or harmful substances, such as gasoline or paint thinners for cleaning.
- Cleaning or repair work on the fuel tank is very dangerous. Do not smoke or allow any ignitable sparks or open fire in the vicinity when cleaning or repairing a tank. .
- When performing welding work strictly comply with the respective welding instructions.

Special safety regulations

- Use only genuine BOMAG spare parts for repair purposes. Original parts and accessories have been specially designed for this machine.
- We wish to make explicitly clear that we have not tested or approved any parts or accessories not supplied by us. The installation and/or use of such products may therefore have an adverse effect on the specific characteristics of the machine and thereby impair the active and/or passive driving safety. The manufacturer explicitly excludes any liability for damage caused by the use of non-original parts or accessories.
- Unauthorized changes to the machine are prohibited for safety reasons.
- If tests on the articulated joint need to be performed with the engine running, do not stand in the articulation area of the machine, danger of injury!
- Do not perform cleaning work while the engine is running.
- If tests must be performed with the engine running do not touch rotating parts of the engine, danger of injury.
- Exhaust gases are highly dangerous. Always ensure an adequate supply of fresh air when starting the engine in closed rooms.
- Refuel only with the engine shut down. Ensure strict cleanliness and do not spill any fuel.
- Keep used filters in a separate waste container and dispose of environmentally.
- Dispose of oils and fuel environmentally when performing repair or maintenance work.
- Do not refuel in closed rooms.
- Do not heat up oil higher than 160 °C* because it may ignite.*(320°F)
- Wipe off spilled oil and fuel.

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- Do not smoke when refuelling or when checking the acid level in the battery.
- Do not check the acid level of the battery with a naked flame, danger of explosion!
- Old batteries contain lead and must be properly disposed of.
- There is a danger of scalding when draining off engine or hydraulic oil at operating temperature.
- on machines with rubber tires a tire may busr if incorrectly assembled. This can cause severe injury.
- Do not exceed the specified highest permissible tire pressure.

Hydraulics

- Hydraulic oil escaping under pressure can penetrate the skin and cause severe injury. You should therefore relieve the pressure in the system before disconnecting any lines.
- Before applying pressure to the system make sure that all line connections and ports have been properly tightened and are in perfect condition.
- Hydraulic oil leaking out of a small opening can hardly be noticed, therefore please use a piece of cardboard or wood when checking for leaks. When being injured by hydraulic oil consult a physician immediately, as otherwise this may cause severe infections.
- Do not step in front of or behind the drums/wheels when performing adjustment work in the hydraulic system while the engine is running. Block drums and/or wheels with wedges.

Reattach all guards and safety installations after all work has been completed.

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General

- Before removing or disassembling and parts, hoses or components mark these parts for easier assembly.
- Before assembly oil or grease all parts, as far as this is necessary.

Hydraulic system

⚠ Caution

Do not open any hydraulic components if you have not been properly trained and without exact knowledge.

Please note

Cleanliness is of utmost importance. Make sure that no dirt or other contaminating substances can enter into the system.

- Clean fittings, filler covers and the area around such parts before disassembly to avoid entering of dirt.
- Before disconnecting hoses, pipes or similar relieve the system pressure with the engine shut down.
- During repair work keep all openings closed with clean plastic plugs and caps.
- Do not run pumps and motors without oil.
- When cleaning hydraulic components take care not to damage any fine machine surfaces.
- Chemical and rubber soluble cleansing agents may only be used to clean metal parts. Do not use such substances to clean seals and gaskets.
- Rinse of cleaned parts thoroughly, dry them with compressed air and apply anti-corrosion oil immediately. Do not install parts that show traces of corrosion.
- Avoid the formation of rust on fine machined caused by hand sweat.
- Grease must not used as a sliding agent for assembly work. Use hydraulic oil.
- Do not start the engine after the hydraulic oil has been drained off.
- Use only the specified pressure gauges. Risk of damaging the pressure gauges under too high pressure.
- Clean ports and fittings before removal so that no dirt can enter into the hydraulic system.
- Check the hydraulic oil level before and after the work.
- Use only clean oil according to specification.
- Check the hydraulic system for leaks, find and rectify the cause.
- Fill new hydraulic units with hydraulic oil before starting operation.
- After changing a component thoroughly flush and bleed the entire hydraulic system.
- Perform measurements at operating temperature of the hydraulic oil (approx. 40 °C) (104°F).
- After changing a component perform a high and charge pressure test, if necessary check the speed of the exciter shaft.
- The operating pressure of the exciter shaft to a great extent depends on the base under the vibrating drum. If the soil is too hard place the drums on old rubber tires. Do not activate the vibration on a hard, concreted base, danger of bearing damage.
- After the completion of all tests perform a test run and then check all connections and fittings for leaks with the engine still stopped and the hydraulic system depressurized.

Before commissioning

- After changing a component clean the hydraulic oil tank thoroughly.
- Fill the housings of hydraulic pumps and motors with hydraulic oil.
- Use only hydraulic oils according to the specification in the maintenance instructions.
- After changing a component clean the hydraulic system as described in the flushing instructions in order to prevent all other components from being damaged by abrasion and metal chips remaining in the system.
- Change the hydraulic oil filter.

Commissioning

- Bleed the hydraulic circuits.
- Start up the system without load.
- Check the hydraulic oil level in the tank, fill up oil if necessary.

After commissioning

- Check system pressures and speeds.
- Check fittings and flanges for leaks.
- After each repair check all adjustment data, rotational speeds and nominal values in the hydraulic system, adjust if necessary.
- Do not adjust pressure relief valves and control valves to values above their specified values.

Electrical system

- Always disconnect the battery before starting work in the electrical system.
- Ensure correct polarity when connecting the battery.

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- Do not check voltage by tapping against ground.
- When performing welding work always fasten the earth clamp of the welding unit in the immediate vicinity of the welding location. Strictly disconnect the cables from the generator before starting work.

Seals and gaskets

- Generally use new seals and gaskets when performing assembly work. The required seal kits are available as spare parts.

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Tightening torques

- Tighten fastening screws and nuts according to the table of tightening torques.
- Tightening torques deviating from the ones in the table are specially mentioned in the repair instructions.

⚠ Caution

Self-locking nuts must be generally renewed.

Tightening torques for screws with metric unified thread

Screw dimension	Tightening torque Nm* (ft-lb)		
	8.8	10.9	12.9
M4	3 (2)	5 (4)	5 (4)
M5	6 (4)	9 (7)	10 (7)
M6	10 (7)	15 (11)	18 (13)
M8	25 (18)	35 (26)	45 (33)
M10	50 (37)	75 (55)	83 (61)
M12	88 (65)	123 (91)	147 (108)
M14	137 (101)	196 (145)	235 (173)
M16	211 (156)	300 (221)	358 (264)
M18	290 (213)	412 (303)	490 (361)
M20	412 (304)	578 (426)	696 (513)
M22	560 (413)	785 (559)	942 (695)
M24	711 (524)	1000 (738)	1200 (885)
M27	1050 (774)	1480 (1092)	1774 (1308)
M30	1420 (1047)	2010 (1482)	2400 (1770)

Tightening torques for screws with metric fine thread

Screw dimension	Tightening torques Nm* (ft-lb)		
	8.8	10.9	12.9
M8 x 1	26 (19)	37 (27)	48 (35)
M10 x 1.25	52 (38)	76 (56)	88 (65)
M12 x 1.25	98 (72)	137 (101)	126 (119)
M12 x 1.5	93 (69)	127 (94)	152 (112)
M14 x 1.5	152 (112)	216 (159)	255 (188)
M16 x 1.5	225 (166)	318 (235)	383 (282)
M18 x 1.5	324 (239)	466 (344)	554 (409)
M20 x 1.5	461 (340)	628 (463)	775 (572)
M22 x 1.5	618 (456)	863 (636)	1058 (780)
M24 x 2	780 (575)	1098 (808)	1294 (1416)
M27 x2	1147 (846)	1578 (1164)	1920 (1416)
M30 x 2	1568 (1156)	2254 (1662)	2695 (1988)

* Strength classes for screws with untreated, non-lubricated surface.

The values result in a 90% utilization of the screw's yield point at a coefficient of friction total = 0,14.

Compliance with the tightening torques is checked with torque wrenches.

Tightening torques deviating from the ones mentioned in the table are specially mentioned in these descriptions.

The values specified in the table apply for screws black, oiled and with surface protection A4C.

The quality designation of the screws is stamped on the screw heads.

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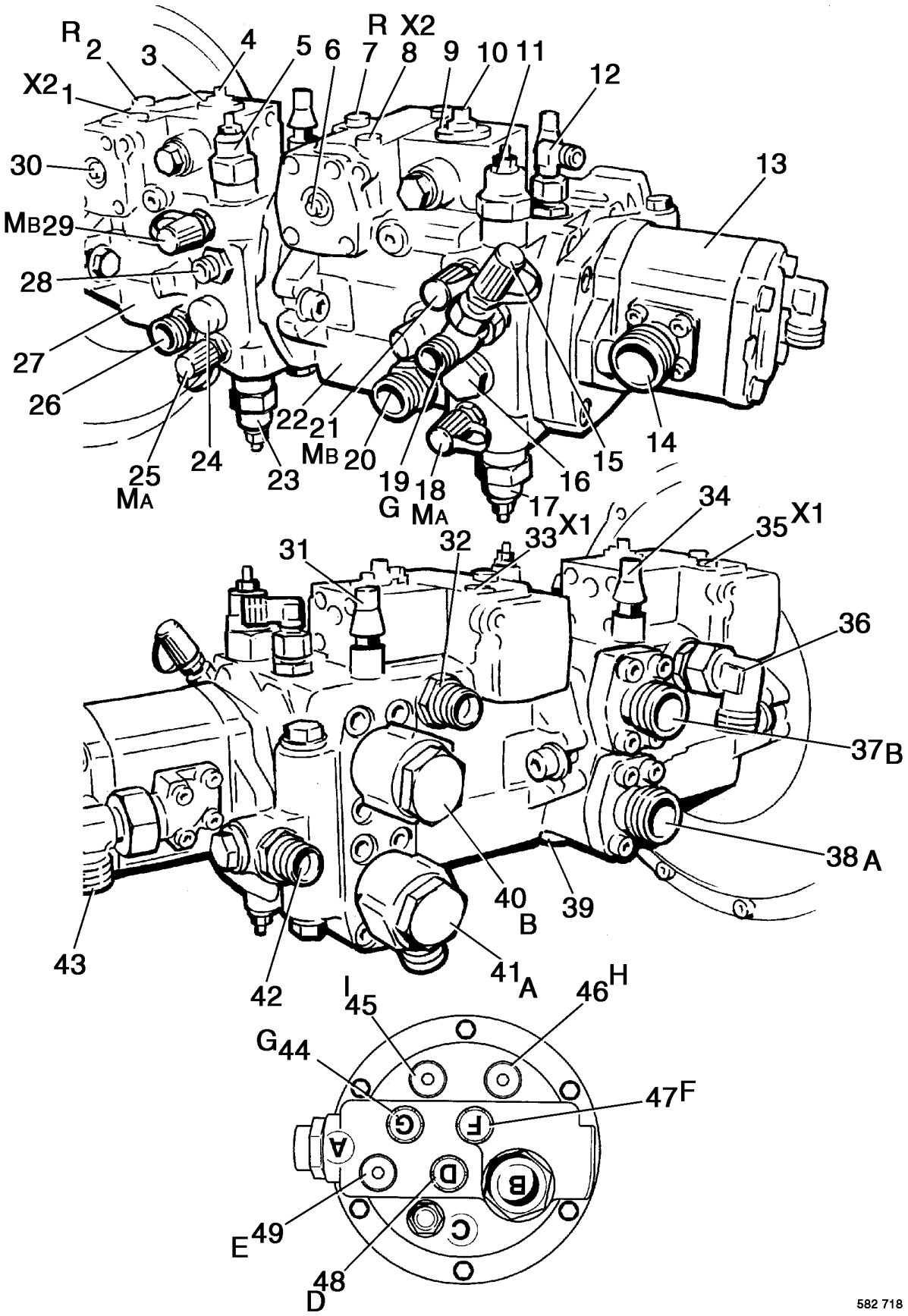


Fig. 1

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1 Test port X2, pilot pressure control piston
2 Pressure test port R, travel pump case pressure
3 Adjustment screw, hydraulic neutral position
4 Travel pump control shaft
5 High pressure relief valve (405 bar)*, high pressure forward *(5874.0 psi)
6 Setscrew, mechanical neutral position
7 Pressure test port R, travel pump case pressure
8 Test port X1, pilot pressure control piston
9 Adjustment screw, hydraulic neutral position
10 Travel pump control shaft
11 High pressure relief valve (405 bar)*, high pressure forward *(5874.0 psi)
12 Port Fe, charge pressure from travel pump 1
13 Vibration pump
14 Port, suction line from tank
15 Test port G, charge pressure
16 Charge pressure relief valve (blocked)
17 High pressure relief valve (405 bar)*, high pressure forward *(5874.0 psi)
18 Pressure test port M_A high pressure reverse
19 Port G, charge pressure to brake solenoid valve
20 Port T2, flushing oil from travel pump 1
21 Pressure test port M_B high pressure forward
22 Travel pump 2, drum drive
23 High pressure relief valve (405 bar)*, high pressure forward *(5874.0 psi)
24 Charge pressure relief valve (25 bar)(362.6psi)
25 Pressure test port M_A high pressure reverse
26 Port T2, flushing oil from drum drive motor
27 Travel pump 1, axle drive
28 Port G, charge pressure to travel pump 2
29 Pressure test port M_B high pressure forward
30 Setscrew, mechanical neutral position
31 Pressure override valve on travel pump 2 (380 bar) (5511.4 psi)
32 Port T1, to travel pump 2
33 Test port X1, pilot pressure control piston
34 Pressure override valve on travel pump 1 (380 bar) (5511.4 psi)
35 Test port X1, pilot pressure control piston
36 Port T1, leak oil to oil tank (E)
37 High pressure port B, high pressure forward
38 High pressure port A, high pressure reverse
39 Port S, charge oil from hydraulic oil filter
40 High pressure port B, high pressure forward
41 High pressure port A, high pressure reverse
42 Flushing oil to oil tank (E)
43 High pressure port on vibration pump
44 Leak oil port G, leak/flushing oil from axle drive motor
45 Leak oil port I, leak oil from vibration motor
46 Leak oil port H, leak oil from brake solenoid valve
47 Leak oil port F, leak oil to oil cooler
48 Leak oil port G, leak/flushing oil from drum drive motor
49 Leak oil port E, leak oil from travel pump T1

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2 Tests and adjustments

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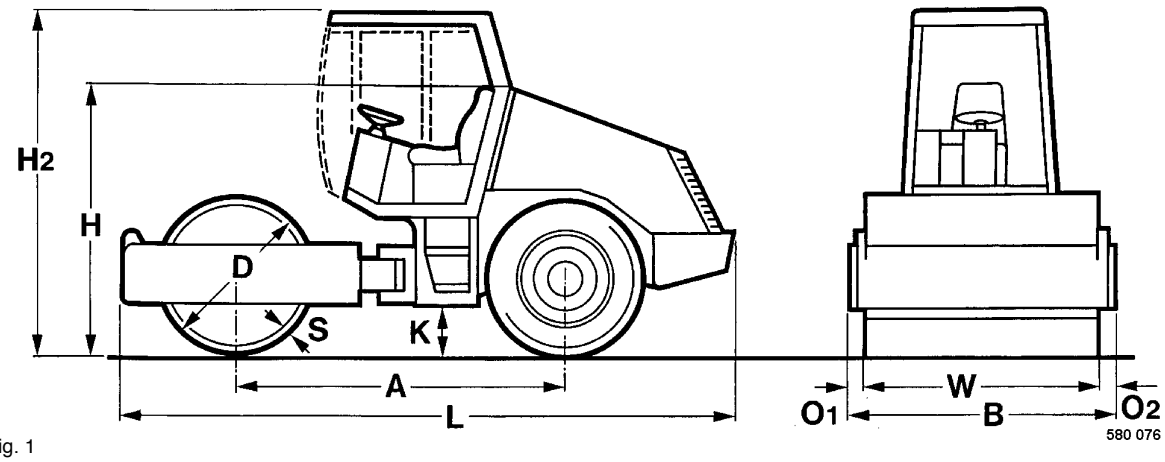


Fig. 1

Dimensions in mm (in)	A	B	D	H	H2	K	L	O1	O2	S	W
BW 145 DH-3	2222 (87.5)	1546 (60.8)	1058 (41.6)	1900 (74.8)	2750 (108.2)	313 (12.3)	4194 (165.1)	60 (2.4)	60 (2.4)	22 (0.86)	1426 (56.1)
BW 145 PDH-3	2222 (87.5)	1546 (60.8)	1044 (41.1)	1900 (74.8)	2750 (108.2)	313 (12.3)	4194 (165.1)	60 (2.4)	60 (2.4)	15 (0.60)	1426 (56.1)

*

		BW 145 DH-3	**BW 145 PDH-3**
Weights			
Operating weight (CECE) with ROPS-cabin	kg(lbs.)	5050(11,133)	5330(11,751)
Front axle load (CECE)	kg(lbs.)	2680(5908)	2960(6526)
Rear axle load (CECE)	kg(lbs.)	2370(5225)	2370(5225)
Static linear load	kg/cm(lb/in.)	18,8(105)	-
Travel characteristics			
Travel speed (1)	km/h(mph)	0 ... 5 (0 - 3.1)	0 ... 5 (0 - 3.1)
Travel speed (2)	km/h(mph)	0 ... 10 (0 - 6.2)	0 ... 10 (0 - 6.2)
Max. gradability with vibration	%	55	55
Drive			
Engine manufacturer		Deutz	Deutz
Type		BF4L 2011	BF4L 2011
Cooling		Air/oil	Air/oil
Number of cylinders		4	4
Rated power ISO 9249	kW(hp)	53.5(72.7)	53.5(72.7)
Rated speed	rpm	2650	2650
Fuel		Diesel	Diesel
Electrical equipment	V	12	12
Drive system		hydrostatic	hydrostatic
Driven axles		2	2

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*		BW 145 DH-3	BW 145 PDH-3
Electrical equipment			
Voltage supply	V	12	12
Battery	V/AH	12/100	12/100
Generator	V/AH	3-phase current	3-phase current
Starter	V/kW	12/2,2	12/2,2
Travel pump			
Manufacturer		Hydromatik	Hydromatik
Type		A10VG 45 HW	A10VG 45 HW
System		Axial piston/swash plate	Axial piston/swash plate
Max. displacement	cm^3/rev.	45	45
Max. flow capacity	l/min(gal/min)	120,4(31.8)	120,4(31.8)
High pressure limitation	bar(psi)	405 ±5(5874±72.5)	405 ±5(5874±72.5)
Pressure override valve	bar(psi)	380 ±5(5511.4±72.5)	380 ±5(5511.4±72.5)
Charge pressure, high idle	bar(psi)	25 ±2(362.6±29)	25 ±2(362.6±29)
Drum drive motor			
Manufacturer		Poclain	Poclain
Type		MSE 08 1CX	MSE 08 1CX
System		Radial piston	Radial piston
Displacement, max.	cm^3/rev.	1260	1260
Max. leak oil rate	l/min	1,5	1,5
Axle drive motor			
Manufacturer		Hydromatik	Hydromatik
Type		A10VM 63	A10VM 63
System		Axial piston – swash plate	Axial piston – swash plate
Max. displacement (stage 1)	cm^3/rev.	57	57
Max. displacement (stage 2)	cm^3/rev.	28,5	28,5
Max. leak oil rate	l/min	2	2
Flushing rate	l/min	6,5	6,5
Vibration system			
Drive system		hydrostatic	hydrostatic
Frequency	Hz(vpm)	34/34(2040/240)	34/34(2040/240)
Amplitude	mm(in)	1,7/0,85(0.067/0.033)	1,4/0,7(0.055/0.028)
Vibration pump			
Manufacturer		Bosch	Bosch
Type		HY/ZFS11/19	HY/ZFS11/19
System		Gear	Gear
Max. displacement	cm^3/rev.	19	19
Start up pressure	bar(psi)	220 ± 5(3190.8±72.5)	220 ± 5(3190.8±72.5)
Operating pressure (soil dependent)	bar(psi)	approx. 50(725.1)	approx. 50(725.1)
Vibration motors			
Manufacturer		Sauer-Danfoss	Sauer-Danfoss
Type		MMF 025	MMF 025
System		Axial piston/bent axle	Axial piston/bent axle
Displacement	cm^3/rev.	25	25
max. leak oil rate	l/min	0,5	0,5

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*		BW 145 D-3
Brakes		
Service brake		hydrostatic
Parking brake		Releasing the mech.
Brake releasing pressure	bar	min. 12
Steering		
Type of steering		articulated
Steering operation		hydrostatic
Oscillation angle	±	12
Steering angle	±	35
Check steering/		
Manufacturer		Bosch/Commercial
Type		HY/1PX
System		Gear
Displacement	cm^3/rev.	16
max. steering pressure	bar	165 ± 10 (2393.1 ± 145psi)
Steering valves		
Manufacturer		Sauer-Danfoss
Type		OSPC 315 LS
System		Rotary spool valve
Rear axle		
Manufacturer		Dana
Type		172/442
Differential		No-Spin
Degree of locking	%	100
Reduction ratio		1:27
Filling capacities		
Engine oil	l(gal)	approx. 10,5(3.0)
Fuel (diesel)	l(gal)	110(29)
Hydraulic oil	l(gal)	44(11.6)
Coolant	l(gal)	approx. 15(3.9)

* The right for technical modifications remains reserved

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2.2 Special tools

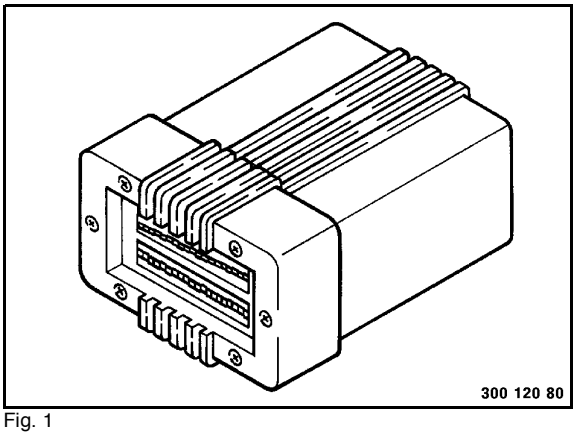


Fig. 1

1. Vibration Reed frequency meter

   BOMAG part-no.: 300 120 80

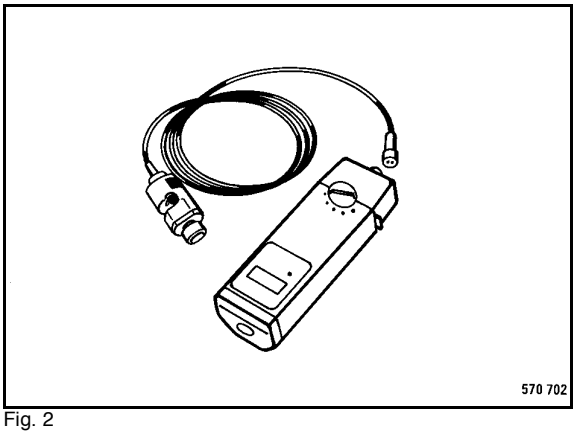


Fig. 2

2. Engine RPM-meter

   BOMAG part-no.: 059 711 12

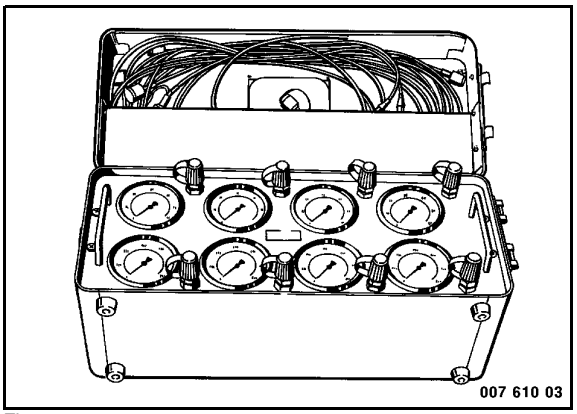


Fig. 3

3. Hydraulic test case

   BOMAG part-no.: 007 610 03

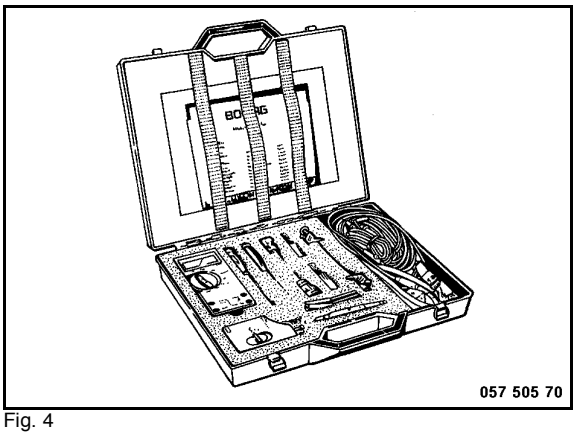


Fig. 4

4. Electric test case

   BOMAG part-no.: 057 505 70

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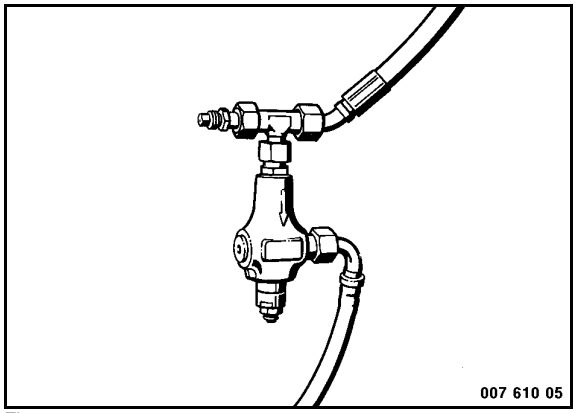


Fig. 5

5. Gear pump testing device

   BOMAG part-no.: 007 610 05

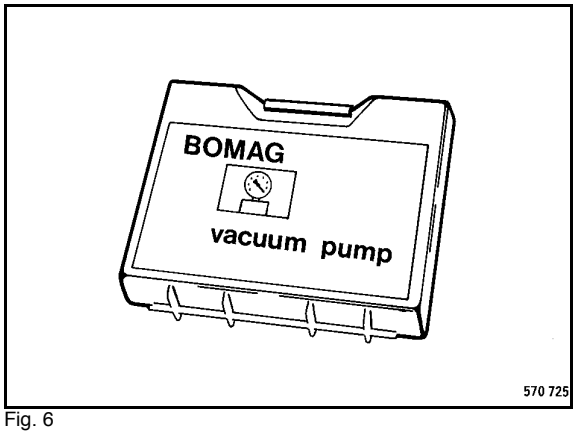


Fig. 6

6. Vacuum pump for hydraulic oil tank

   BOMAG part-no.: 007 610 04 (12V)

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2.3 Checking the rotation speeds

Special tools

Vibration reed frequency meter

⚠ Caution

Perform measurements at operating temperature of the hydraulic oil (40 °C)(104°F).

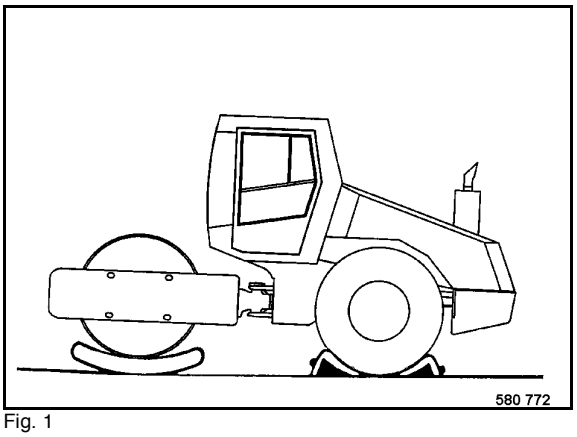


Fig. 1

1. Drive the machine with both drums on an elastic base (rubber buffers) (Fig. 1).
2. Apply the parking brake and block the wheels additionally with suitable chocks.
3. Start the diesel engine and shift the throttle lever to max. speed position.

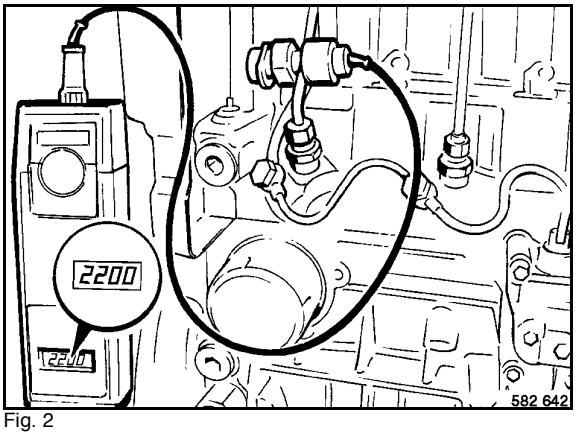


Fig. 2

Check the engine speed

1. Connect the RPM-meter to the injection line (Fig. 2).
2. Run the engine with maximum speed.
3. Measure the rotation speeds.

Nominal value low idle speed

1010 ±50 rpm

Nominal value high idle speed

2675 ±75 rpm

4. Switch the vibration on.

Nominal value nominal speed

2650 rpm

Evaluation of test

If the nominal value is not reached, check the engine speed.

If the engine speed is correct, perform trouble shooting in the vibration circuit.

https://truckmanualshub.com/

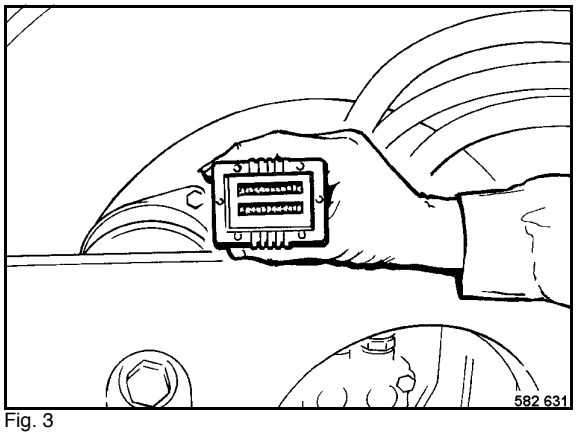


Fig. 3

Checking the exciter shaft speed

1. Switch the vibration on at max. engine speed.
2. Measure the speed of the vibrator shaft, rest the tester on your thumb (Fig. 3).

Nominal value

high amplitude/
low frequency = 34 Hz, 2040 vpm

low amplitude/
high frequency = 34 Hz, 2040 vpm

Evaluation of test

If the nominal value is not reached, perform trouble shooting in the vibration circuit.

https://truckmanualshub.com/

2.4 Checking / adjusting the neutral positions of the travel pumps

Special tools

Hydraulic test case

i Note

This documentation only described the adjustment procedure for travel pump 1 (axle drive).

The adjustment procedure for travel pump 2 (drum drive) is identical

⚠ Caution

Perform measurements at operating temperature of the hydraulic oil (40 °C)(104°F).

1. Block the wheels with suitable chocks (Fig. 1).

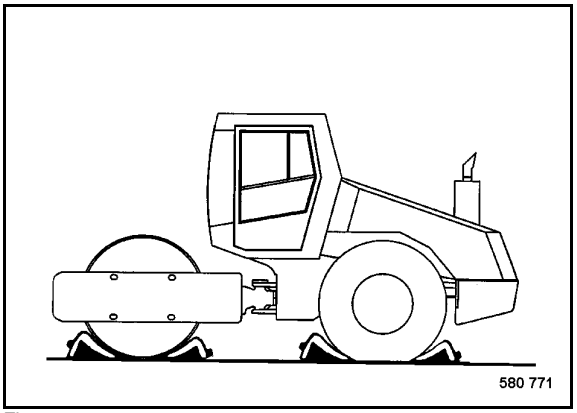


Fig. 1

2. Check whether travel lever (Fig. 2) is in brake position.

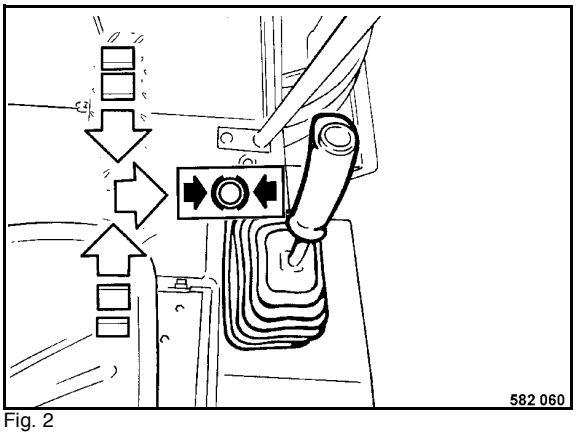


Fig. 2

https://truckmanualshub.com/

Mechanical neutral position

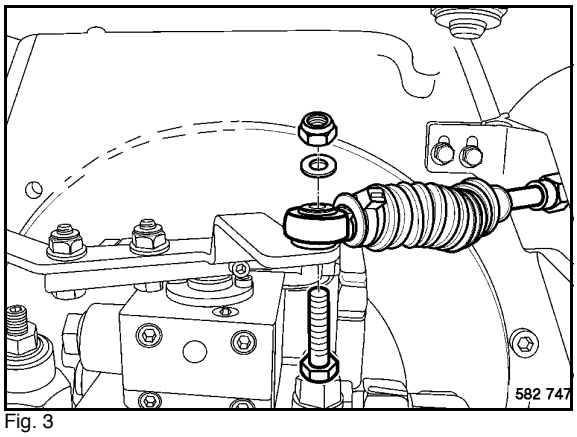


Fig. 3

3. Unhook the travel cable (Fig. 3) from the pump.

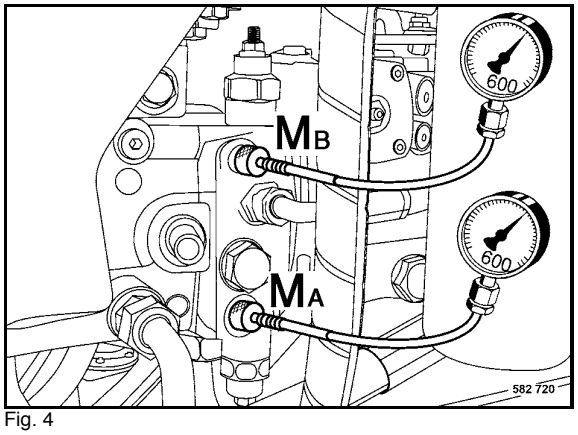


Fig. 4

4. Connect 600 bar pressure gauges to high pressure test ports MA and MB (Fig. 4).

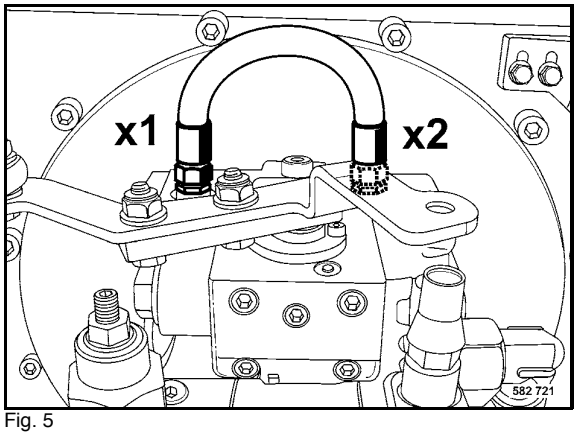


Fig. 5

5. As a measure to avoid signal residues from the hydraulic neutral position connect both control chambers X1 and X2 with a hose (Fig. 5).
6. Start the engine and run it with maximum speed.

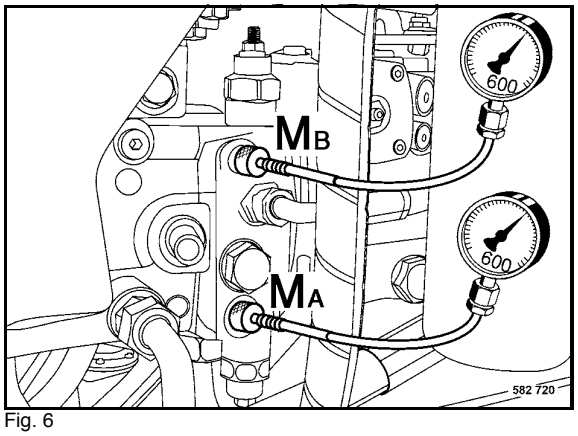


Fig. 6

7. Read the pressure gauges (Fig. 6).

i Note

For a more exact adjustment repeat the test with 60 bar pressure gauges

Nominal value

Both pressure gauges must show identical pressure, if necessary correct the mechanical neutral position.

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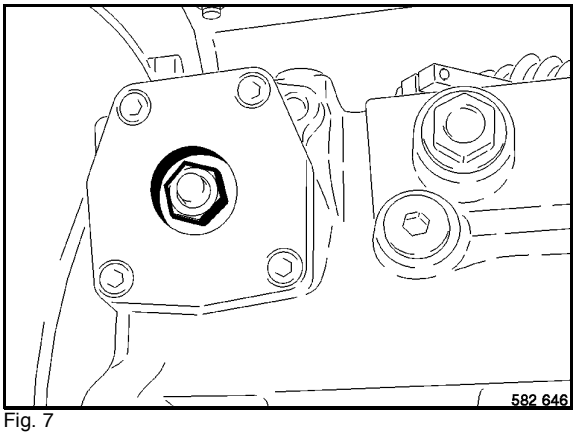


Fig. 7

8. Adjust the neutral position with the setscrew (Fig. 7) so that both pressure gauges show identical pressure (charge pressure).

i Note

Equalize the dead range of the neutral position.

Hydraulic neutral position

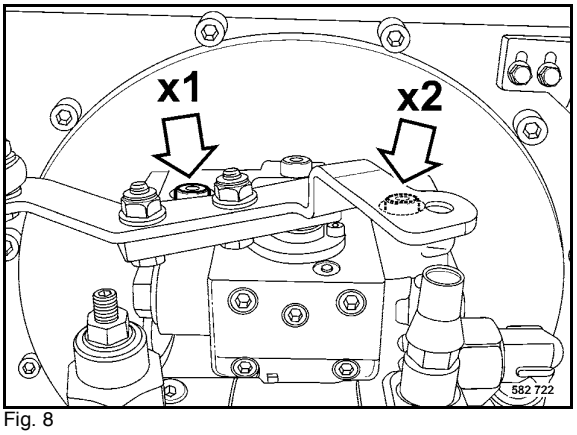


Fig. 8

9. Remove the connecting hose between the control chambers and turn plugs X1 and X2 tightly back in (Fig. 8).
10. Start the engine and run it with maximum speed.

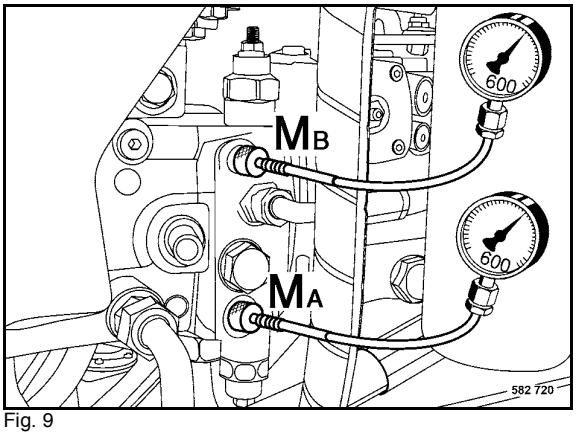


Fig. 9

11. Read the pressure gauges (Fig. 9).

i Note

For a more exact adjustment repeat the test with 60 bar pressure gauges

Do not actuate the travel lever, since this may destroy the pressure gauges.

Nominal value

Both pressure gauges must show identical pressure (charge pressure), if necessary correct the hydraulic neutral position.

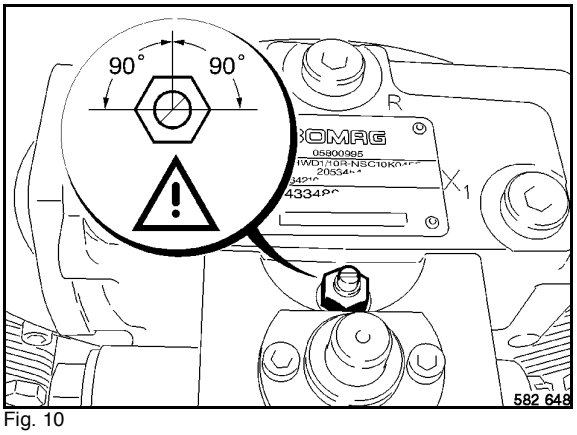


Fig. 10

12. Slacken counternut (Fig. 10) to adjust the hydraulic neutral position.

⚠ Caution

Do not adjust the eccentric beyond the ± 90° position.

13. Adjust the neutral position on the eccentric so that both pressure gauges show identical pressure (charge pressure).
14. Retighten the counter nut.

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2.5 Pressure tests in the travel circuit

Special tools

Hydraulic test case

⚠ Caution

Perform measurements at operating temperature of the hydraulic oil (40 °C)(104°F).

1. Block drums and wheels with suitable chocks (Fig. 1).

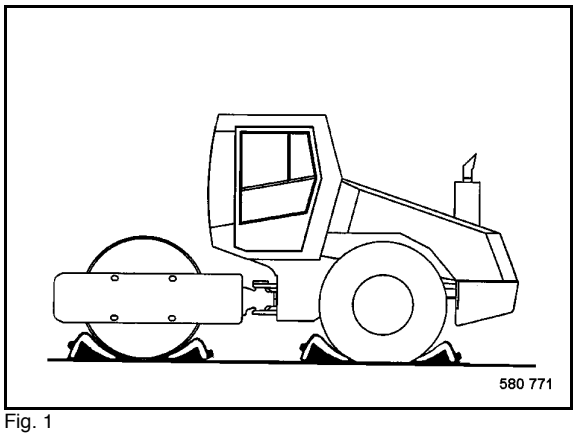


Fig. 1

2. Check whether travel lever (Fig. 2) is in brake position.

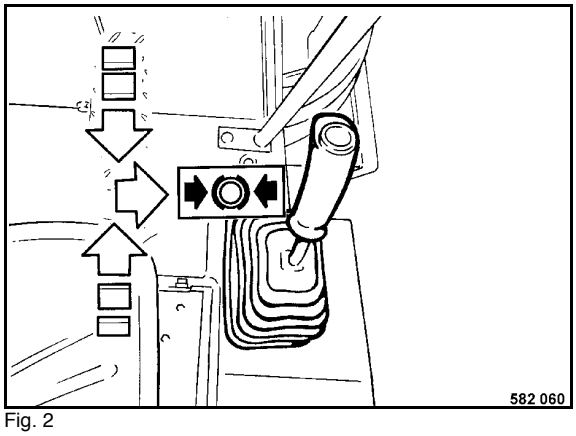


Fig. 2

3. Unhook the travel cable (Fig. 3) from the pump.

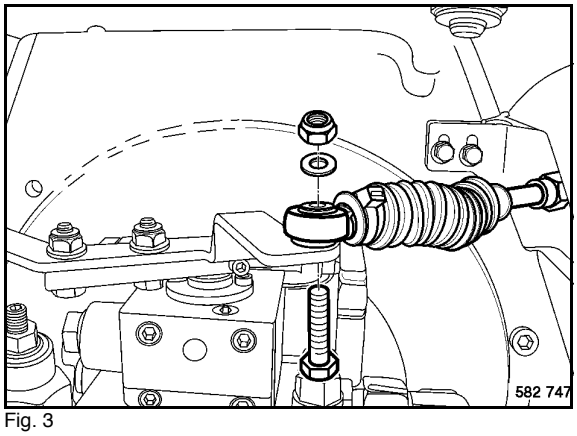


Fig. 3

https://truckmanualshub.com/

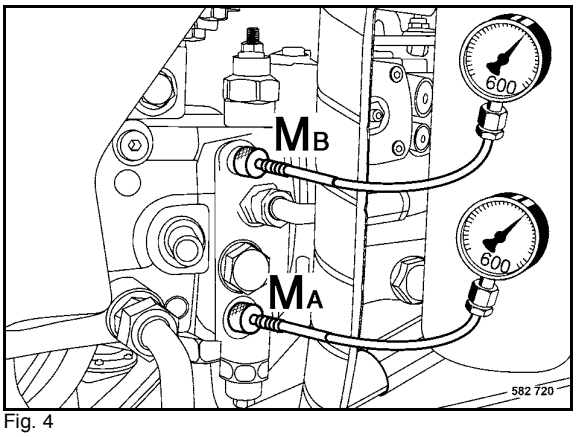


Fig. 4

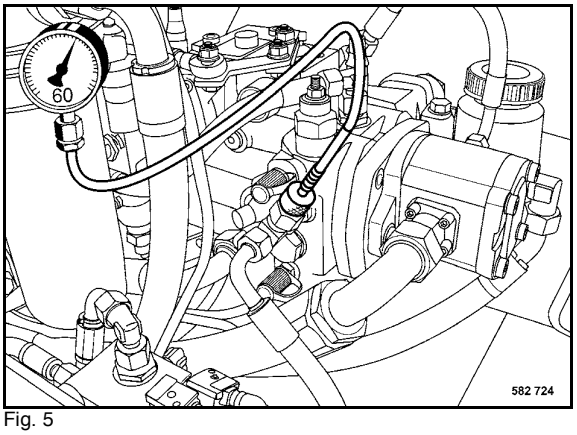


Fig. 5

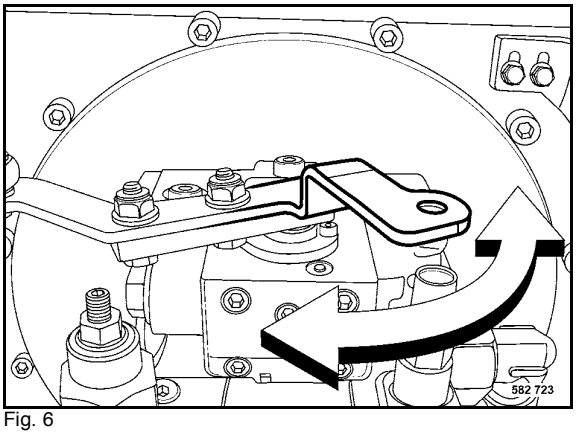


Fig. 6

Pressure test in axle drive circuit

4. Connect 600 bar pressure gauges to high pressure test ports MA and MB (Fig. 4).

5. Connect a 60 bar pressure gauge to charge pressure test port (Fig. 5).
6. Start the diesel engine and shift the throttle lever to max. speed position.
7. Read charge and high pressure gauges.

   Nominal value

   Charge pressure gauge: 25 ±2 bar

   High pressure gauge: Both identical pressure (charge pressure).

   Evaluation of test

   If the nominal value is not reached, check the steering/charge pump.

8. Move the travel lever (Fig. 6) quickly out of neutral, read the pressure gauge.

   Nominal value

   Charge pressure: min. 23 bar(362.6psi)

   High pressure: 380 ± 5 bar * (to both travel directions). *(5511.4psi ±72.5psi)

   Evaluation of test

   If the charge pressure drops below 23 bar * during the high pressure test, check the individual components. *(362.6psi)

   If the specified high pressure is not reached, check the travel pump.

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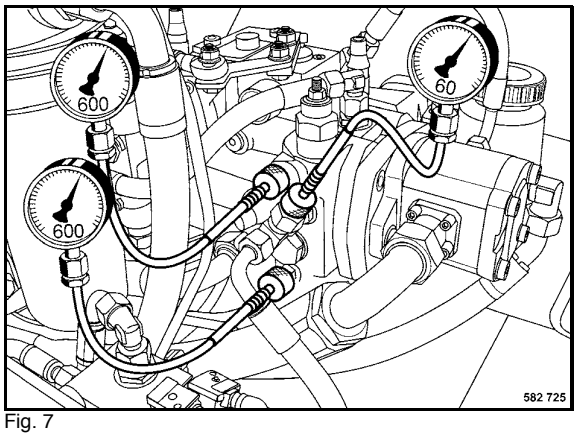


Fig. 7

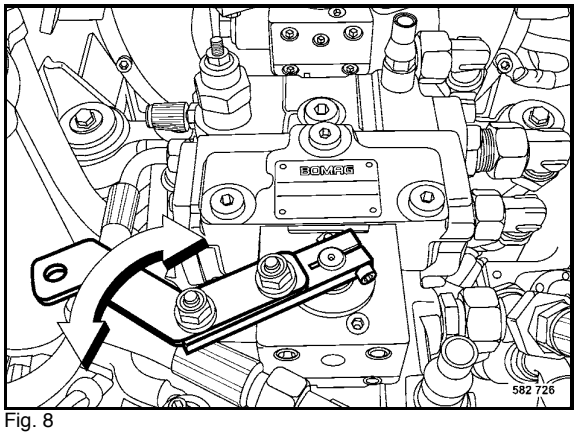


Fig. 8

Pressure test in drum drive circuit

9. Connect 600 bar pressure gauges to high pressure test ports MA and MB and a 60 bar pressure gauge to the charge pressure test port (Fig. 7).
10. Start the diesel engine and shift the throttle lever to max. speed position.
11. Read charge and high pressure gauges.

Nominal value

Charge pressure gauge: 25 ±2 bar(363.6 ±29.0 psi)

High pressure gauge: Both identical pressure (charge pressure).

Evaluation of test

If the nominal value is not reached, check the steering/charge pump.

12. Move the travel lever (Fig. 8) quickly out of neutral, read the pressure gauge.

Nominal value

Charge pressure: min. 23 bar(333.6 psi)

High pressure: 380 ± 5 bar * (to both travel directions). *(551.4 ± 72.5 psi)

Evaluation of test

If the charge pressure drops below 23 bar * during the high pressure test, check the individual components. * (333.6 psi)

If the specified high pressure is not reached, check the travel pump.

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2.6 Check the setting of the high pressure relief valves in the travel circuit

Special tools

Hydraulic test case

⚠ Caution

Perform measurements at operating temperature of the hydraulic oil (40 °C)(104°F).

1. Block drums and wheels with suitable chocks (Fig. 1).

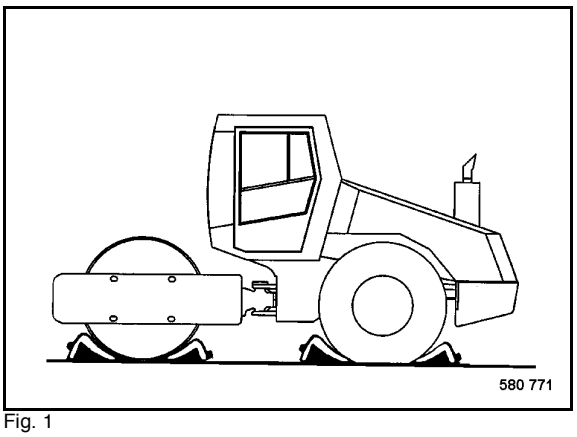


Fig. 1

2. Check whether travel lever (Fig. 2) is in brake position.

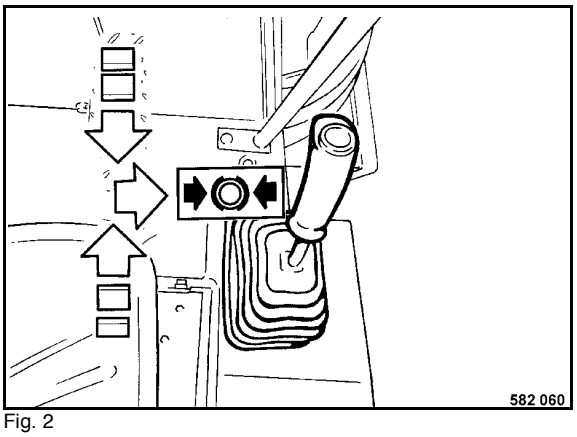


Fig. 2

3. Unhook the travel cable (Fig. 3) from the pump.

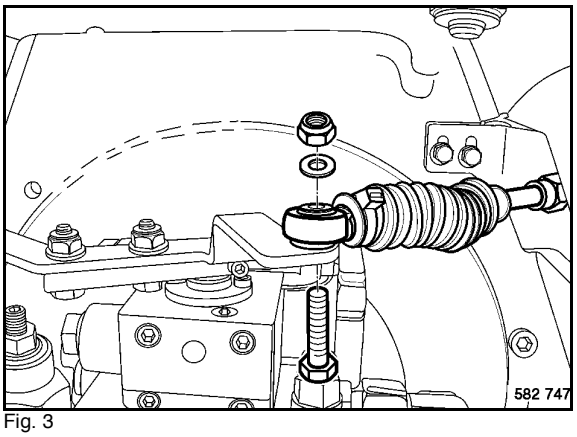


Fig. 3

https://truckmanualshub.com/

Axle drive

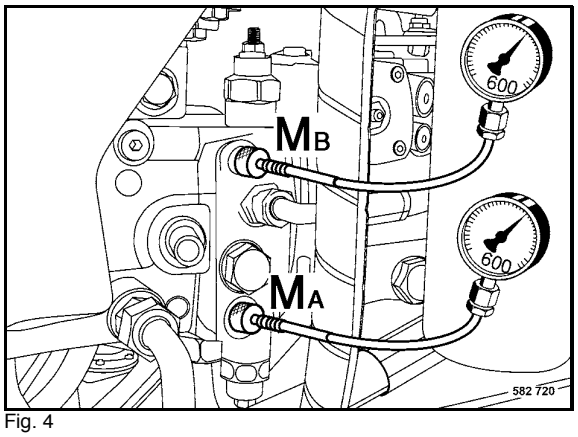


Fig. 4

4. Connect a 600 bar pressure gauge (Fig. 4) each to test ports M_A and M_B.

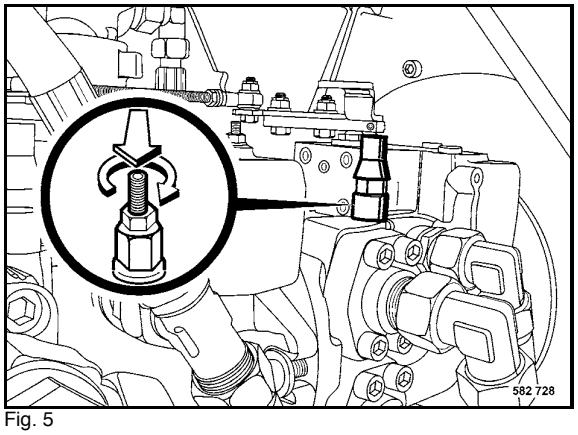


Fig. 5

5. Slacken the counter nut and turn setscrew (Fig. 5) of the pressure override completely in to block the valve.
6. Start the engine and run it with maximum speed.

⚠ Caution

Perform the following pressure test for max. 3 seconds, otherwise pump damage caused by overheating.

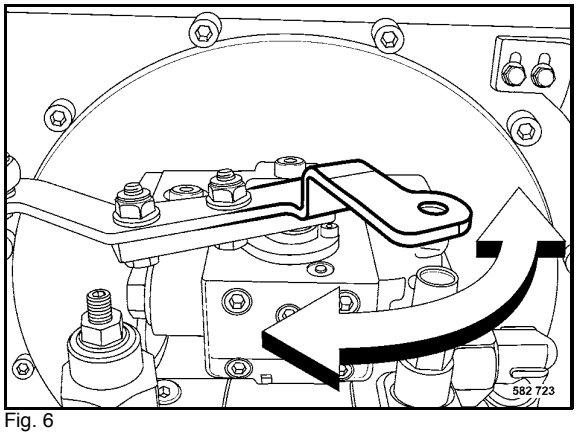


Fig. 6

7. Move the control lever (Fig. 6) quickly to both travel directions and read the pressure gauges.

Nominal value

405 ±5 bar (5874 ± 72.5psi)

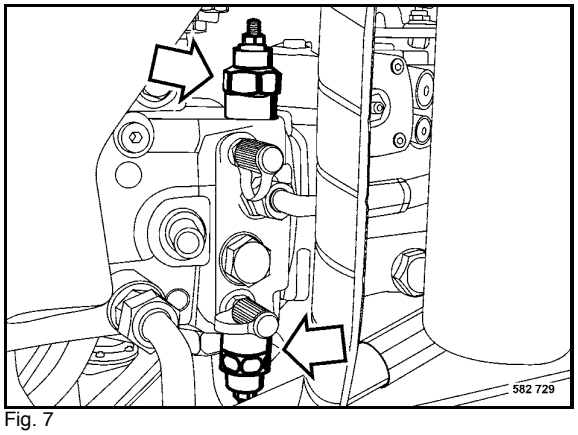


Fig. 7

Evaluation of test:

If the nominal value is only reached to one direction, clean or replace the corresponding high pressure relief valve (Fig. 7) if necessary.

If the nominal value is not reached to both directions check the travel pump, replace if necessary.

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Adjusting the pressure override for the axle drive

⚠ Caution

To assure a reliable function of the pressure override, the pressure override valve must be adjusted 10% lower than the high pressure relief valve.

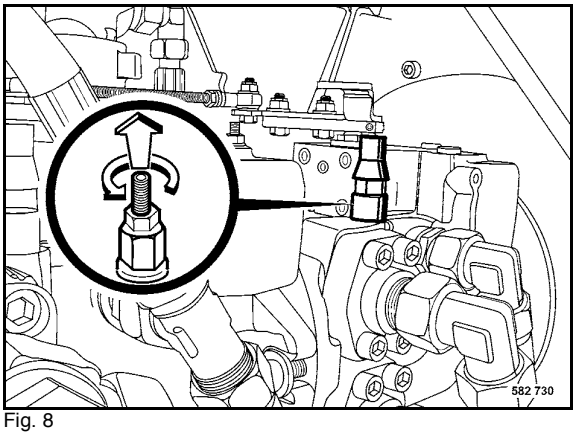


Fig. 8

8. Turn the setscrew (Fig. 8) back out again, until the high pressure is limited to 380 ±5 bar * when the drums are blocked. *(5511.4 ± 72.5)
9. Retighten the counter nut.

Drum drive

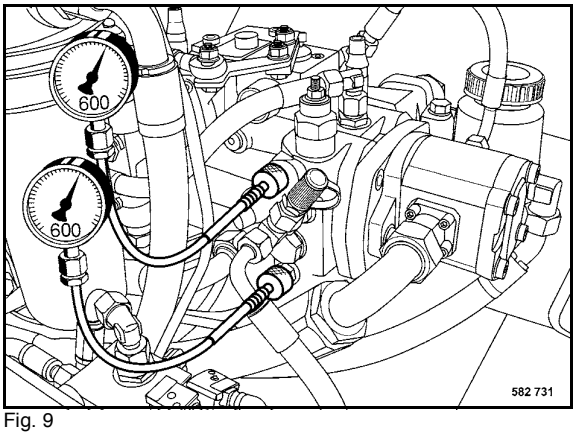


Fig. 9

10. Connect a 600 bar pressure gauge (Fig. 9) each to test ports M_A and M_B.

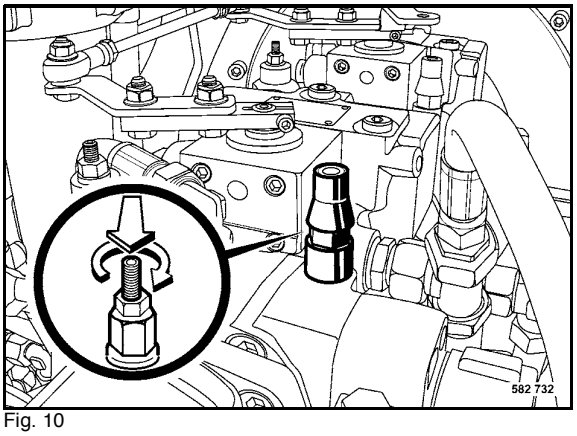


Fig. 10

11. Slacken the counter nut and turn setscrew (Fig. 10) of the pressure override completely in to block the valve.
12. Start the engine and run it with maximum speed.

⚠ Caution

Perform the following pressure test for max. 3 seconds, otherwise pump damage caused by overheating.

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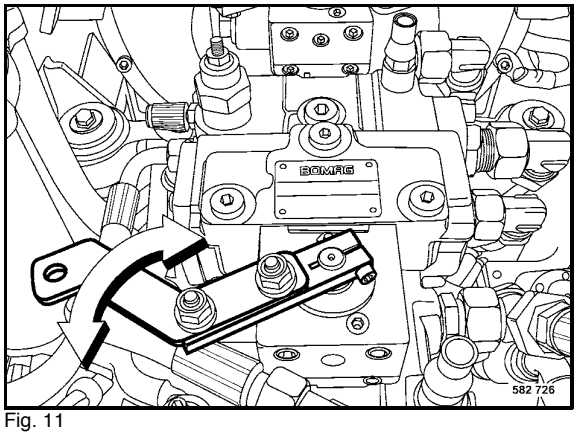


Fig. 11

13. Move the control lever (Fig. 11) quickly to both travel directions and read the pressure gauges.

Nominal value

405 ±5 bar (5874 ± 72.5)

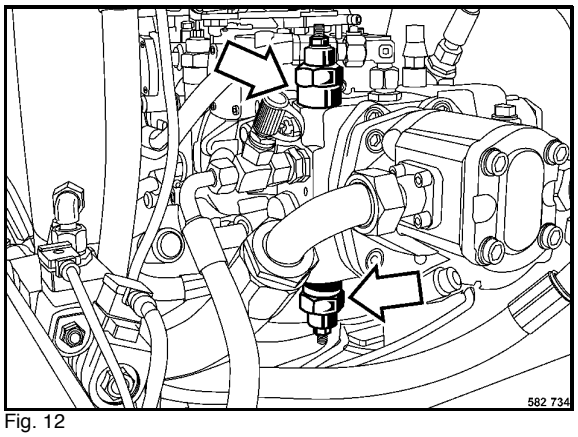


Fig. 12

Evaluation of test:

If the nominal value is only reached to one direction, clean or replace the valve (Fig. 12) if necessary.

If the nominal value is not reached to both directions check the travel pump, replace if necessary.

Adjusting the pressure override for the drum drive

⚠ Caution

To assure a reliable function of the pressure override, the pressure override valve must be adjusted 10% lower than the high pressure relief valve.

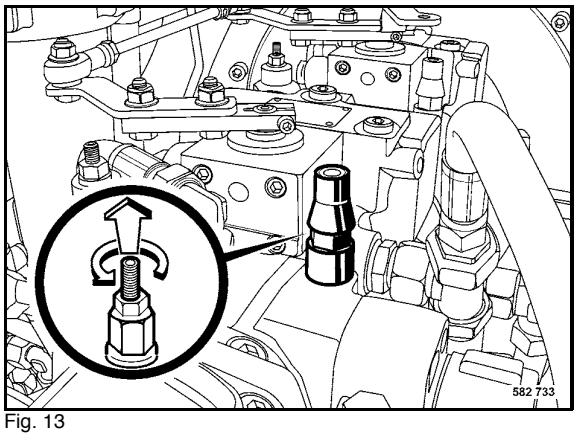


Fig. 13

14. Turn the setscrew (Fig. 13) back out again, until the high pressure is limited to 380 ±5 bar * when the drums are blocked. *(5511.4 ± 72.5 psi)
15. Retighten the counter nut.

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2.7 Checking / adjusting the vibrator shaft speeds

Special tools

Vibration reed frequency meter

⚠ Caution

Perform measurements at operating temperature of the hydraulic oil (40 °C) (104 °F).

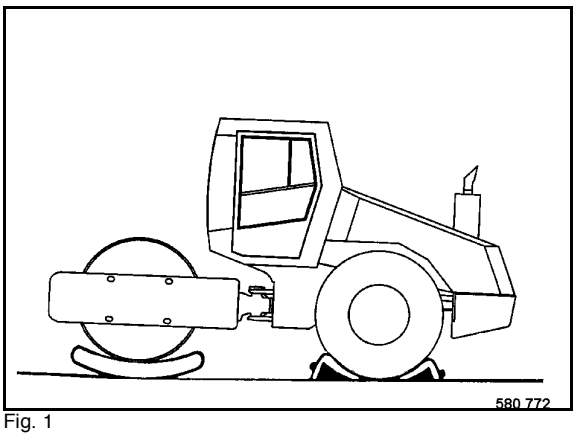


Fig. 1

1. Drive the machine on an elastic base (rubber buffers) (Fig. 1).
2. Apply the parking brake and block the wheels additionally with suitable chocks.
3. Start the diesel engine and shift the throttle lever to max. speed position.

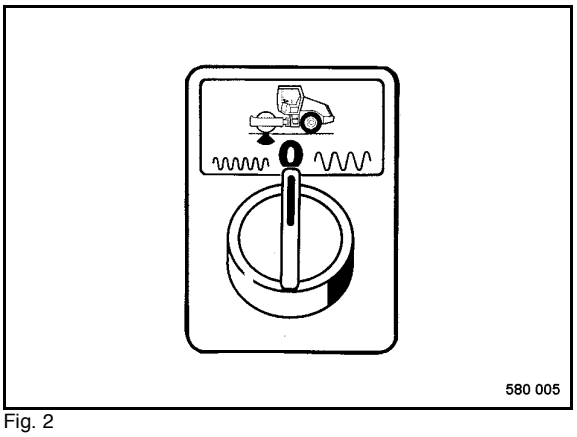


Fig. 2

4. Switch on vibration high frequency / low amplitude (Fig. 2) or low frequency / high amplitude.

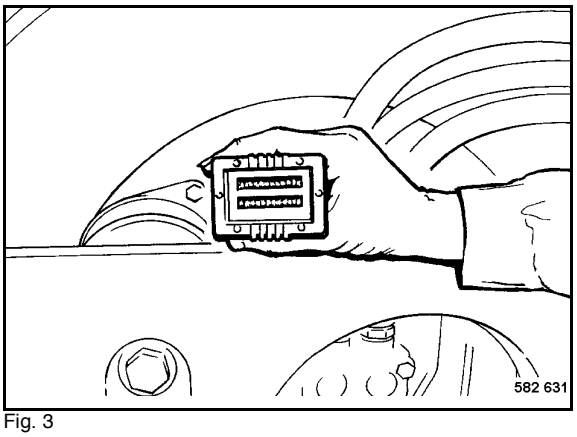


Fig. 3

5. Measure the speed (Fig. 3), rest the tester on your thumb.

Nominal value

high amplitude/
low frequency = 34 Hz, 2040 vpm

low amplitude/
high frequency = 34 Hz, 2040 vpm

Evaluation of test

In case of deviations exceeding 10% determine the cause, perform trouble shooting for engine / vibration circuit and check vibration motor.

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2.8 Pressure measurements in the vibration circuit

Special tools

Hydraulic test case

⚠ Caution

Perform measurements at operating temperature of the hydraulic oil (40 °C) (104 °F).

1. Drive the drum of the machine on an elastic base (rubber buffers) (Fig. 1) and block drums and wheels additionally with suitable chocks.

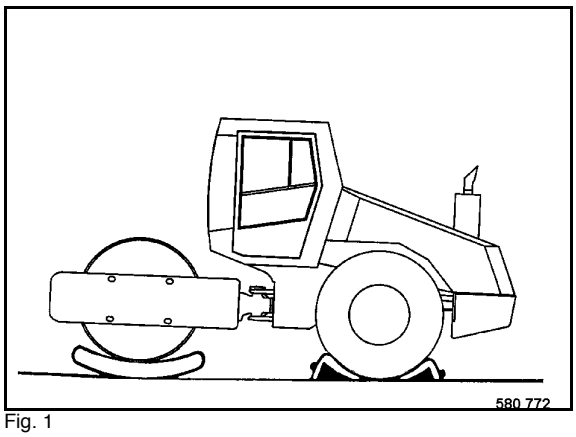


Fig. 1

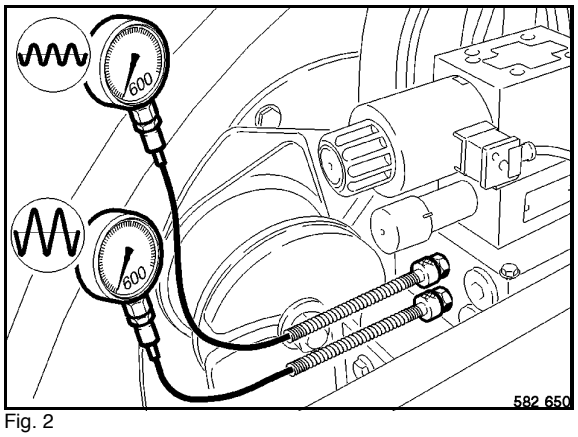


Fig. 2

2. Connect 600 bar pressure gauges to high pressure test ports MA and MB (Fig. 2).
3. Start the diesel engine and shift the throttle lever to max. speed position.

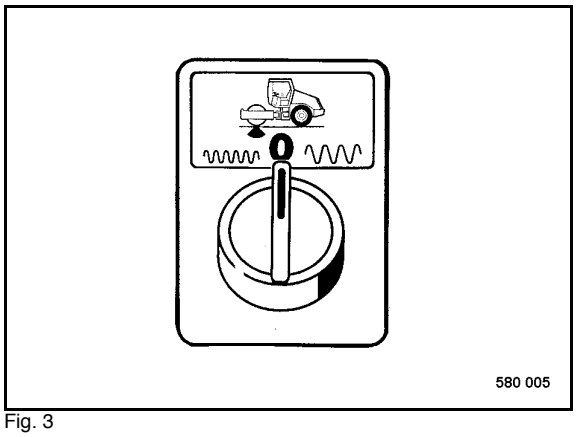


Fig. 3

4. Switch on vibration with high or low frequency (Fig. 3).

Nominal value

Starting pressure approx. 220 bar * (both frequencies) *(3190.8 psi)

Operating pressure (soil dependent) approx. 50 to 100 bar (725.1 to 1450.3 psi).

Evaluation of test

If the starting pressure is not reached, check the vibration pump.

If the starting pressure is only reached for one frequency, check the high pressure relief valves.

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2.9 Check the leakage rate of the vibration motor

⚠ Caution

Perform measurements at operating temperature of the hydraulic oil (40 °C) (104 °F).

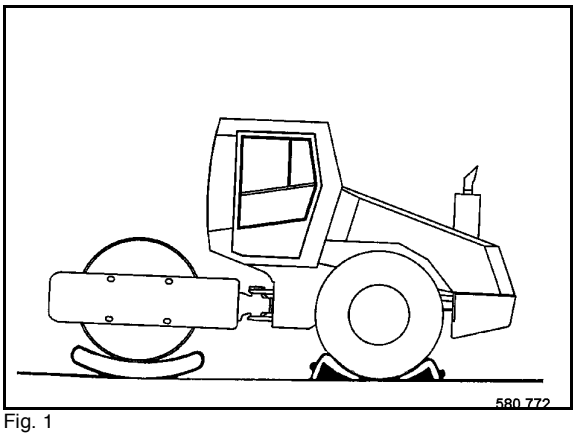


Fig. 1

1. Drive the drum of the machine on an elastic base (rubber buffers) (Fig. 1) and block drums and wheels additionally with suitable chocks.

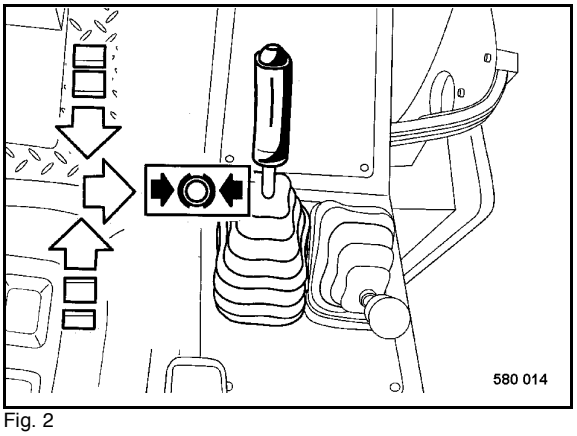


Fig. 2

2. Apply the parking brake (Fig. 2).
3. Start the diesel engine and shift the throttle lever to max. speed position.

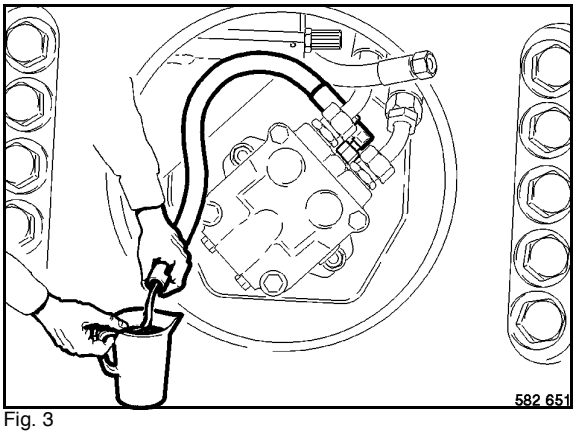


Fig. 3

4. Disconnect the leak oil hose (Fig. 3), connect a measuring hose and hold it into a measuring beaker.
5. Switch the vibration on and measure the running out leak oil during one timed minute.

Nominal value

max. 0,5 litre/min (0.13 gal/min)

Evaluation of test

If the permissible leak oil rate is exceeded, replace the vibration motor.

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2.10 Pressure test in steering circuit

⚠ Caution

Perform measurements at operating temperature of the hydraulic oil (40 °C) (104 °F).

1. Connect a 600 bar pressure gauge to the steering pressure test port (Fig. 1).

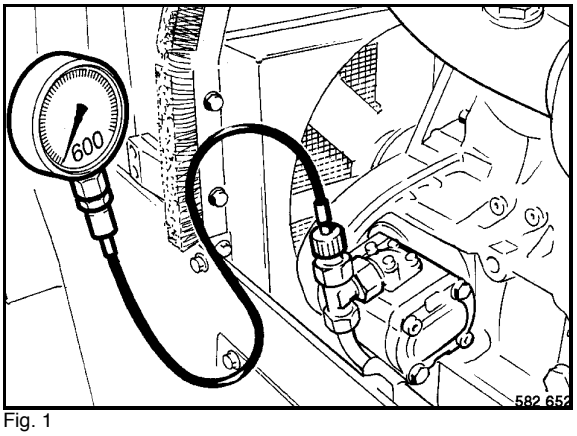


Fig. 1

2. Engage the articulation lock (Fig. 2).

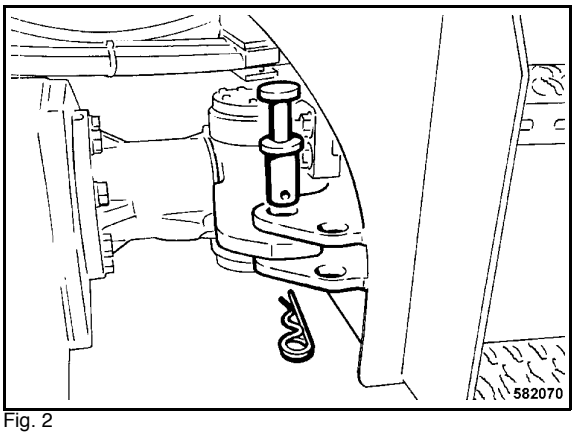


Fig. 2

3. Pull plug (Fig. 3) off the engine shut down solenoid.

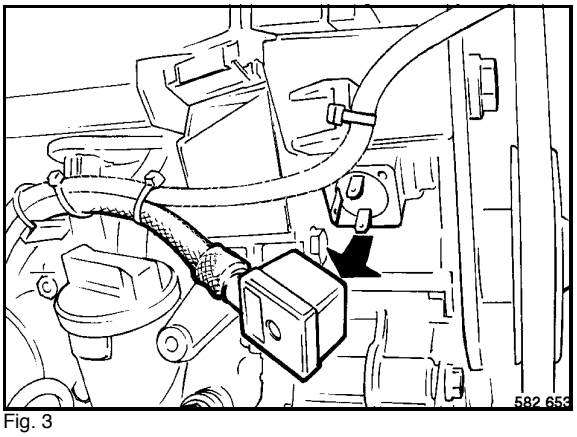


Fig. 3

⚠ Danger

Danger of squashing!

Do not stand in the articulation area of the machine.

4. Crank the engine with the starter, turn the steering against the stop and read the pressure gauge.

Nominal value

approx. 150 bar * with battery fully charged *(2175.5)

Evaluation of test

If the nominal value is reached, check the steering cylinder.

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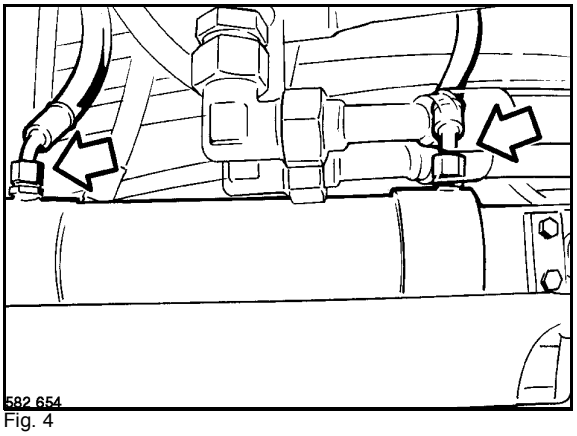


Fig. 4

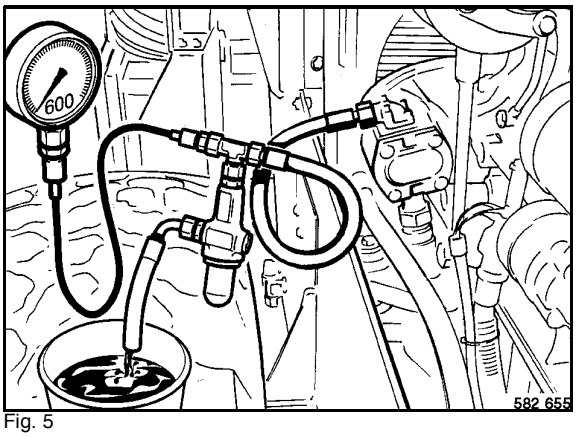


Fig. 5

5. Disconnect the hydraulic hoses (Fig. 4) from ports L and R on the steering cylinder and close them with plugs.
6. Repeat the pressure test.

   Nominal value

   approx. 150 bar (2175.5 psi)

   Evaluation of test

   If the nominal value is reached, replace the steering cylinder.

   If the nominal value is not reached, check the steering/charge pump.
7. Reconnect the hydraulic hoses to the steering cylinders.
8. Close the pump outlet (Fig. 5) with a 200 bar* pressure relief valve * (2900.7 psi)
9. Crank the engine with the starter and read the pressure gauge.

   Nominal value

   approx. 150 to 200 bar (2175.5 to 2900.7 psi)

   Evaluation of test

   If the nominal value is reached, replace the steering valve.

   If the nominal value is not reached, replace the steering/charge pump.

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3 Flushing

https://truckmanualshub.com/

3.1 Special tool:

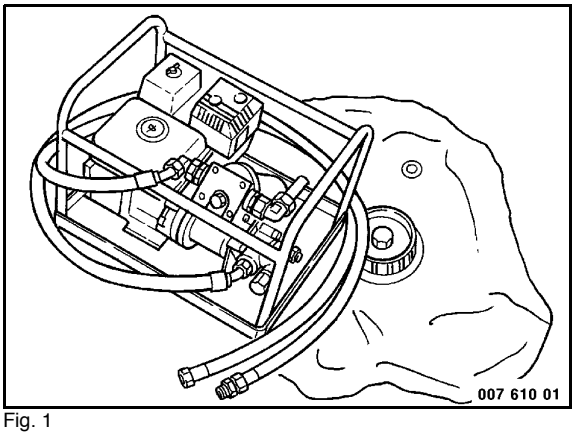


Fig. 1

1. Filling and filtering unit with oil bag

   BOMAG part-no.: 007 610 01

2. Filter element

   BOMAG part-no.: 079 930 35

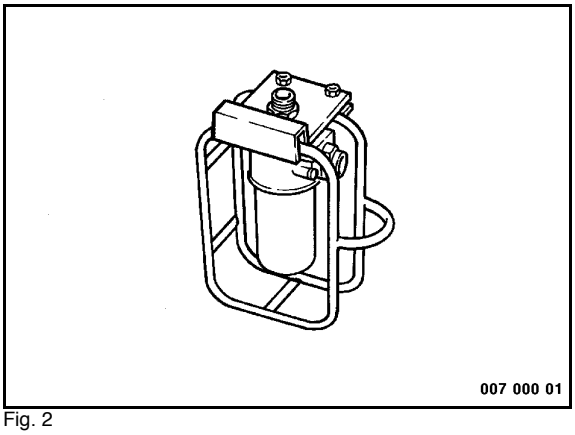


Fig. 2

3. Flushing filter

   BOMAG part-no.: 007 000 01

4. Filter element 1

   BOMAG part-no.: 079 930 52

5. Flushing hose 25S - 20S (2 pieces)

   BOMAG part-no.: 055 509 19

6. Screw socket R1“ -- 25S (2 pieces)

   BOMAG part-no.: 055 400 52

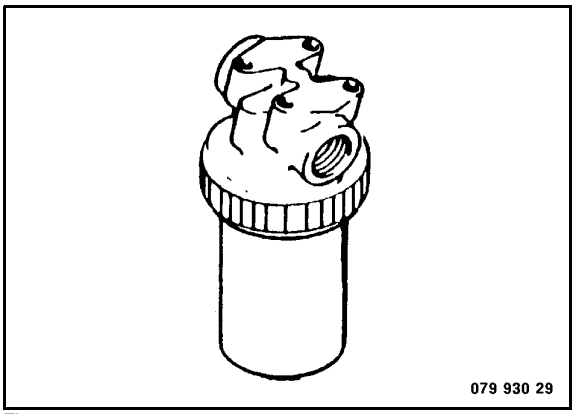


Fig. 3

7. Flushing filter for vibration

   BOMAG part-no.: 079 390 29

8. Filter element

   BOMAG part-no.: 079 390 14

9. Flushing hose 15L (2 pieces)

   BOMAG part-no.: 055 510 09

10. Screw socket R3/4“ -- 15L (2 pieces)

    BOMAG part-no.: 055 400 89

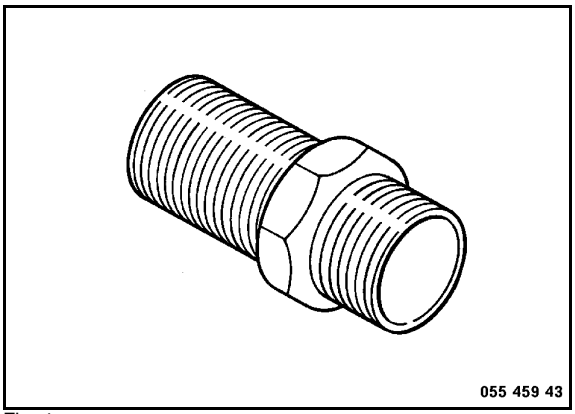


Fig. 4

11. Connecting fitting 20S

    BOMAG part-no.: 055 459 43

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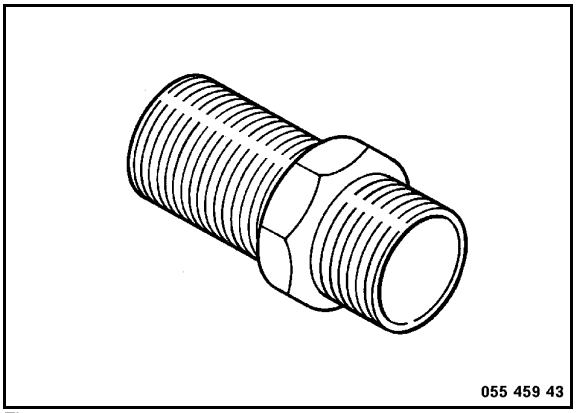


Fig. 5

12. Connecting socket 18L

    BOMAG part-no.: 055 426 06

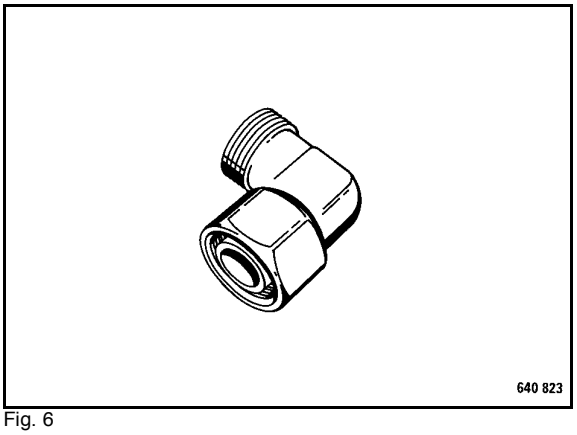


Fig. 6

13. Elbow 20S

    BOMAG part-no.: 055 421 37

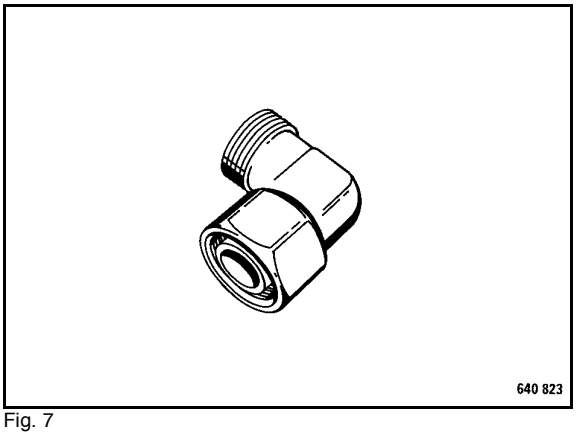


Fig. 7

14. Angular fitting 18L

    BOMAG part-no.: 055 421 26

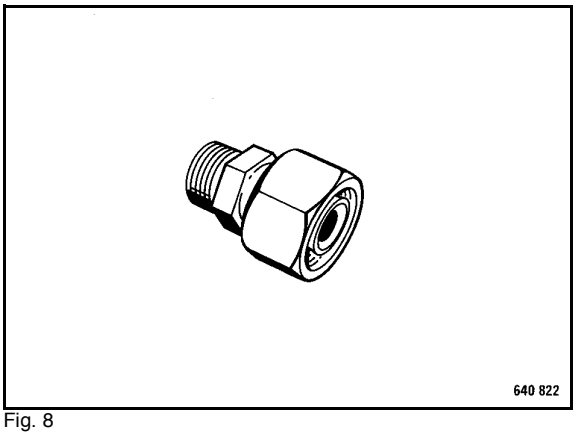


Fig. 8

15. Reducing fitting 18L - 15L

    BOMAG part-no.: 055 422 92

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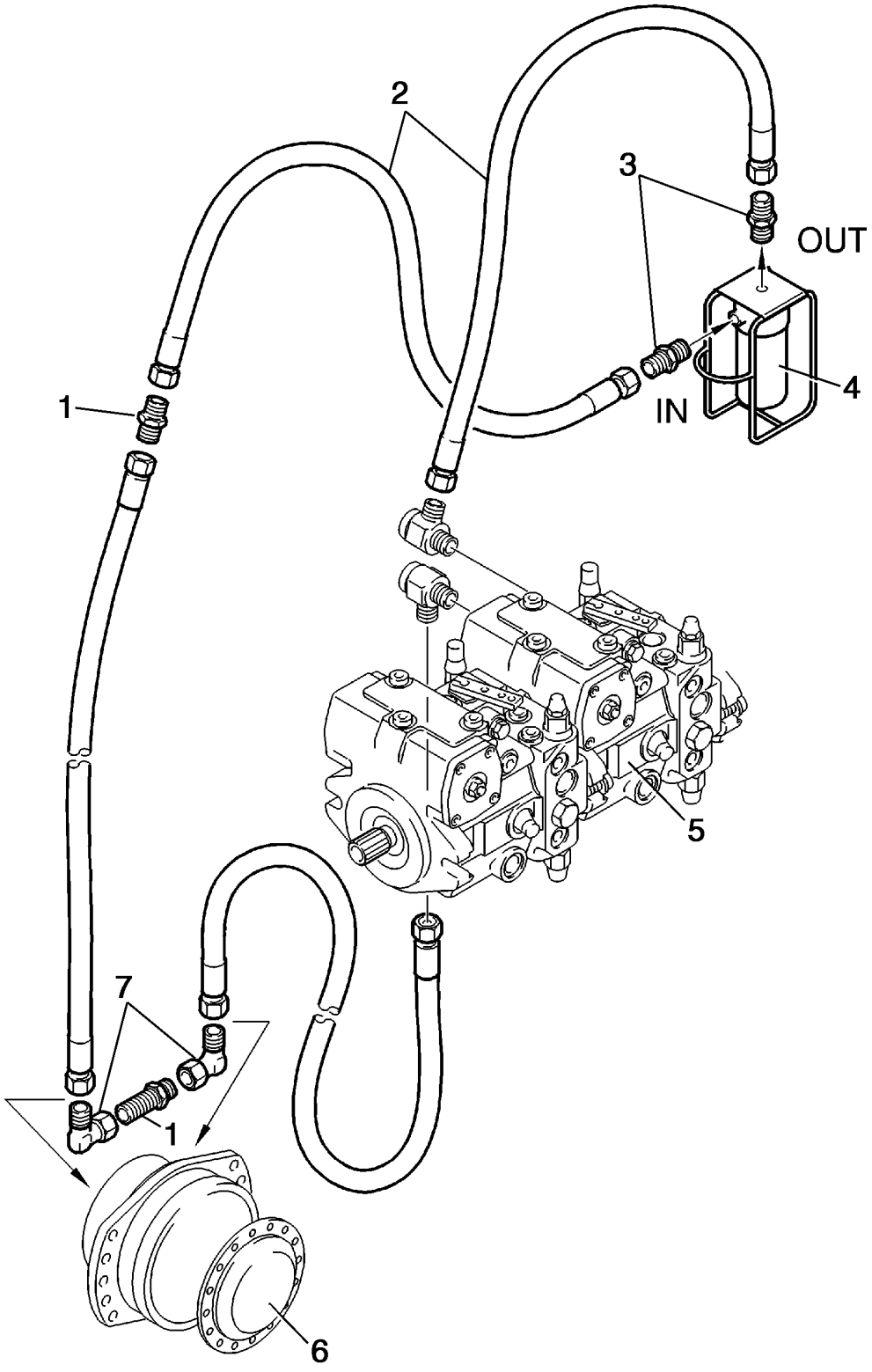


Fig. 1

https://truckmanualshub.com/

1 Connecting fitting 20S
2 Flushing hose 20S - 25S
3 Screw socket R1 - 25S
4 Flushing filter
5 Travel pump for drum drive
6 Drum drive motor
7 Elbow 20S

After changing a component

1. Always flush the closed circuit.

⚠ Caution

Solid particles remaining in the circuit will damage the components again within a short period of time.

In case of excessive oil contamination (abrasion)

1. Open and clean all other components.
2. If necessary replace the hydraulic hoses.
3. Flush also the vibration circuit.

Befor flushing

1. Change the hydraulic oil filter element.
2. Clean the inside of the hydraulic oil tank.
3. Filter the hydraulic oil with the filtering unit.

i Note

For filtering use the filling and filtering unit. Pump the tank contents through a fine filter into the oil bag or a clean container.

Environment

Catch hydraulic oil and dispose of environmentally! For filling use also the filtering unit.

Change the oil:

in case of excessive contamination,

oil discoloration,

oil change interval almost reached.

Flushing filter installation (Fig. 1)

1. Connect the flushing filter outlet "OUT" with the travel pump.
2. Connect the flushing filter inlet „IN“ with the hose from the drum drive motor.

⚠ Caution

The flushing filter must be installed in the low pressure side in the return flow to the pump, so that only cleaned oil will enter the travel pump.

With the connection shown in the illustration the travel pump must therefore be actuated to reverse direction.

Flushing of the hoses

1. Take the drum drive motor out of the circuit, for this purpose join the high pressure lines together.

Flushing the complete system

1. Reconnect the drum drive motor and raise the drum for flushing, so that the drum can rotate freely without load.

Bleeding

1. Always bleed the closed hydraulic circuit if lines had been removed or connected.

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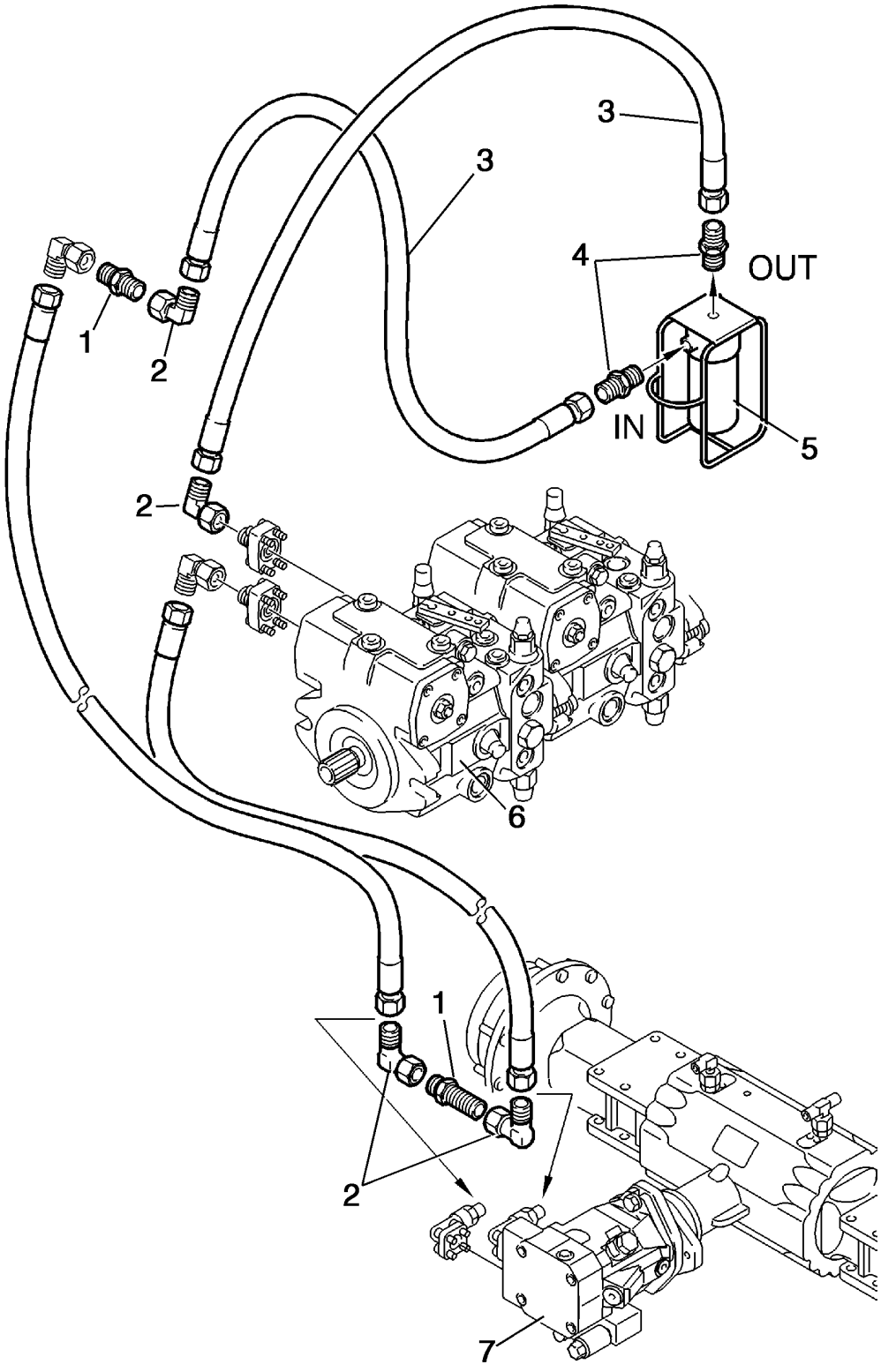


Fig. 1

https://truckmanualshub.com/

1 Connecting fitting 20S
2 Elbow 20S
3 Flushing hose 25S - 20S
4 Screw socket R1 - 25S
5 Flushing filter
6 Travel pump for axle drive
7 Axle drive motor

After changing a component

1. Always flush the closed circuit.

⚠ Caution

Solid particles remaining in the circuit will damage the components again within a short period of time.

In case of excessive oil contamination (abrasion)

1. Open and clean all other components.
2. If necessary replace the hydraulic hoses.
3. Flush also the vibration circuit.

Befor flushing

1. Change the hydraulic oil filter element.
2. Clean the inside of the hydraulic oil tank.
3. Filter the hydraulic oil with the filtering unit.

i Note

For filtering use the filling and filtering unit. Pump the tank contents through a fine filter into the oil bag or a clean container.

Environment

Catch hydraulic oil and dispose of environmentally! For filling use also the filtering unit.

Change the oil:

in case of excessive contamination,

oil discoloration,

oil change interval almost reached.

Flushing filter installation (Fig. 1)

1. Connect the flushing filter outlet "OUT" with the travel pump.
2. Connect the flushing filter inlet „IN“ with the hoses from the travel motor.

⚠ Caution

The flushing filter must be installed in the low pressure side in the return flow to the pump, so that only cleaned oil will enter the travel pump.

With the connection shown in the illustration the travel pump must therefore be actuated to reverse direction.

Flushing of the hoses

1. Take the axle drive motor out of the circuit, for this purpose join the high pressure lines on the axle drive motor together.

Flushing the complete system

1. Reconnect the travel motor and raise the axle for flushing, so that the wheels can rotate freely without load.

⚠ Danger

Danger of accident!

Always lift up both wheels, as otherwise the locking differential will engage.

Bleeding

1. Always bleed the closed hydraulic circuit if lines had been removed or connected.

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3.4 Flushing the travel circuit

Cleaning the hydraulic oil tank

1. Pump the hydraulic oil from the hydraulic oil tank into a clean container or an oil bag using the filling and filtering unit.
2. Mark all hoses (Fig. 1) and disconnect them from the tank cover.
3. Unscrew the fastening screws for the cover and remove the cover.

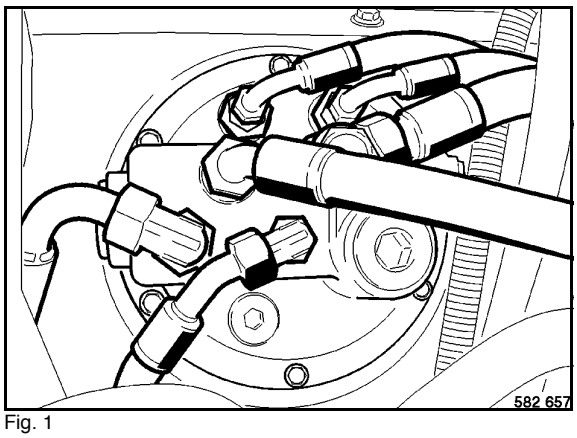


Fig. 1

Environment

Catch hydraulic oil and dispose of environmentally!

4. Clean the hydraulic oil tank thoroughly from inside, reassemble cover and hoses.

Filter installation for flushing of the drum drive

Caution

Before installing the flushing filter check hoses and connections for cleanliness, clean if necessary.

1. Disconnect the upper high pressure hose (Fig. 2) from the travel pump.

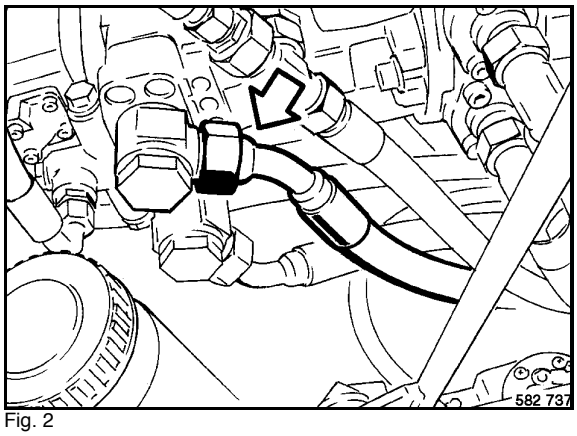


Fig. 2

2. Connect flushing hose 6 (Fig. 3) from filter outlet port to the travel pump using an angle fitting (1).
3. Connect flushing hose (5) from the filter inlet to the disconnected high pressure hose (5) using double end union (4) and angular fitting (2).

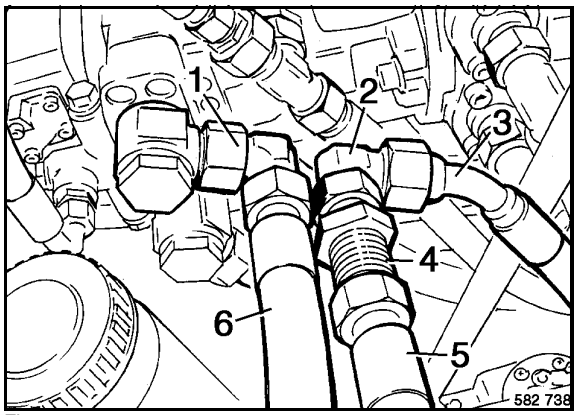


Fig. 3

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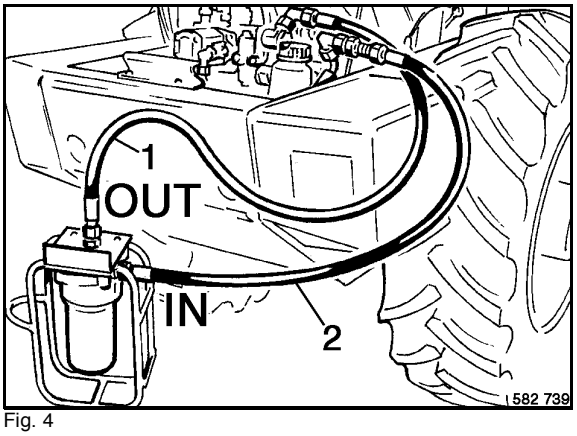


Fig. 4

4. Connect flushing hose 1 (Fig. 4) to travel pump with flushing filter outlet „OUT“.
5. Connect flushing hose (2) joined to the high pressure hose for the drum drive motor to the flushing filter inlet "IN".

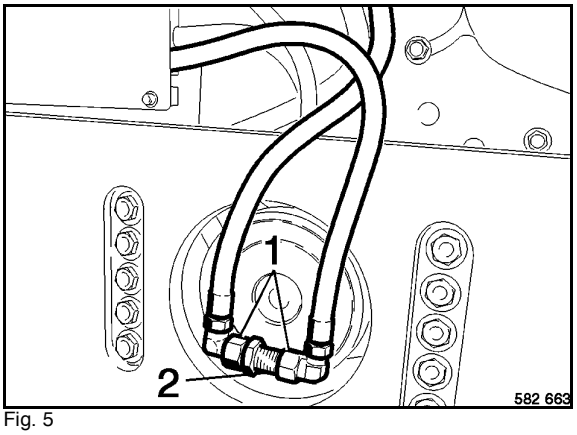


Fig. 5

6. Unscrew the high pressure hoses (Fig. 5) from the drum drive motor and join them together with angle fittings (1) and socket (2).
7. Fill the hydraulic oil tank again with the filling and filtering unit.
8. Keep circulating the tank contents throughout the complete flushing process.

i Note

If the hydraulic oil change interval is almost reached use new hydraulic oil.

Bleeding the travel circuit

Environment

Catch hydraulic oil and dispose of environmentally.

1. Block drums and wheels with suitable chocks.
2. Install pressure test hoses to the charge pressure test port and to the high pressure test ports.
3. Hold the open ends of the pressure test hoses (Fig. 6) into a container.
4. Crank the engine approx. 30 seconds with the starter motor. Wait one minute and repeat this procedure, until oil starts to run out from the pressure test hoses.
5. Disconnect the pressure test hoses from the high pressure test ports.

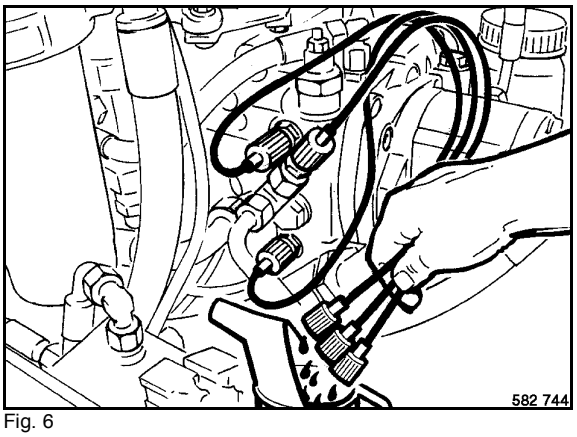


Fig. 6

https://truckmanualshub.com/

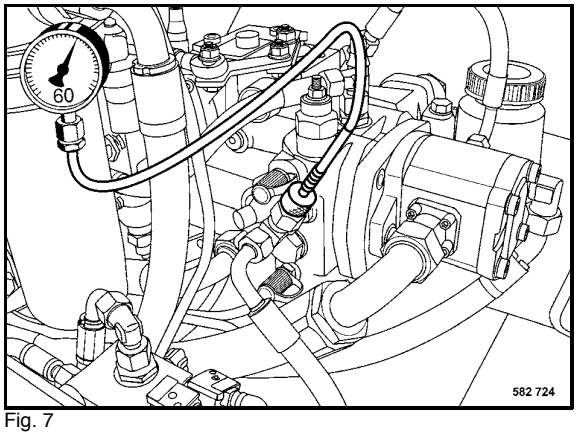


Fig. 7

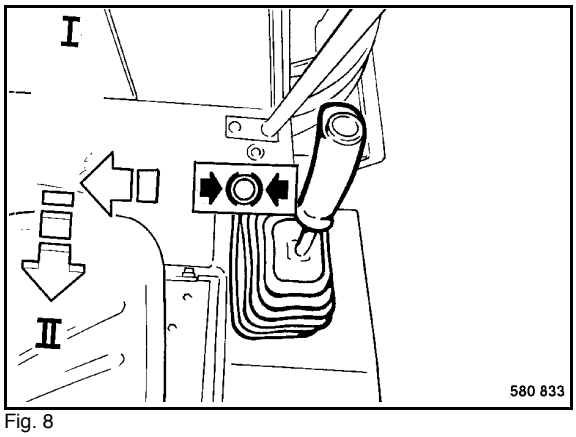


Fig. 8

6. Connect a 60 bar pressure gauge to the charge pressure test hose (Fig. 7) and run the engine max. 15 seconds at idle speed.
7. Wait for approx. 30 seconds and repeat the procedure, until the pressure gauge shows a constant charge pressure.

i Note

Perform these measures with the travel lever in neutral position. As soon as charge pressure is present you may start to bleed the system.

⚠ Caution

Move the travel lever only to travel direction reverse, as otherwise the flushing filter will be subjected to oil flow from the wrong direction.

8. For bleeding shift the travel lever (Fig. 8) approx. 1/3 in travel direction backward (I) while running the engine with idle speed.
9. After running the engine 1 to 2 minutes with idle speed pause for approx. one minute.

i Note

This waiting time is necessary to allow air bubbles to escape through the leak oil return line.

Repeat this measure, until the charge pressure reading immediately drops to zero when shutting the engine down.

In this case the closed travel circuit is properly bled.

10. Remove the pressure test hoses.

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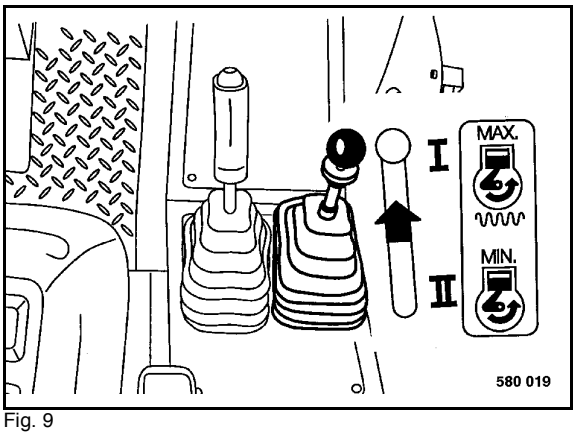


Fig. 9

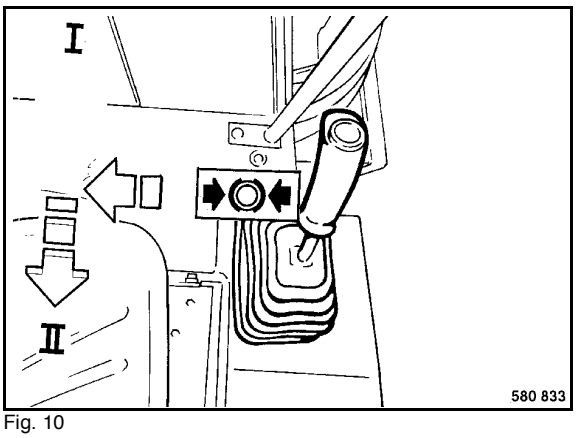


Fig. 10

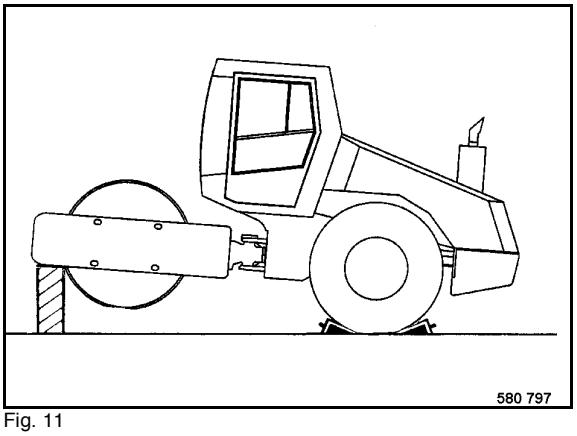


Fig. 11

Flushing the lines to the drum drive motor

1. Run the engine with max. speed (Fig. 9).

⚠ Caution

Move the travel lever only to travel direction reverse, as otherwise the flushing filter will be subjected to oil flow from the wrong direction.

2. Shift the travel lever (Fig. 10) fully to travel direction backward (II).
3. Perform the flushing process at various engine speeds for approx. 10 minutes.
4. Shut down the engine.

Flushing the drum drive motor

1. Reconnect the high pressure hoses to the drum drive motor.

⚠ Danger

Danger of squashing!

Do not lay under the jacked up machine.

2. Jack up the front of the machine (Fig. 11), so that the drum can rotate freely.
3. Secure the rear wheels with chocks.
4. Repeat the bleeding process as previously described.
5. Switch to slow travel speed range (turtle).

⚠ Caution

Move the travel lever only to travel direction reverse, as otherwise the flushing filter will be subjected to oil flow from the wrong direction.

6. Start the engine, run it with maximum speed and shift the travel lever to travel direction reverse.
7. Run the flushing procedure for approx. 10 minutes. During this process keep changing the pump flow by shifting the travel lever several times between full and halve reverse travel.

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Filter installation for flushing the axle drive circuit

⚠ Caution

Before installing the flushing filter check hoses and connections for cleanliness, clean if necessary.

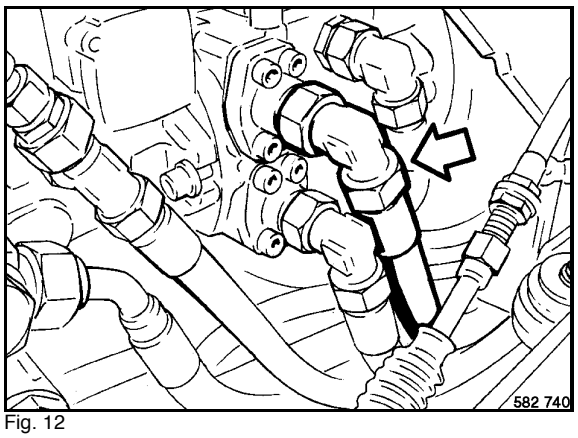


Fig. 12

1. Disconnect the upper high pressure hose (Fig. 12) from the travel pump.

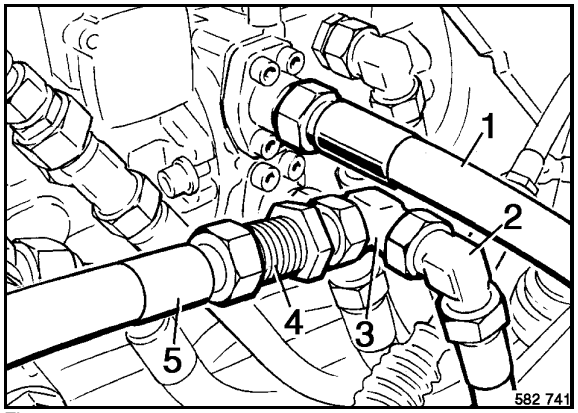


Fig. 13

2. Connect flushing hose 5 (Fig. 13) from the flushing filter outlet to the travel pump.
3. Connect flushing hose (4) from the filter inlet to the disconnected high pressure hose (2) using double end union (3) and angular fitting (2).

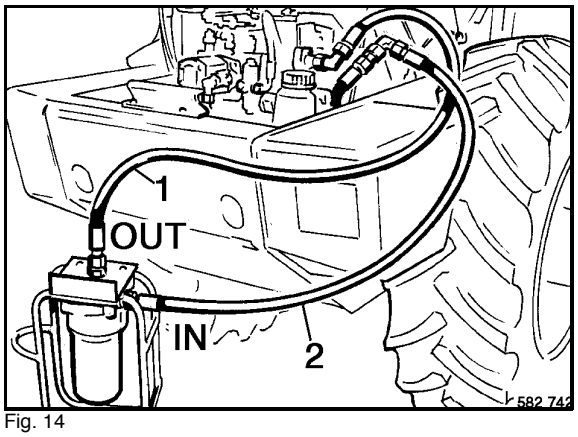


Fig. 14

4. Connect flushing hose 1 (Fig. 14) to travel pump with flushing filter outlet „OUT“.
5. Connect flushing hose (2) joined to the high pressure hose for the axle drive motor to the flushing filter inlet "IN".

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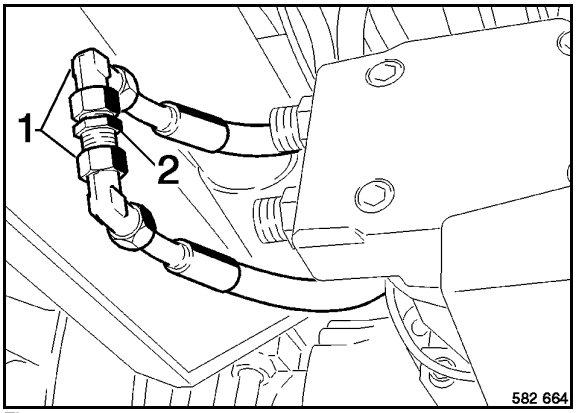


Fig. 15

6. Unscrew high pressure hoses 1 (Fig. 15) from the travel motor and join them together with socket (2).
7. Fill the hydraulic oil tank again with the filling and filtering unit.
8. Keep circulating the tank contents throughout the complete flushing process.

Bleeding the travel circuit

Environment

Catch hydraulic oil and dispose of environmentally.

1. Block drums and wheels with suitable chocks.
2. Install pressure test hoses to the charge pressure test port and to the high pressure test ports.
3. Hold the open ends of the pressure test hoses (Fig. 16) into a container.
4. Crank the engine approx. 30 seconds with the starter motor. Wait one minute and repeat this procedure, until oil starts to run out from the pressure test hoses.
5. Disconnect the pressure test hoses from the high pressure test ports.

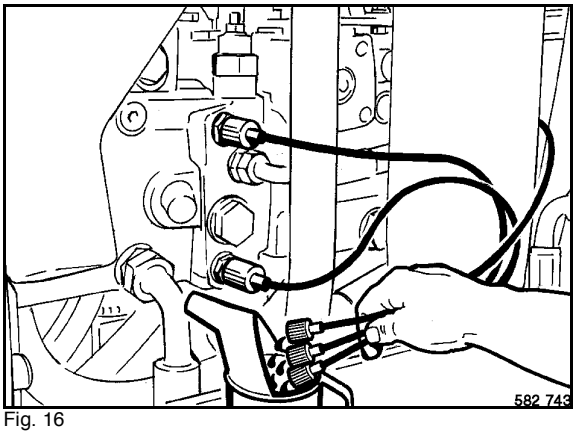


Fig. 16

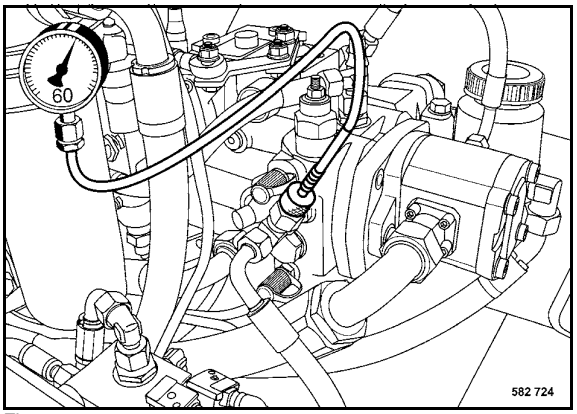


Fig. 17

6. Connect a 60 bar pressure gauge to the charge pressure test hose (Fig. 17) and run the engine max. 15 seconds at idle speed.
7. Repeat this procedure after a pause of approx. 30 seconds, until the pressure gauge shows a constant pressure of 28 bar (406.1 psi).

i Note

Perform these measures with the travel lever in neutral position. As soon as charge pressure is present you may start to bleed the system.

⚠ Caution

Move the travel lever only to travel direction reverse, as otherwise the flushing filter will be subjected to oil flow from the wrong direction.

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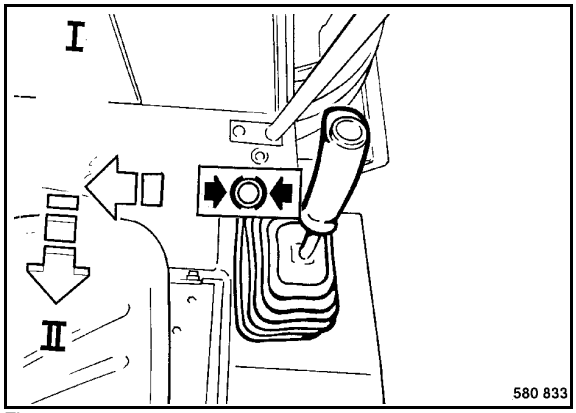


Fig. 18

8. For bleeding shift the travel lever (Fig. 18) approx. 1/3 in travel direction backward (I) while running the engine with idle speed.
9. After running the engine 1 to 2 minutes with idle speed pause for approx. one minute.

i Note

This waiting time is necessary to allow air bubbles to escape through the leak oil return line of the pump.

Repeat this measure, until the charge pressure reading immediately drops to zero when shutting the engine down.

In this case the closed travel circuit is properly bled.

10. Remove the pressure test hoses.

Flushing the lines to the axle drive motor

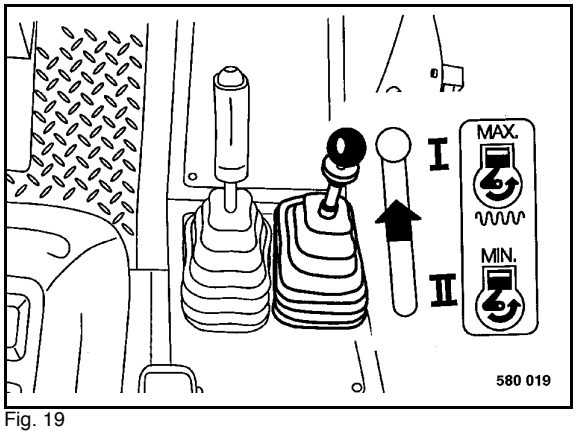


Fig. 19

1. Run the engine with max. speed (Fig. 19).

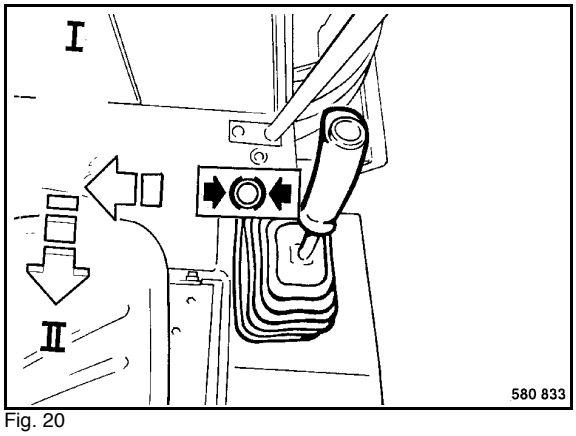


Fig. 20

2. Shift the travel lever (Fig. 20) fully to travel direction backward (II).

⚠ Caution

Move the travel lever only to travel direction reverse, as otherwise the flushing filter will be subjected to oil flow from the wrong direction.

3. Perform the flushing process at various engine speeds for approx. 10 minutes.
4. Shut down the engine.

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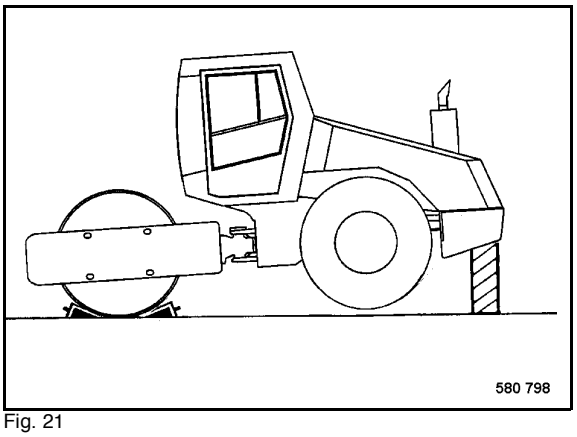


Fig. 21

Flushing the axle drive motor

1. Reconnect the high pressure hoses to the drum drive motor.

⚠ Danger

Danger of squashing!

Do not lay under the jacked up machine.

2. Jack up the rear of the machine (Fig. 21), so that the wheels can rotate freely.
3. Secure the drum with wheel chocks.
4. Repeat the bleeding process as previously described.
5. Switch to slow travel speed range (turtle).

⚠ Caution

Move the travel lever only to travel direction reverse, as otherwise the flushing filter will be subjected to oil flow from the wrong direction.

6. Start the engine, run it with maximum speed and shift the travel lever to travel direction reverse.
7. Run the flushing procedure for approx. 10 minutes. During this process keep changing the pump flow by shifting the travel lever several times between full and halve reverse travel.

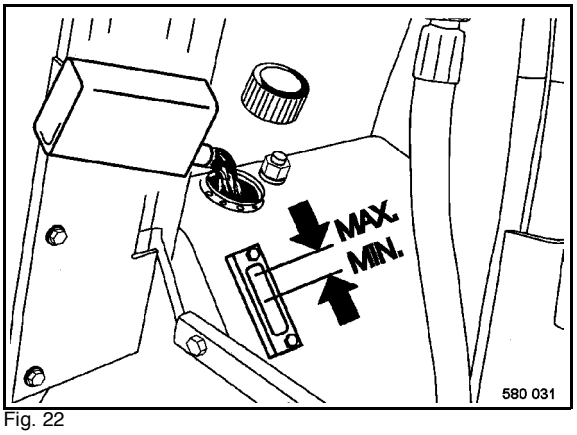


Fig. 22

Function test

1. Check the hydraulic oil level (Fig. 22) in the tank, fill up if necessary.
2. Check all connections for leaks with the engine running (visual inspection).
3. Perform a test drive, load the travel system in forward and reverse, e.g. by driving uphill or starting on a gradient.
4. Check all ports and connections for leak tightness (visual inspection).

Servicing the flushing filter kit

1. Replace the filter element of the flushing filter when the red control pin of the contamination indicator is pressed out during the filtering process.

https://truckmanualshub.com/

i Note

This is also possible with very cold oil.

2. Clean hoses and connections and store the flushing kit in a clean and protected environment.
3. Change the flushing filter element of the filling and filtering unit when the red control pin of the contamination indicator is pressed out.

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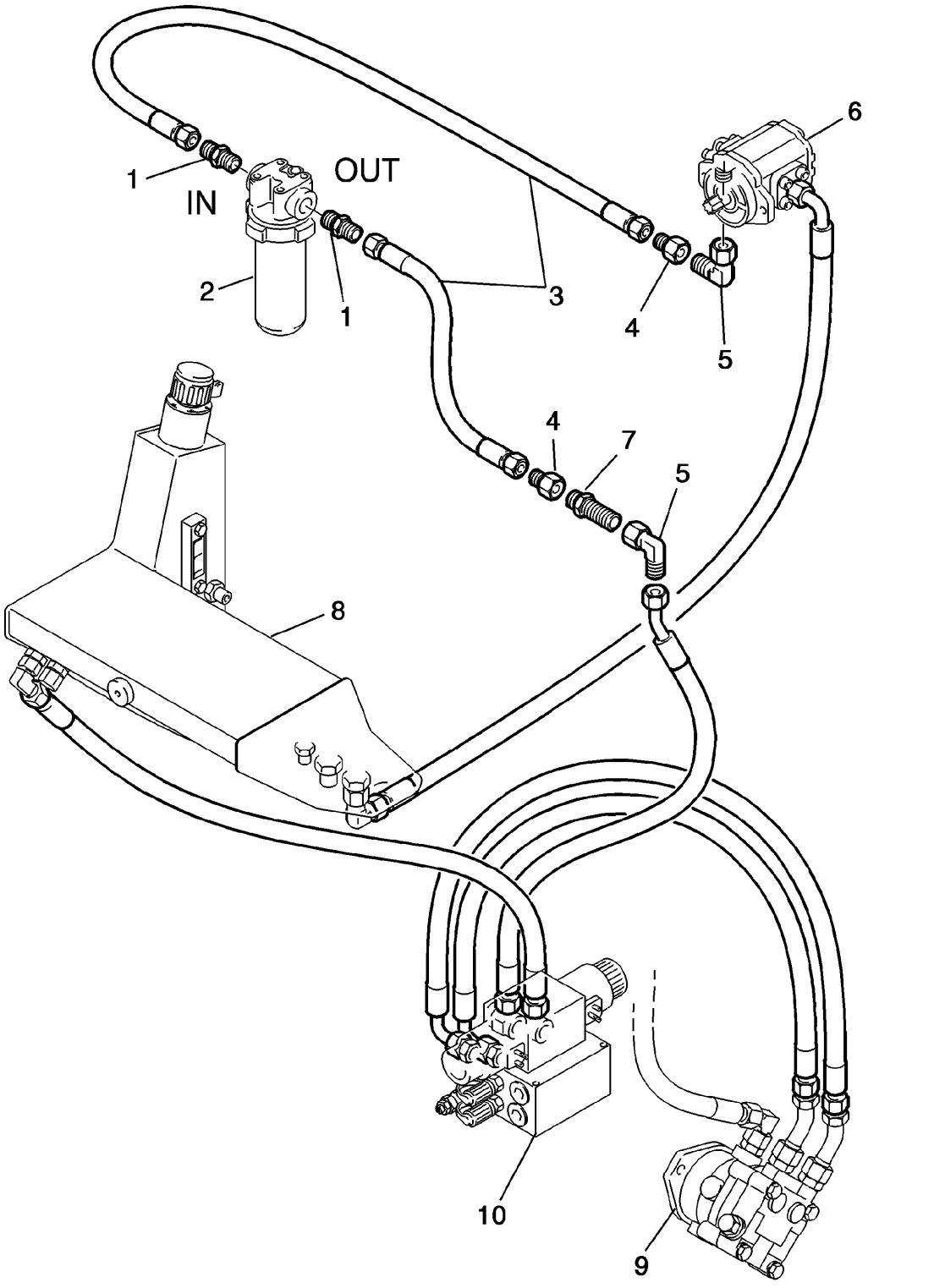


Fig. 1

https://truckmanualshub.com/

1 Screw fitting 3/4“ - 15L
2 Flushing filter
3 Flushing hose
4 Reducing fitting 18L - 15L
5 Angular fitting 18L
6 Vibration pump
7 Connecting socket 18L
8 Hydraulic oil tank
9 Vibration motor
10 Vibration valve

After changing a component

1. Always flush the hydraulic circuit.

⚠ Caution

Solid particles remaining in the circuit will damage the components again within a short period of time.

In case of excessive oil contamination (abrasion)

1. Open and clean all other components.
2. If necessary replace the hydraulic hoses.
3. Flush also the travel circuit.

Befor flushing

1. Change the hydraulic oil filter element.
2. Clean the inside of the hydraulic oil tank.
3. Filter the hydraulic oil with the filtering unit.

i Note

For filtering use the filling and filtering unit. Pump the tank contents through a fine filter into the oil bag or a clean container.

Environment

Catch hydraulic oil and dispose of environmentally! For filling use also the filtering unit.

Change the oil:

in case of excessive contamination,

oil discoloration,

oil change interval almost reached.

Flushing filter installation (Fig. 1)

1. Connect the flushing filter outlet "OUT" with the high pressure hose to the vibration control valve.
2. Connect the flushing filter inlet "IN" with the pump outlet.

Flushing the complete system

1. Pull the vibration motor out of its coupling for flushing.

Function test

1. Perform a test run with vibration switched on.
2. Check all ports and connections for leak tightness.
3. Check the exciter shaft speeds.

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3.6 Flushing the vibration circuit

Cleaning the hydraulic oil tank

Environment

Catch hydraulic oil and dispose of environmentally!

1. Pump the hydraulic oil from the hydraulic oil tank into a clean container or an oil bag using the filling and filtering unit.
2. Mark all hoses (Fig. 1) and disconnect them from the tank cover.
3. Unscrew the fastening screws for the cover and remove the cover.
4. Clean the hydraulic oil tank thoroughly from inside, reassemble cover and hoses.

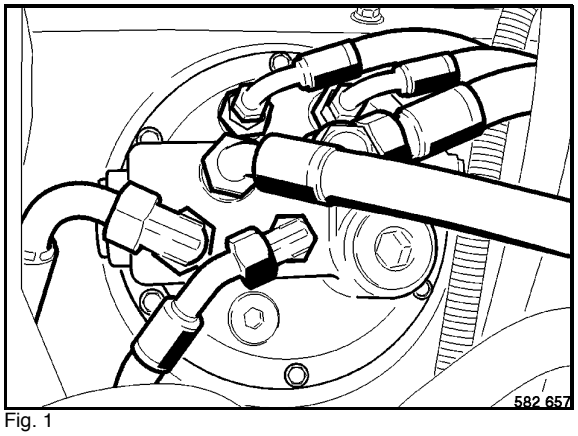


Fig. 1

Filter installation for flushing of the vibration drive

⚠ Caution

Before installing the flushing filter check hoses and connections for cleanliness, clean if necessary.

1. Disconnect the high pressure hose (Fig. 2) from the vibration pump.

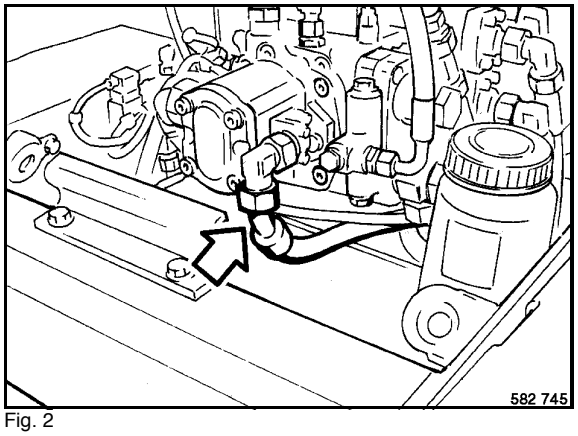


Fig. 2

https://truckmanualshub.com/

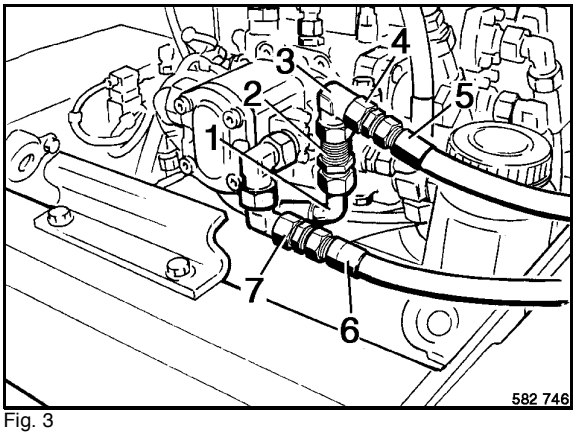


Fig. 3

2. Connect flushing hose 6 (Fig. 3) with reducing fitting (7) to the vibration pump.
3. Connect flushing hose (5) to the disconnected high pressure hose (1) using reducing fitting (4), angular fitting (3) and double end union (2).

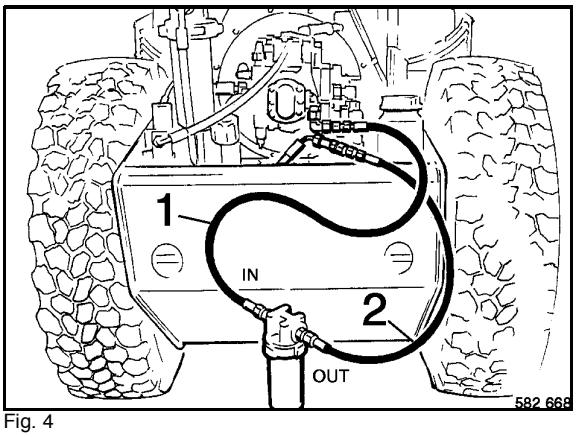


Fig. 4

4. Connect flushing hose 2 (Fig. 4) joined to the high pressure hose for the vibration motor to the flushing filter outlet "OUT".
5. Connect flushing hose (1) to the vibration pump to the flushing filter inlet "IN".

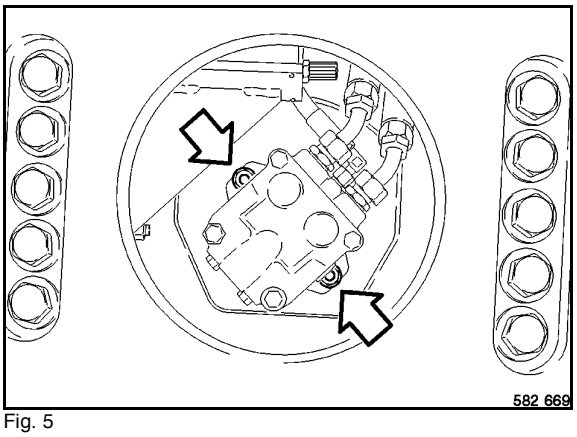


Fig. 5

6. Unscrew fastening screws (Fig. 5) and pull the vibration motor out of its coupling.
7. Fill the hydraulic oil tank again with the filling and filtering unit.

i Note

If the hydraulic oil change interval is almost reached use new hydraulic oil.

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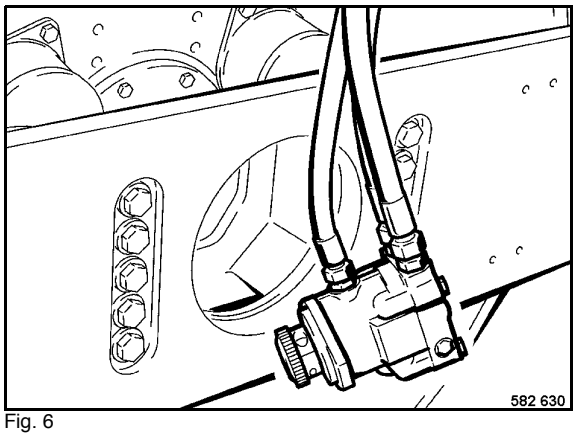


Fig. 6

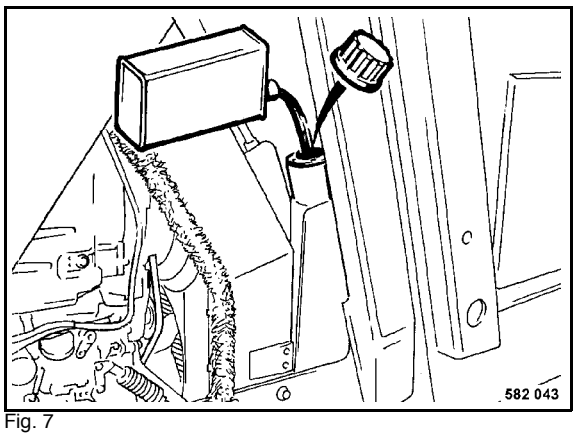


Fig. 7

Flushing the vibration circuit

8. Run the engine with maximum speed.
9. Run the flushing procedure for approx. 10 minutes. Switch the vibration on and off at intervals of approx. 30 seconds and frequently change the amplitude.
10. Shut down the engine.
11. Remove the flushing filter and reinstall the vibration motor (Fig. 6).
12. After completing the bleeding process circulate the tank contents with the filtering unit for another 15 minutes.
13. Remove the filtering unit and screw on the tank cap.

Function test

1. Check the hydraulic oil level (Fig. 7) in the tank, fill up if necessary.
2. Test drive.
3. Check all ports and connections for leak tightness (visual inspection).

Servicing the flushing filter kit

1. Replace the filter element of the flushing filter when the red control pin of the contamination indicator is pressed out during the filtering process.

i Note

This is also possible with very cold oil.

2. Clean hoses and connections and store the flushing kit in a clean and protected environment.
3. Change the flushing filter element of the filling and filtering unit when the red control pin of the contamination indicator is pressed out.

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4 Trouble shooting

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General notes on trouble shooting in hydraulic systems

The following tests are performed for fault diagnostics and should enable you to encircle a fault in the hydraulic system.

At this point it is assumed that there is no fault in the electric system, i.e. trouble shooting in the electric system has already been performed.

In some cases these tests may also be conducted to identify faults on hydraulic components of the power transmission system.

On the basis of preliminary tests the individual measurements have the purpose to limit the cause of the fault first of all to a general area and then to determine exactly which oil circuit or hydraulic component is not working correctly.

Important points for trouble shooting and fault rectification

⚠ Danger

Danger of injury!

Do not touch rotating parts of the engine.

When working on the travel pump and performing tests in the travel circuit block the drums with suitable wheel chocks.

Hydraulic oil escaping under pressure can penetrate the skin and cause severe injury. You should therefore relieve the pressure in the system before disconnecting any lines. Before repressurizing the system make sure that all line connections and ports are in perfect condition.

When being injured by hydraulic oil consult a physician immediately, as otherwise this may cause severe infections.

⚠ Caution

It is not recommended to open or repair hydraulic units and components without comprehensive knowledge.

Risk of damage to pressure gauges if incorrectly connected.

When performing trouble shooting it is assumed that the machine is correctly equipped and connected, that connections and hoses are free of faults and that setscrews have not been deadjusted without permission.

Progressive tests drawn up in the trouble shooting diagram lead to the detection of faults and their rectification by trained personnel.

- Ensure strict cleanliness, clean ports and fittings before disconnecting.
- Cover all openings and ports or close with plugs.
- Check the hydraulic oil level before and after the work.
- Use only clean oil according to specification.
- Check the hydraulic system for leaks, find and rectify the cause.
- Ensure strict cleanliness, clean ports and fittings before disconnecting.
- Fill new hydraulic units with hydraulic oil before starting operation.
- After changing a component thoroughly flush and bleed the hydraulic system.
- AS far as possible conduct all measurements at operating temperature 40 ... 50 °C (104 … 122°F).
- After changing a component check charge and high pressure, if necessary check the rotational speed.

Hydraulic hoses

⚠ Danger

Danger of injury

Hydraulic hoses must be visually inspected at regular intervals.

Hydraulic hoses must be immediately replaced if:

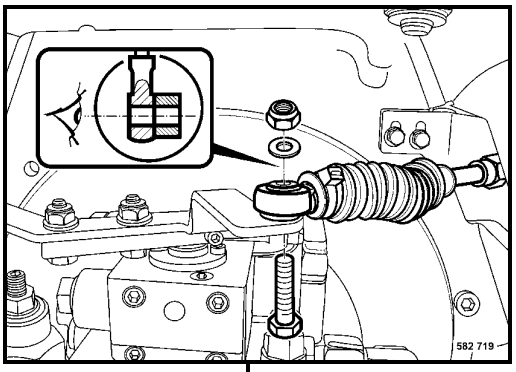
- the outer layer is damaged down to the inlay (e.g. chafing, cuts, cracks, etc.)
- the outer layer is brittle (formation of cracks in the hose material)
- the hose shows deformations in pressurized and depressurized condition, which do not comply with the genuine shape of the hydraulic hose
- the hose shows deformations in bends, e.g. squeezing, buckling, layer separation, formation of blisters
- the hose is leaking
- the hydraulic hose has separated from the fitting
- the fitting shows corrosion that impairs both function and strength
- the fitting is deformed in a way that both function and strength are affected
- the storage time and utilization period has expired.

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4.2 Trouble shooting diagram

The machine drives with the travel lever in „NEUTRAL“

Note: The documentation shows work on travel pump 1, work on travel pump 2 must be performed accordingly.



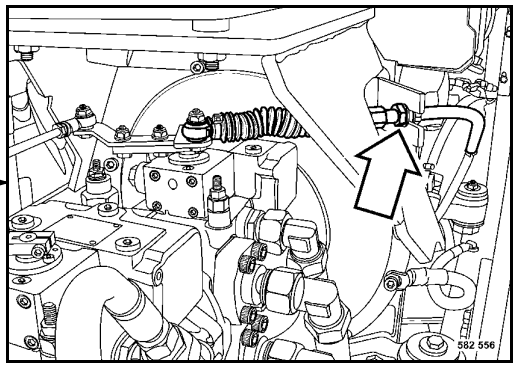
Check the neutral setting

- Shift the travel lever to “neutral”
- Unhook the travel cable from the pump
- check whether bore in ball socket is in line with bore in control lever

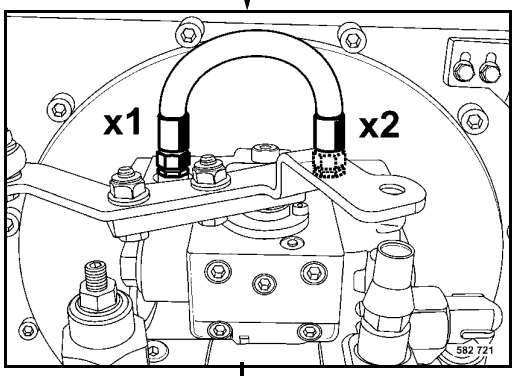
Bores in line?

no

yes



Adjust the travel cable



Check the mechanical 0-position

- Join the control chambers with a hose
- Connect 600 bar pressure gauges to the high pressure test ports
- Travel lever in braking position
- Block drum and wheels with suitable chocks .
- Run the engine with maximum speed.
- Read the pressure gauge

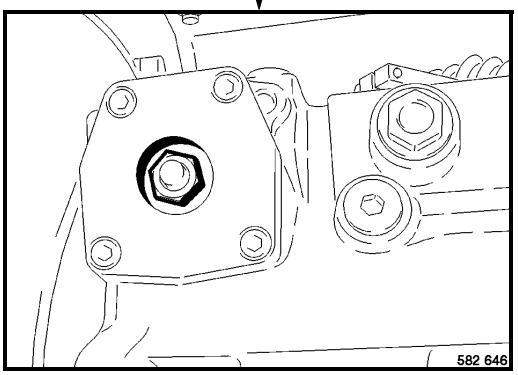
Nominal value:
Identical pressure (charge pressure) on both pressure gauges

Neutral position OK?

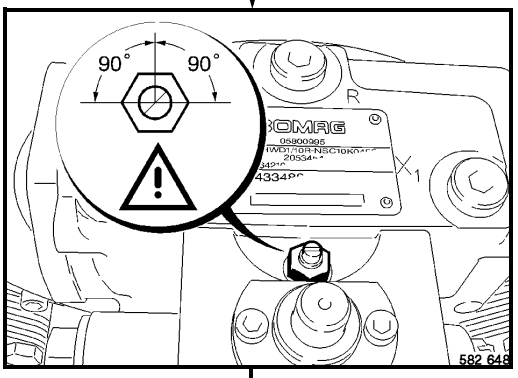
no

yes

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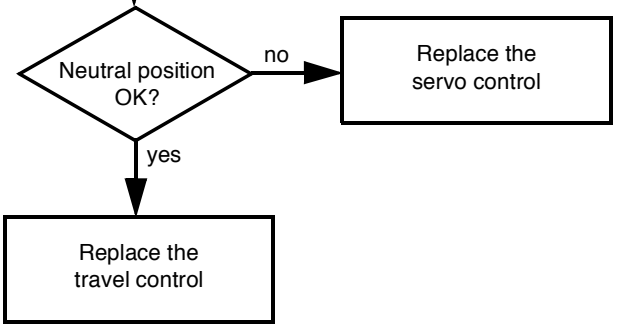


- Adjust the mechanical 0-position so that identical pressures (charge pressure) are indicated on both sides
- Repeat the test with 60 bar pressure gauges



Adjust the hydraulic 0-position

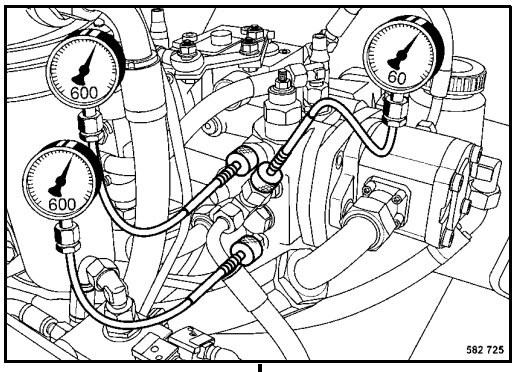
- Install 60 bar pressure gauges to X1and X2
- Travel lever in braking position and drum blocked
- Run the engine with maximum speed.
- Read the pressure gauge
- Adjust the mechanical 0-position so that identical pressures are indicated on both sides



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The machine does not drive

(to both directions)



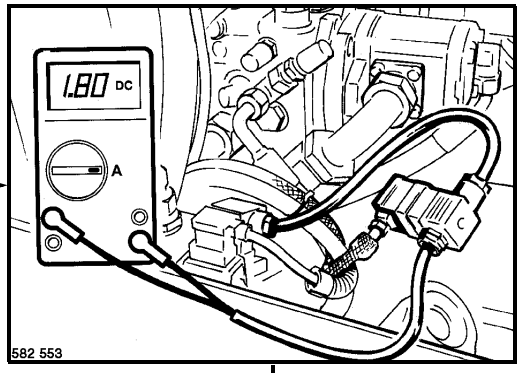
Check high and charge pressure

- Connect 600 bar pressure gauges to the high pressure test port
- Connect a 60 bar pressure gauge to the charge pressure test port
- Pull the plug off the brake solenoid valve and block the drum
- Start the engine and run it with maximum speed
- Drive the machine against the closed brake, for this purpose actuate the travel lever for a moment and read the pressure gauge

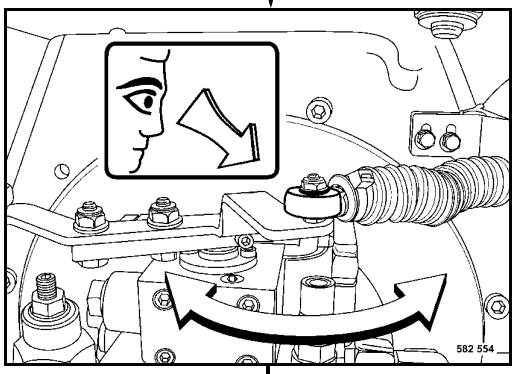
Nominal value:
High pressure approx. 380 bar*, charge pressure approx. 25 bar**
*5511.4psi
**362.6psi

High pressure OK?

yes



no



Check magnetic coil of brake valve

- Start the engine and release the brake (unlock travel lever)
- measure voltage and current consumption of coil with an appropriate meter

Nominal value:
approx. 14V / 1.8 A

Magnetic coil OK?

no

Perform trouble shooting in the electric system

yes

Check the travel control cable

- Check whether the pump control lever moves when actuating the travel lever

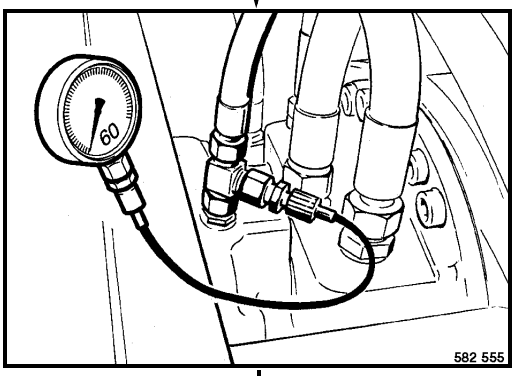
Control cable OK?

no

Replace the travel control

yes

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Check the brake releasing pressure

- Connect a 60 bar pressure gauge to the brake releasing line and check whether the brake valve opens.

Nominal value: approx. 25 bar * (charge pressure) *(362.6psi)

Brake valve OK?

no → Replace the brake valve

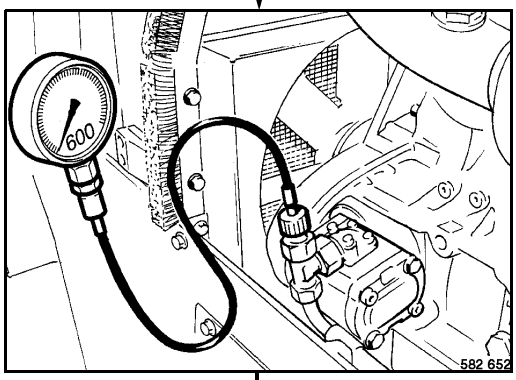
yes → Mechanical fault, axle, drum

Charge pressure OK?

no

yes

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Check steering/charge pump

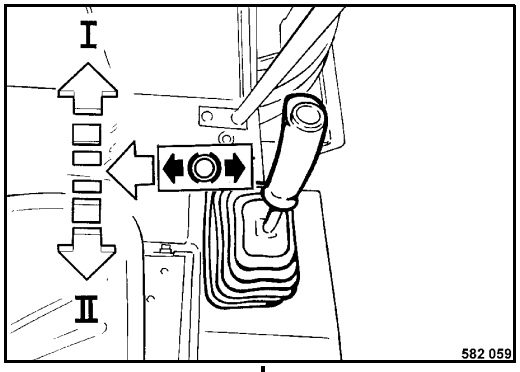
- Connect a 600 bar pressure gauge to the steering pressure test port
- Pull the plug off the starter solenoid and crank the engine with the starter
- Turn the steering against an end stop and read the pressure gauge

Nominal value:
approx. 200 bar (2900.7 psi)

Steering pressure OK?

no → Perform trouble shooting in steering system

yes



Check leakage of brake

- Release the brake and repeat the charge pressure test

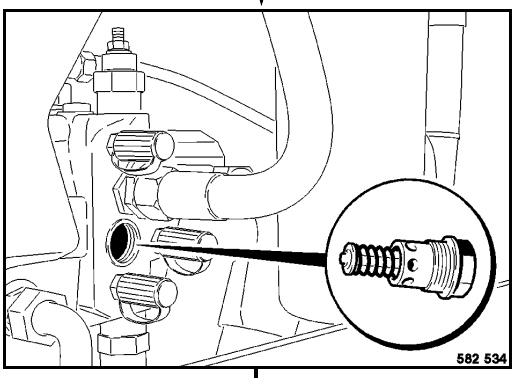
Charge pressure OK?

yes →

- Disconnect the brake releasing lines to drum drive and axle drive motors one after the other, close them with plugs and repeat the charge pressure test with the brake closed.
- Repair the unit with which the charge pressure is OK after the brake line has been disconnected

no

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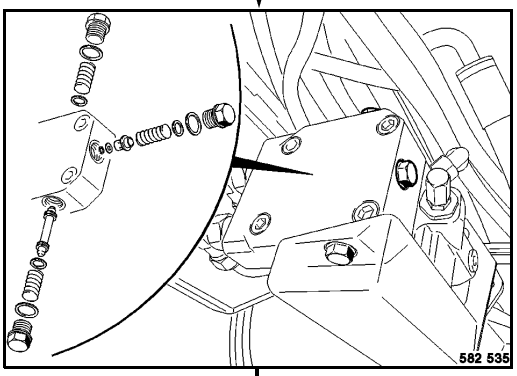
Check the charge pressure relief valve

Valve OK?

no

Replace charge pressure relief valve

yes



Check the flushing valve on the axle drive motor

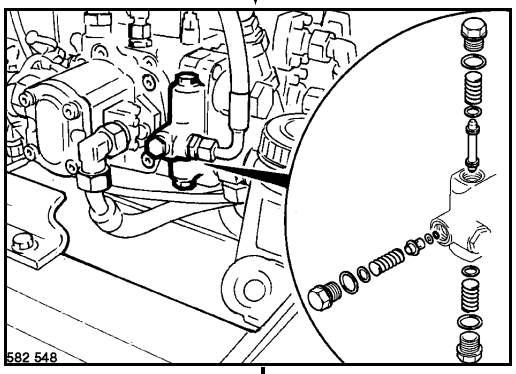
Flushing valve OK?

no

Replace the flushing valve

yes

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Check flushing valve on drum drive motor

Flushing valve OK?

no

Replace the flushing valve

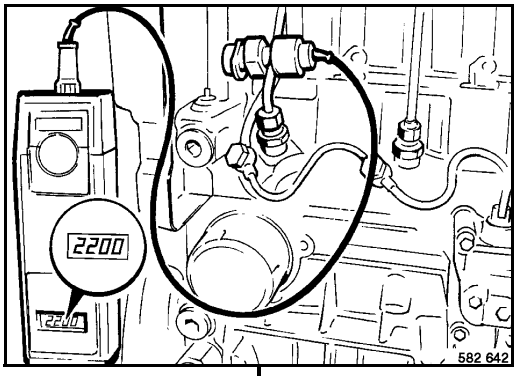
yes

Replace, repair the travel pumps

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Insufficient travel power, max speed is not reached

Check the axle drive circuit



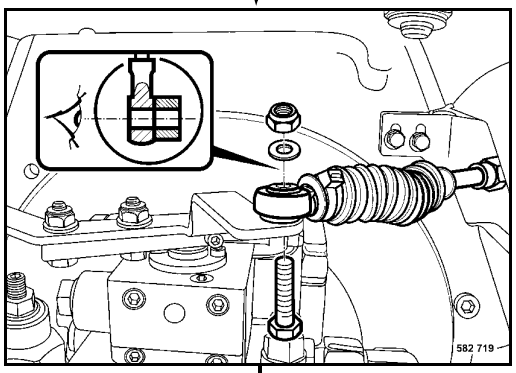
Check the engine speed

Nominal value:
2200 rpm (nominal speed)

Rated speed OK?

no → Perform engine trouble shooting

yes



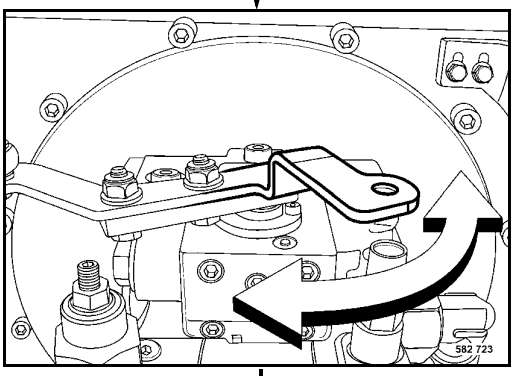
- Check the travel control cable
- Unhook the travel control cable
- Check bores and bolt for excessive play and wear

Control OK?

no → Replace the travel cable

yes

https://truckmanualshub.com/



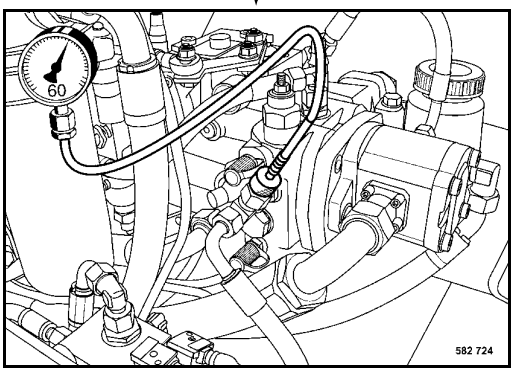
- Actuate travel lever forward and backward
- check whether max. displacement of travel lever is reached

max. displacement reached ?

no

Adjust or replace travel lever or travel cable

yes



Check charge pressure

- Connect a charge pressure gauge (60 bar)
- Start the engine and run it with idle speed
- Read the pressure gauge

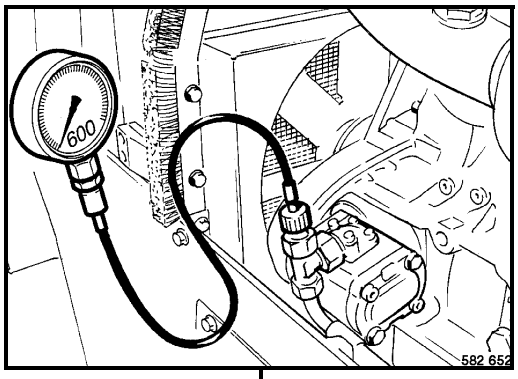
Nominal value:
min. 24 bar (348 psi)

Charge pressure OK?

no

yes

https://truckmanualshub.com/



Check steering/ charge pump

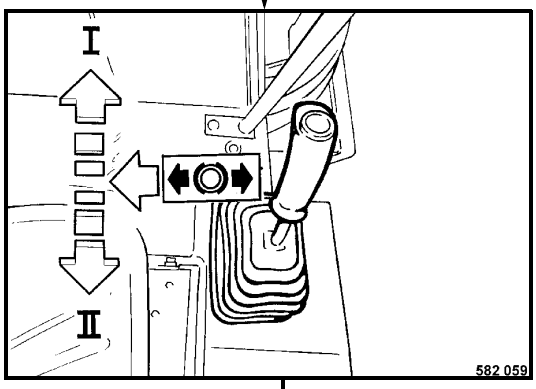
- Connect a 600 bar pressure gauge to the steering pressure test port
- Pull the plug off the starter solenoid and crank the engine with the starter
- Turn the steering against an end stop and read the pressure gauge

Nominal value:
approx. 200 bar (battery fully charged)(2900 psi)

Steering pressure OK?

no → Perform trouble shooting in steering system

yes



Check leakage of brakes

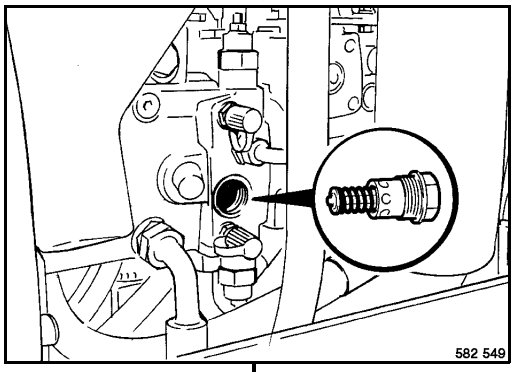
- Relieve the brake, for this purpose shift the travel lever out of brake position, and repeat the charge pressure test.

Charge pressure OK?

yes →
- Disconnect the brake releasing lines to drum drive and axle drive motors one after the other, close them with plugs and repeat the charge pressure test.
- Repair the unit with which the charge pressure is OK after the brake line has been disconnected

no

https://truckmanualshub.com/



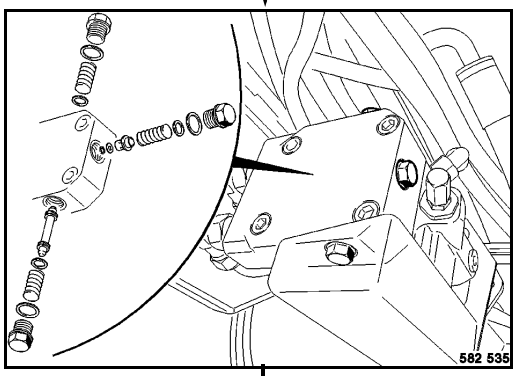
Check charge pressure relief valve

Valve OK?

no

Replace the charge pressure relief valve

yes



Check flushing valve on axle drive motor

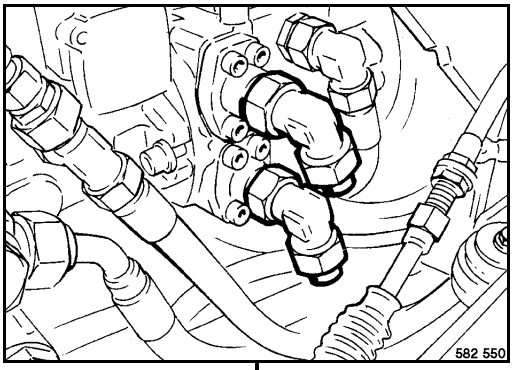
Flushing valve OK?

no

Replace the flushing valve

yes

https://truckmanualshub.com/



Check the individual components

Check axle drive motor / travel pump

- Close the high pressure ports on the travel pump with plugs and repeat the pressure test

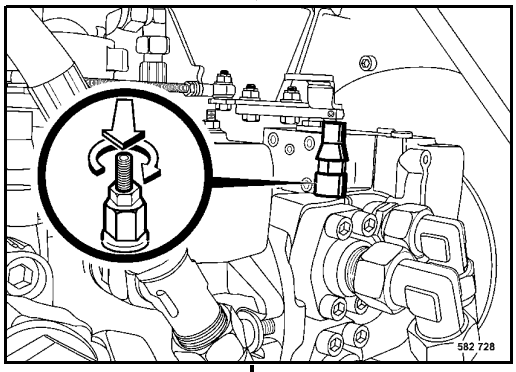
Pressures OK?

yes

Replace or repair the axle drive motor

no

https://truckmanualshub.com/



Check the setting of the high pressure relief valves

- Turn the setscrew of the pressure override valve completely in
- Repeat the pressure test

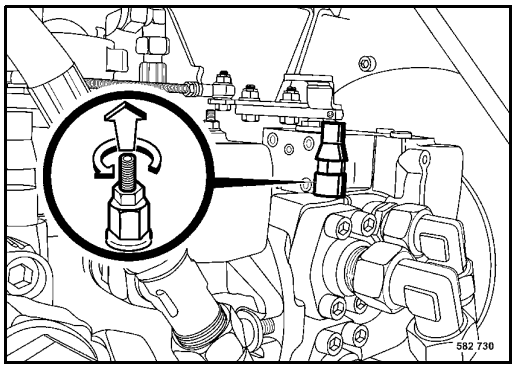
Attention!
Pressure test max. 3 seconds

Nominal value:
405 bar (5874.0 psi)

High pressure OK?

no

yes

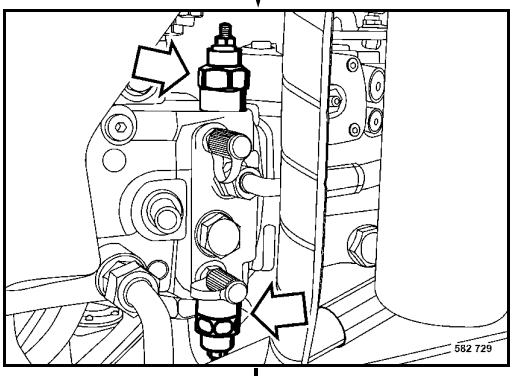


Adjusting the pressure override

- Unscrew the setscrew until the nominal value is reached, if necessary replace the pressure override

Nominal value:
approx. 380 bar (5511.4 psi)

https://truckmanualshub.com/



Check the high pressure relief valves

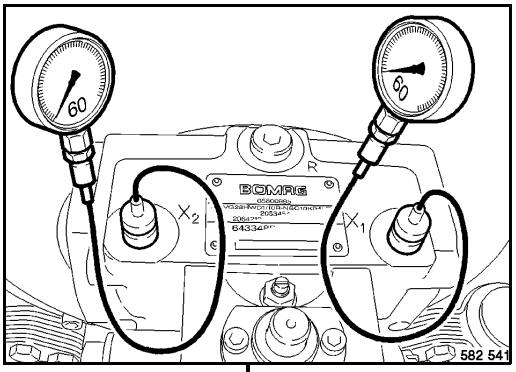
- Unscrew the high pressure relief valves, check their condition

High pressure relief valves

no

Clean valves, if necessary replace and adjust

yes



Check the control chamber pressure

- Install pressure test ports to X3 and X4
- Connect a 60 bar pressure gauge
- Run the engine with maximum speed
- Switch on vibration and read pressure gauges

Nominal value:
approx. 15 bar (217.5 psi)

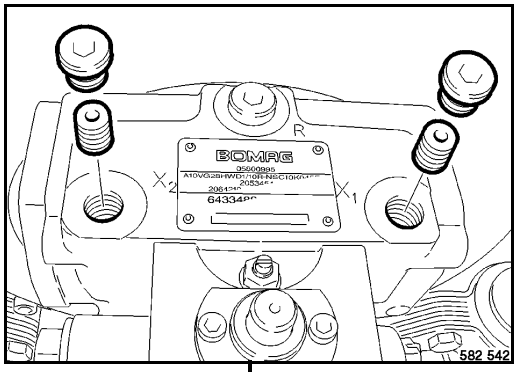
Chamber pressure

no

Check servo control, replace if necessary

yes

https://truckmanualshub.com/



Check the swash time nozzles

- Remove plugs and nozzles from pressure test ports X1 and X2

Nozzles OK?

no

Clean the nozzles

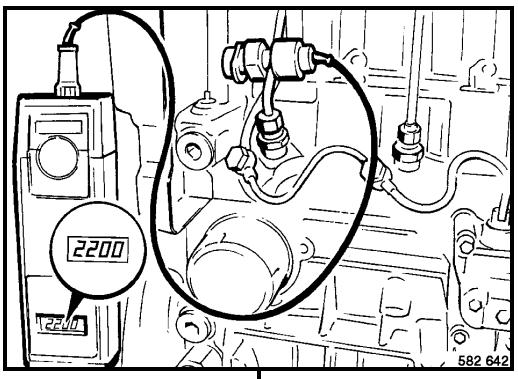
yes

Replace, repair the travel pump

https://truckmanualshub.com/

Insufficient travel power, max speed is not reached

Check drum drive circuit



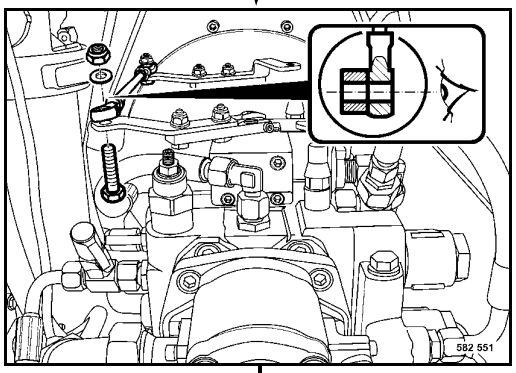
Check the engine speed

Nominal value:
2200 rpm (nominal speed)

Rated speed OK?

no → Perform engine trouble shooting

yes



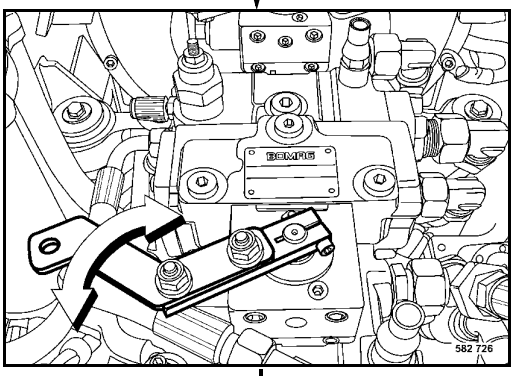
- Check the travel control cable
- Unhook the travel control cable
- Check bores and bolt for excessive play and wear

Control OK?

no → Replace the travel cable

yes

https://truckmanualshub.com/

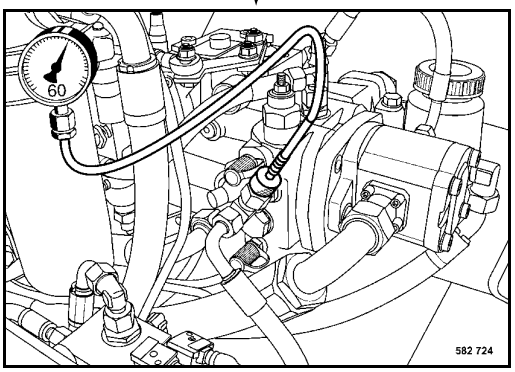


- Actuate travel lever forward and backward
- check whether max. displacement of travel lever is reached

max. displacement reached ?

no → Adjust or replace travel lever or travel cable

yes



Check charge pressure

- Connect a charge pressure gauge (60 bar)
- Start the engine and run it with idle speed
- Read the pressure gauge

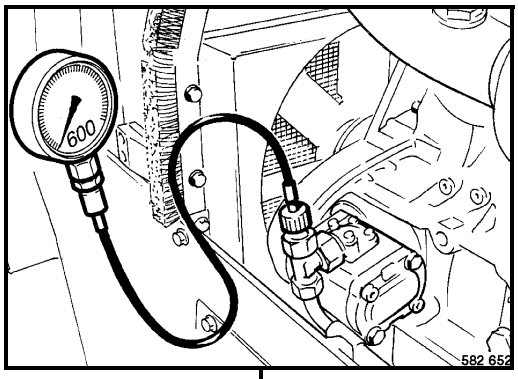
Nominal value:
min. 24 bar (348 psi)

Charge pressure OK?

no

yes

https://truckmanualshub.com/



Check steering/ charge pump

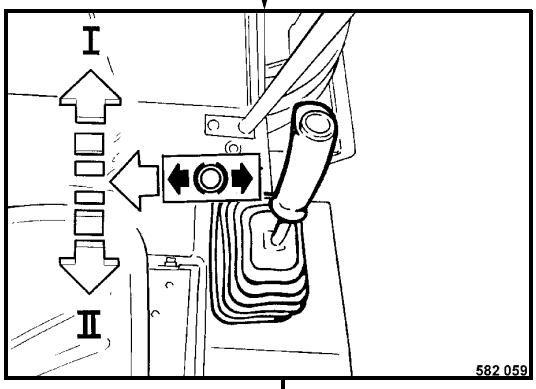
- Connect a 600 bar pressure gauge to the steering pressure test port
- Pull the plug off the starter solenoid and crank the engine with the starter
- Turn the steering against an end stop and read the pressure gauge

Nominal value:
approx. 200 bar (battery fully charged) (2900psi)

Steering pressure OK?

no → Perform trouble shooting in steering system

yes



Check leakage of brake

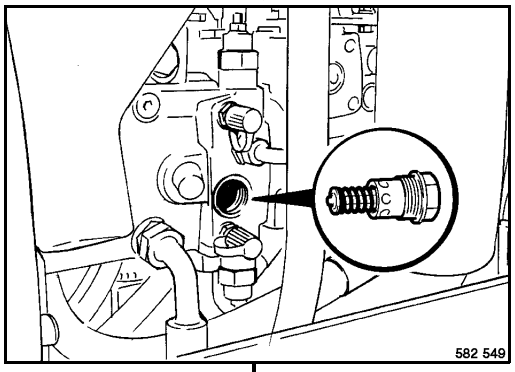
- Relieve the brake, for this purpose shift the travel lever out of brake position, and repeat the charge pressure test.

Charge pressure OK?

yes →
- Disconnect the brake releasing lines to drum drive and axle drive motors one after the other, close them with plugs and repeat the charge pressure test.
- Repair the unit with which the charge pressure is OK after the brake line has been disconnected

no

https://truckmanualshub.com/



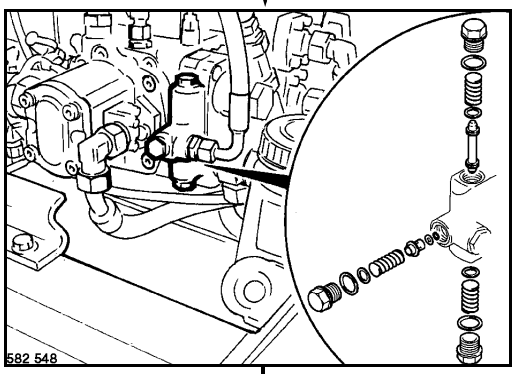
Check charge pressure relief valve

Valve OK?

no

Replace the charge pressure relief valve

yes



Check flushing valve on drum drive motor

Flushing valve OK?

no

Replace the flushing valve

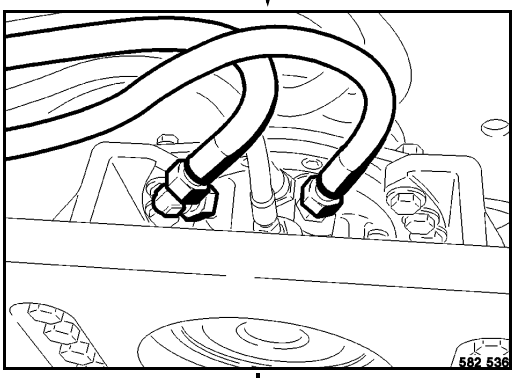
yes

https://truckmanualshub.com/

Check the individual components

Check the drum drive motor

- Close the high pressure ports on the drum drive motor with plugs and repeat the pressure test



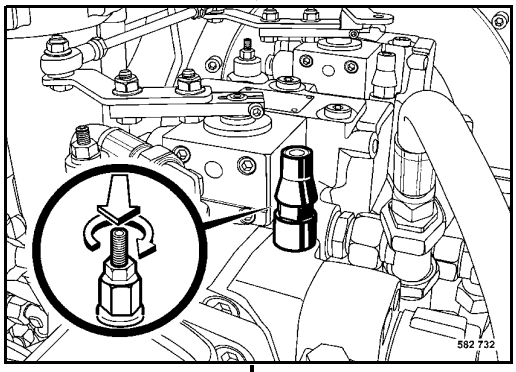
Pressures OK?

yes

Replace or repair the axle drive motor

no

https://truckmanualshub.com/



Check the setting of the high pressure relief valves

- Turn the setscrew of the pressure override valve completely in
- Repeat the pressure test

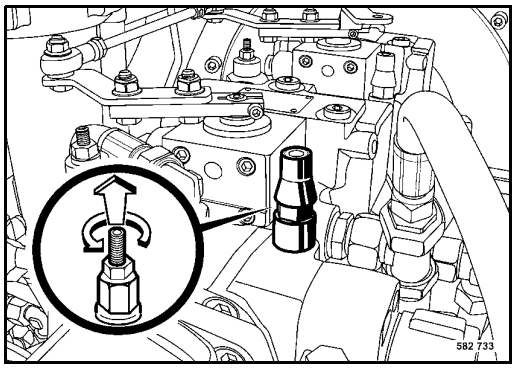
Attention!
Pressure test max. 3 seconds

Nominal value:
405 bar (5801.5 psi)

High pressure OK?

no

yes

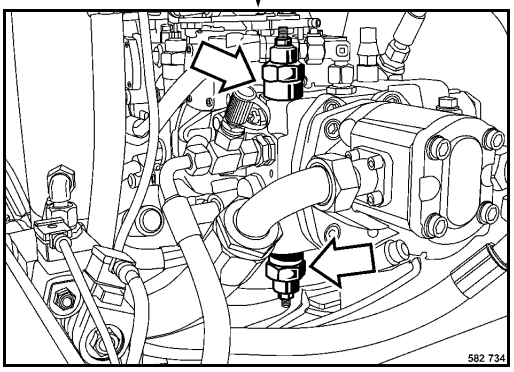


Adjusting the pressure override

- Unscrew the setscrew until the nominal value is reached, if necessary replace the pressure override

Nominal value:
approx. 380 bar (5511.4 psi)

https://truckmanualshub.com/



Check the high pressure relief valves

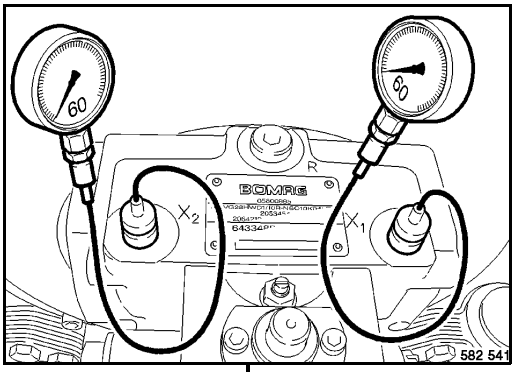
- Unscrew the high pressure relief valves, check their condition

High pressure relief valves

no

Clean valves, if necessary replace and adjust

yes



Check the control chamber pressure

- Install pressure test ports to X3 and X4
- Connect a 60 bar pressure gauge
- Run the engine with maximum speed
- Switch on vibration and read pressure gauges

Nominal value:
approx. 15 bar (217.5 psi)

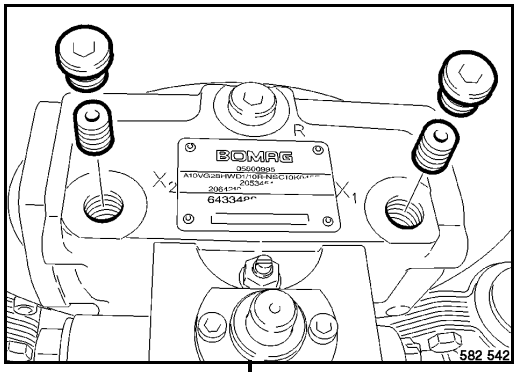
Chamber pressure

no

Check servo control, replace if necessary

yes

https://truckmanualshub.com/



Check the swash time nozzles

- Remove plugs and nozzles from pressure test ports X1 and X2

Nozzles OK?

no

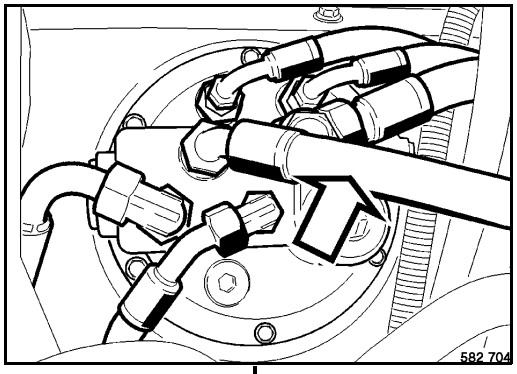
Clean the nozzles

yes

Replace, repair the travel pump

https://truckmanualshub.com/

Hydraulic oil overheating >90 °C



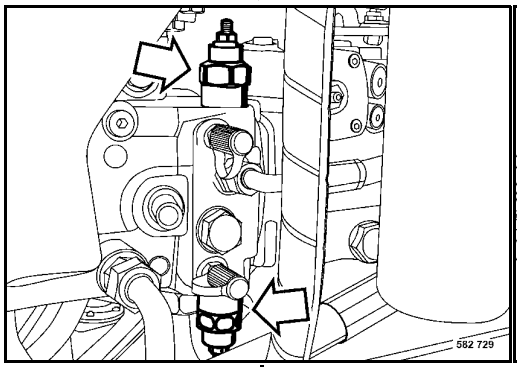
Check the thermostat valve

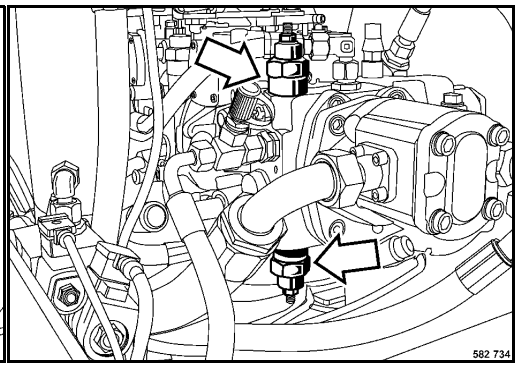
- Check whether the hose to the cooler heats up at a hydraulic oil temperature of > 60 °C (140 °F)

Thermostat opens?

no → Replace the thermostat valve

yes





Check the high pressure relief valves

- Pull the plug off the brake solenoid valve and block drum and wheels additionally with chocks
- Shift the travel lever to both directions and check the high pressure relief valves for any development of heat

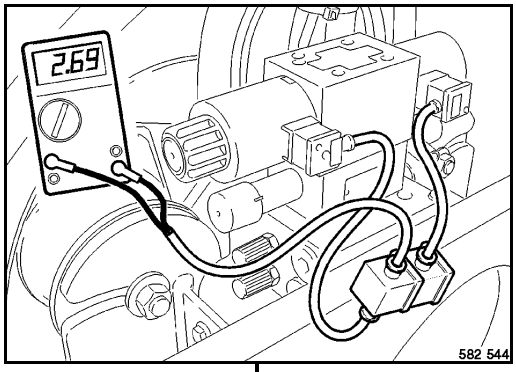
Valve heating up?

no →
- Check hoses for buckling
- Check components for excessive development of heat

yes → Clean, replace the corresponding high pressure relief valve

https://truckmanualshub.com/

No vibration



Check magnetic coil on vibration valve

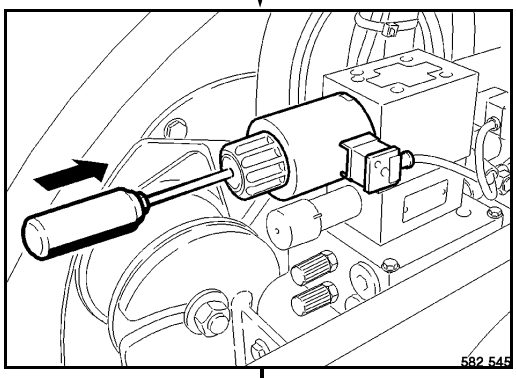
- Switch on the ignition
- Switch on vibration with high or low frequency
- measure voltage and current consumption of coil with an appropriate meter

Nominal value:
approx. 12 V / 2,7 A

Voltage / current OK?

no → Perform trouble shooting in the electric system

yes



Check the vibration solenoid valve

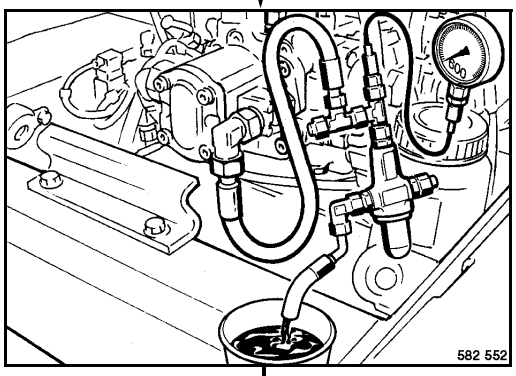
- Start the engine and run it with maximum speed
- Operate the valve manually with a pin (emergency operation)

Vibration OK?

yes → Replace the solenoid valve

no

https://truckmanualshub.com/



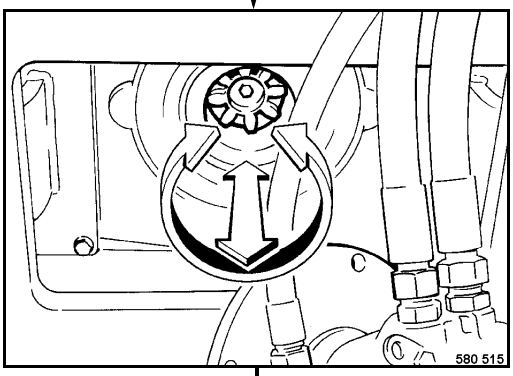
Check the vibration pump

- Connect a 200 bar testing valve to the pump outlet
- Start the engine for moment and read the pressure gauge

High pressure OK?

no → Replace / repair the vibration pump

yes



Check the exciter shaft bearings

- Remove the vibration motor
- Check end float and free movement of the exciter shaft
- Check the condition of the coupling

Bearing and coupling OK?

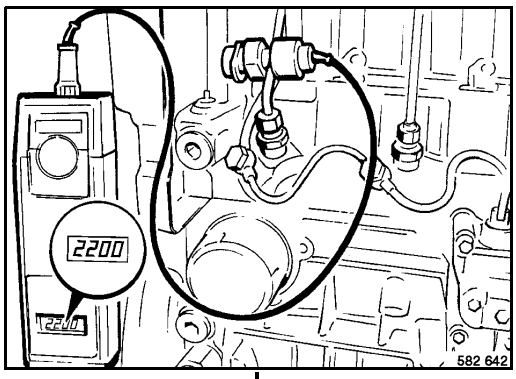
no → Replace bearing or coupling

yes

Replace / repair the vibration motor

https://truckmanualshub.com/

Exciter shaft speed too low



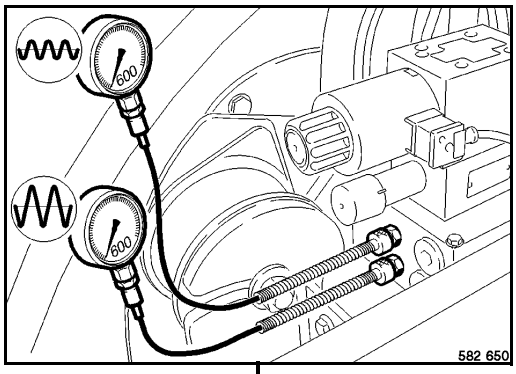
Check the engine speed

Nominal value:
2800 rpm (nominal speed)

Engine speed OK?

no → Perform engine trouble shooting

yes



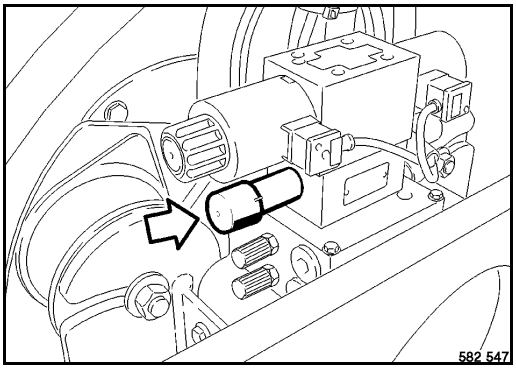
Check vibration pressures

- Connect a 600 bar pressure gauge to test port P1.
- Drive the drum onto rubber tires
- Run the engine with maximum speed
- Switch on vibration and read pressure gauges

Nominal values:
Start-up pressure 200 bar (2900.7 psi)
Operating pressure approx. 100 bar (1450.3 psi)

Operating pressure OK?

too low → Start-up pressure OK?

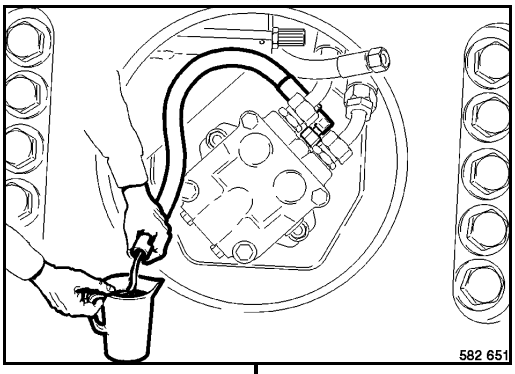
no → 

- Check, adjust the high pressure relief valve

yes

to high

https://truckmanualshub.com/



Check the leakage rate of the vibration motor

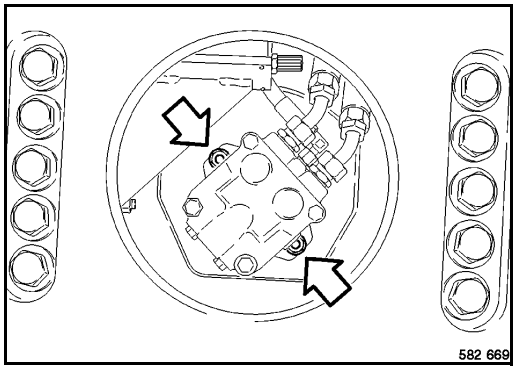
- Disconnect the leakage line and connect a test hose
- Switch on vibration and measure the leakage rate

Nominal value:
max. 0,5 l/min at approx. 100 bar*
* (max. 0,13gal/min at approx. 1450.3 psi)

Leak oil OK?

no → Replace/repair the vibration motor

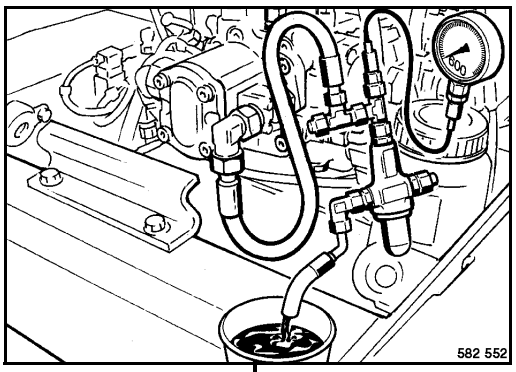
yes



Check the exciter shaft bearings

- Remove the vibration motor
- Check end float and moveability of the exciter shaft

https://truckmanualshub.com/



Check the vibration pump

- Close the pump outlet with a 200 bar pressure relief valve
- Start the engine for moment and read the pressure gauge

High pressure OK?

no

Replace /repair the vibration pump

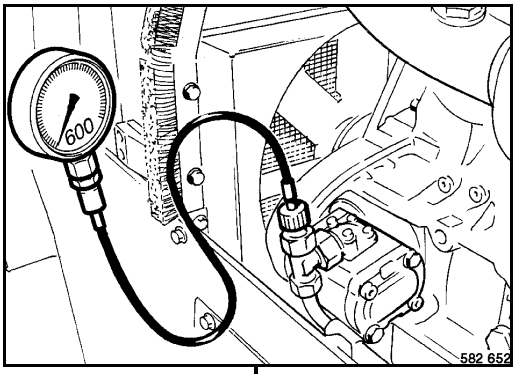
yes

Replace, repair the vibration motor

https://truckmanualshub.com/

No steering function / steering stiff / end stops are not reached

Note: Steering pump serves also as charge pump



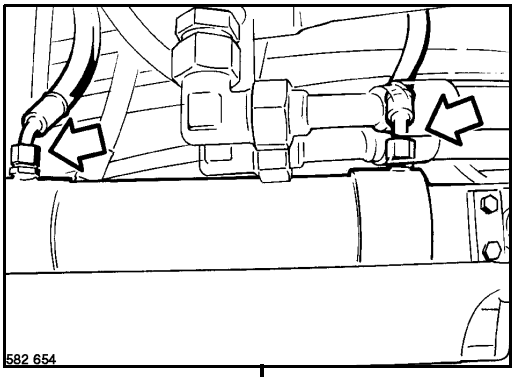
- Check the steering pressure
- Connect a 600 bar pressure gauge to the steering pressure test port
- Pull the plug off the starter solenoid and crank the engine with the starter
- Turn the steering against an end stop and read the pressure gauge

Nominal value:
approx. 200 bar (battery fully charged) (2900.7 psi)

Steering pressure OK?

yes → Check free movement of articulated joint and steering cylinders

no



Check steering cylinders

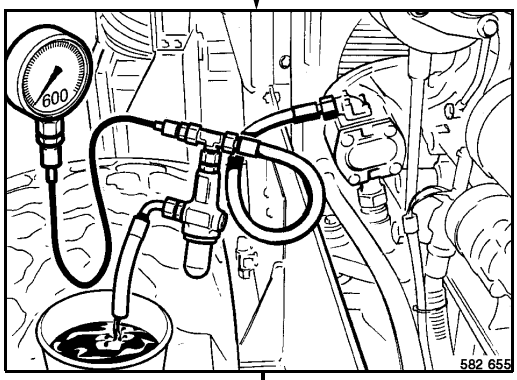
- Close hydraulic hose connections „R“ and „L“ on steering cylinders with plugs
- Repeat the pressure test

Steering pressure OK?

yes → Replace the steering cylinders

no

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Check steering/charge pump

- Close the pump outlet with a 200 bar pressure relief valve
- Connect a 600 bar pressure gauge
- Crank the engine with the starter
- Read the pressure gauge

Nominal value:
approx. 200 bar (2900.7 psi)

Steering pressure

yes

Replace/repair the steering valve

no

Replace/repair the steering/charge pump

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5 Drum

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5.1 Special tools

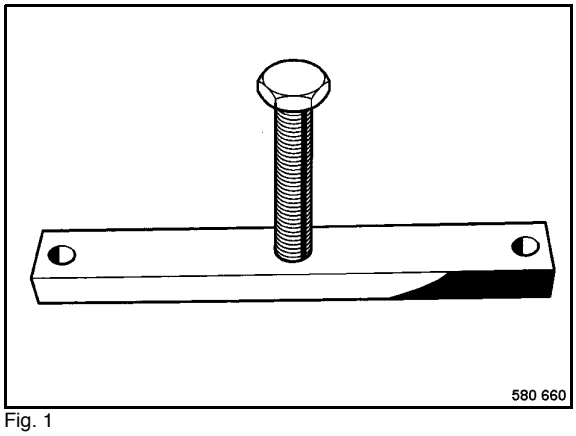


Fig. 1

1. Disassembly device for side plate

   BOMAG part-no.: 007 211 55

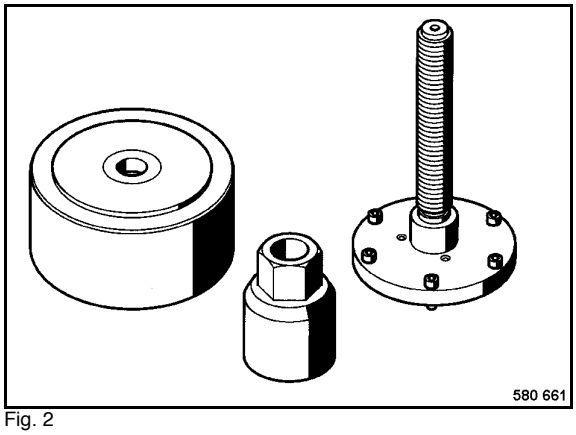


Fig. 2

2. Assembly device for side plate

   BOMAG part-no.: 971 079 21

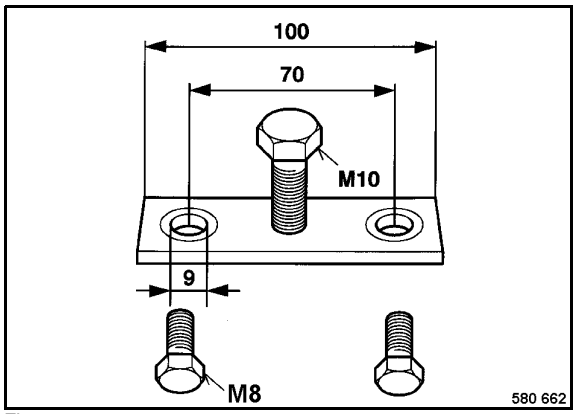


Fig. 3

3. Assembly device for coupling hub abd flanged hub

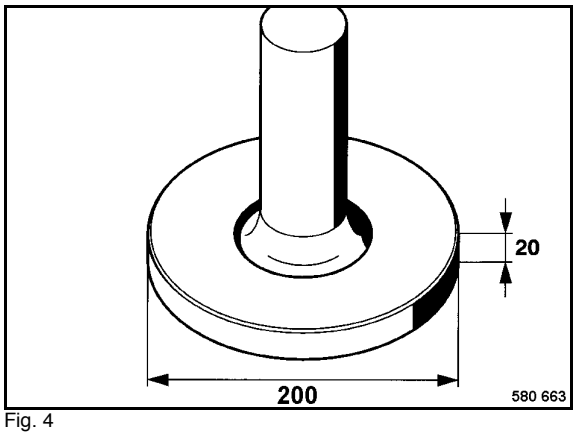


Fig. 4

4. Pressing plate for cylinder roller bearing

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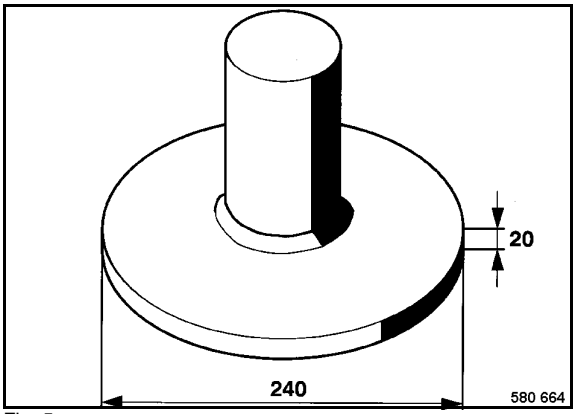


Fig. 5

5. Pressing plate for travel bearing

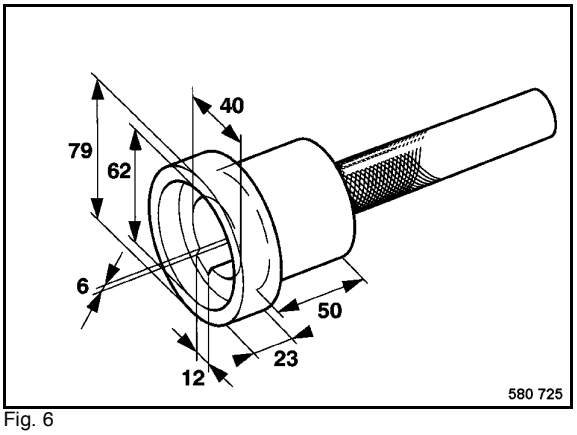


Fig. 6

6. Pressing bushing for radial seal

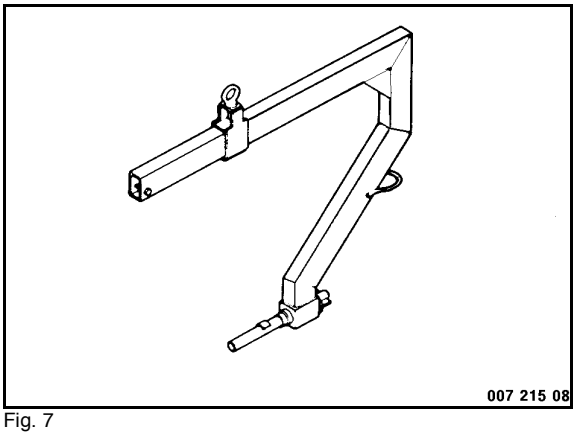


Fig. 7

7. Lifting device for exciter unit

   BOMAG part-no.: 007 215 08

https://truckmanualshub.com/

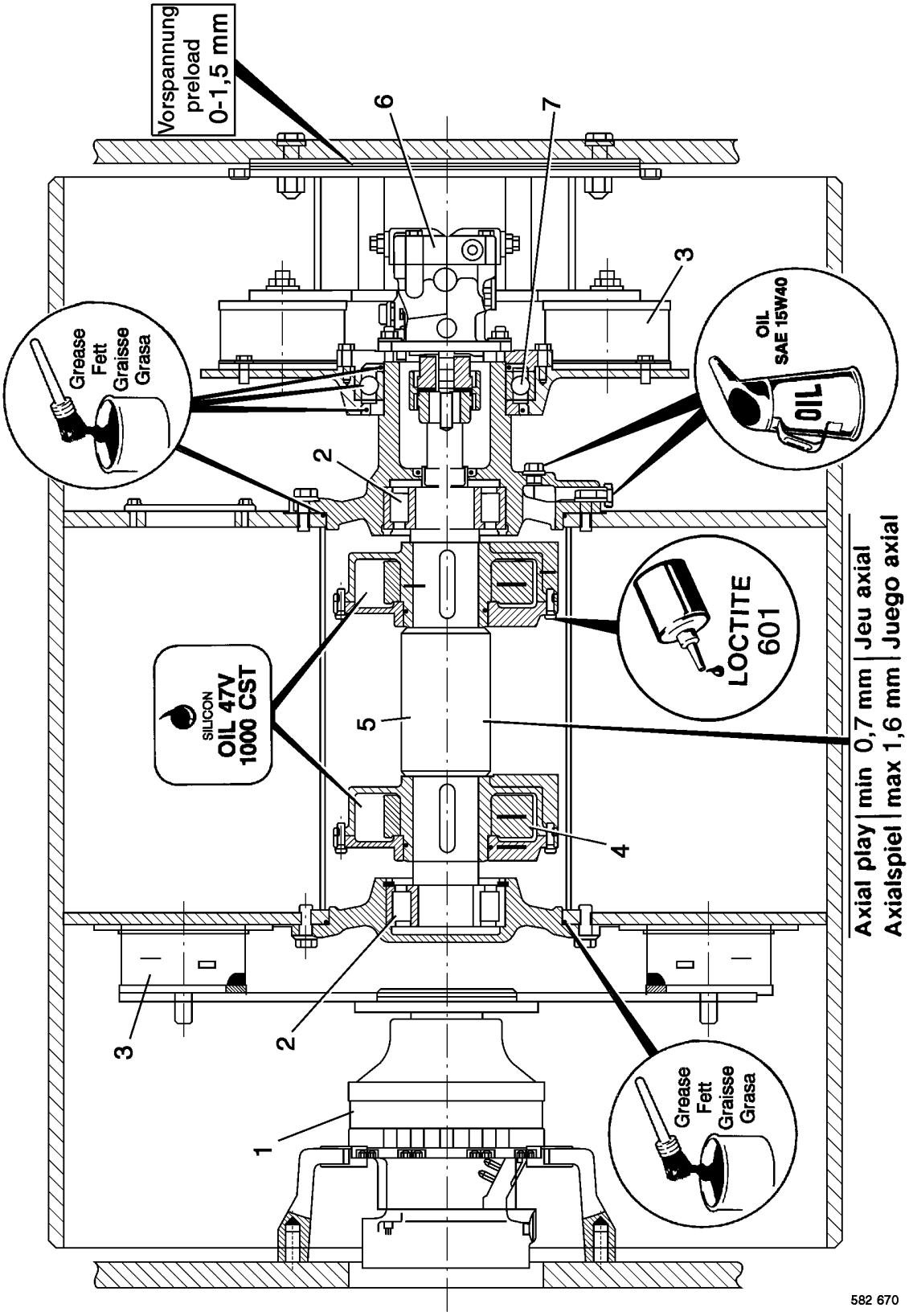


Fig. 1

https://truckmanualshub.com/

1 Drum drive motor
2 Vibration bearings
3 Rubber buffer
4 Change-over weight
5 Vibrator shaft
6 Vibration motor
7 Travel bearings

https://truckmanualshub.com/

5.3 Removing and installing the drum

Removing the drum

Environment

Environmental damage

Catch running out hydraulic oil and dispose of environmentally.

1. Unscrew the fastening screws (Fig. 1) from the hose brackets on both sides of the drum.

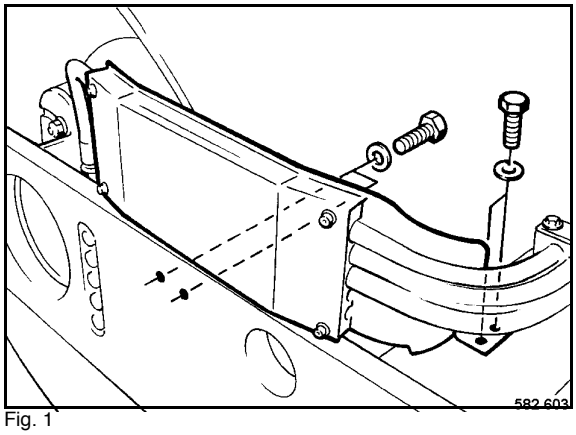


Fig. 1

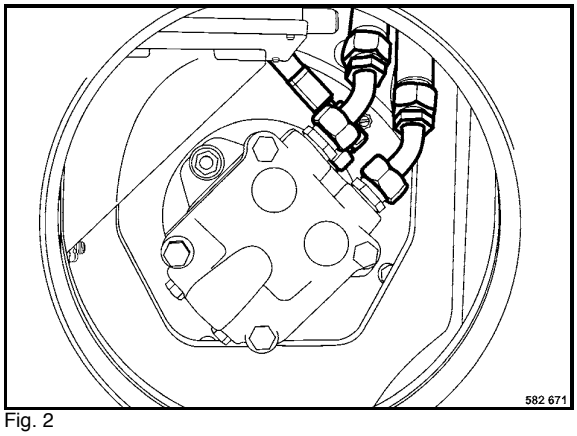


Fig. 2

2. Mark the hydraulic hoses on the vibration motor (Fig. 2) and disconnect them from the ports.
3. Close all hydraulic hoses and motor ports with suitable plugs.

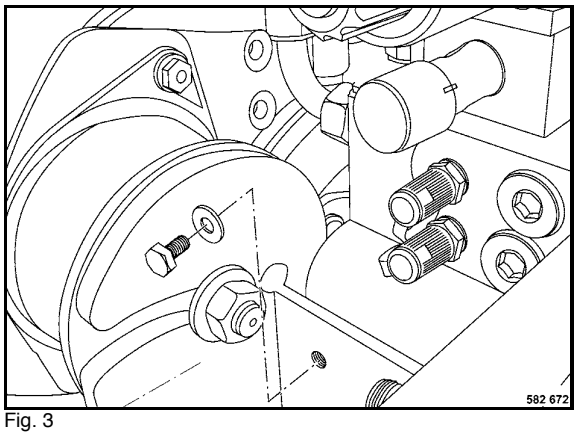


Fig. 3

4. Unscrew fastening screws (Fig. 3) from the vibration valve block.
5. Lay down the vibration valve block.

https://truckmanualshub.com/

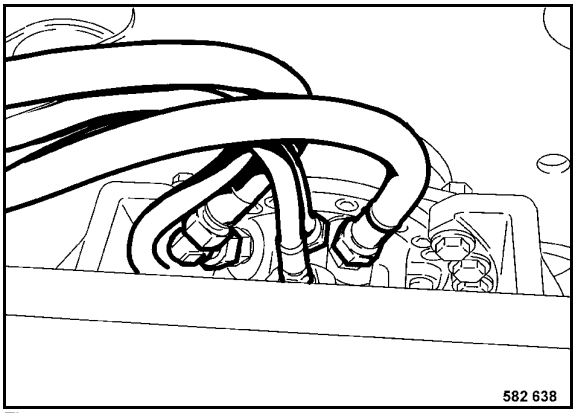


Fig. 4

6. Mark the hydraulic hoses (Fig. 4) on the travel motor and disconnect them from the ports.
7. Close all hydraulic hoses and motor ports with suitable plugs.

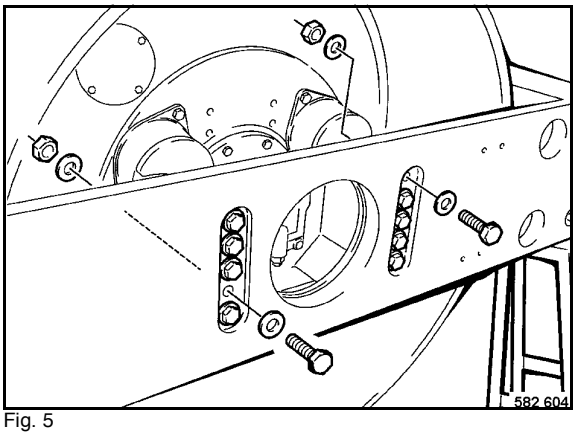


Fig. 5

⚠ Danger

Danger of accident!

8. Jack up the front frame, until the rubber buffers are unloaded.
9. Properly support the front frame on both sides of the rear cross-member.
10. Unscrew the fastening screws (Fig. 5) from the spacer block on the vibration motor.

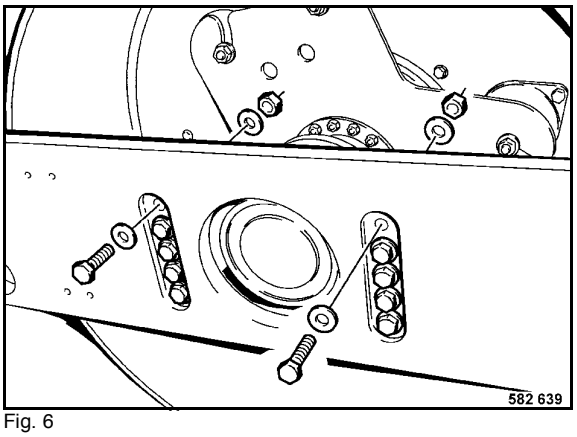


Fig. 6

11. Unscrew the fastening screws (Fig. 6) from the spacer block on the drum drive motor.

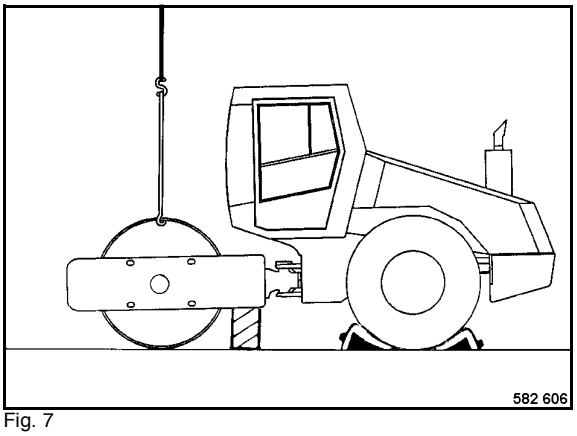


Fig. 7

⚠ Danger

Danger of squashing! Do not stand or step under loads being loaded.

i Note

If necessary you may also disassemble the side plate and lift the drum out sideways.

12. Fasten the lifting tackle to the drum (Fig. 7) and lift the drum carefully out of the front frame.

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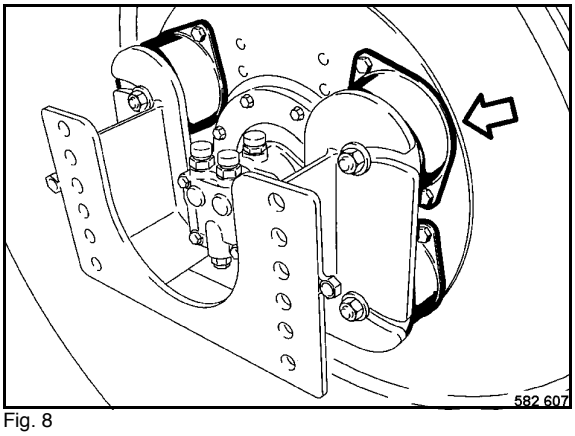


Fig. 8

13. Check all rubber buffers on vibration motor side (Fig. 8), replace if necessary (see corresponding chapter).

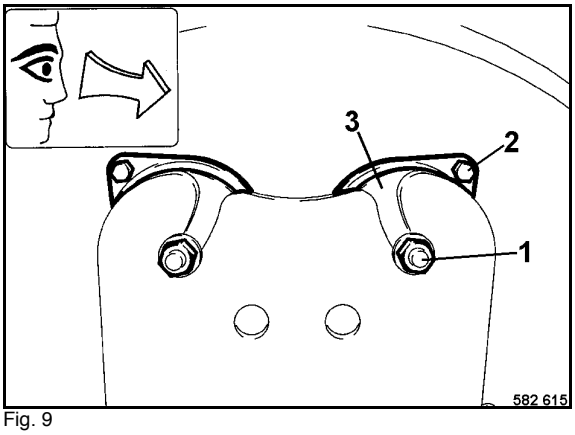


Fig. 9

14. Check rubber buffers on drum drive side (Fig. 9), replace if necessary.

Installing the drum

⚠ Danger

Danger of squashing!

Do not stand or step under loads being loaded.

1. Place the drum into the frame (Fig. 10) and align it parallel to the frame.

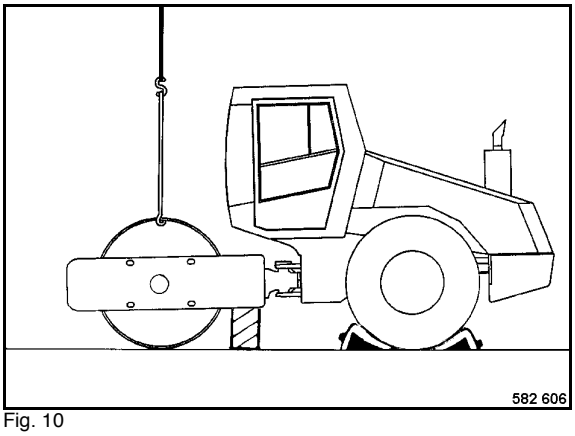


Fig. 10

2. Fasten the spacer blocks with screws (Fig. 11) and nuts to the side plate.

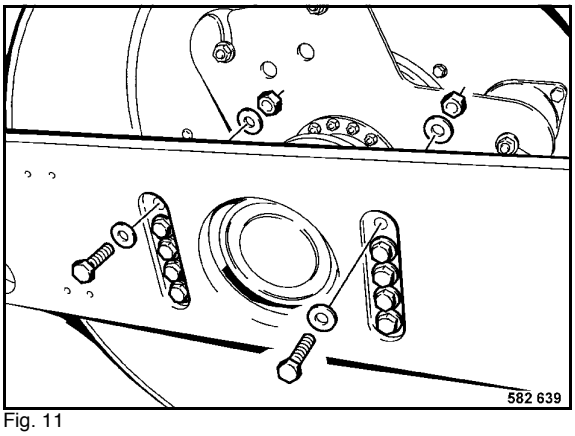


Fig. 11

https://truckmanualshub.com/

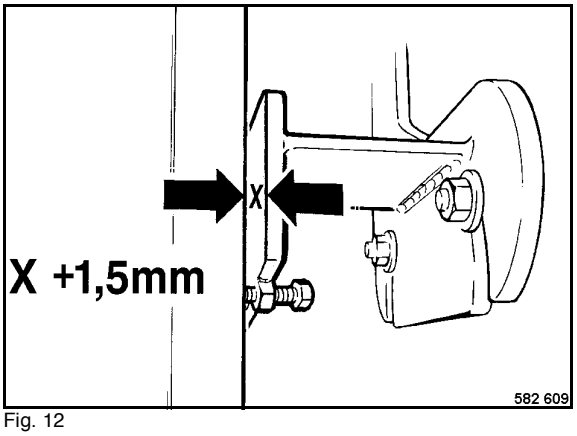


Fig. 12

3. On the vibration drive side measure the distance „X“ between spacer block and side plate (Fig. 12).
4. Calculate the thickness of the shims.

   Nominal value:
   Distance „X“ + 1.5 mm
5. Turn one screw into each welded nut at front and rear and open a sufficient gap to insert the shims.

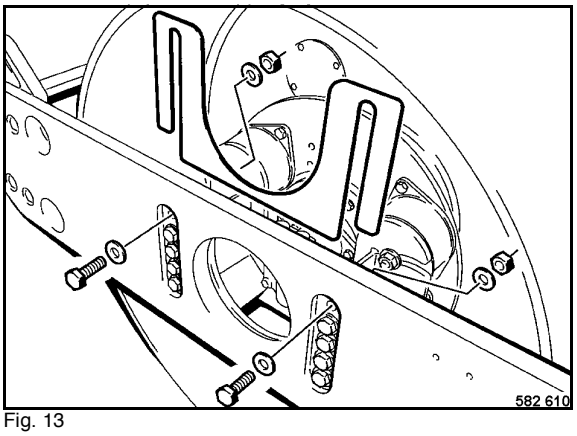


Fig. 13

6. Insert the shims (Fig. 13).
7. Unscrew the screws from the welded nuts.
8. Fasten the spacer blocks for the vibration motor with screws and nuts to the side plate.

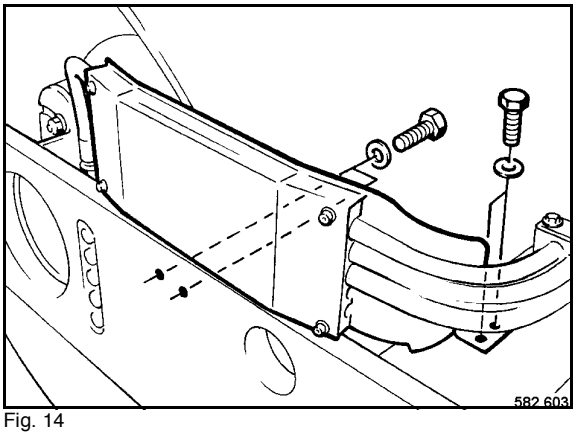


Fig. 14

9. Fasten the brackets (Fig. 14) for the hydraulic hoses on both sides.
10. Connect hydraulic hoses to the connections on travel motor and vibration motor according to the marking.

⚠ Caution

After connecting the hydraulic components and before starting operation bleed the hydraulic system, check the function and inspect the system for leaks.

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5.4 Repairing the drum

Disassembling the travel drive

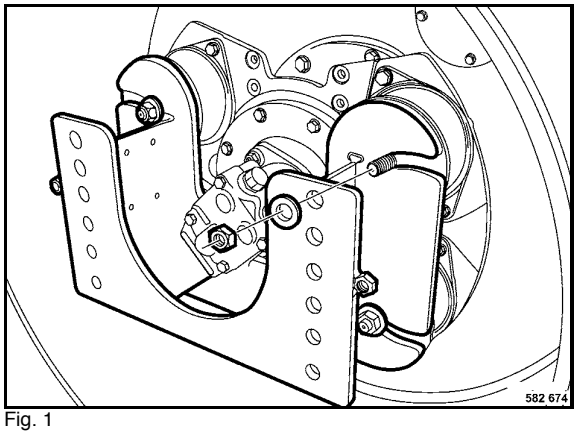


Fig. 1

1. Remove the drum.
2. Unscrew the fastening nuts (Fig. 1) and take off the spacer block.

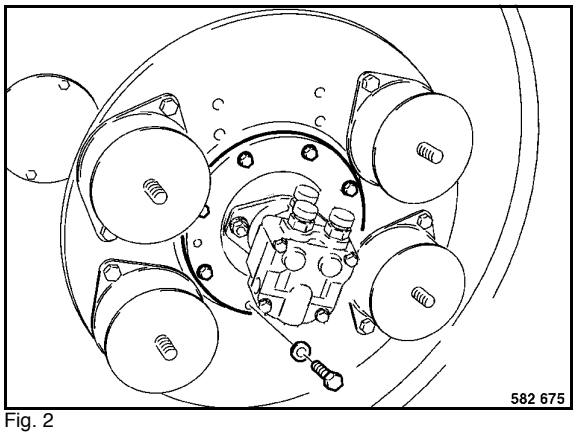


Fig. 2

3. Unscrew the fastening screws for the flanged cover (Fig. 2) and remove the cover with the vibration motor.

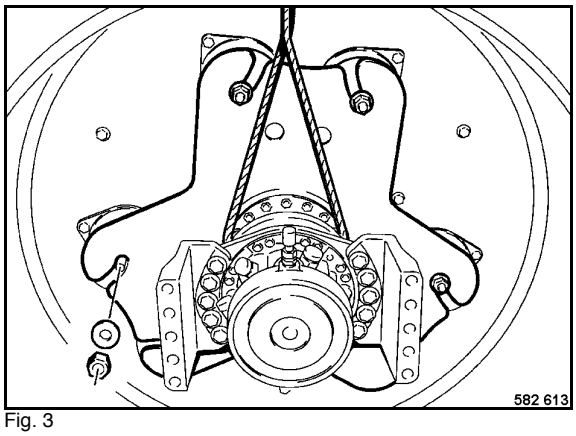


Fig. 3

4. Attach the lifting tackle to the drum drive motor.
5. Unscrew the fastening screws (Fig. 3) and take off the drive disc with the drum drive motor.
6. Check all rubber buffers for wear, replace if necessary (see corresponding chapter).

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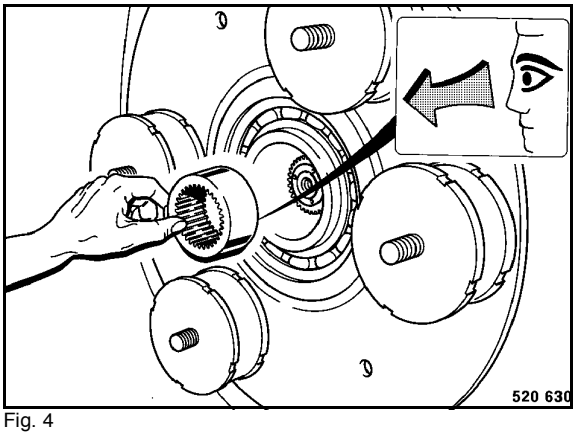


Fig. 4

7. Pull the coupling sleeve off the hub (Fig. 4) and check for wear.

Disassembling the bearing cover

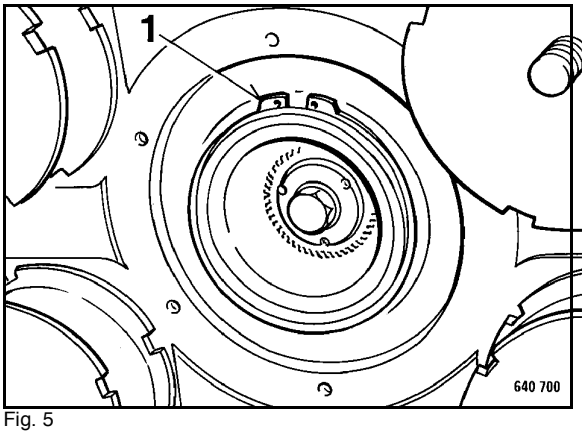


Fig. 5

1. Remove circlip 1 (Fig. 5) from the bearing housing.

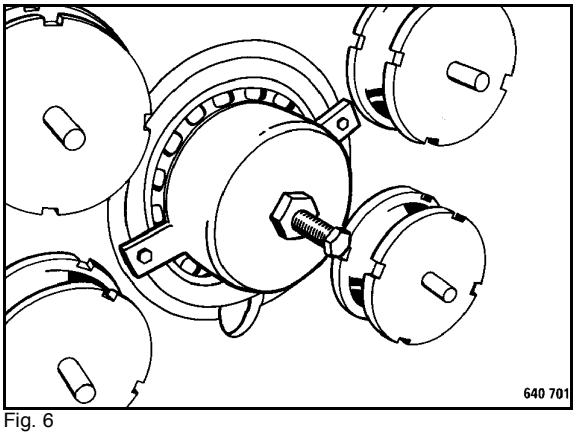


Fig. 6

2. Pull the bearing cover off the bearing housing (Fig. 6).

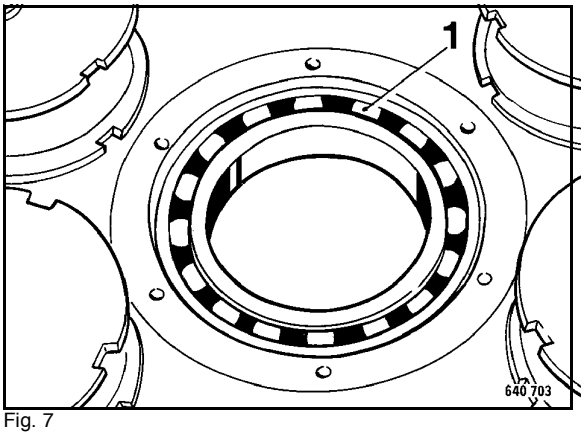


Fig. 7

3. Knock grooved ball bearing 1 (Fig. 7) out of the bearing cover.

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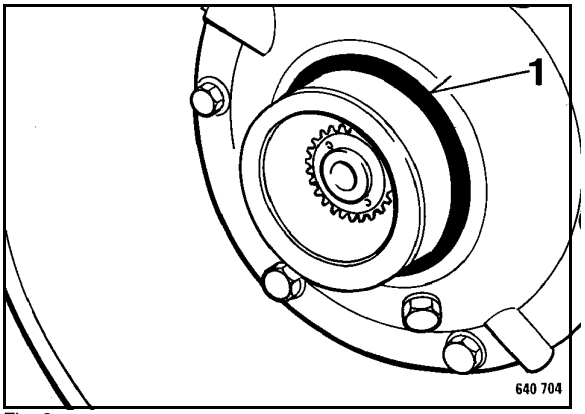


Fig. 8

4. Take V-ring 1 (Fig. 8) off the bearing housing.

Disassembling the exciter shaft

1. Pull the coupling hub off the exciter shaft (Fig. 9).

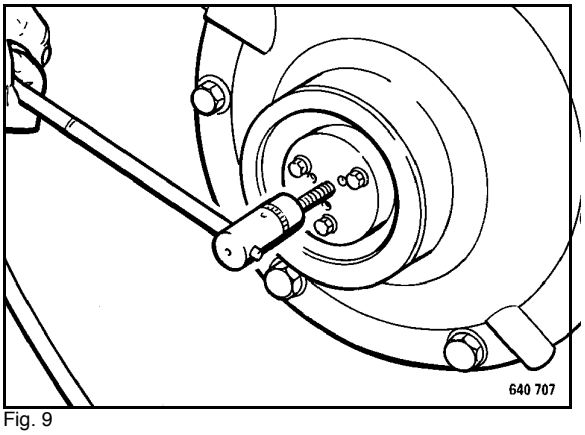


Fig. 9

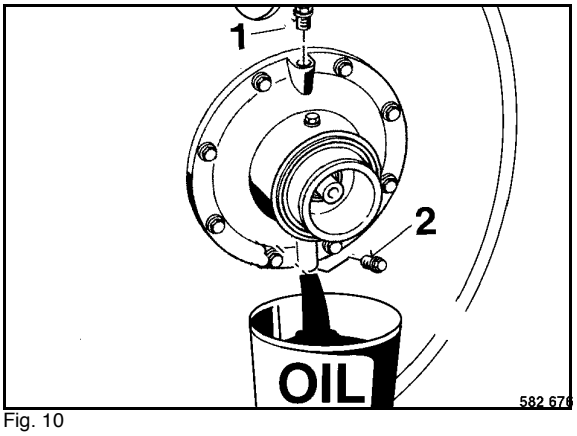


Fig. 10

2. Unscrew filler plugs 1 (Fig. 10).

Environment

Environmental damage!

Catch running out oil and dispose of environmentally.

3. Unscrew drain plug (2) from the flange and drain the oil from the bearing housing.

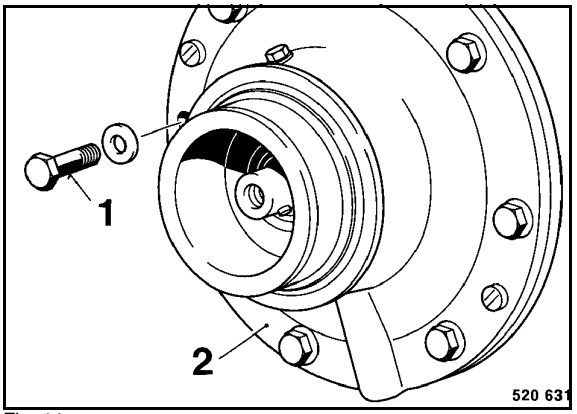


Fig. 11

4. Unscrew fastening screws 1 (Fig. 11) from bearing housing (2).

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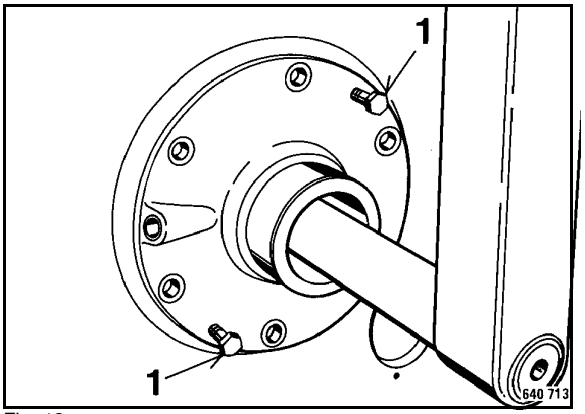


Fig. 12

5. Pick up the lifting device with a crane and slide it over the exciter shaft.
6. Force the bearing housing out of the drum using forcing screws 1 (Fig. 12).

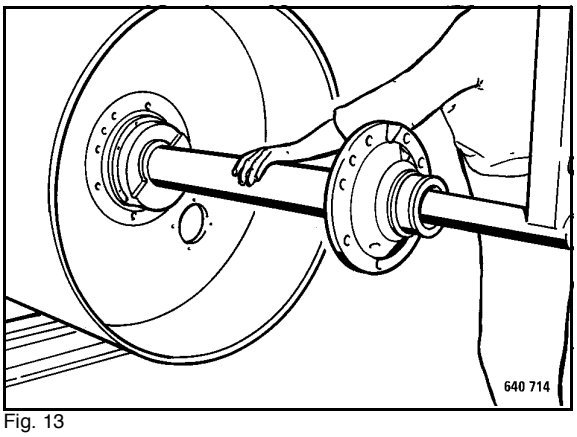


Fig. 13

7. Pull the exciter shaft out of the drum (Fig. 13).

Dismantling the vibrator unit

1. Take the bearing housing off the exciter shaft (Fig. 14).

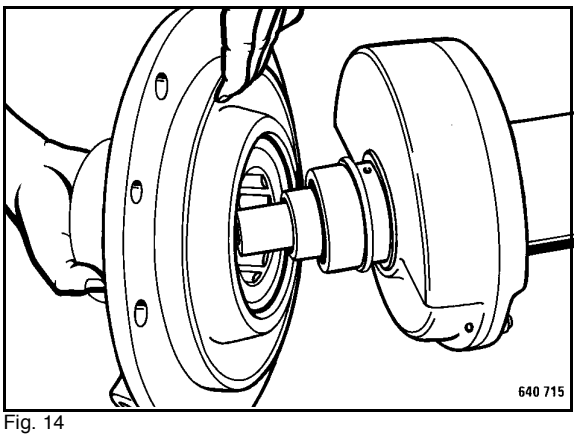


Fig. 14

2. Take O-ring 1 (Fig. 15) off the bearing housing.

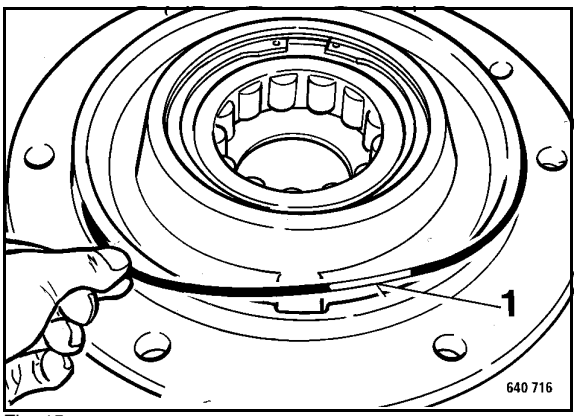


Fig. 15

https://truckmanualshub.com/

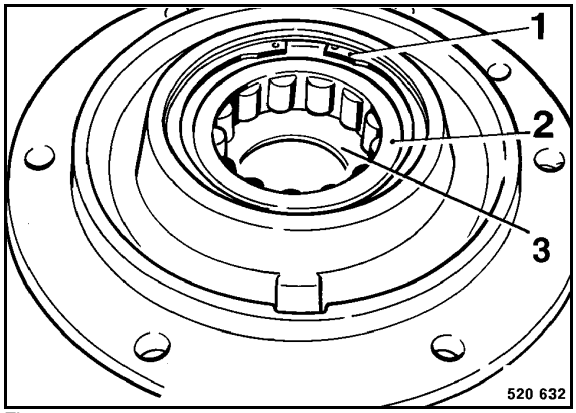


Fig. 16

3. Remove circlip 1 (Fig. 16) and knock out cylinder roller bearing (2).
4. Knock the radial seal (3) out of the bearing housing.

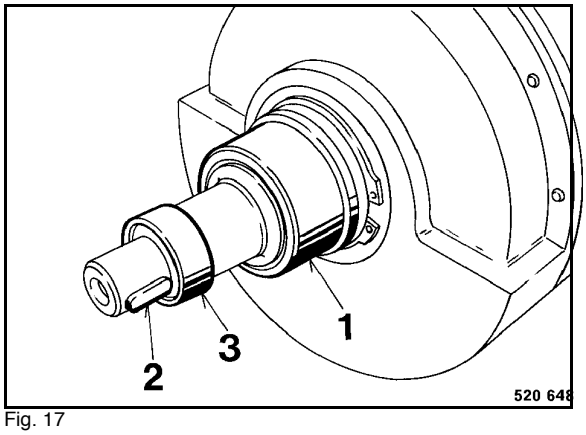


Fig. 17

5. Take fitting key 2 (Fig. 17) out of the keyway.

i Note

If inner bearing race and inner ring are very tight on the shaft, heat them up with a torch.

6. Knock inner bearing race (1) and inner ring (3) of the shaft.

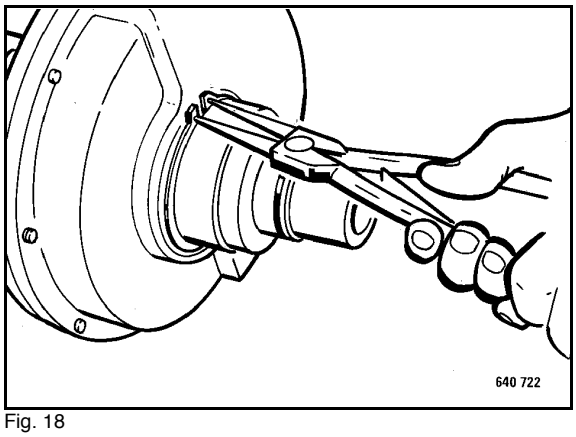


Fig. 18

7. Unclip the circlip from the groove in front of the change-over weight (Fig. 18).

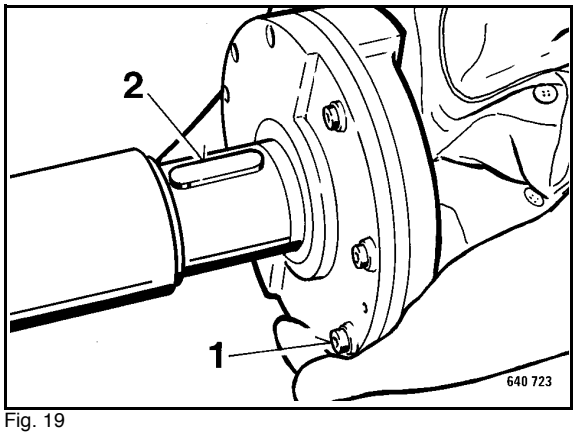


Fig. 19

8. Extract change-over weight 1 (Fig. 19) from the exciter shaft.

i Note

If necessary disassemble, assemble the change-over weight (see corresponding chapter).

9. Take the circlip (2) out of the groove in the vibrator shaft.

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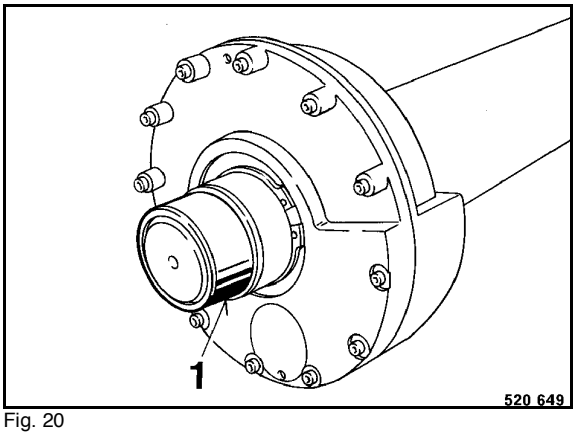


Fig. 20

10. Pull the inner bearing race 1 (Fig. 20) off the other side of the vibrator shaft.

⚠ Danger

Wear protective gloves.

i Note

If the inner bearing race sits very tight, heat the ring up with a torch.

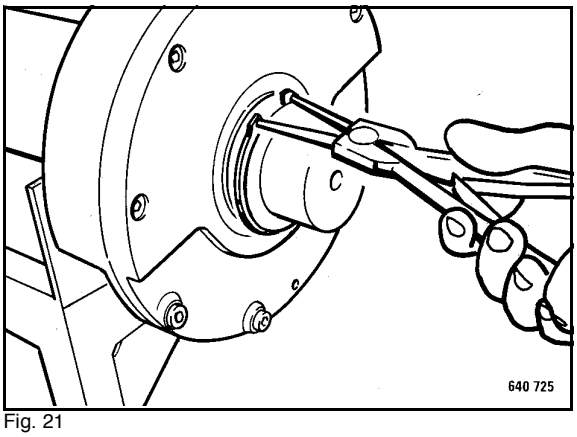


Fig. 21

11. Unclip the circlip from the groove in front of the change-over weight (Fig. 21).

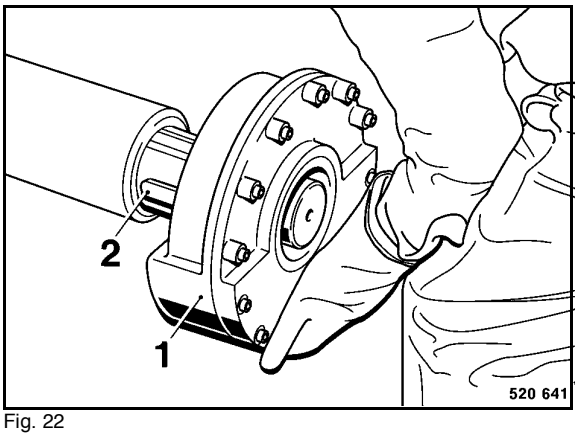


Fig. 22

12. Extract change-over weight 1 (Fig. 22) from the exciter shaft.

i Note

If necessary disassemble, assemble the change-over weight (see corresponding chapter).

13. Take the circlip (2) out of the groove in the vibrator shaft.

Removing the cover

1. Unscrew fastening screws 1 (Fig. 23) from cover (2).

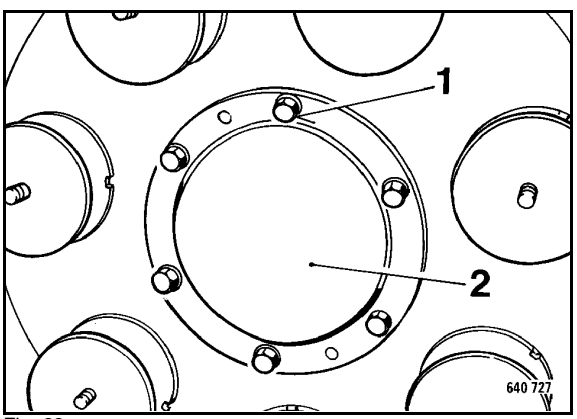


Fig. 23

https://truckmanualshub.com/

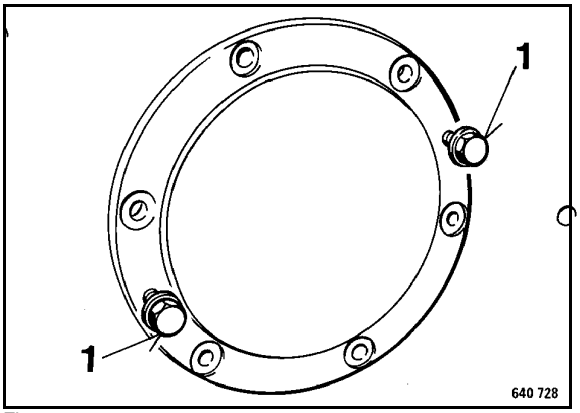


Fig. 24

2. Force the cover off the drum using forcing screws 1 (Fig. 24).

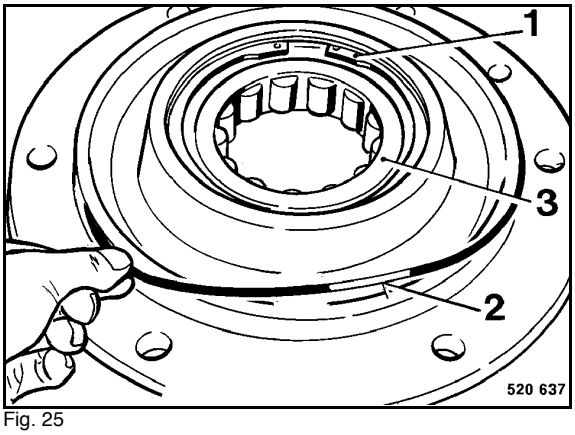


Fig. 25

3. Take O-ring 2 (Fig. 25) off the cover.
4. Remove circlip (1) and knock out cylinder roller bearing (3).

Assembling the cover

1. Drive the new bearing 3 (Fig. 26) into the cover until it bottoms and lubricate it with oil.
2. Assemble circlip (1).
3. Assemble the new O-ring (2) with grease.

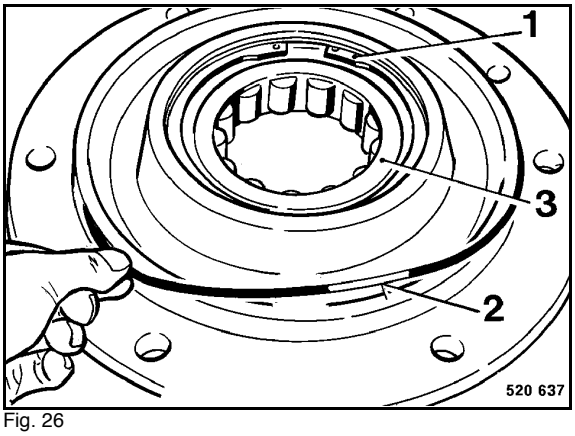


Fig. 26

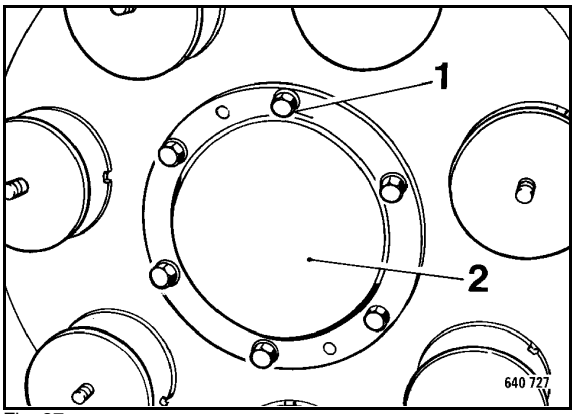


Fig. 27

4. Assemble cover 2 (Fig. 27) and fasten with screws (1).

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Assembling the exciter shaft

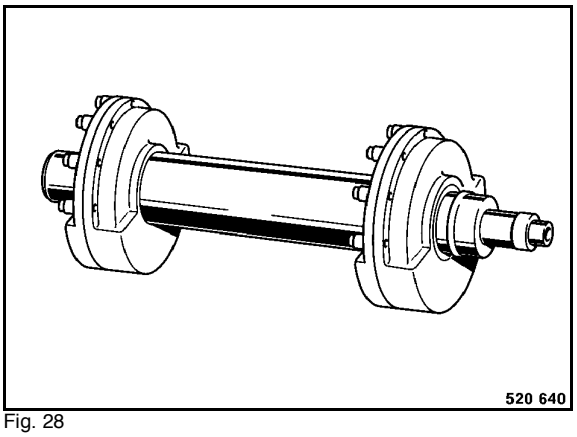


Fig. 28

⚠ Caution

During assembly observe the installation direction of the change-over weights (Fig. 28).

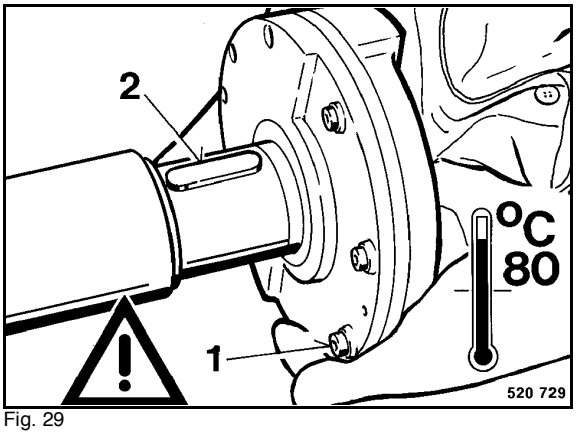


Fig. 29

1. Insert fitting key 2 (Fig. 29) into the keyway in the exciter shaft.

⚠ Danger

Danger of burning!

Wear protective gloves.

2. Heat the change-over weight (1) up to approx. 80 °C (176 °F) and slide it on the exciter shaft.

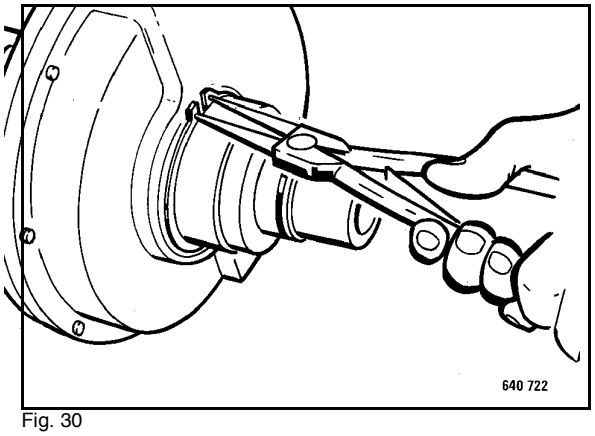


Fig. 30

3. Fit the circlip (Fig. 30).

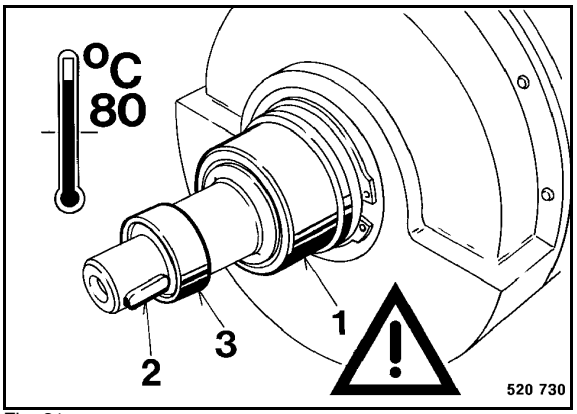


Fig. 31

⚠ Danger

Danger of burning!

Wear protective gloves.

4. Heat inner bearing race 1 (Fig. 31) up to approx. 80° *and press it on against the shoulder with the larger outer diameter facing forward. *(176°F)
5. Heat the inner ring (3) up to approx. 80 °C *and slide it on against the stop.*(176°F)
6. Insert fitting key (2) into the keyway in the exciter shaft.

https://truckmanualshub.com/

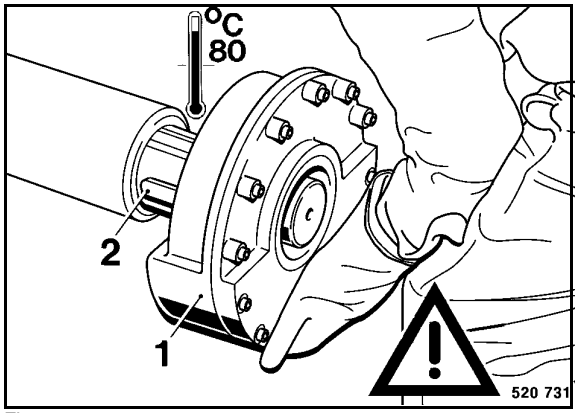


Fig. 32

7. Insert fitting key 2 (Fig. 32) into the keyway in the exciter shaft.

⚠ Caution

Observe the installation direction.

8. Heat the change-over weight (1) up to approx. 80 °C (176°F)and slide it on the exciter shaft.

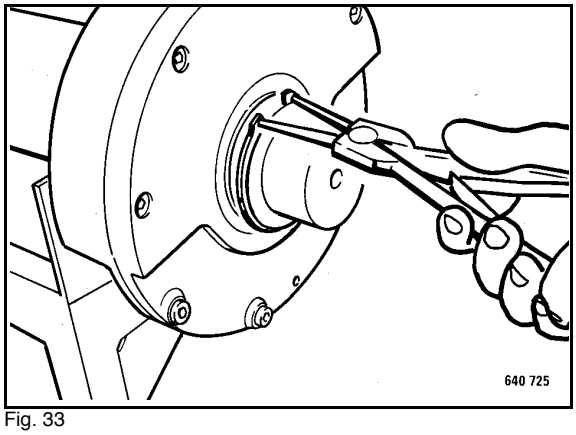


Fig. 33

9. Fit the circlip (Fig. 33).

⚠ Danger

Danger of burning!

Wear protective gloves.

10. Heat inner bearing race up to approx. 80° (176°F)and press it on against the shoulder with the larger outer diameter facing forward (Fig. 34).

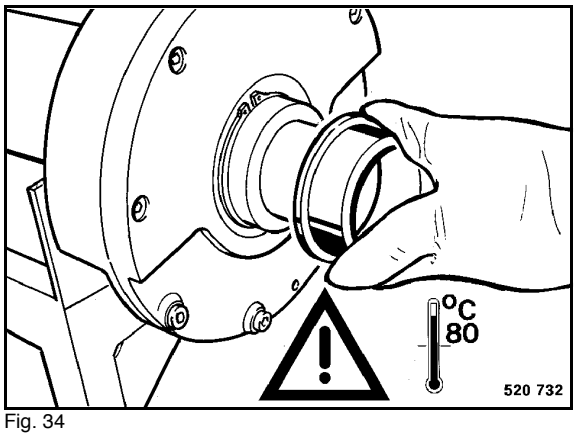


Fig. 34

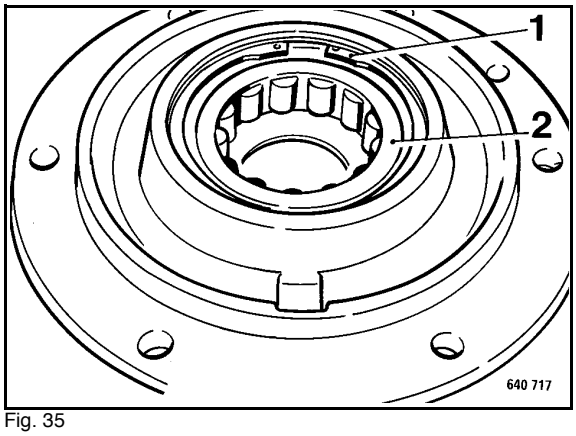


Fig. 35

11. Drive the new bearing 2 (Fig. 35) into the bearing housing until it bottoms and lubricate it with oil.
12. Assemble circlip (1).

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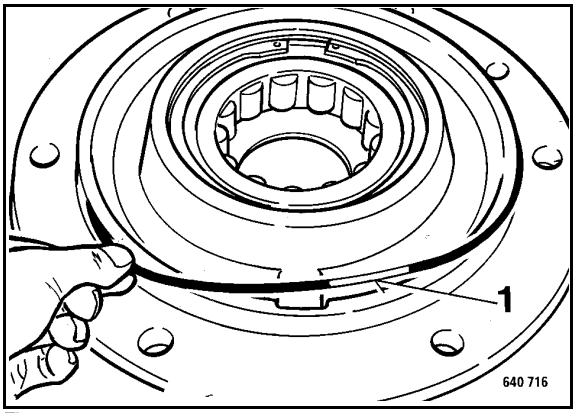


Fig. 36

13. Stick the new O-ring 1 (Fig. 36) with grease into the bearing housing.

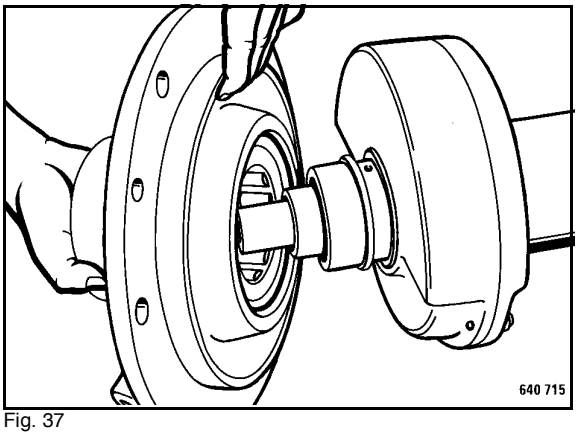


Fig. 37

14. Slide the bearing housing over the exciter shaft (Fig. 37).

Installing the exciter shaft

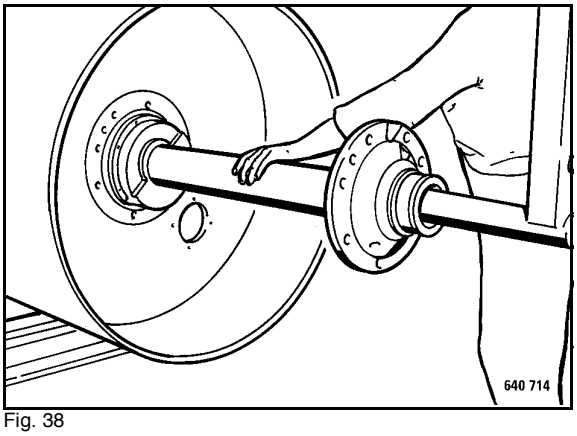


Fig. 38

1. Slide the lifting device over the exciter shaft and insert it carefully into the opposite bearing (Fig. 38).

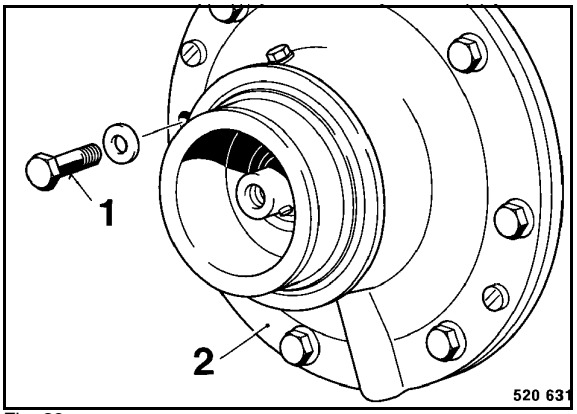


Fig. 39

2. Fasten bearing housing (2) with screws 1 (Fig. 39).

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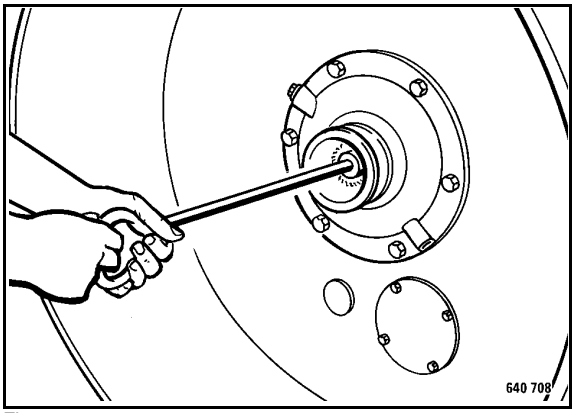


Fig. 40

3. To measure the end float turn an eye bolt M16 (Fig. 40) into the bore in the exciter shaft.
4. Push the exciter shaft into the bearing housing against the end stop.

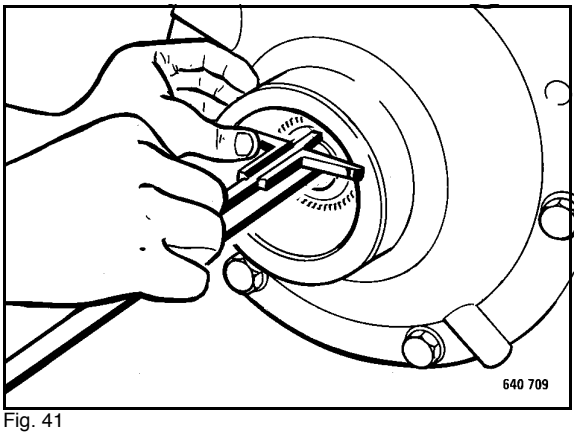


Fig. 41

5. Measure the distance between exciter shaft and front face of bearing housing (Fig. 41).

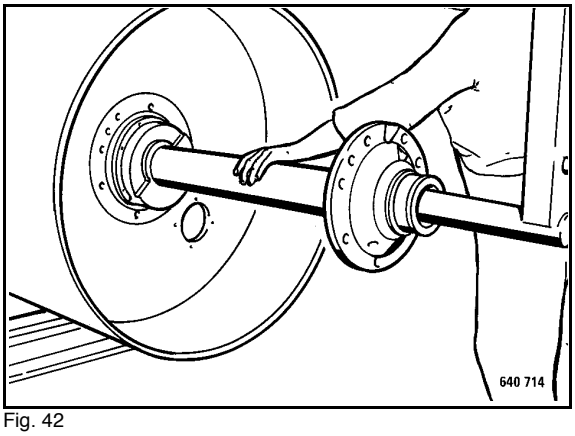


Fig. 42

6. Pull the exciter shaft out of the flange against the stop (Fig. 42).

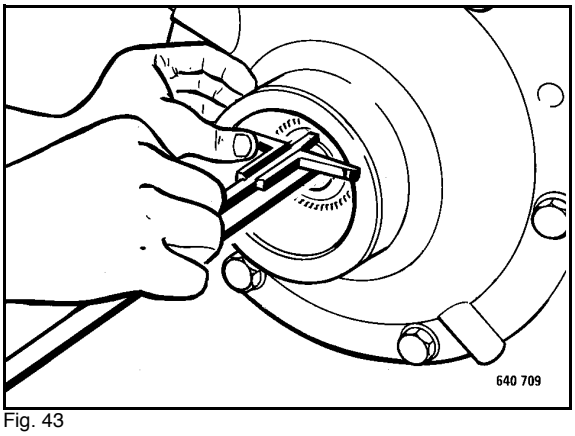


Fig. 43

7. Measure the distance between exciter shaft and front face of bearing housing once again (Fig. 43).

i Note

Subtract the second measurement from the first measurement to calculate the end float.

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Nominal value:
min. + 0,7 mm
max. + 1,6 mm

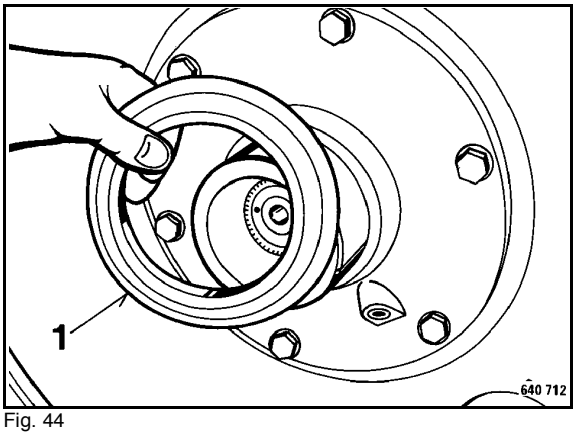


Fig. 44

8. If a new bearing housing has been installed heat the spacer ring 1 (Fig. 44) up to approx. 80 °C *and slide it on the bearing housing against the stop with the bigger outer diameter facing forward. *(176°F).

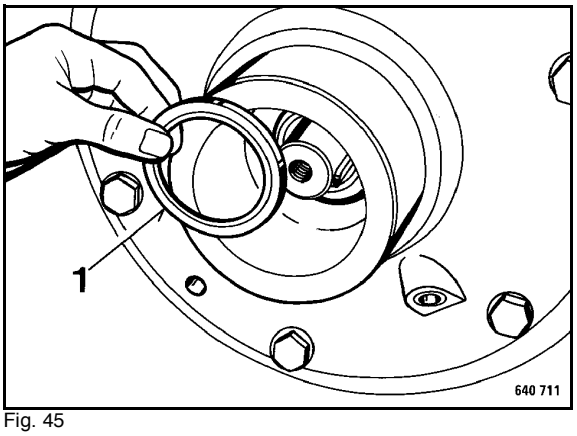


Fig. 45

⚠ Caution

The outer rim of the seal ring must be absolutely dry and free of grease, oil, paint and conserving agent.

9. Apply some Hylomar to the outer rim of seal ring 1 (Fig. 45) and press the seal ring into the bearing housing until it bottoms, with the sealing lip forward.

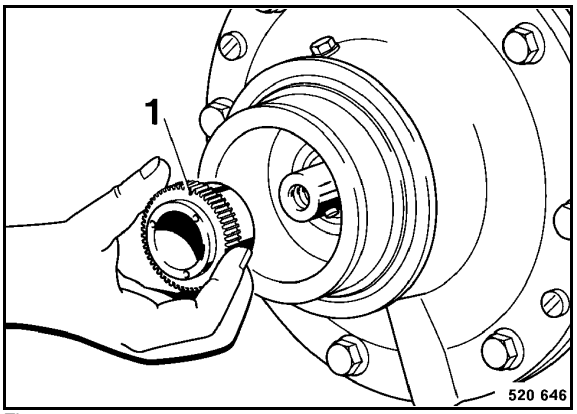


Fig. 46

10. Drive coupling hub 1 (Fig. 46) on the exciter shaft.

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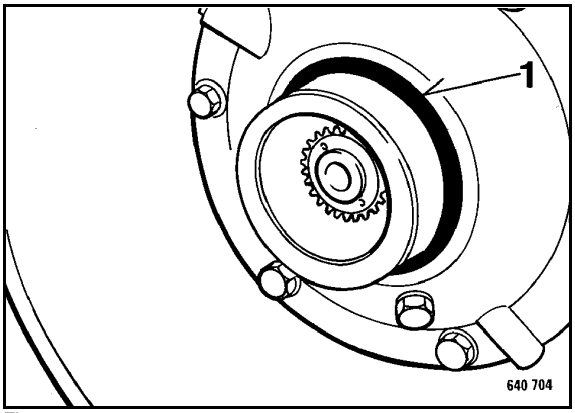


Fig. 47

11. Push the new V-ring 1 (Fig. 47) on the bearing housing with the sealing lip pointing to the outside.

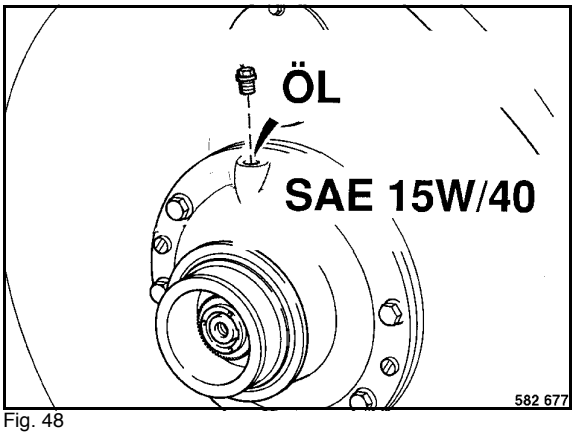


Fig. 48

12. Unscrew plugs 1 and 2 (Fig. 48) and fill in engine oil, as specified in the maintenance instructions.
13. Close the filler openings with plugs (1) and (2).

Assembling the cover

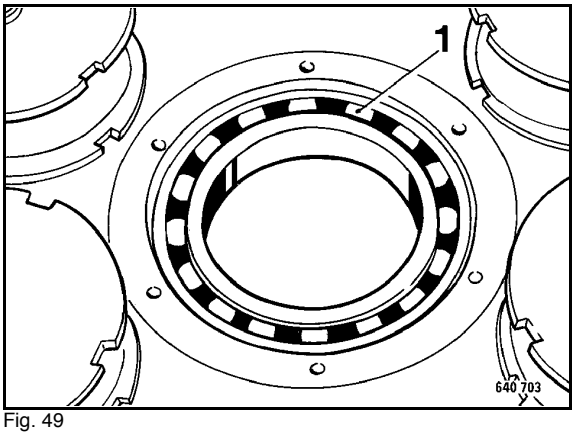


Fig. 49

1. Knock the grooved ball bearing 1 (Fig. 49) into the bearing cover until it bottoms and fill it with grease.

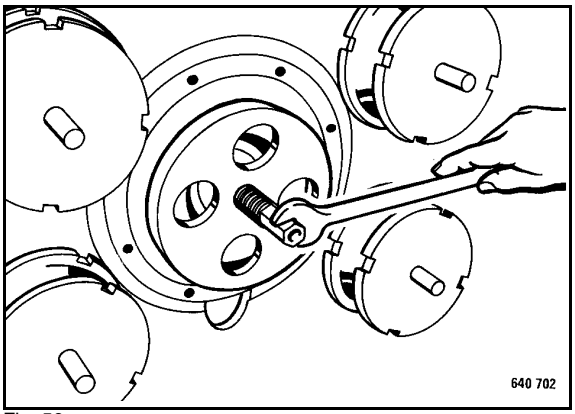


Fig. 50

2. Pull the bearing cover down to full contact (Fig. 50).

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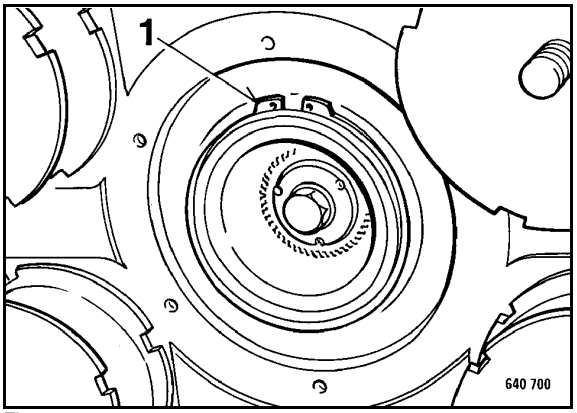


Fig. 51

3. Install circlip 1 (Fig. 51).

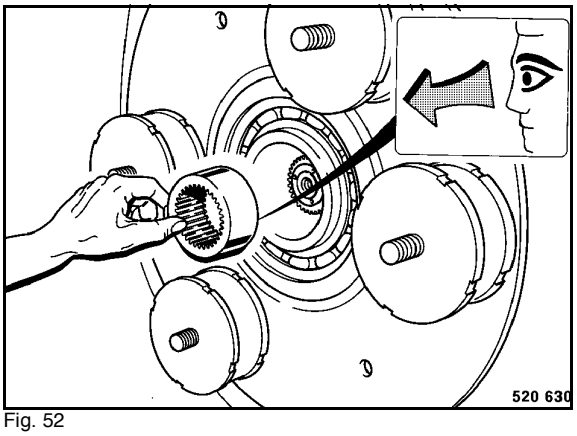


Fig. 52

4. Check the splines in the coupling sleeve (Fig. 52) for wear, if necessary use and install a new one.

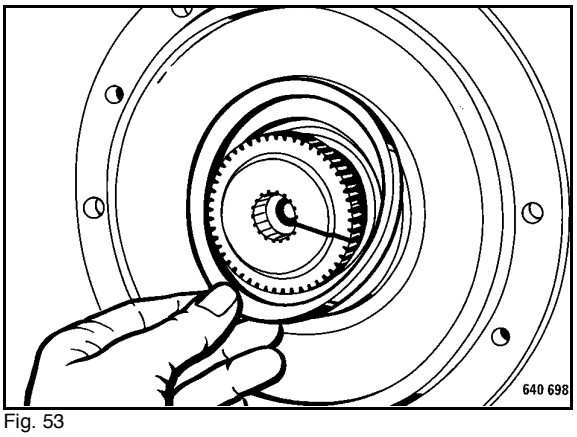


Fig. 53

5. Slide the new V-ring (Fig. 53) on the flange cover of the vibration motor with the sealing lip pointing towards the outside.

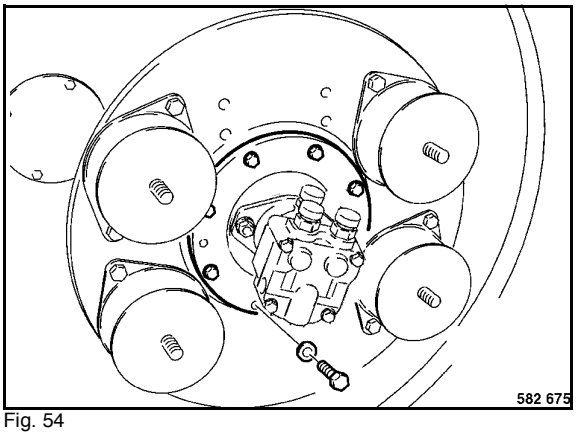


Fig. 54

6. Assemble the flange with the vibration motor (Fig. 54).

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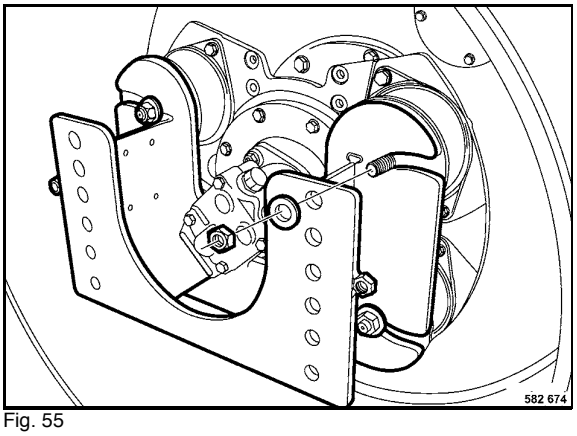


Fig. 55

7. Assemble the spacer block (Fig. 55) to the rubber buffers.

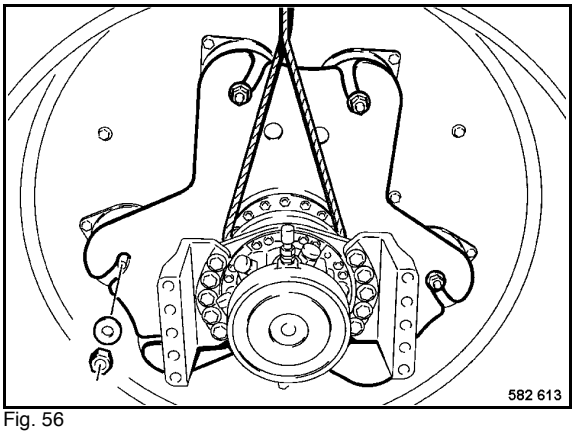


Fig. 56

8. Assemble drum drive motor with drive disc (Fig. 56).
9. Install the drum (see corresponding chapter).

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5.5 Dismantling, assembling the change-over weights

Dismantling

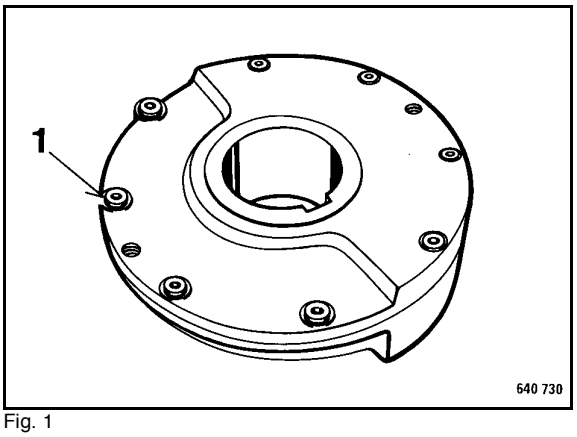


Fig. 1

1. Unscrew all fastening screws (Fig. 1).

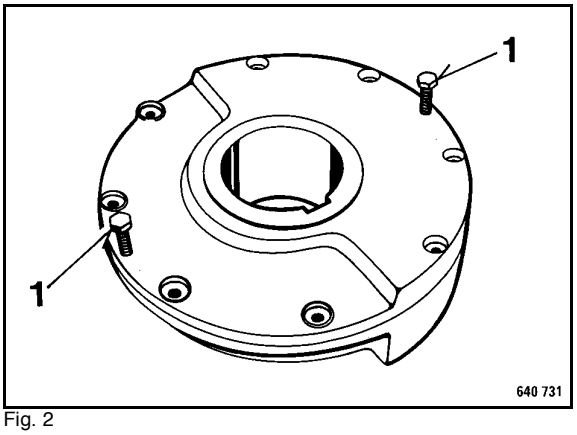


Fig. 2

2. Turn screws 1 (Fig. 2) into the tapped bores of the cover and force the cover off.

Environment

Catch running out oil and dispose of environmentally.

3. Tip the oil into a suitable container.

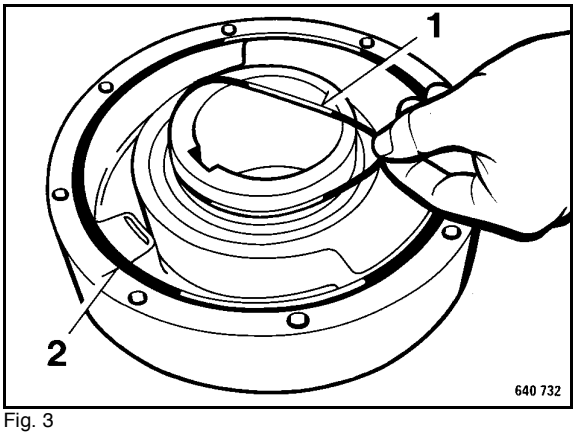


Fig. 3

4. Pull O-rings 1 and 2 (Fig. 3) out of the grooves.

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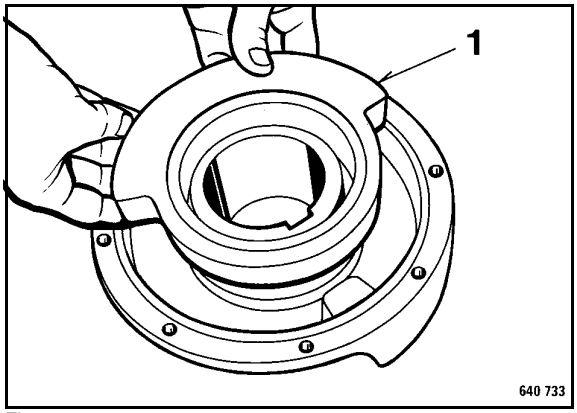


Fig. 4

5. Take weight 1 (Fig. 4) out of the housing.

Assembly

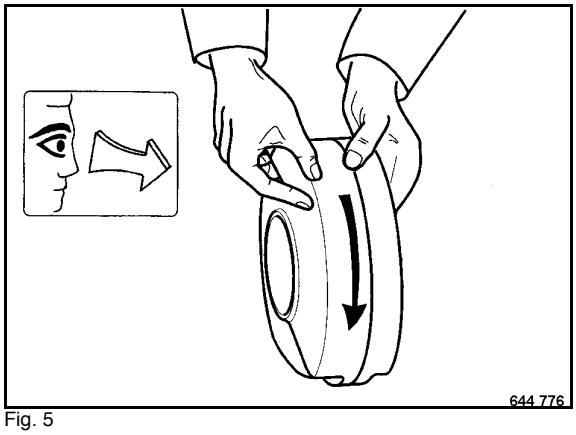


Fig. 5

1. Before reassembling check whether the weight correctly changes its position after the cover has been installed (without oil) (Fig. 5).

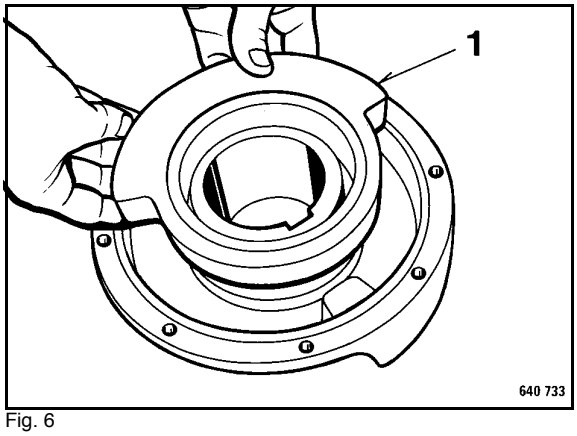


Fig. 6

2. Lay the change-over weight into the housing with the chamfered inner edge (Fig. 6) facing up.

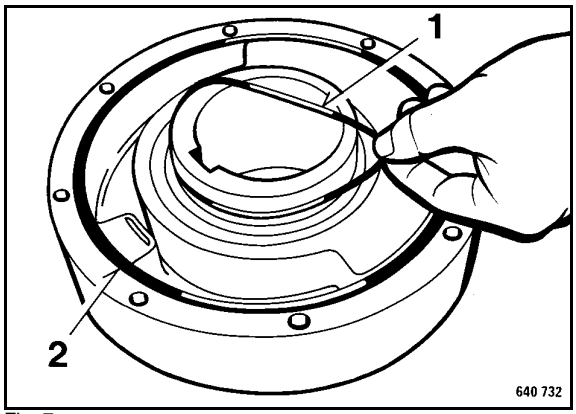


Fig. 7

3. Place O-rings 1 and 2 (Fig. 7) with some grease into the grooves.

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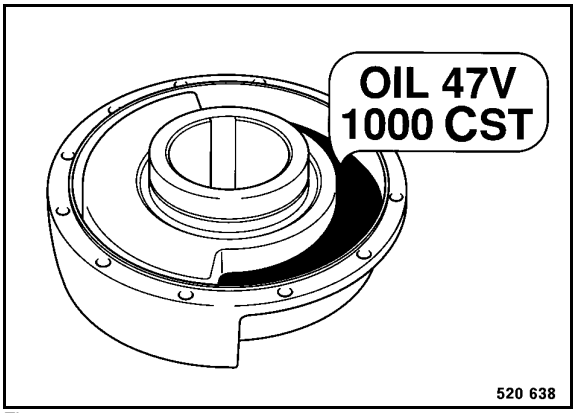


Fig. 8

4. Fill the housing up to the edge with approx. 1 litre of silicone oil 47V 1000 cSt (Fig. 8).

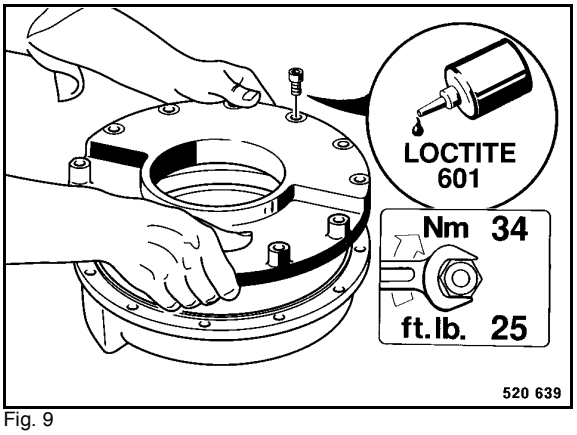


Fig. 9

5. Attach the cover (Fig. 9) to the housing.
6. Cover the fastening screws with LOCTITE green (No. 601).
7. Tighten the fastening screws evenly with 34 Nm*.
*(25 lbf*lb)

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5.6 Changing the rubber buffers

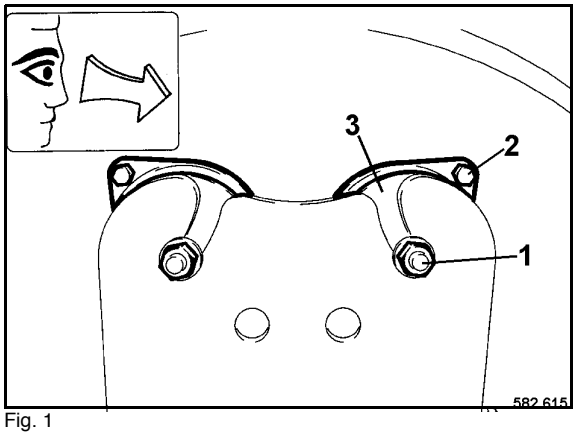


Fig. 1

1. Jack the frame up at the side, until the rubber buffers are unloaded.
2. Unscrw nut 1 (Fig. 1) and remove the washer.
3. Unscrew screws (2).
4. Take off rubber buffer (3).
5. Attach the new rubber buffer to the drive disc and align the bores to the tapped bores in the drum.
6. Turn in and tighten the fastening screws.
7. assemble the washer, turn on and tighten the nut.

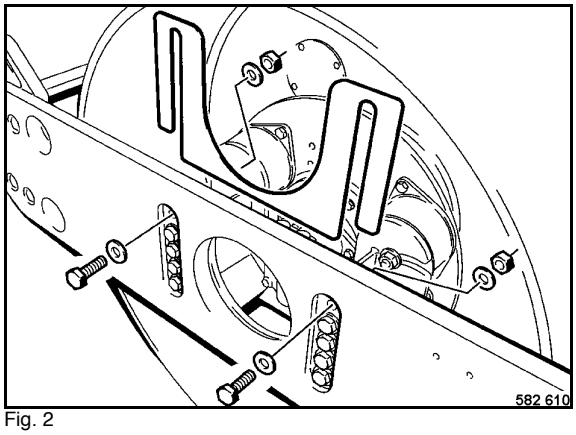


Fig. 2

8. Unscrew the fastening screws (Fig. 2) from the spacer block on the vibration motor.
9. Remove the shims.

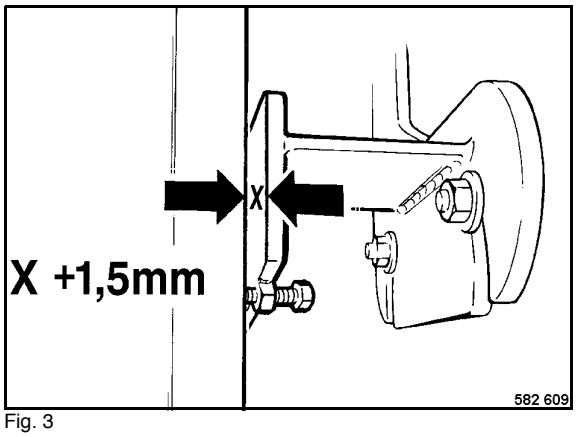


Fig. 3

10. Measure distance „X“ between spacer piece and side plate (Fig. 3).
11. Calculate the thickness of the compensation plates.

    Nominal value:
    Distance „X“ + 1.5 mm
12. Turn one screw into each welded nut at front and rear and open a sufficient gap to insert the shims.

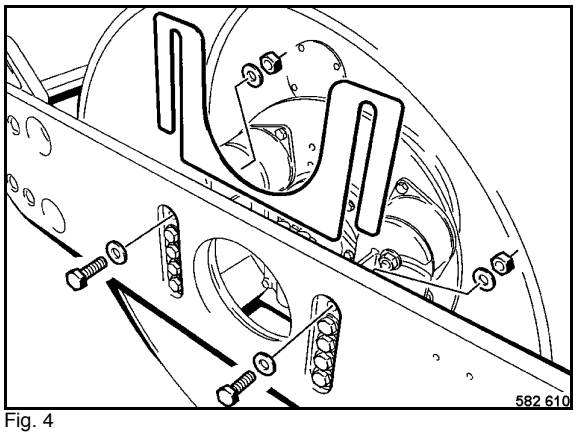


Fig. 4

13. Insert the shims (Fig. 4).
14. Unscrew the screws from the welded nuts.
15. Fasten the spacer blocks for the vibration motor with screws and nuts to the side plate.
16. Lower the side of the frame.

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6 Oscillating articulated joint

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6.1 Special tools

1. Pressing device for rocker bearings

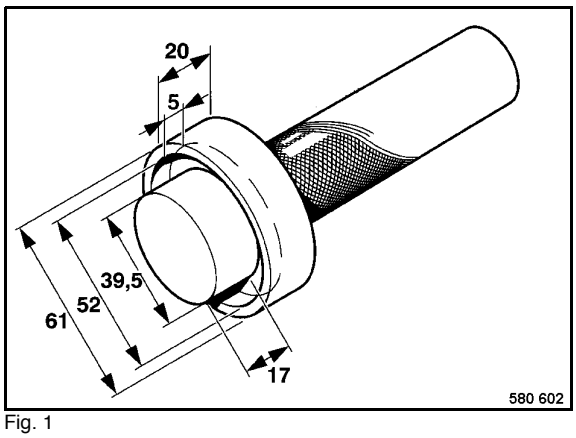


Fig. 1

2. Pressing bushing for self-aligning bearings

   BOMAG part-no.: 971 070 94

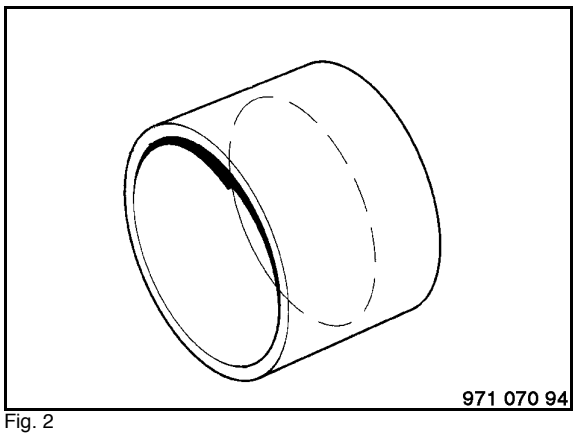


Fig. 2

3. Guide pin

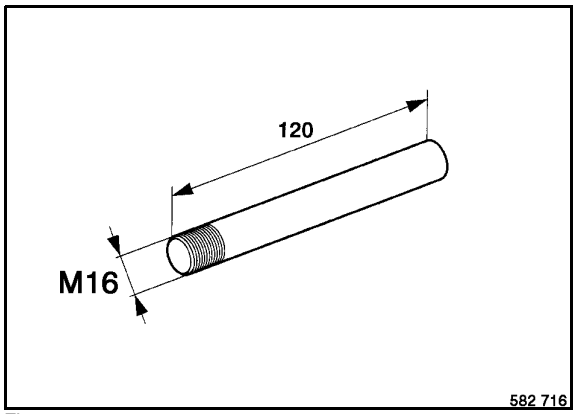


Fig. 3

4. Pressing mandrel for self-aligning bearings

   BOMAG part-no.: 971 079 92

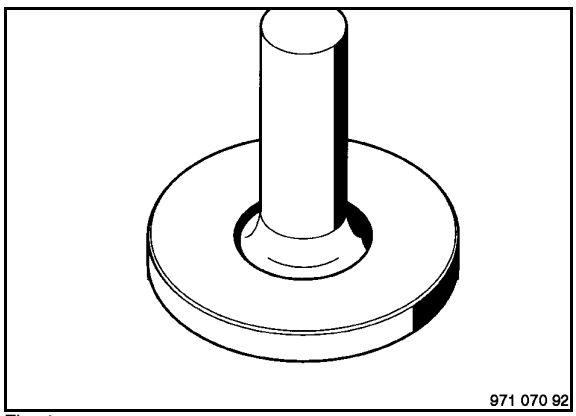


Fig. 4

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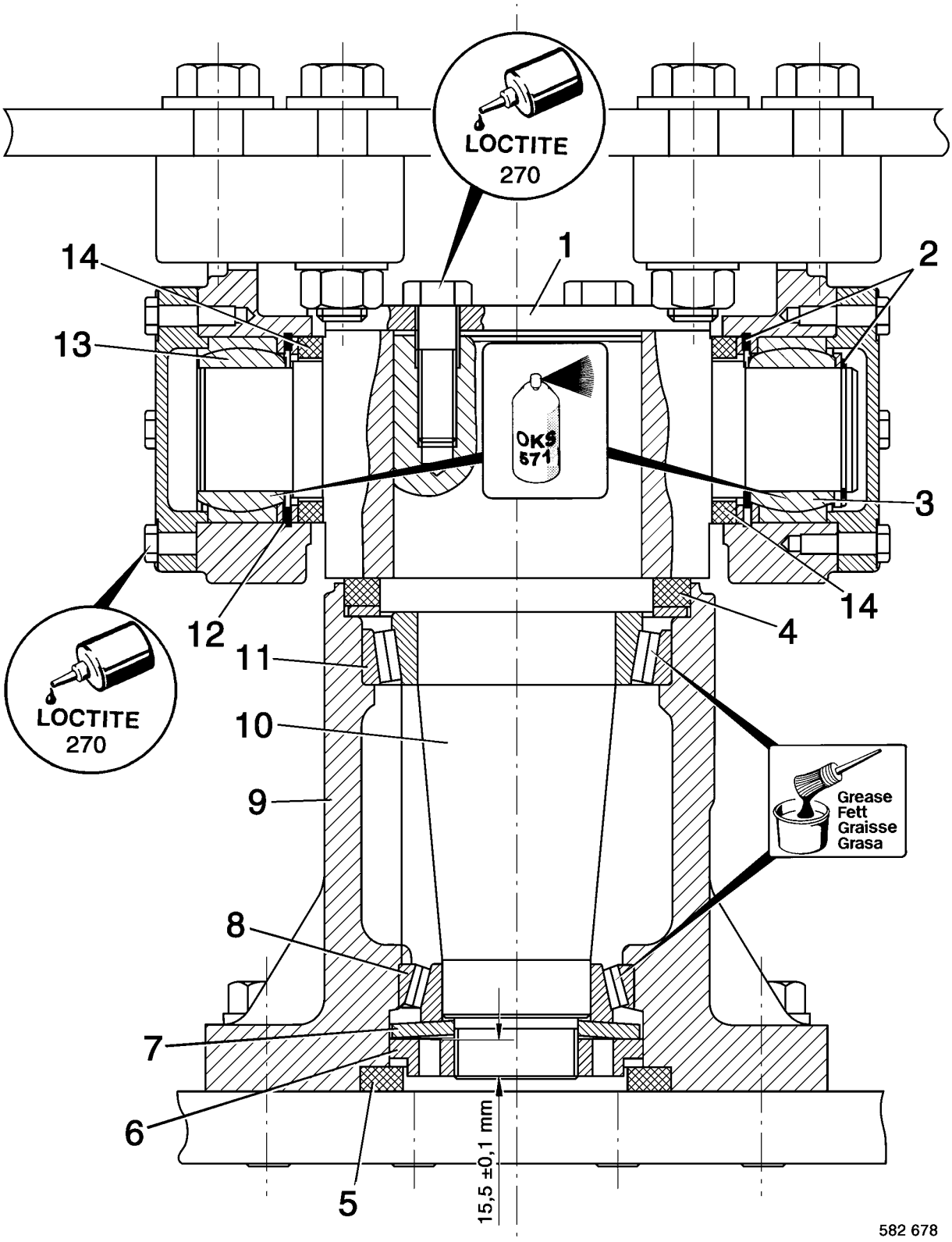


Fig. 1

https://truckmanualshub.com/

1 Flanged cover
2 Circlip
3 Self-aligning bearing
4 Seal ring
5 Seal ring
6 Tensioning nut
7 Belleville spring
8 Taper roller bearing
9 Bearing housing
10 Oscillation axle
11 Taper roller bearing
12 Circlip
13 Self-aligning bearing
14 Seal ring

https://truckmanualshub.com/

6.3 Removing and installing the oscillating articulated joint

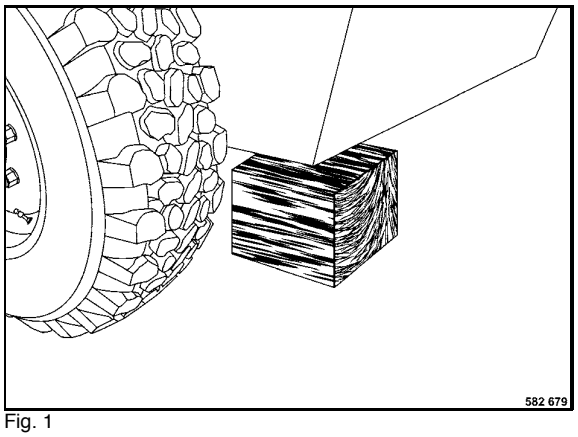


Fig. 1

1. Jack the back of the frame (Fig. 1) up and secure it with trestles or wooden blocks.

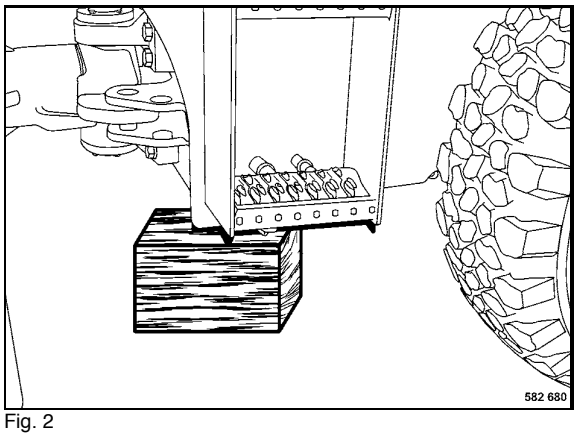


Fig. 2

2. Support the rear frame near the oscillating articulated joint (Fig. 2) safely with trestles or wooden blocks.

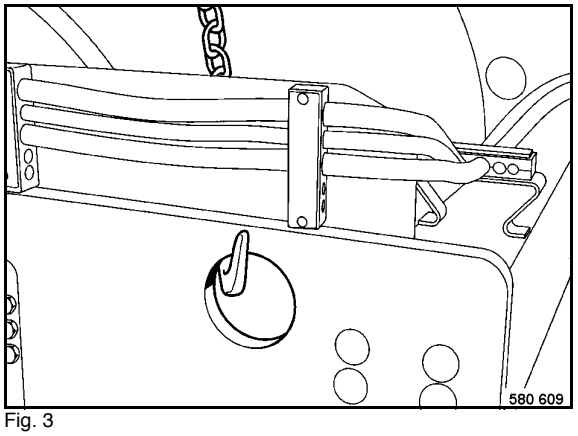


Fig. 3

3. Fasten the lifting tackle to the front frame near the oscillating articulated joint (Fig. 3).

https://truckmanualshub.com/

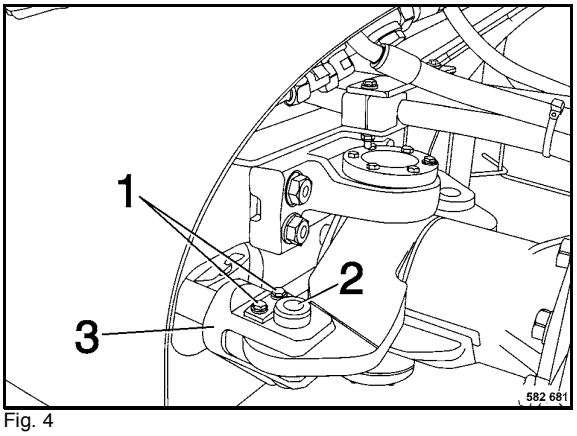


Fig. 4

4. Unscrew fastening screws 1 (Fig. 4) and take off the axle holder.
5. Knock out bearing bolt (2).
6. Retract steering cylinder (3).

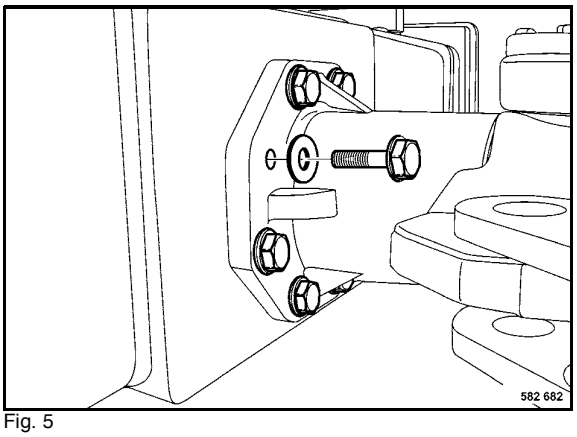


Fig. 5

⚠ Danger

Danger of accident!

7. Support the oscillating articulated joint in the middle with a suitable jack or a similar device.
8. Unscrew the fastening screws (Fig. 5) and take off with washers.

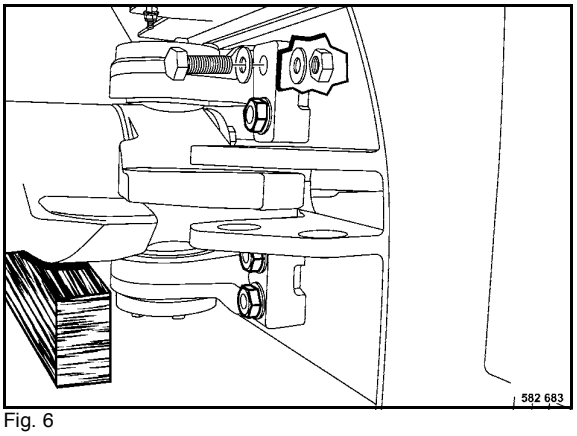


Fig. 6

9. Unscrew nuts (Fig. 6) and take off the clamping washers.
10. Pull out the fastening screws.
11. Pull out the oscillating articulated joint.

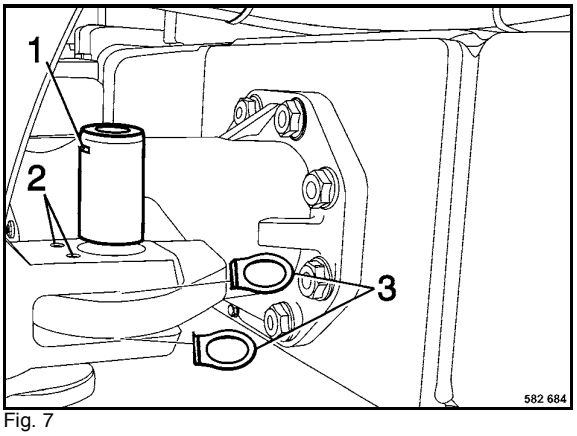


Fig. 7

Note on assembly

12. Assemble the oscillating articulated joint so that the bores with the self-aligning bearings for the steering cylinder (Fig. 7) are on the right hand side.
13. Insert the bolt for the steering cylinder so that groove (1) is in line with threaded bores (2).
14. Replace sealing discs (3) for the self-aligning bearings.

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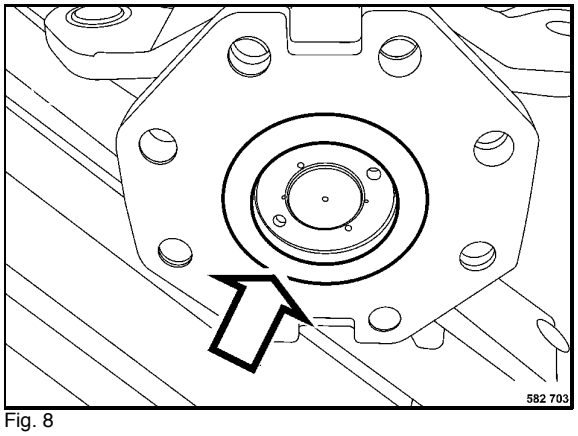


Fig. 8

15. Replace the sealing ring for the oscillating axle (Fig. 8).

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6.4 Repairing the oscillating articulated joint

Dismantling the oscillating articulated joint

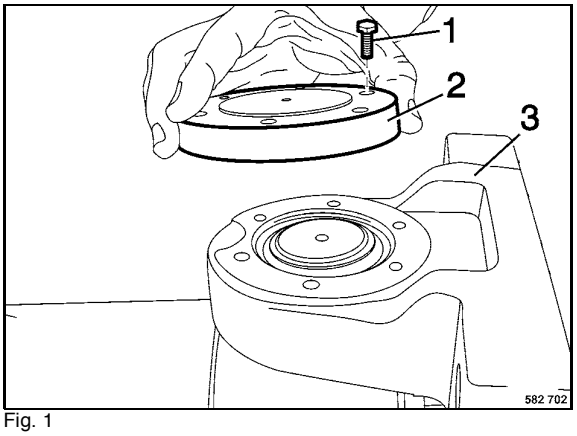


Fig. 1

1. Unscrew fastening screws 1 (Fig. 1) for top cover (2) and take off the cover.
2. Pull pillow block (3) off the journal.

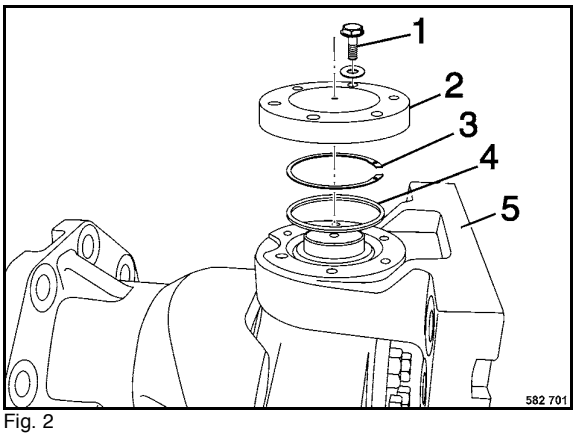


Fig. 2

3. Unscrew fastening screws 1 (Fig. 2) for bottom cover (2) and take off the cover.
4. Remove circlip (3) and take off supporting disc (4).
5. Pull pillow block (5) off the journal.

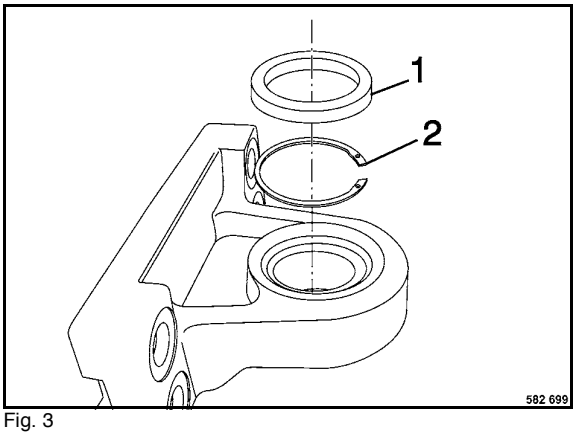


Fig. 3

6. Remove sealing rings 1 (Fig. 3) and backing discs (2) from both pillow blocks.

i Note

Renew sealing rings, do not use again.

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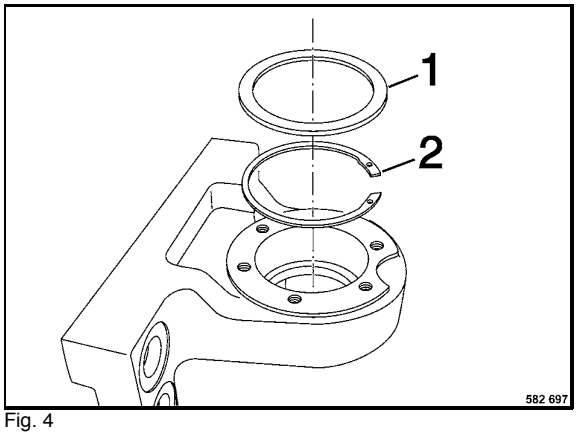


Fig. 4

7. Remove backing disc 1 (Fig. 4) and disassemble circlip (2).
8. Disassemble circlip and backing ring also from the second pillow block.

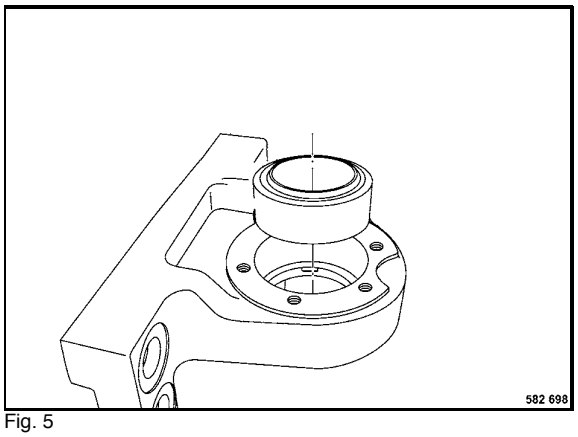


Fig. 5

9. Press self–aligning bearings (Fig. 5) out of both pillow blocks.

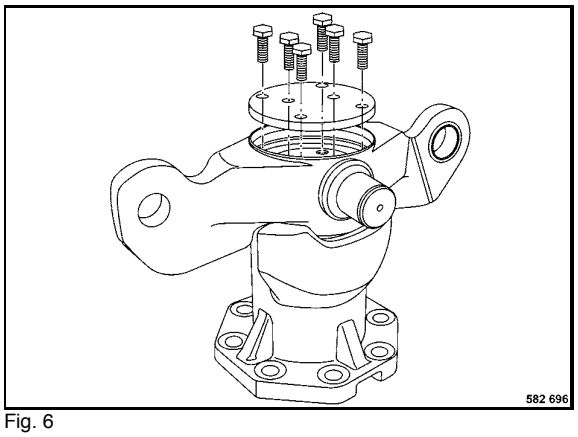


Fig. 6

i Note
The following step is only necessary if the cross-member has to be changed.

10. Unscrew the fastening screws (Fig. 6) for the flanged cover and remove the cover.
11. If necessary press the cross-member off the oscillation axle.

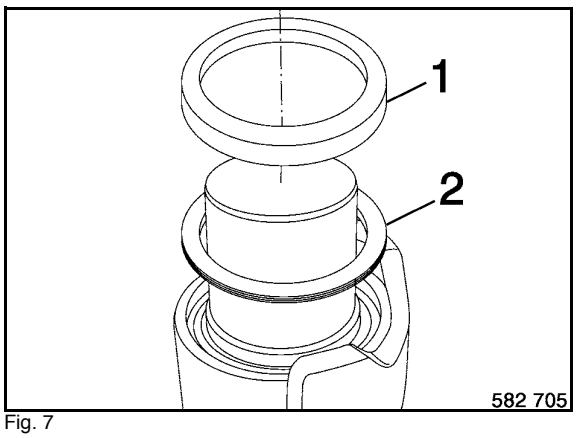


Fig. 7

12. Take off seal ring 1 (Fig. 7) and washer (2).

i Note
Renew sealing rings, do not use again.

13. Turn the housing around

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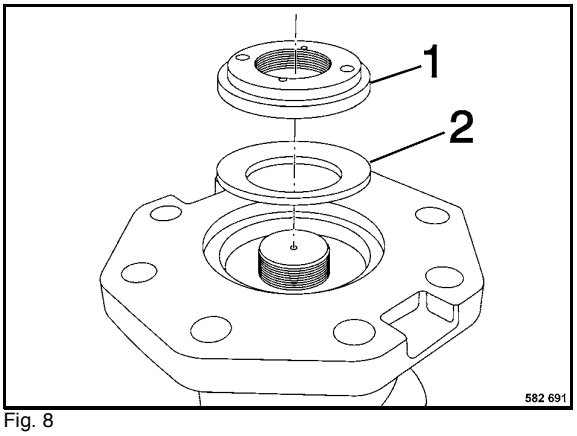


Fig. 8

14. Unscrew tensioning nut 1 (Fig. 8) and take off Belleville spring (2).

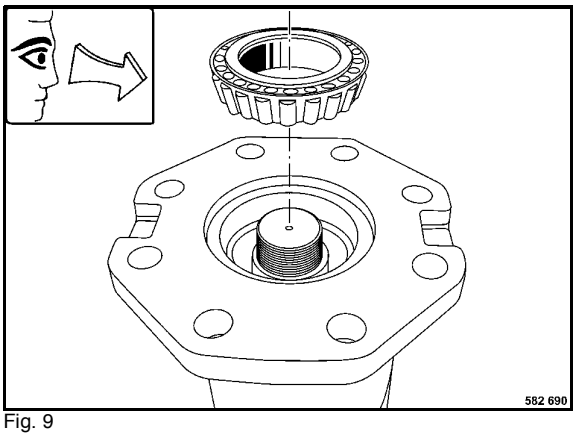


Fig. 9

15. Lift bearing housing (Fig. 9) off the oscillation axle.
16. Check state of bearing, replace bearing if necessary

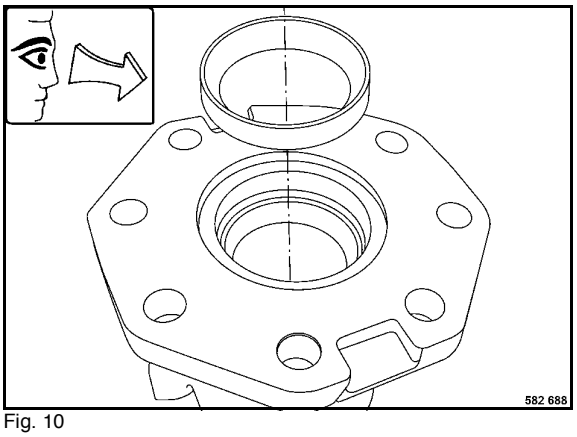


Fig. 10

17. If necessary force the outer bearing race (Fig. 10) out of the bearing housing.

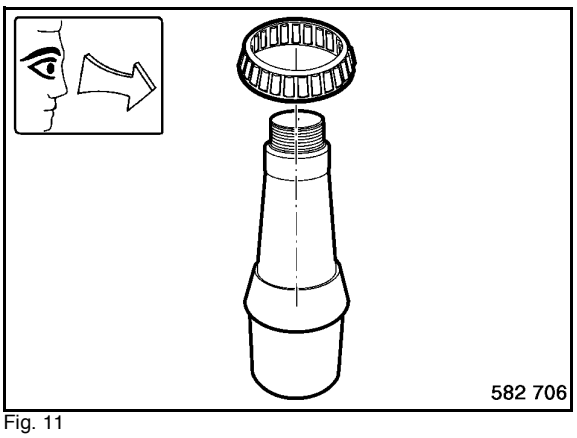


Fig. 11

18. Check state of bearing (Fig. 11), replace bearing and inner ring if necessary

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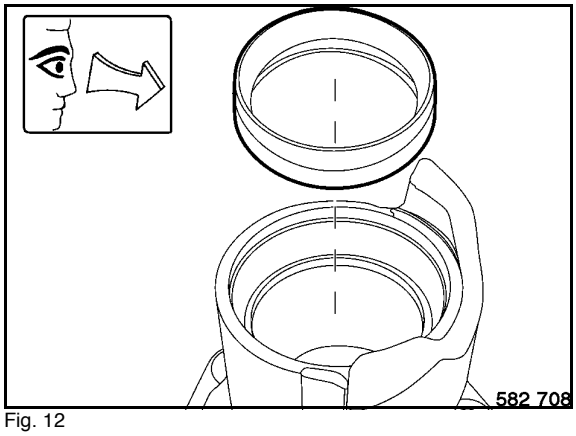


Fig. 12

19. If necessary force the outer bearing race (Fig. 12) out of the bearing housing.

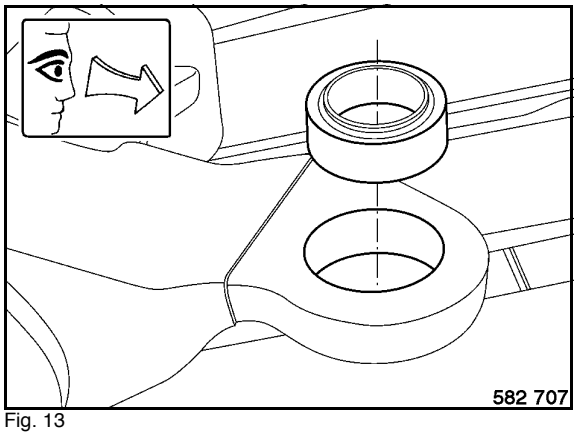


Fig. 13

20. Check rocker bearings, if necessary press out of the housing (Fig. 13).

Assembling the oscillating articulated joint

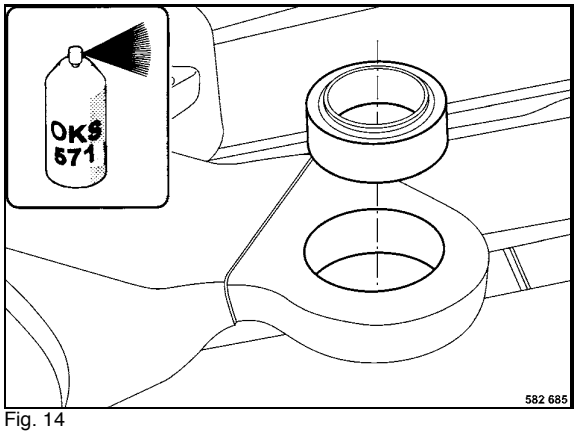


Fig. 14

1. Press self-aligning bearings into the housing, if these were disassembled (Fig. 14).

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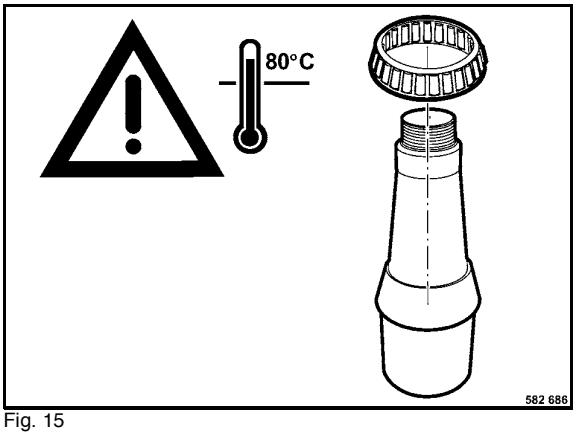


Fig. 15

⚠ Danger

Danger of burning!

Wear protective gloves.

2. Heat taper roller bearing (Fig. 15) up to. 80 °C* and slide over oscillation axle against the end stop *(176° F).

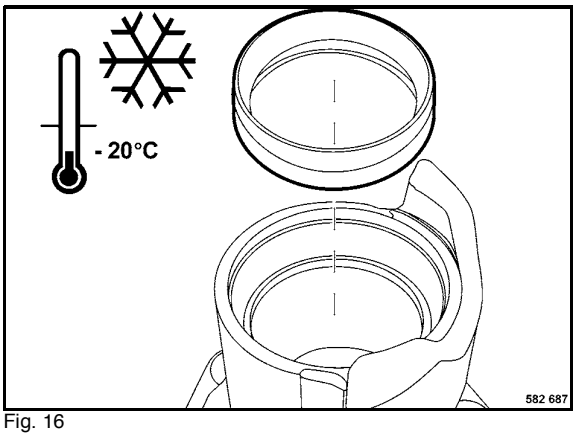


Fig. 16

⚠ Danger

Danger of injury!

Wear protective gloves.

3. Cool outer bearing race (Fig. 16) down to. -20 °C * and press it into the bearing housing. *(-4° F).

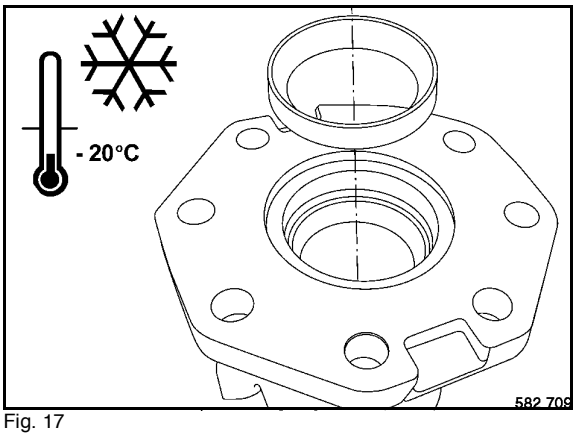


Fig. 17

⚠ Danger

Danger of injury!

Wear protective gloves.

4. Cool outer bearing race (Fig. 17) down to. -20 °C * and press it into the bearing housing. *(-4° F).

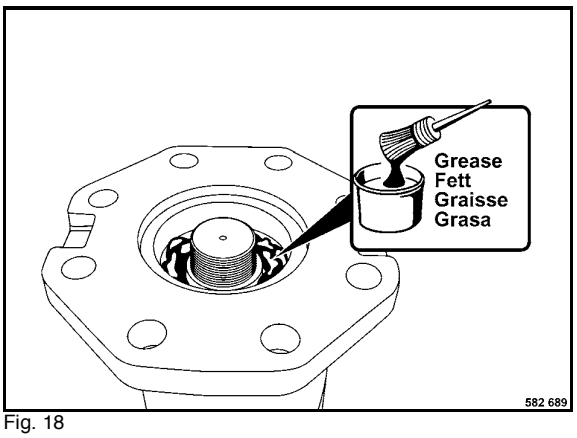


Fig. 18

5. Slide the housing over the oscillation axle (Fig. 18).
6. Fill the bearing seat with grease.

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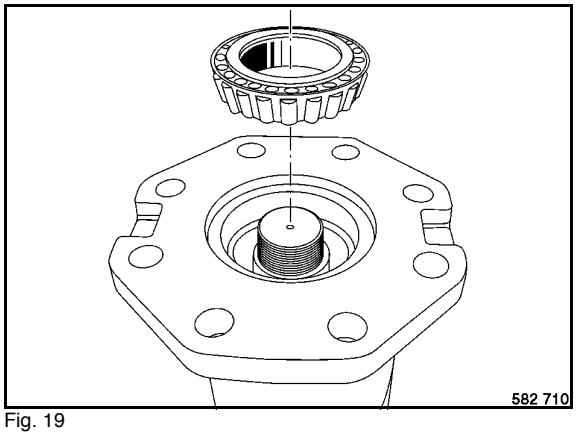


Fig. 19

7. Assemble the taper roller bearing (Fig. 19).

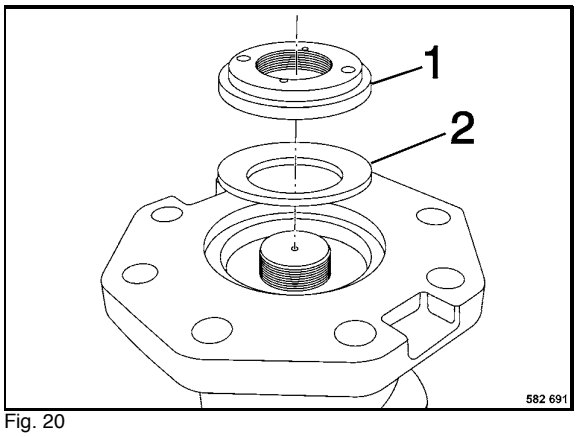


Fig. 20

8. Lay the Belleville spring into the cover with the curvature pointing down (Fig. 20).
9. Screw on the tensioning nut, but do not yet tighten.

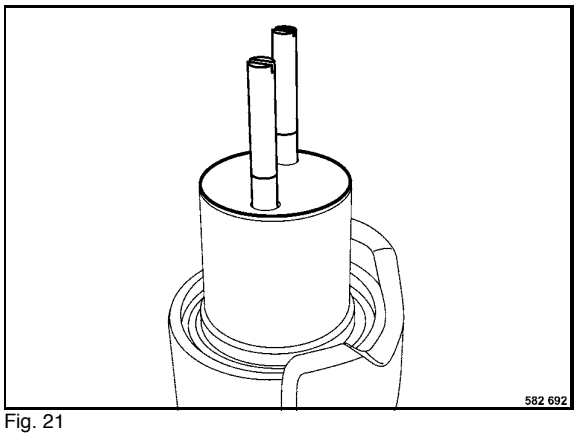


Fig. 21

10. Screw two threaded bolts M16 into the oscillation axle (Fig. 21) and use these to fix the oscillation axle in a vice.

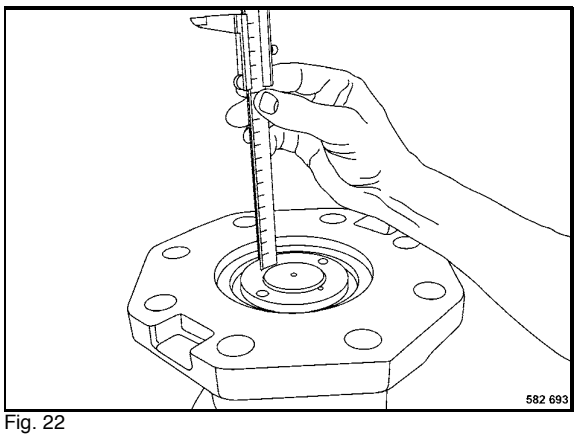


Fig. 22

11. Tighten the tensioning nut until the specified measurement of 15 mm ± 0.1 is reached (Fig. 22).

i Note

While tightening keep moving the housing, in order to achieve a correct contact pattern of the individual rolls.

Only attach the cross-member to the oscillation axle after adjusting the bearings.

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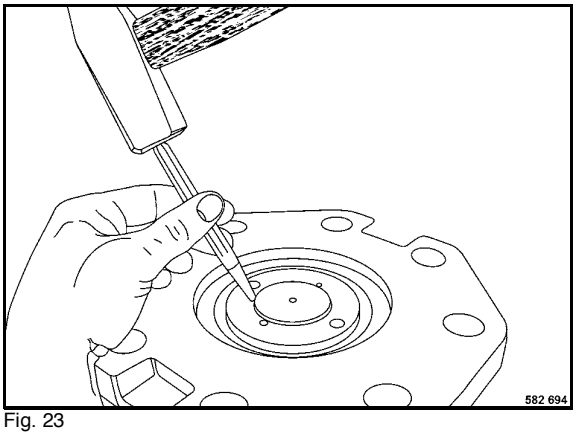


Fig. 23

12. Secure the tensioning nut with a centre punch (Fig. 23).
13. Turn the housing around.

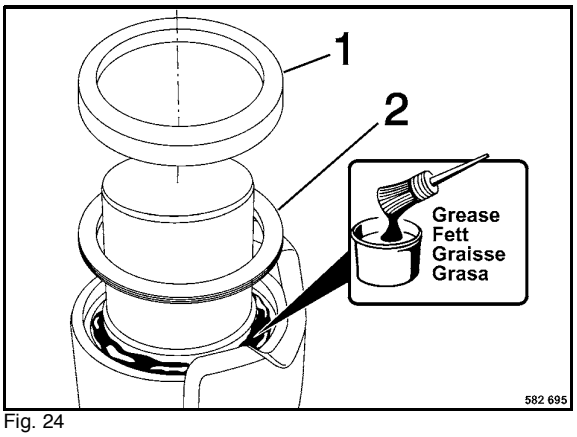


Fig. 24

14. Grease the bearings (Fig. 24).
15. Insert washer (1) and seal ring (2).

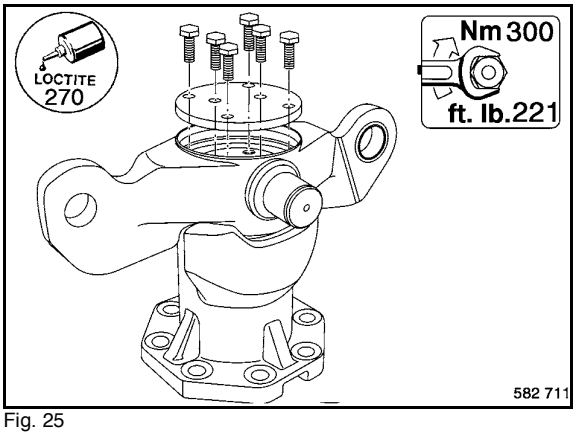


Fig. 25

⚠ Danger

Danger of burning!

Wear protective gloves.

16. Heat cross-member (Fig. 25) up to. 150 °C *and slide over the oscillation axle against the end stop *(320° F).

⚠ Caution

Do not use any grease.

17. Attach the flanged cover, screw in fastening screws with Loctite 270 and tighten with 300 Nm*. *(221.2 lbf*ft).
18. Insert circlip 2 (Fig. 26) into the bottom pillow block.
19. Assemble backing disc (1).

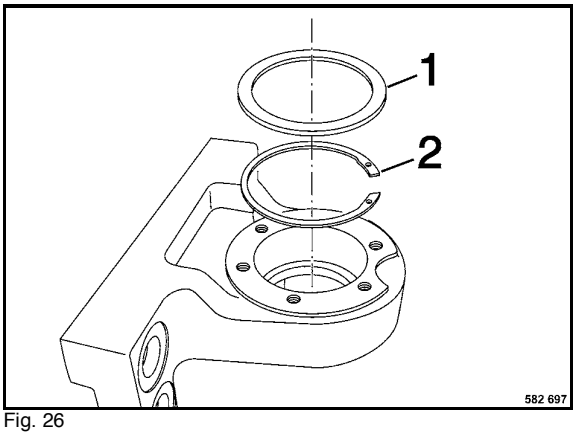


Fig. 26

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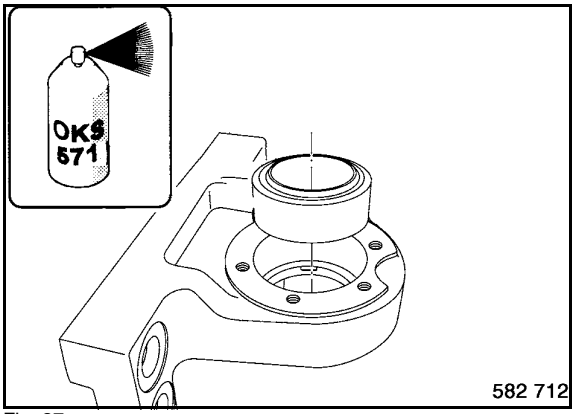


Fig. 27

20. Press self-aligning bearing (Fig. 27) into the pillow block until it bottoms.

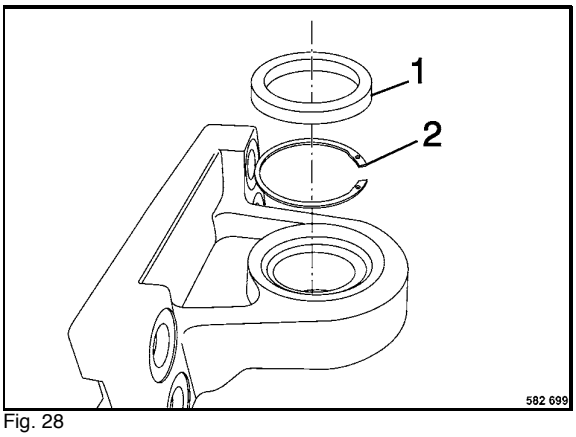


Fig. 28

21. Turn the pillow block around, assemble backing disc 2 (Fig. 28) and seal ring (1).

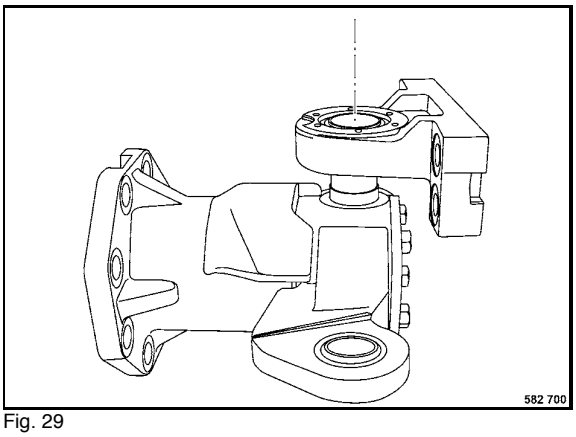


Fig. 29

22. Drive pillow block (Fig. 29) onto the bottom journal with the sealing ring facing down.

⚠ Caution

After assembly ensure correct fit of seal ring 1 (Fig. 28), if necessary correct its seat.

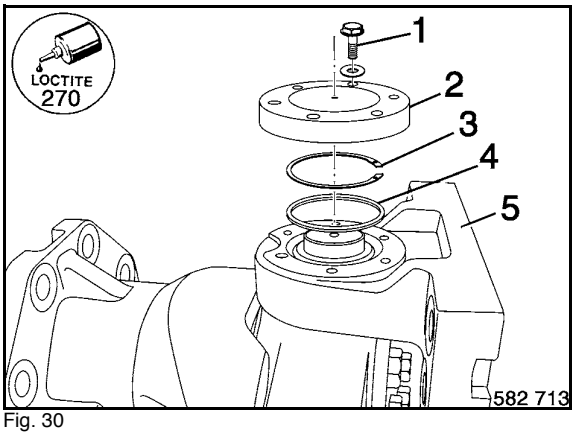


Fig. 30

23. Insert backing disc 4 (Fig. 30) and assemble circlip (3).

i Note

Circlip (3) and backing disc (4) are not needed for the top pillow block.

24. Attach cover (2).
25. Assemble fastening screws (1) with Loctite 270 and tighten.

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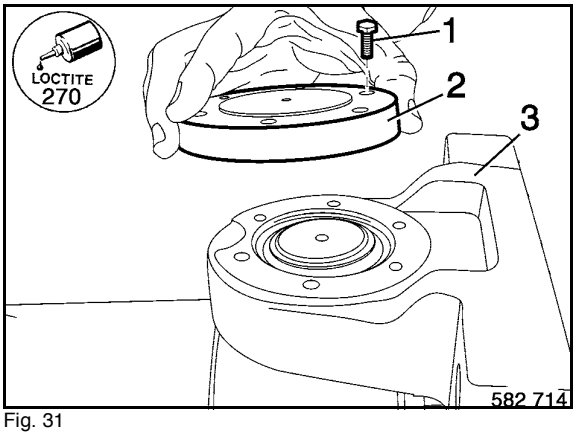


Fig. 31

26. Assemble the self-aligning bearing in the top pillow block 3 (Fig. 31), as described before and drive it over the top journal.
27. Attach cover (2).

i Note

Backing disc and circlip are not required.

28. Assemble fastening screws (1) with Loctite 270 and tighten.

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7 Suppliers documentation

https://truckmanualshub.com/

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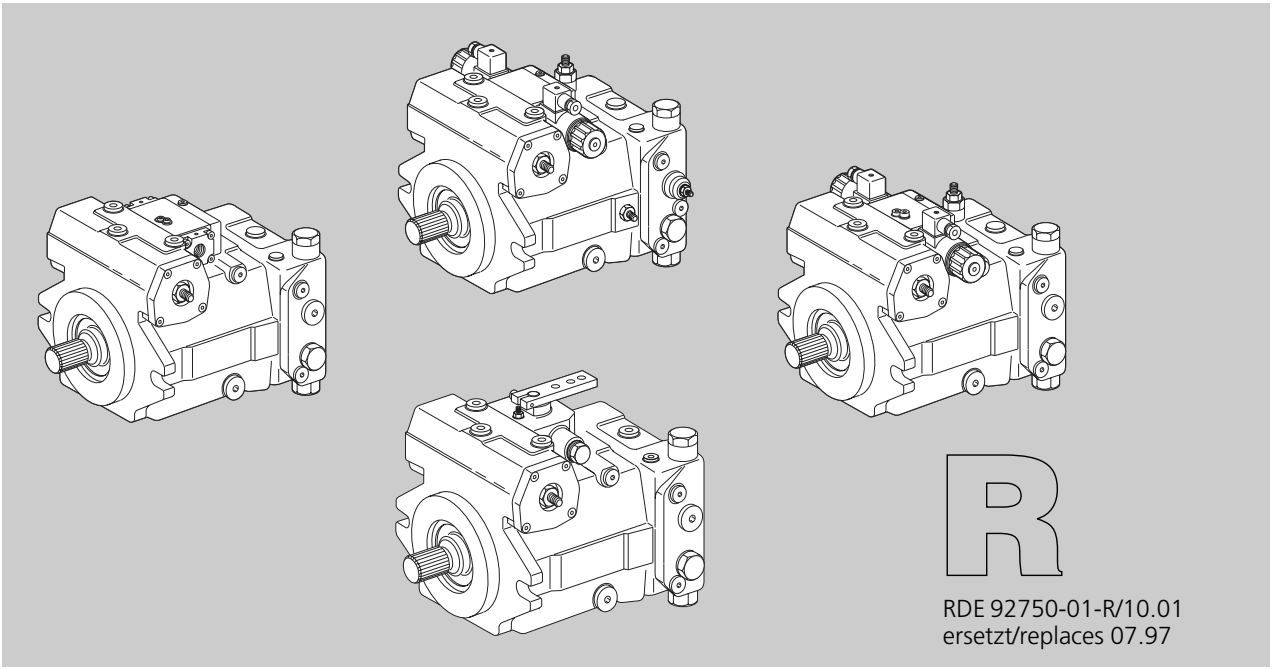
7.1 A10VG

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https://truckmanualshub.com/

Rexroth
Bosch Group

Reparaturanleitung / Repair instructions
A10VG ... 28-63 Baureihe/Series 10



R

RDE 92750-01-R/10.01
ersetzt/replaces 07.97

Mobile Hydraulics

https://truckmanualshub.com/

HINWEIS

Bezeichnungen, Beschreibungen und Darstellungen entsprechen dem Informationsstand zum Zeitpunkt der Drucklegung dieser Unterlage.

Änderungen können den Service am Produkt beeinflussen, Verpflichtungen entstehen uns daraus nicht. Methoden und Vorrichtungen sind Empfehlungen, für deren Resultat wir keine Haftung übernehmen können. BRUENINGHAUS HYDROMATIK- Baugruppen, mit Angabe der Fabrik-Nr. bestellt, sind die Basis guter Reparaturen.

Einstell- und Prüfarbeiten sind bei Betriebstemperatur auf dem Teststand vorzunehmen.

Schutz von Personen und Eigentum ist durch Vorkehrungen sicherzustellen.

Sachkenntnis, die Voraussetzung für jede Service-arbeit, vermitteln wir in unseren Schulungskursen.

NOTICE

Specifications, descriptions and illustrative material shown herein were as accurate as known at the time this publication was approved for printing.

BRUENINGHAUS HYDROMATIK reserves the right to discontinue models or options at any time or to change speci-fications, materials, or design without notice and with-out incurring obligation.

Optional equipment and accessories may add cost to the basic unit, and some options are available only in combination with certain models or other options.

For the available combinations refer to the relevant data sheet for the basic unit and the desired option.

Adjustment and tests have to be carried out on the test bench under operating temperatures.

Protection of personnel and property has to be guaranteed by appropriate measures.

Expert knowledge, the precondition of any service work, can be obtained in our training courses.

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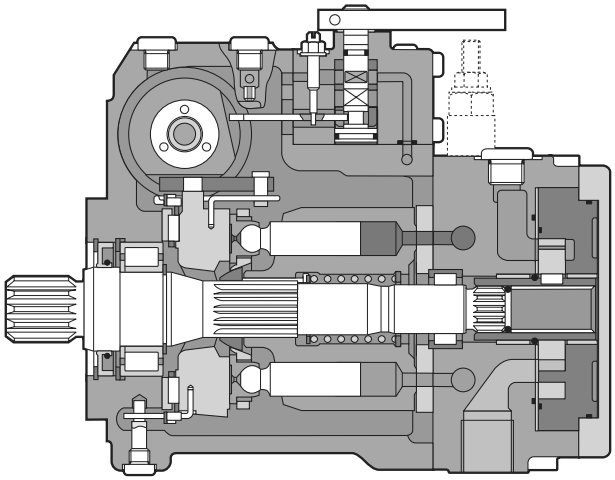
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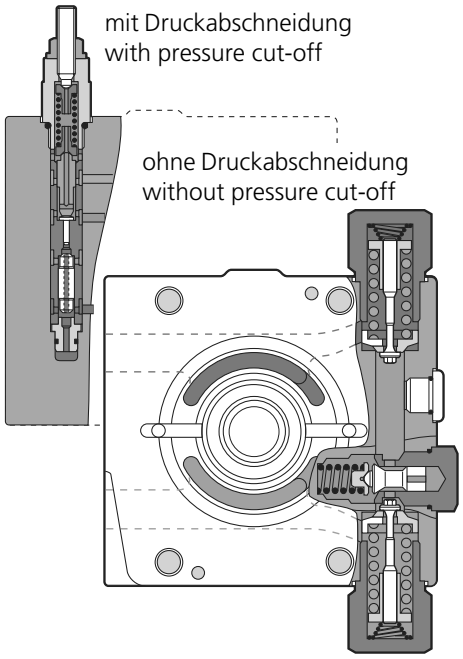
A10VG

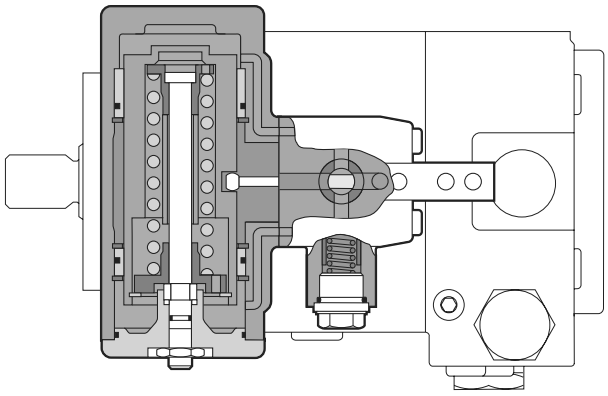
Sectional view
General repair instructions
Seal kits and sub assembly groups
Sealing of the drive shaft
Sealing of the boost pump
Sealing of the control piston cover
Sealing of the valves
Sealing of the pressure cut-off valve
Sealing of the regulator valve
Removal of the control unit
Control units
Pump disassembly
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Disassembly of the positioning piston
Inspection notes
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Safety regulations
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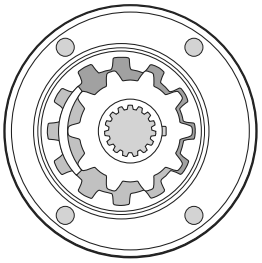
https://truckmanualshub.com/

HW

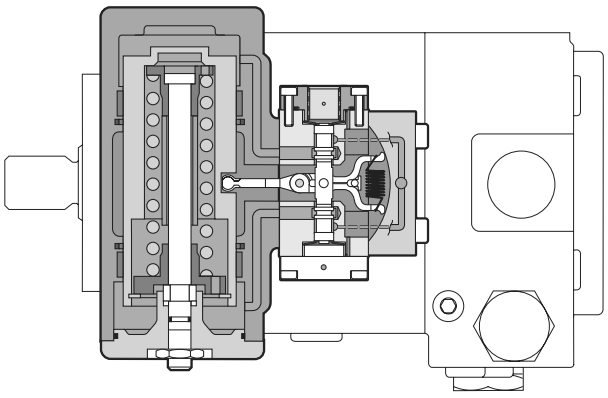




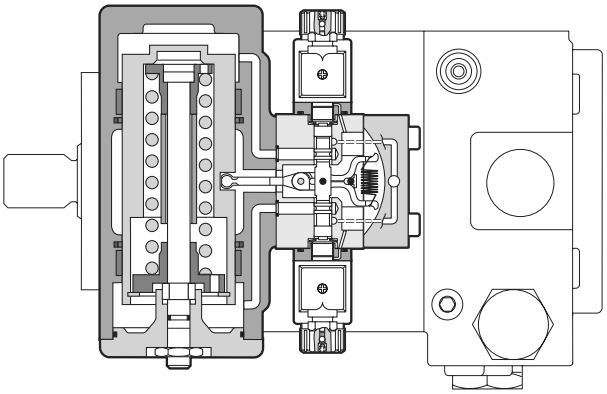




HDD

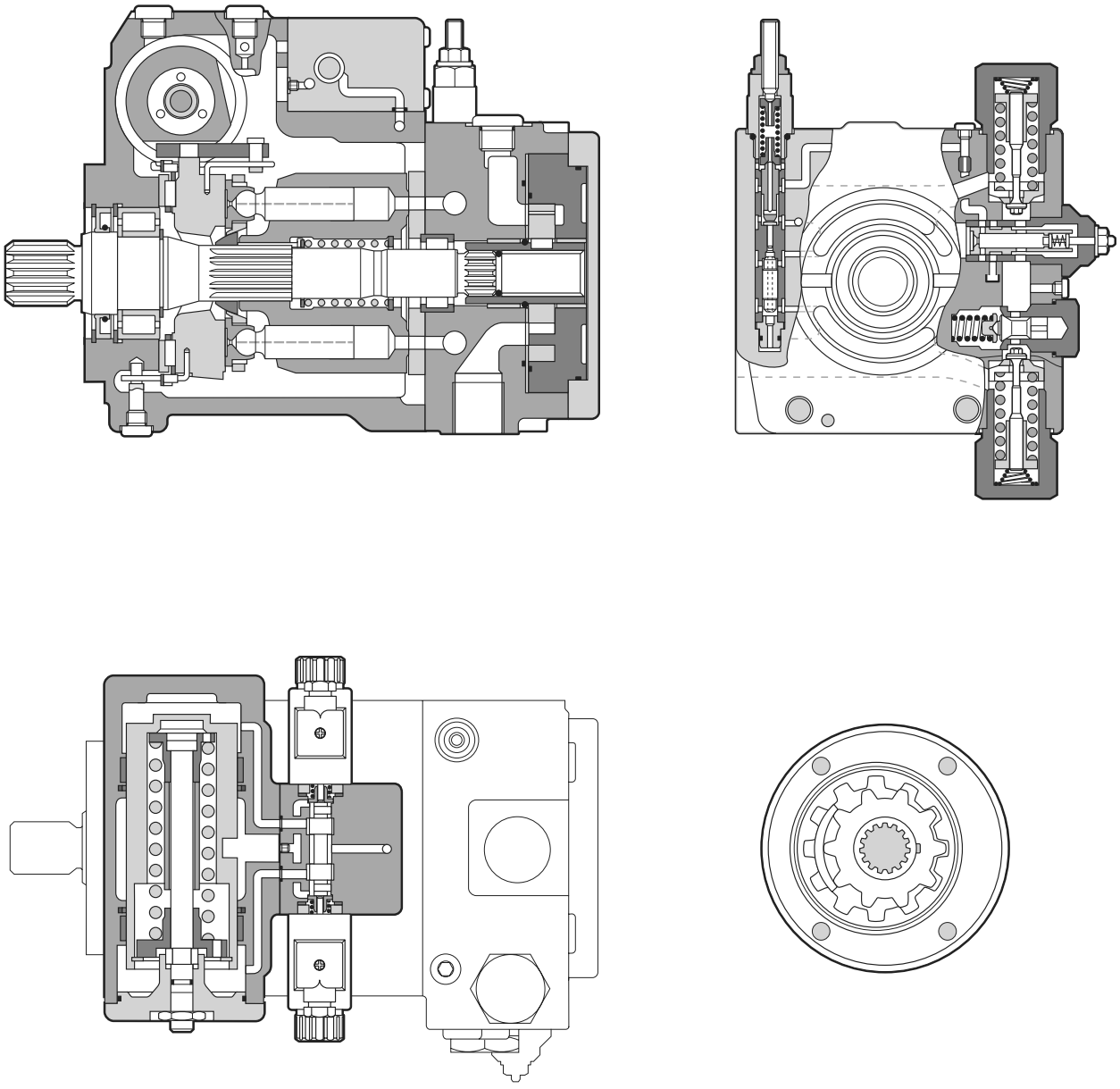


EPD



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DA

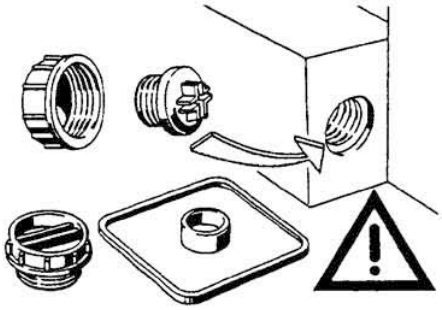


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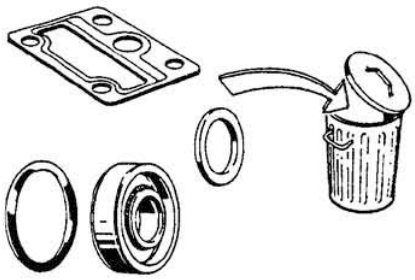
Achtung!
Nachfolgend Hinweise bei allen Reparaturarbeiten an Hydraulikaggregaten beachten!

Attention!
Please take into account the following guidelines when carrying out repair work on hydraulic units!



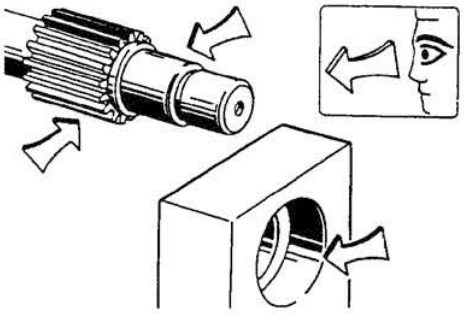
Alle Öffnungen der Hydraulikaggregate verschließen.

Close all openings on the hydraulic units.



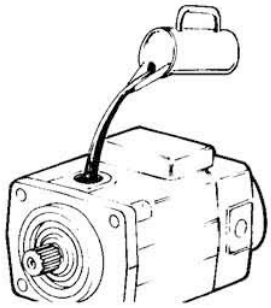
Alle Dichtungen erneuern.
Nur original BRUENINGHAUS HYDROMATIK-Ersatzteile verwenden.

Replace all seals.
Use only original BRUENINGHAUS HYDROMATIK spare parts.



Alle Dicht- und Gleitflächen auf Verschleiß prüfen.
Achtung: Nacharbeiten an Dichtflächen z.B. durch Schleifpapier kann die Oberfläche beschädigen.

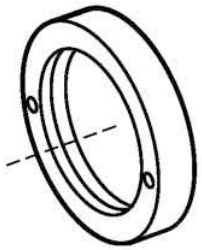
Check all sealing and sliding surfaces for wear.
Attention: Rework of the sealing areas, f. ex., with abrasive paper can cause damage to the surface.



Hydraulikaggregate vor Inbetriebnahme mit Betriebsmedium befüllen.

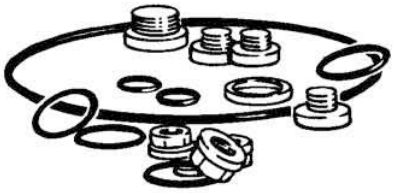
Fill the hydraulic units with the operating mediumbefore commissioning.

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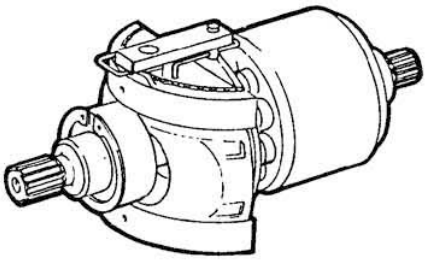
Dichtsatz für Triebwelle.

Seal kit for drive shaft.



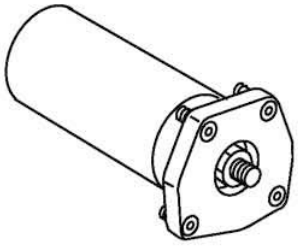
Äußerer Dichtsatz.

Peripheral seal kit.



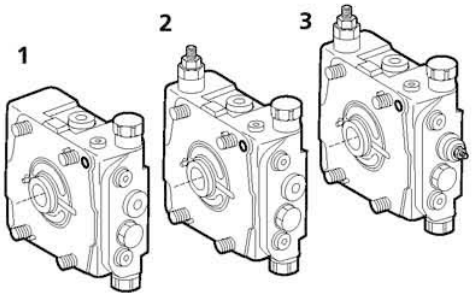
Triebwerk komplett.

Complete rotary group.



Stellkolben

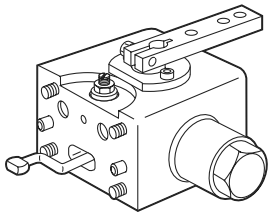
Positioning piston



1. Anschlußplatte Standard,
2. Anschlußplatte mit Druckabschneidung
3. Anschlußplatte DA mit Druckabschneidung

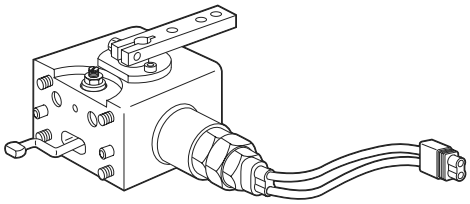
1. Standard connection plate
2. Connection plate with pressure cut-off
3. DA connection

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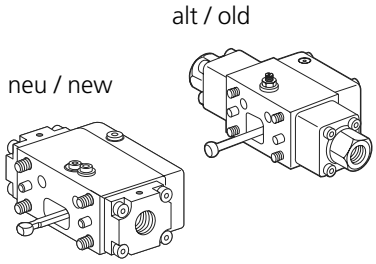
Ansteuergerät **HW**

Control unit **HW**



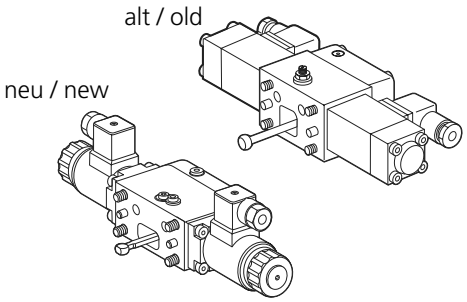
Ansteuergerät **HW** mit Nullagenanzeige

Control unit **HW** with zero indicator



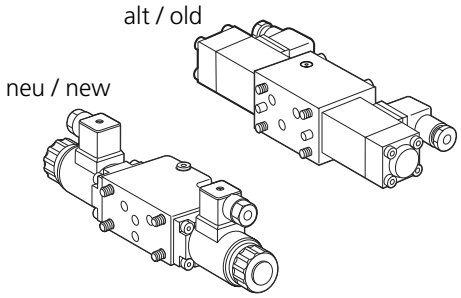
Ansteuergerät **HD**

Control unit **HD**



Ansteuergerät **EP**

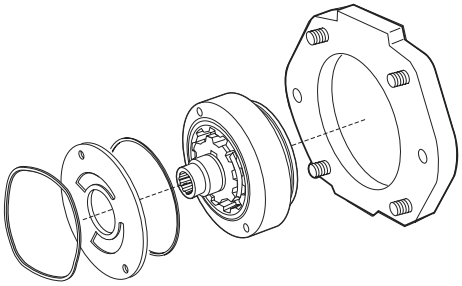
Control unit **EP**



Ansteuergerät **DA**

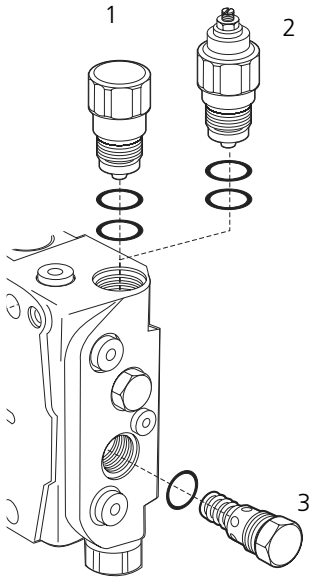
Control unit **DA**

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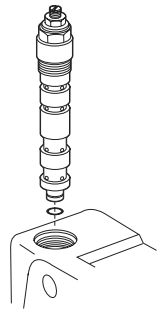
Hilfspumpe mit Verschleißplatte

Boost pump with wear plates



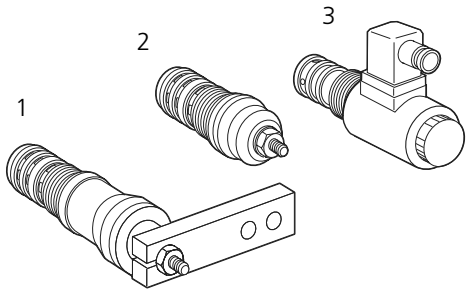
1. HD - Ventil
2. HD - Ventil mit Bypass
3. ND - Ventil

1. High pressure valve
2. High pressure valve with bypass function
3. Low pressure valve



Druckabschneidung

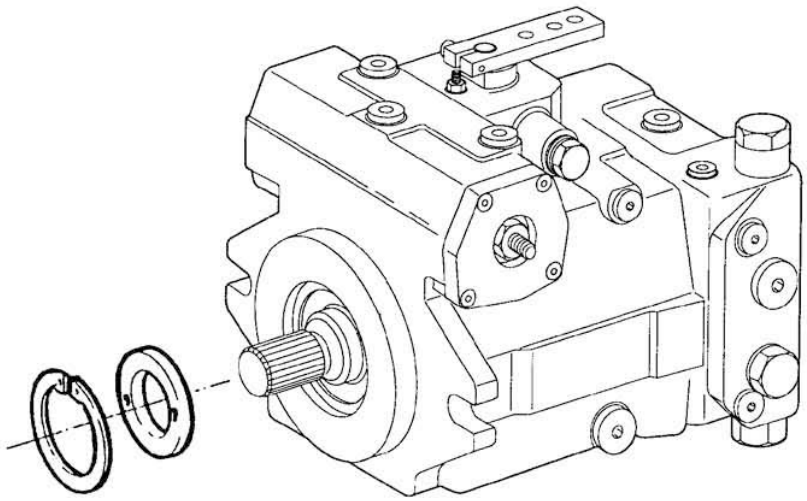
Pressure cut-off

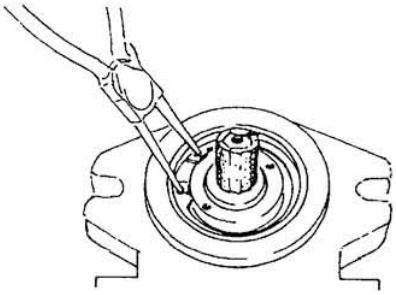


1. DA - Regelventil, verstellbar mit Hebel
2. DA - Regelventil, festeingestellt
3. Zuschaltventil

1. DA control valve, adjustable via a lever
2. DA control valve, fixed
3. Switching valve

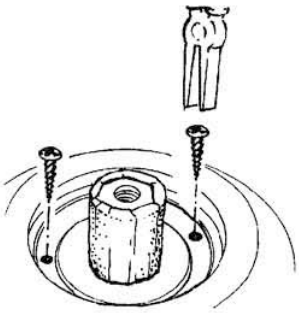
https://truckmanualshub.com/





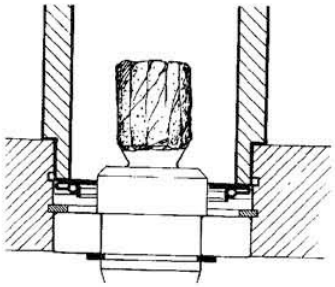
Triebwelle abkleben.
Sicherungsring ausbauen.

Protect the drive shaft (e.g. masking tape).
Remove the retaining ring.



Blechschraube in die mit Gummi gefüllten Löcher eindrehen.
Mit Zange WDR herausziehen.

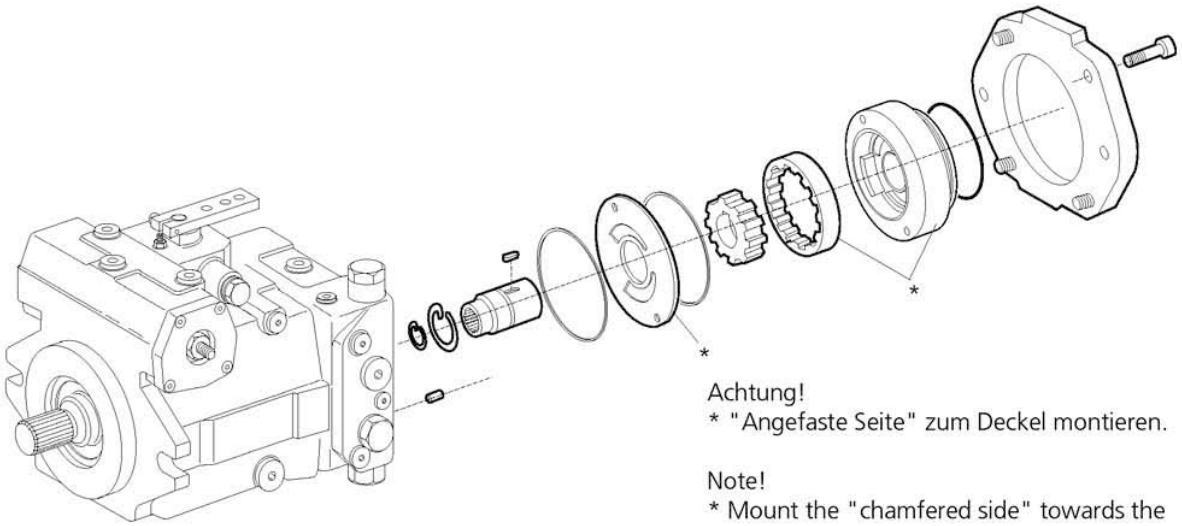
Screw the metal screws into the holes that are fitted with rubber.
Withdraw the shaft seal using pliers.



Wellendichtring mit Buchse auf Anschlag einpressen.

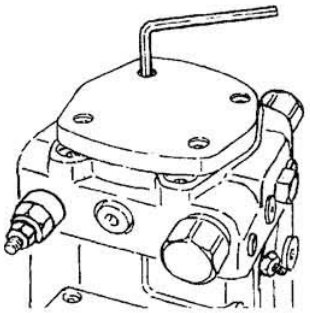
Press-in the shaft seal with a bush untilth end stop is reached.

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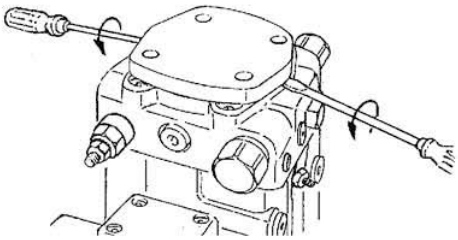
Achtung!
* "Angefaste Seite" zum Deckel montieren.

Note!
* Mount the "chamfered side" towards the cover.



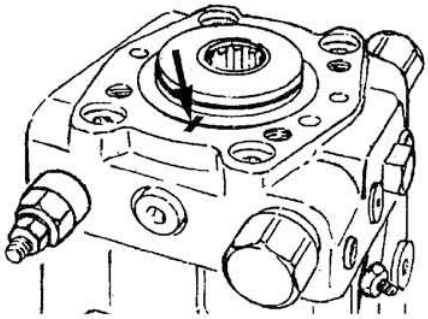
Befestigungsschrauben ausbauen.

Remove fixing screws.



Deckel abdrücken.

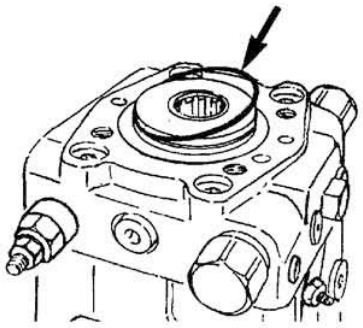
Pry-off cover.



Einbaulage kennzeichnen.

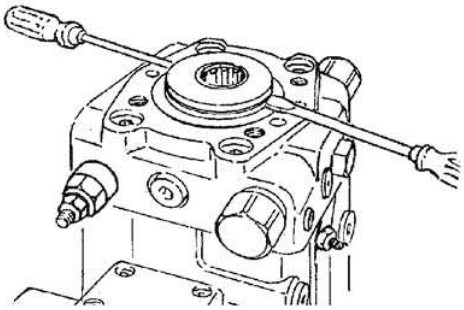
Mark position.

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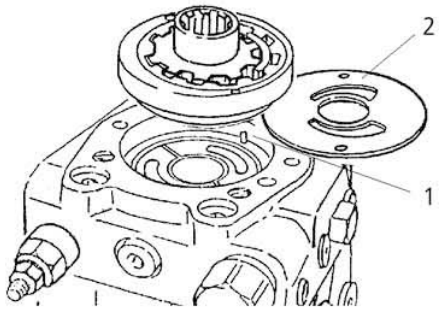
O-Ring ausbauen.

Remove O-ring.



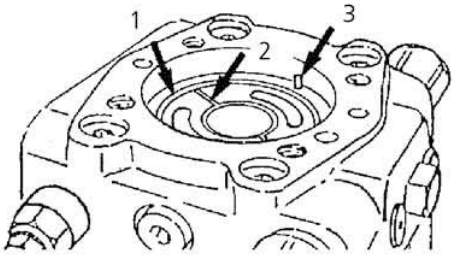
Hilfspumpe abdrücken.

Pry off the boost pump.



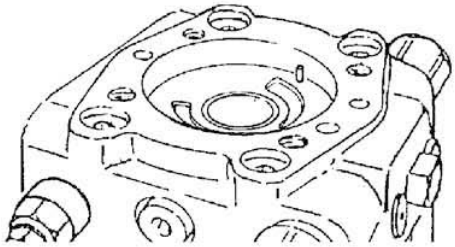
1. Verschleißplatte
2. Fixierstift

1. Wear plate
2. Locating pin



1. Kantsil-Ring
2. Entlastungsnut
3. Fixierstift

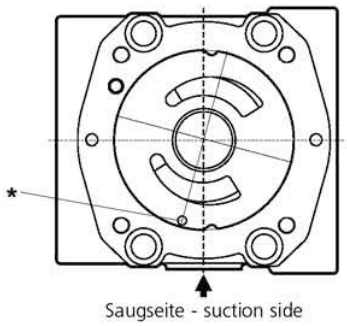
1. Kantsil-ring
2. Unloading channel
3. Locating pin



Verschleißplatte einsetzen.
Drehrichtung beachten!

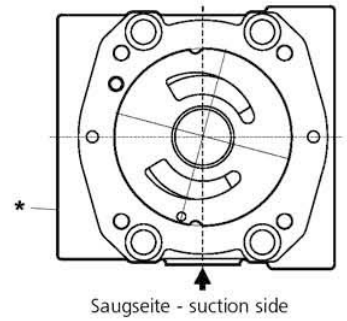
Fit wear plate taking the direction of rotation account.

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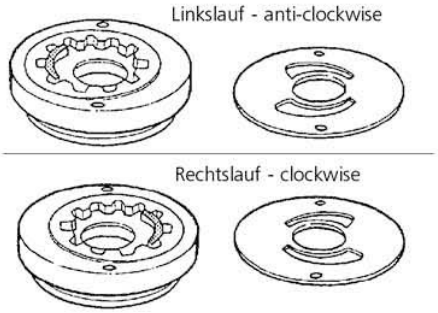
Verschleißplatte einsetzen.
Drehrichtung "Rechts" bei Blick auf die Triebwelle.
Achtung! Fixierstift

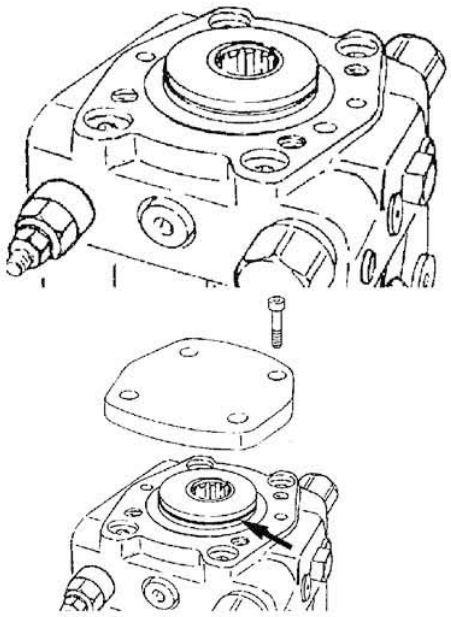
Fit wear plate.
Direction of rotation "clockwise" looking on the drive shaft.
Attention! Locating pin



Verschleißplatte einsetzen.
Drehrichtung "Links" bei Blick auf die Triebwelle.
Achtung! Fixierstift

Fit wear plate.
Direction of rotation "anti-clockwise" looking on the drive shaft.
Attention! Locating pin





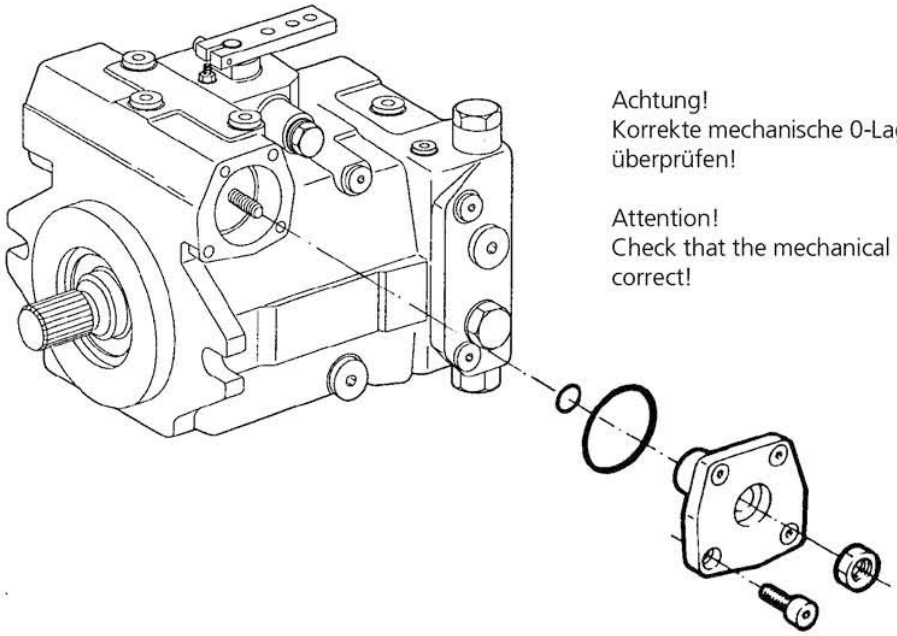
Hilfspumpe montieren.

Fit boost pump

O-Ring und Deckel montieren.

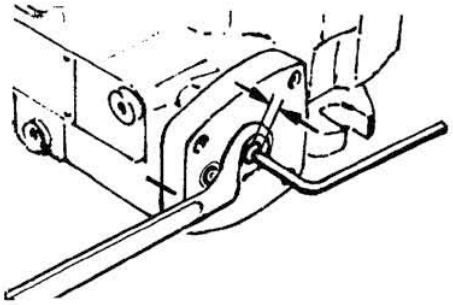
Fit O-ring andcover plate.

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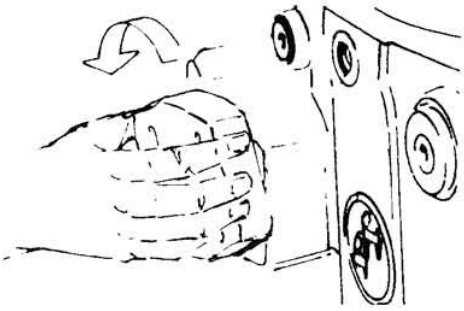
Achtung!
Korrekte mechanische 0-Lageneinstellung überprüfen!

Attention!
Check that the mechanical "0"-position is correct!



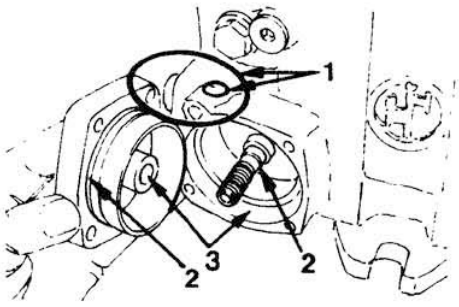
Kontermutter ausbauen, Stellschraube gegenhalten.
Deckel kennzeichnen. Maß festhalten, Kontermutter lösen.

Remove lock unit, whilst holding the adjustment screw,
mark the cover plate, ascertain the dimension, loosen locknut.



Deckel von Stellschraube "abschrauben".

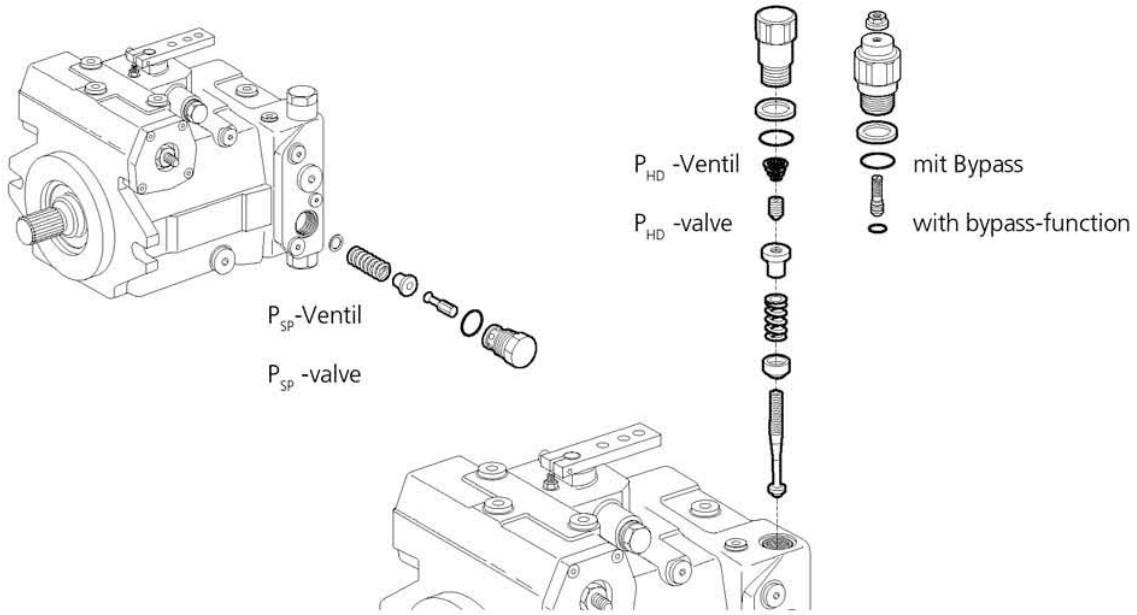
Remove the cover from the adjustment screw by unscrewing it from the adjustment screw.

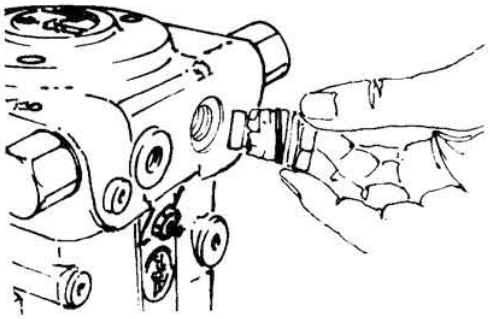


Kontrolle! O-Ring (1), Nut (2), Gehäuse und Deckel (3).
Achtung!
Korrekte mechanische 0-Lageneinstellung muß nach Einbau im Gerät bzw. Prüfstand erfolgen.

Check! O-ring (1), groove (2), housing with cover (3).
Attention!
The correct mechanical "0" position has to be adjusted after the unit has been built into the machine or on a test rig.

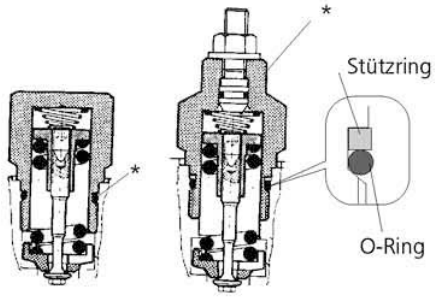
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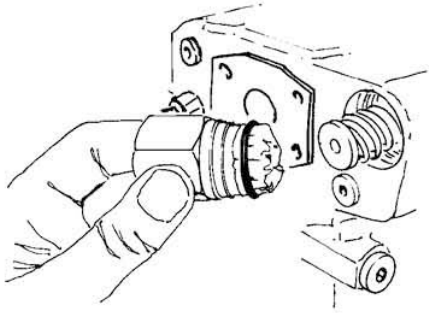
Gewinde vor Montage des neuen O-Ringes abkleben.
(Beschädigungsschutz).

Cover threads before fitting new O-rings.
(Damage protection).



Ventilkegel mit Druckfeder ausbauen.
* mit Bypassfunktion

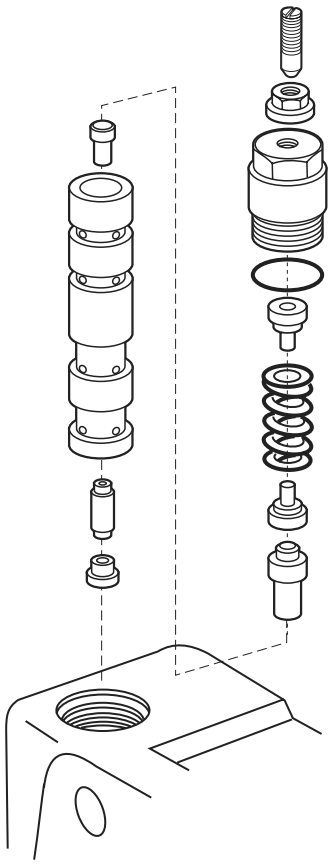
Remove valve poppet with compression spring.
* with bypass function

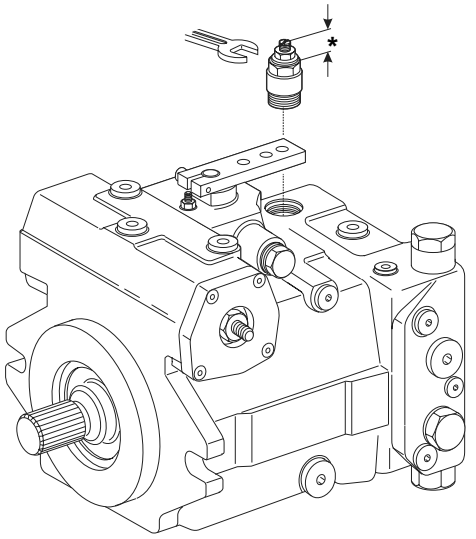


Gewinde vor Montage des neuen O-Ringes abkleben.
(Beschädigungsschutz).

Cover threads before fitting new O-rings.
(Damage protection).

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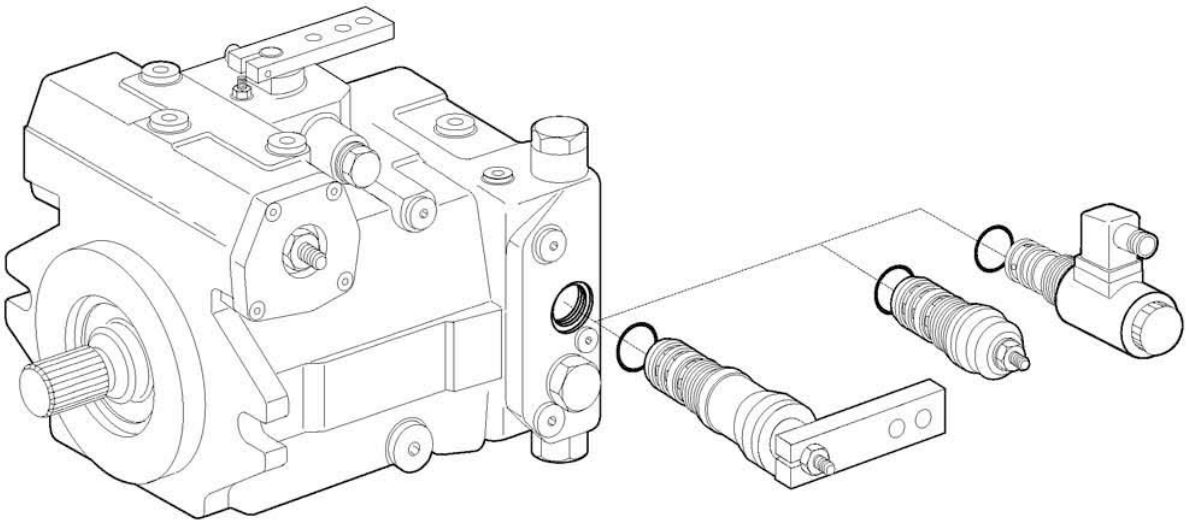
Wechsel der Dichtmutter.
Einstellmaß festhalten (*).

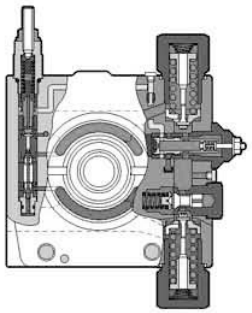
Exchanging the sealing nut.
Ascertsion the adjustment dimension (*).

Achtung!
Nach Einbau "Ventileinstellung" überprüfen.

Attention!
After assembly check "valve setting".

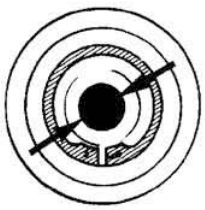
https://truckmanualshub.com/





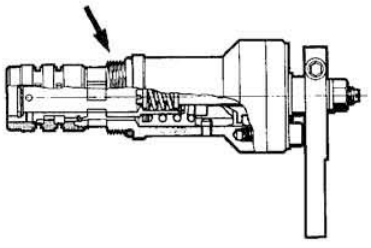
Regelventil ausbauen.

Remove control valve.



Blendendurchmesser nicht beschädigen.
Kontrolle:
Blendendurchmesser

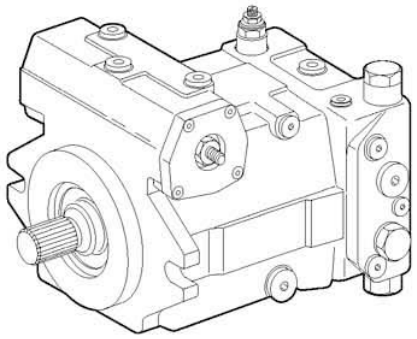
Do not damage the orifice diameter.
Check: Orifice diameter.

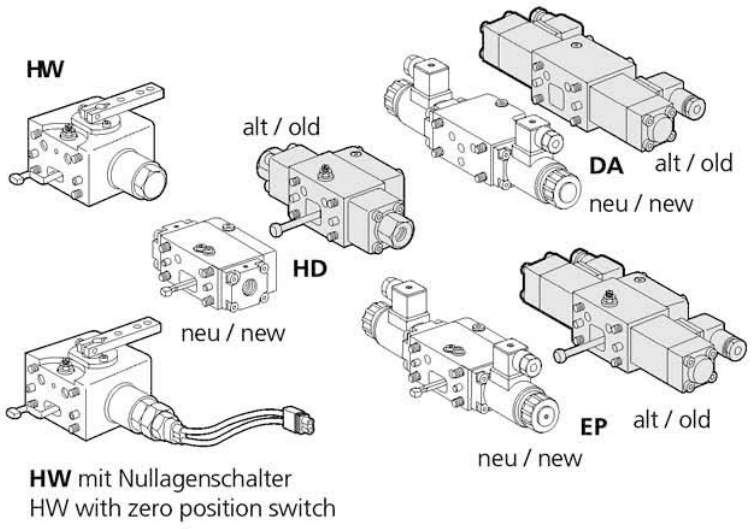


Gewinde vor Montage des neuen O-Ringes abkleben.

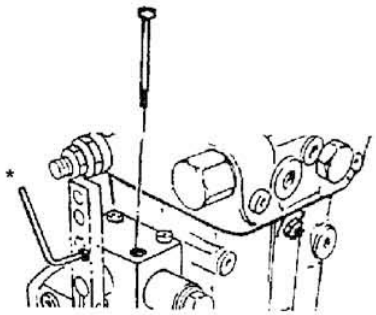
Before fitting the new O-ring cover the threads (e.g. tape).

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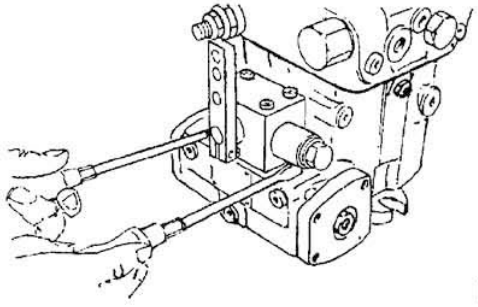


HW mit Nullagenschalter
HW with zero position switch



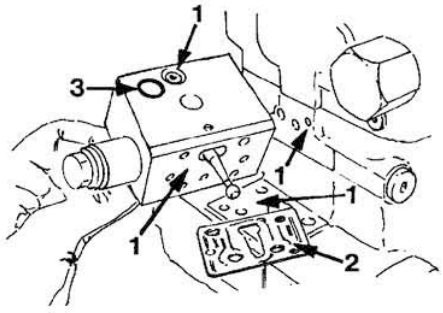
* Befestigungsschrauben demontieren.

* Remove fixing screws.



Ansteuergerät abdrücken.

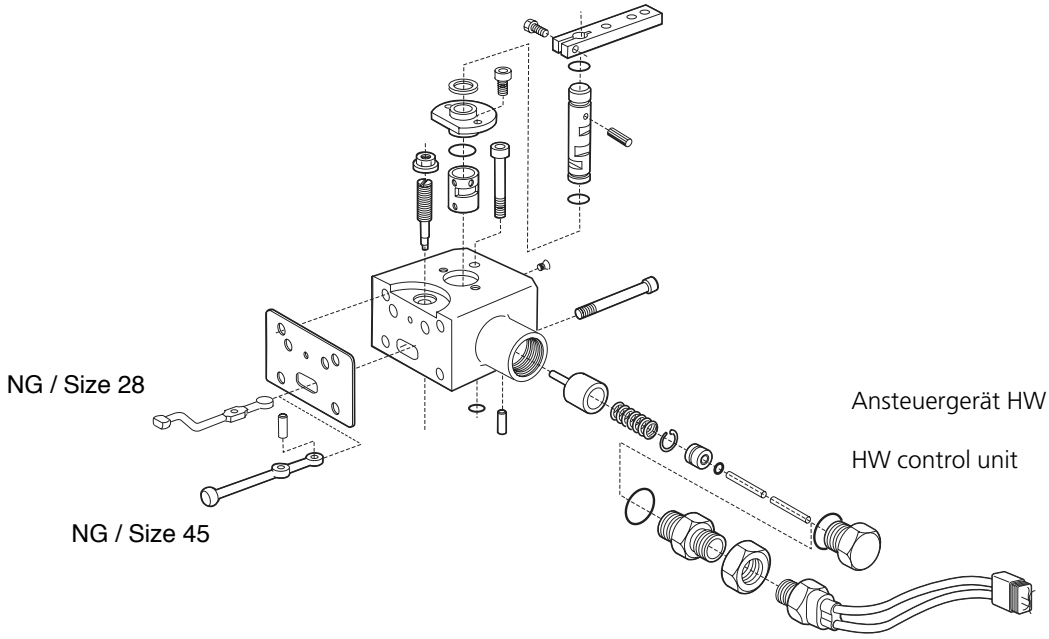
Pry-off the control unit.

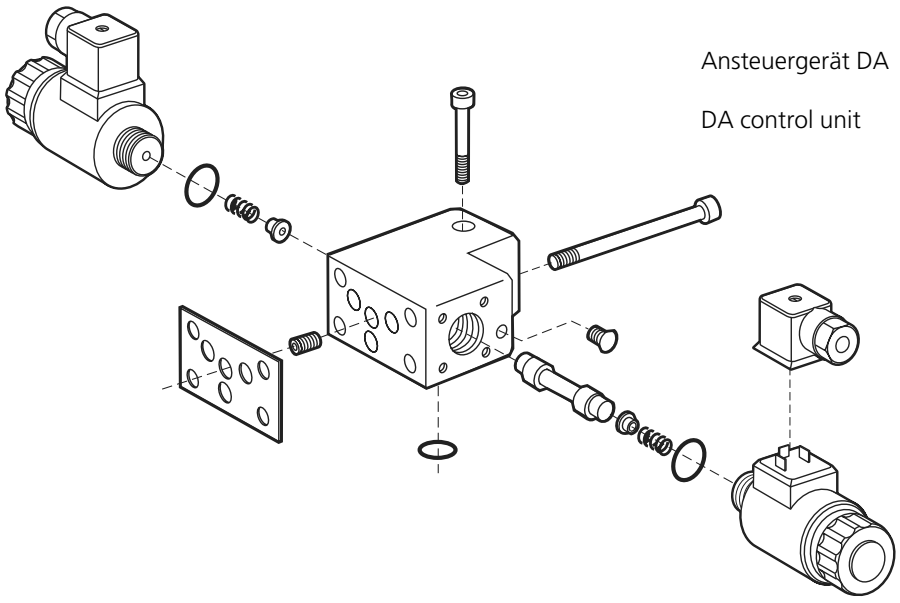


Kontrolle
Dichtfläche (1), Flachdichtung (2), O-Ringe (3).

Check
Sealing surface (1), gasket (2), O-rings (3).

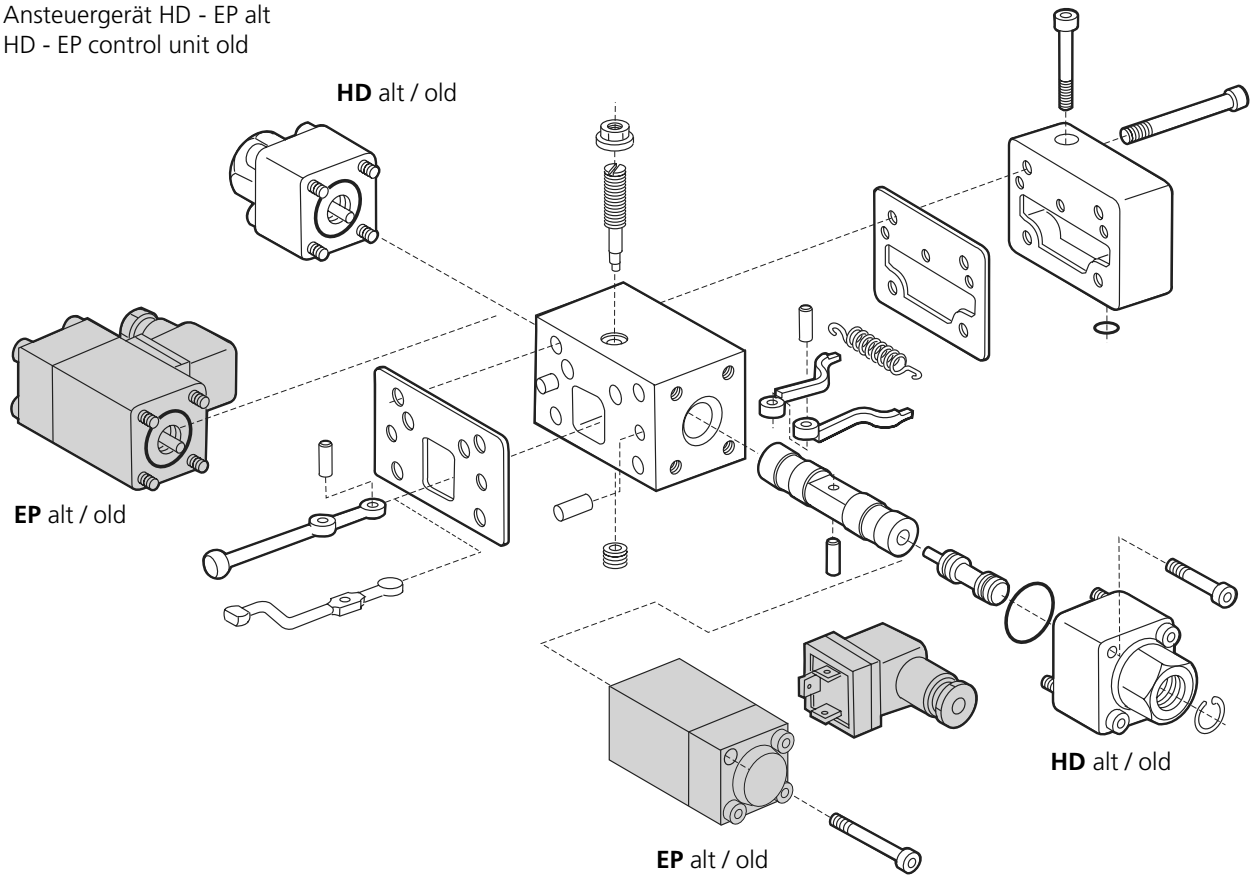
https://truckmanualshub.com/



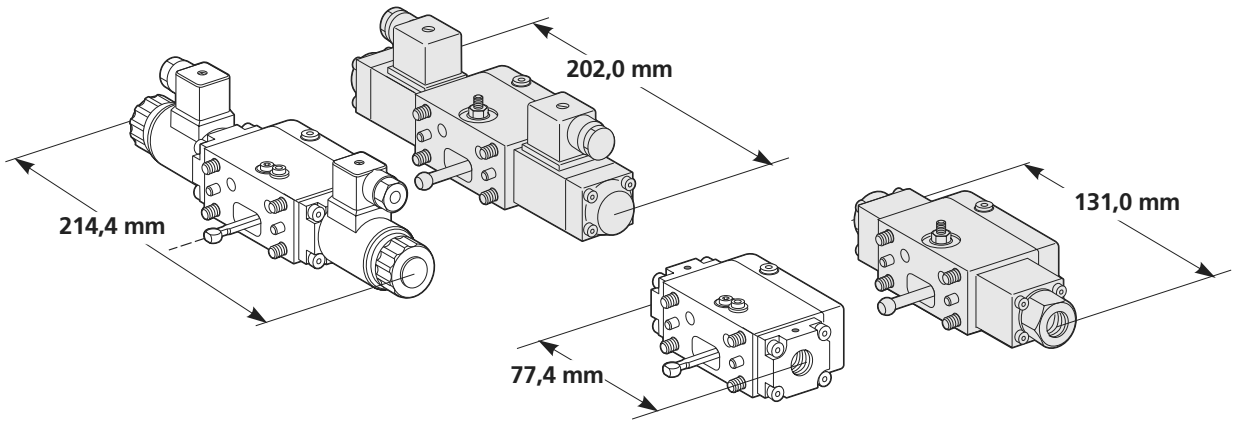


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Ansteuergerät HD - EP alt
HD - EP control unit old

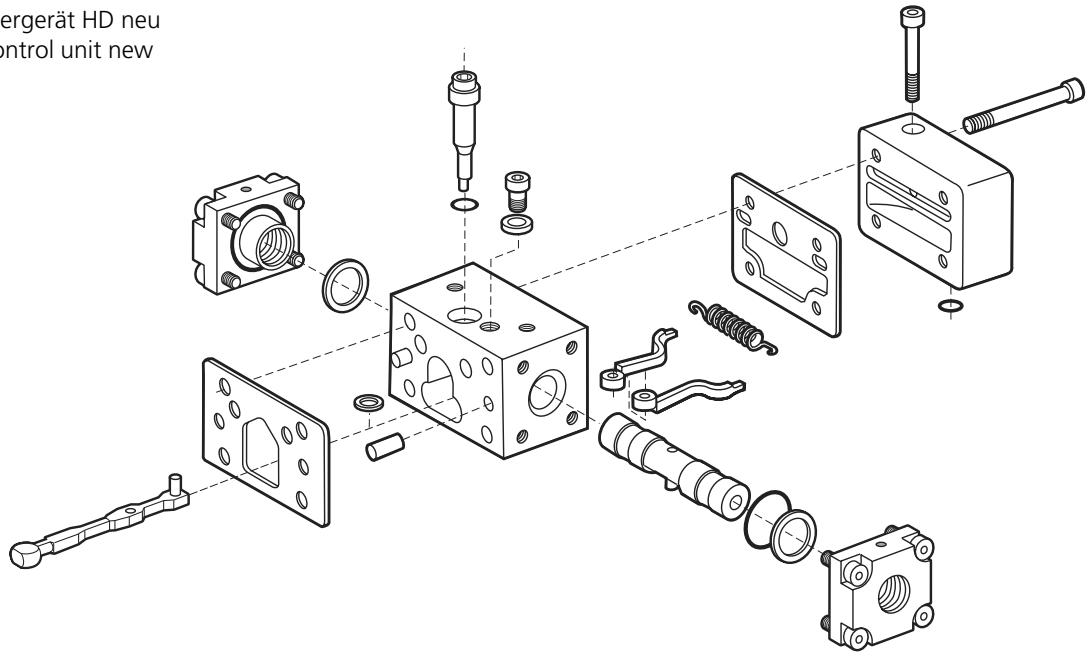


Neues Ansteuergerät HD - EP
New HD - EP control unit old

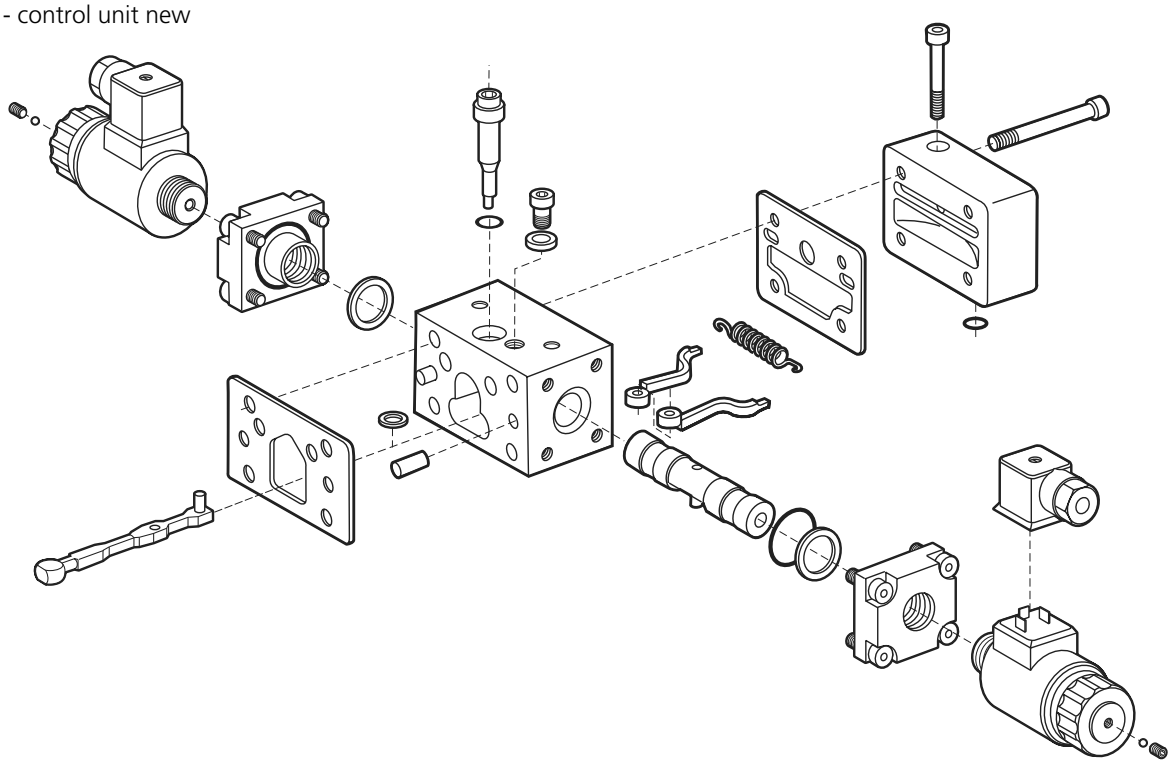


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Ansteuergerät HD neu
HD - control unit new

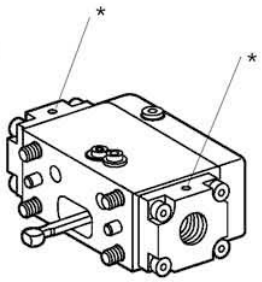


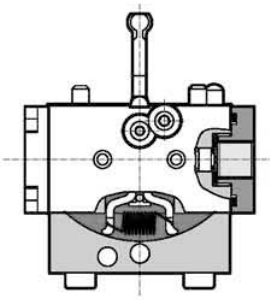
Ansteuergerät EP neu
EP - control unit new

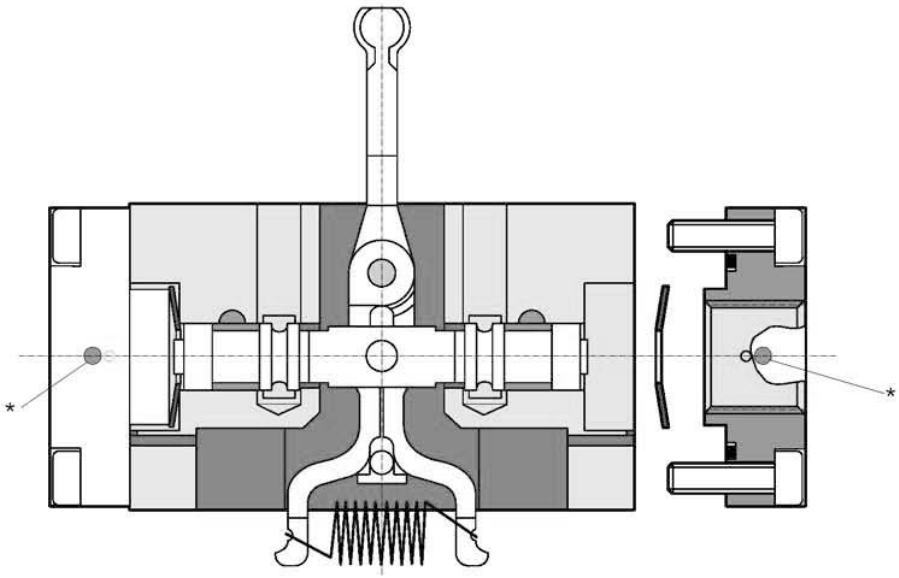


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* Markierung Montageposition **HD**
* Marking the assembly position HD







* Markierung
Montageposition **HD**

* Assembly position marker **HD**

Wird von EP- auf HD-Ausführung umgebaut - Deckelposition beachten siehe Markierung

○ Leckölkanal offen wird geschlossen.

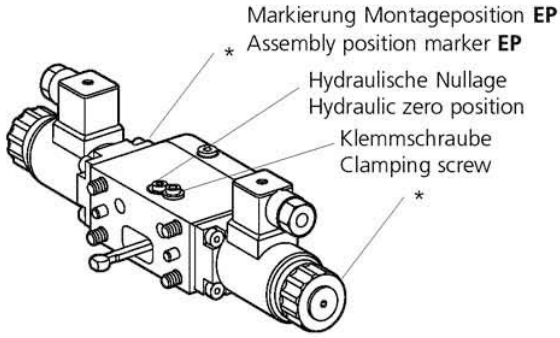
⚠ Zugfeder tauschen!

Is converted from EP into the HD version - take note of the cover position, see marker

○ The open leakage port is plugged

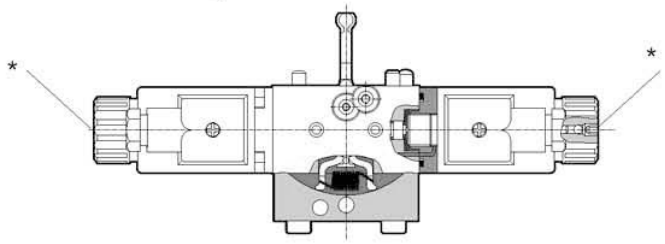
⚠ Exchange the tension spring!

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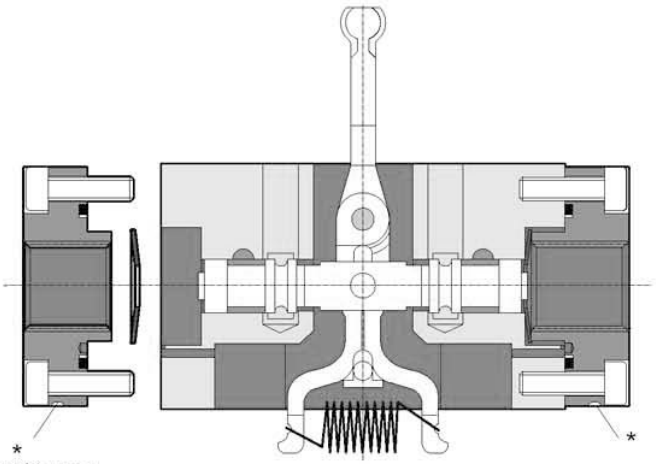


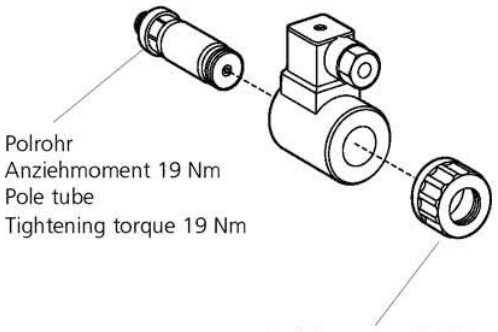
Die neuen Proportionalmagnete müssen bei der Inbetriebnahme entlüftet werden. Wird die Luft nicht aus dem Ankerraum entfernt, kann es zum Schwingen der Ansteuerung kommen.
Zum Entlüften ist am Ende des Magneten, im Messingteil, ein kleiner Gewindestift M4, SW 2 vorhanden. Dieser Gewindestift ist max. 2 Umdrehungen herauszudrehen und nach dem Entlüften mit 1 Nm wieder festzuziehen.
Bei der Ausführung mit Nothand mit Federrückzug muß zum Entlüften die Kunststoffmutter mit Gummibalg entfernt und nach dem Entlüften mit 5+1 Nm wieder angeschraubt werden.

Entlüftungsschraube * max. 2 Umdrehungen herausdrehen.
Bleed screw *. Unscrew by a max. of 2 turns



The new proportional solenoids must be bled during commissioning. If the air is not removed from the armature chamber oscillations at the control can occur.
For bleeding purposes there is, on the end of the solenoid, in the brass component a small set screw M4, 2A/F. This can be unscrewed by a maximum of 2 turns and then after completion of the bleeding tightened to a maximum of 2 Nm.
For the version with hand override and spring return the plastic nut with rubber coating has to be removed for bleeding. After bleeding it has to be replaced and tightened with 5+1 Nm.

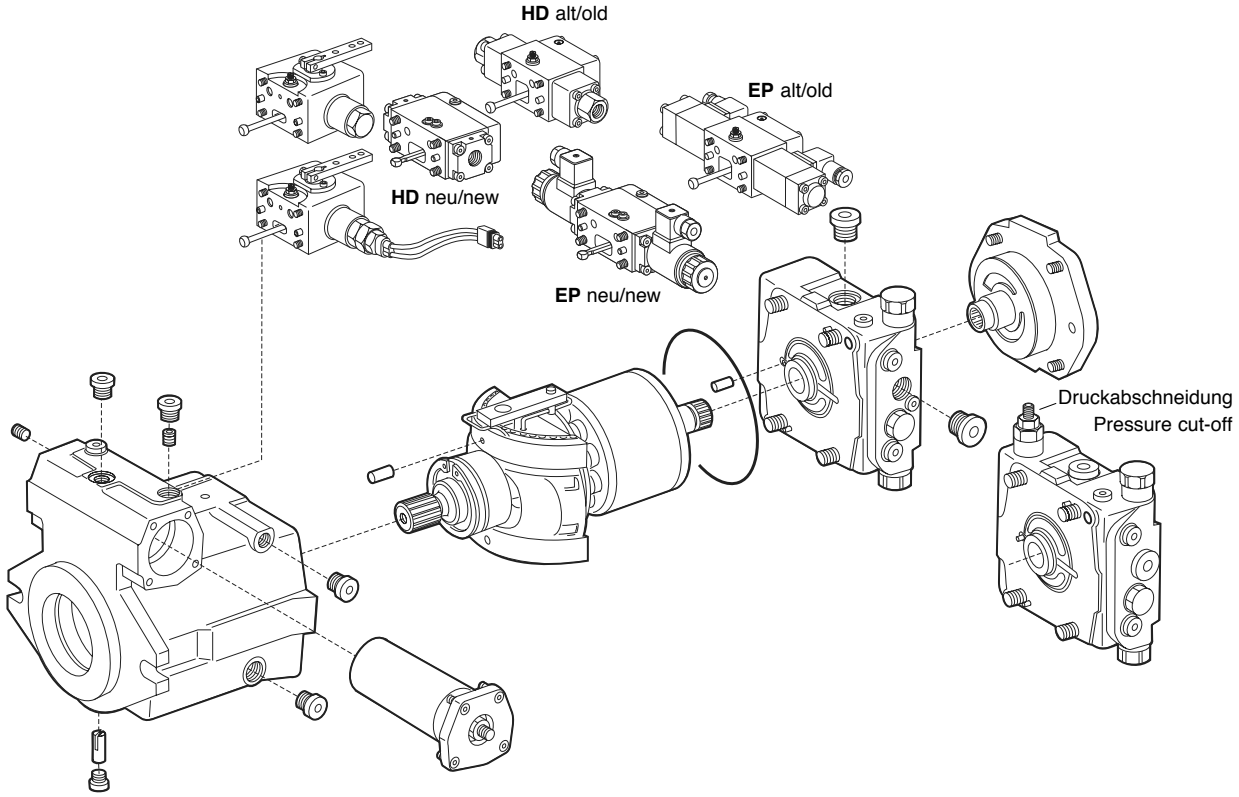


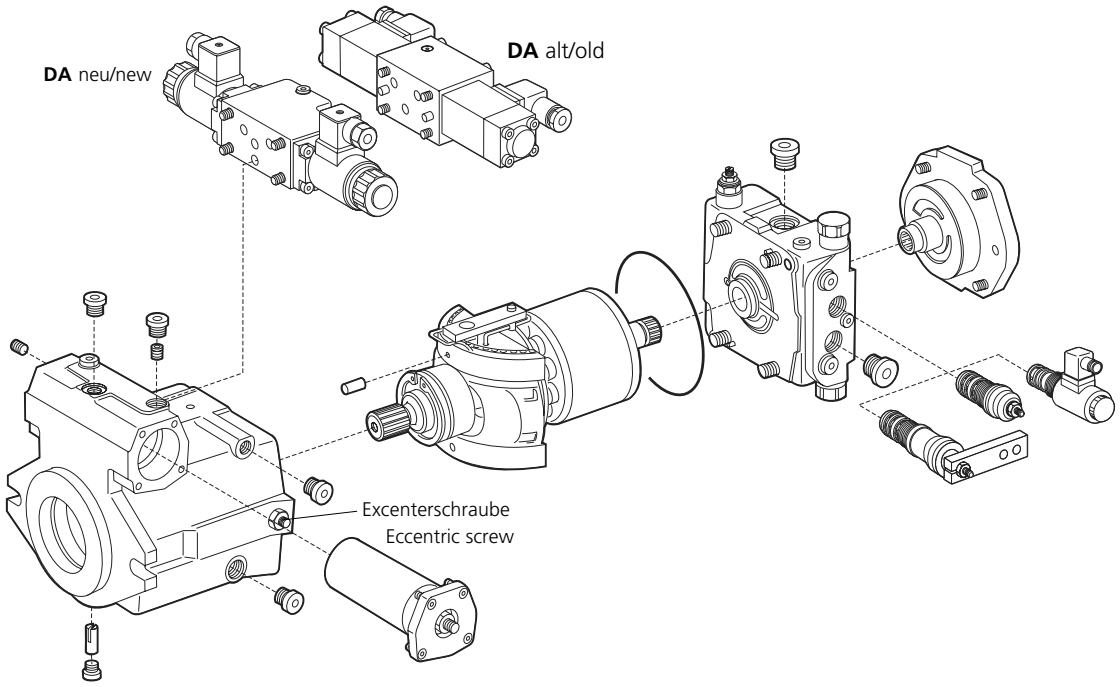


⚠ Beim Lösen der Klemmschraube
Exzenterstift - Hydraulische Nullage festhalten.

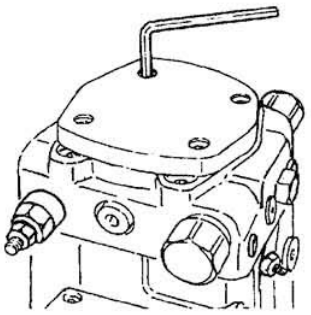
⚠ When loosening the clamping screw
Hold the eccentric pin - hydraulic zero point

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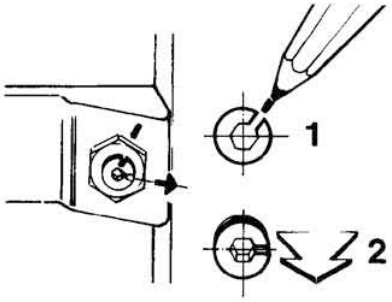


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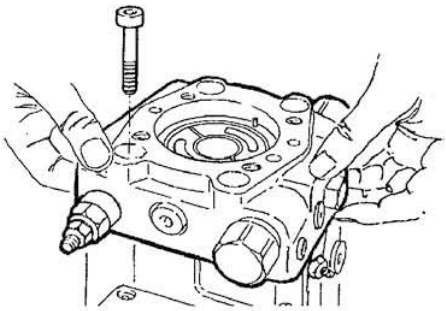
Lage der Hilfspumpe und Anschlußplatte markieren.
Hilfspumpe abbauen.

Mark position of the boost pump and the port plate.
Remove the boost pump.



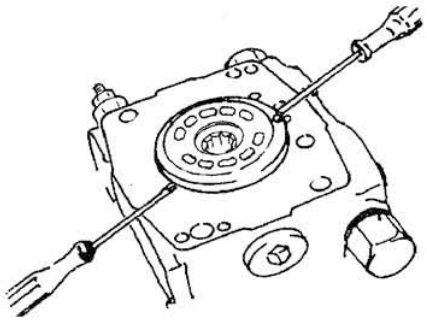
DA-Ausführung:
Lage der Verdrillschraube markieren (1).
Verdrillschraube auf Demontageposition stellen (2).

DA-design:
Mark the position of the eccentric screw (1).
Set the eccentric screw to disassembly position (2).



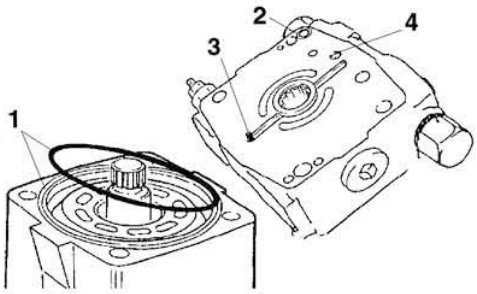
Anschlußplattenbefestigung lösen. Anschlußplatte abheben.

Remove connecting plate fixing screws.
Lift off the connection plate.



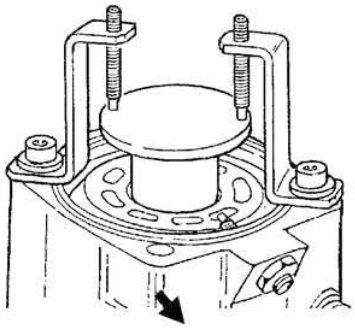
Steuerplatte abdrücken.
Lage notieren.

Lift off control plate.
Note position.



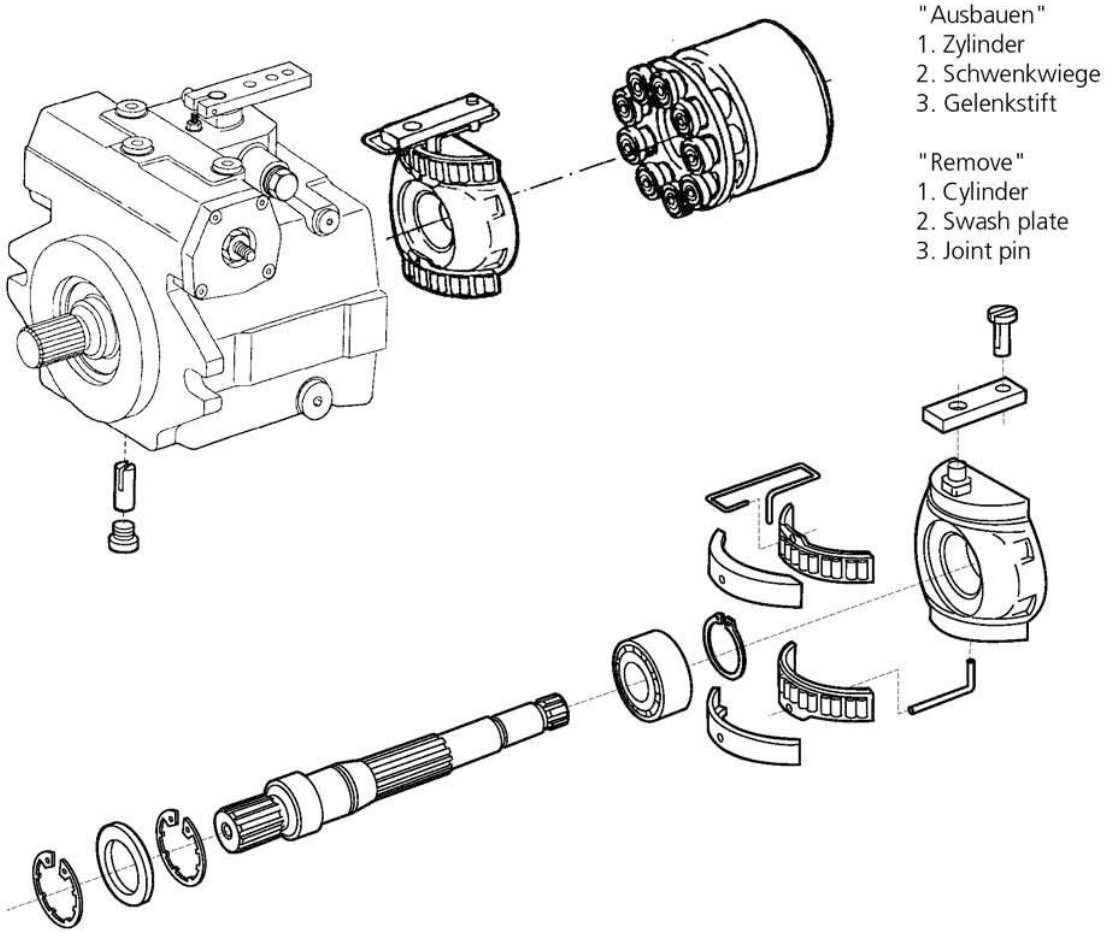
Kontrolle!
O-Ring mit Nut (1)
O-Ring mit Nut (2)
Fixierstift - Steuerplatte (3) Bei **DA** - kein Stift
T - Ablauf verschlossen (4)
Check
O-ring and groove (1)
O-Ring and groove (2)
Locating pin - control plate (3) type DA has no pin
T drain plugged (4) open for type DA

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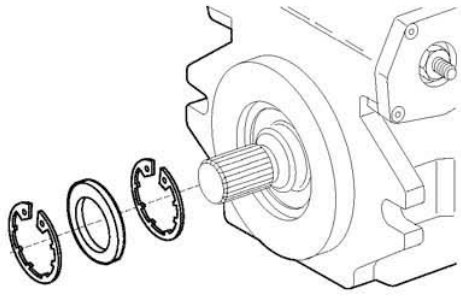
DA-Ausführung
Zylinder nach unten drücken (1).
Verdrillschraube herausdrehen (2).
Triebwerk ausheben (3).

DA- version
Press the cylinder downwards (1).
Remove the eccentric screw (2).
Lift out the rotary group (3).



"Ausbauen"
1. Zylinder
2. Schwenkwiege
3. Gelenkstift

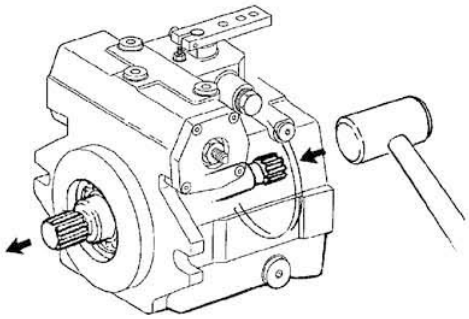
"Remove"
1. Cylinder
2. Swash plate
3. Joint pin



Sicherungsring, WDR ausbauen.

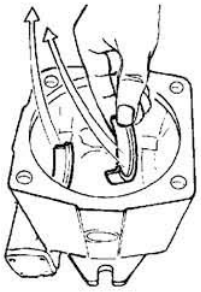
Remove retaining ring, remove drive shaft seal.

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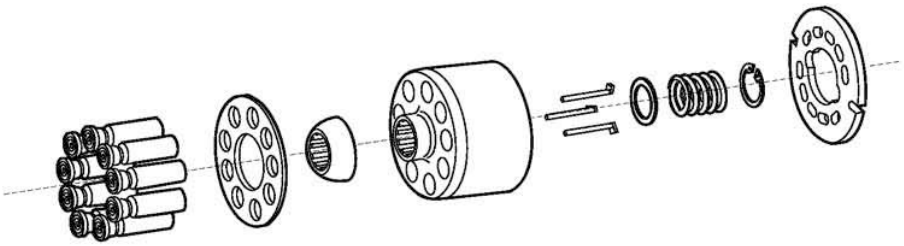
Triebwelle mit leichten Hammerschlägen austreiben.

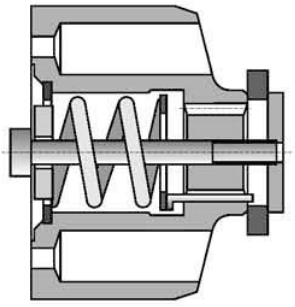
Remove drive shaft with light hammer strokes.



Lagerschalen ausbauen.

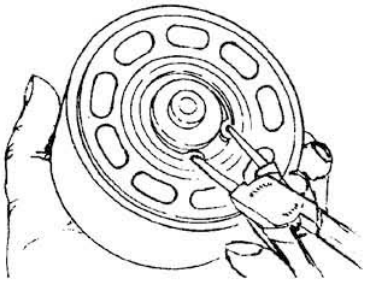
Remove bearing shells.





Feder mit Vorrichtung vorspannen.

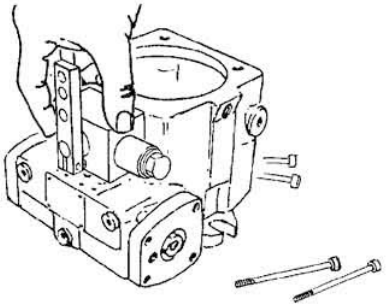
Pre-tension the spring using a suitable device.



Sicherungsring demontieren.
Feder und Druckstifte ausbauen.

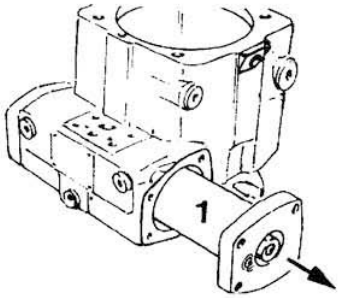
Remove circlip.
Remove spring and pressure pins.

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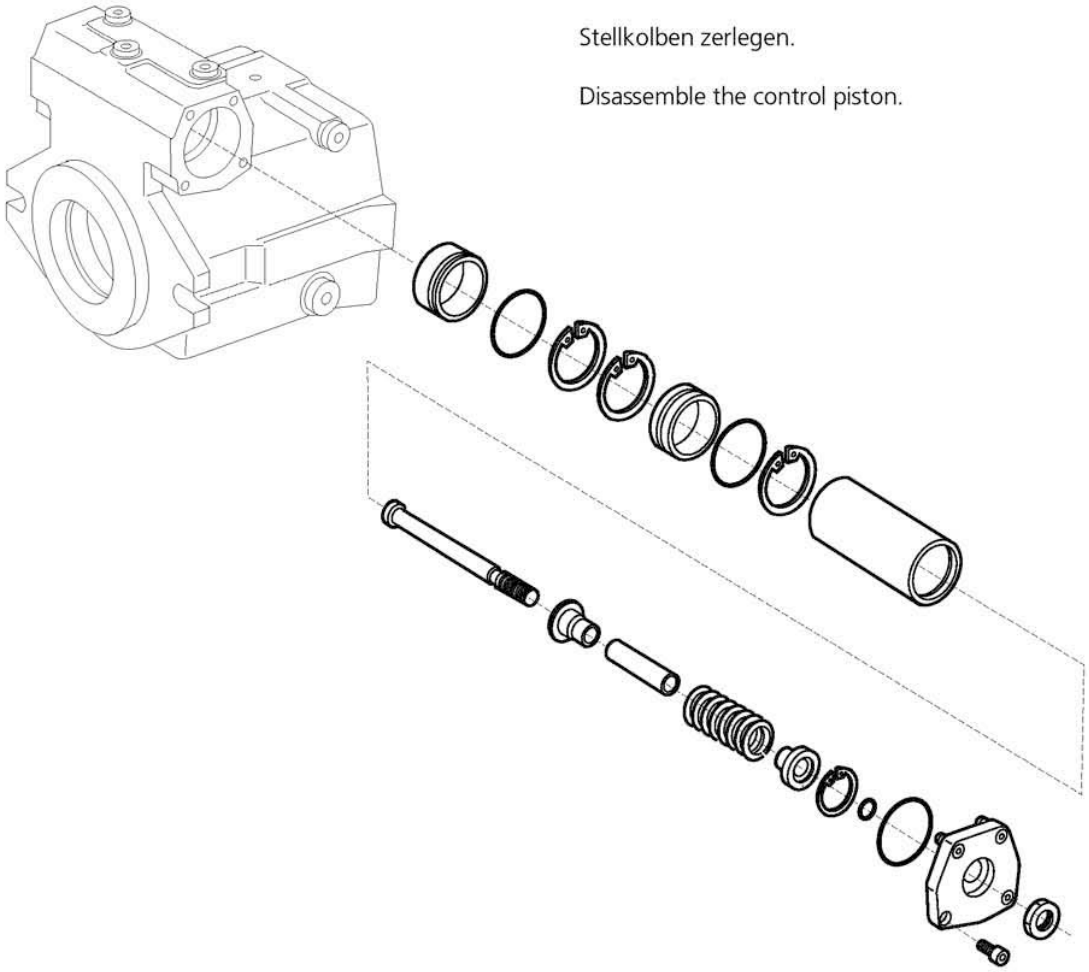
Steuergerät abbauen.

Remove control unit.



Stellkolben (1) ziehen.

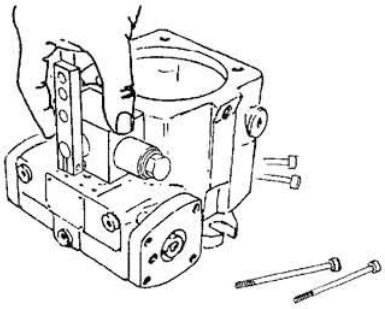
Pull out control piston (1).



Stellkolben zerlegen.

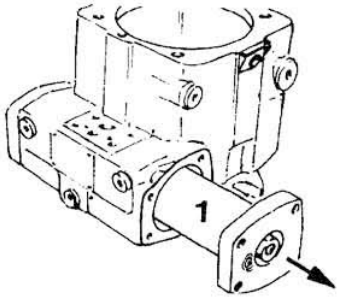
Disassemble the control piston.

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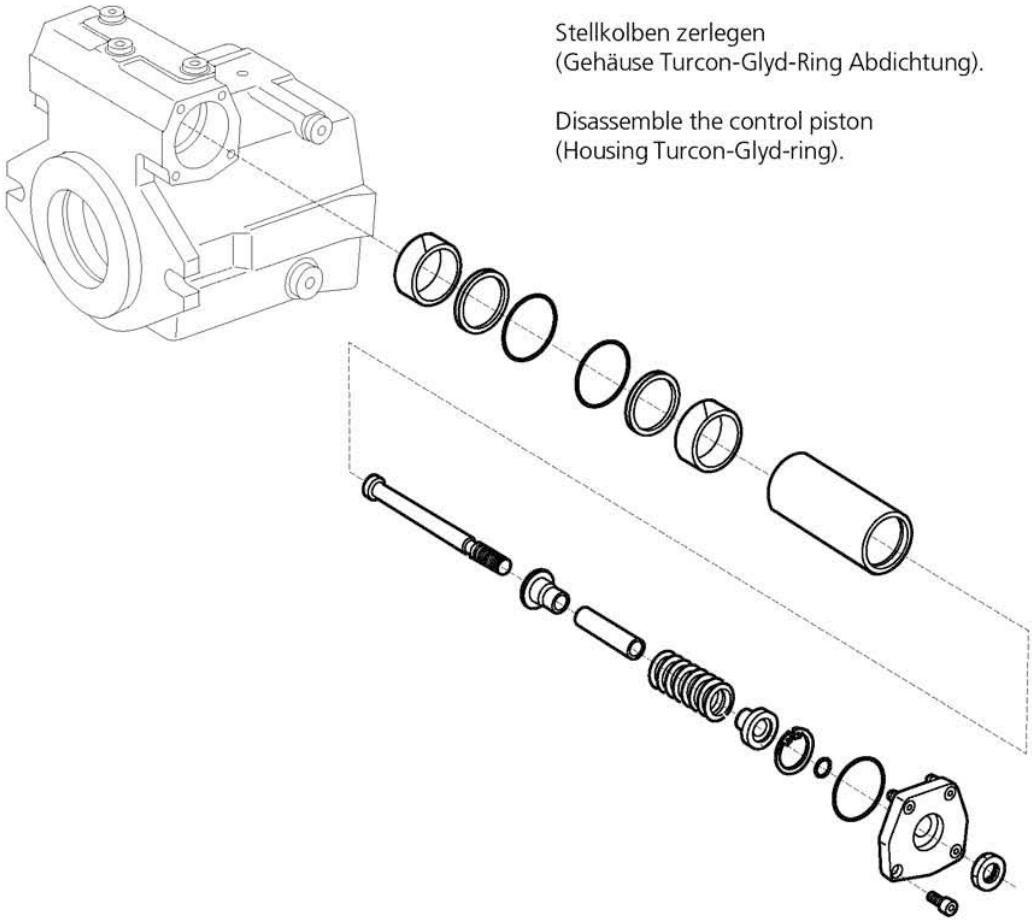
Steuergerät abbauen.

Remove control unit.



Stellkolben (1) ziehen.

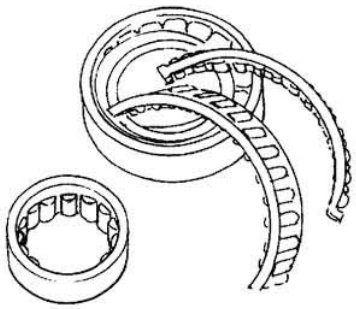
Pull out control piston (1).



Stellkolben zerlegen
(Gehäuse Turcon-Glyd-Ring Abdichtung).

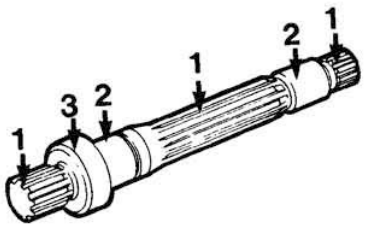
Disassemble the control piston
(Housing Turcon-Glyd-ring).

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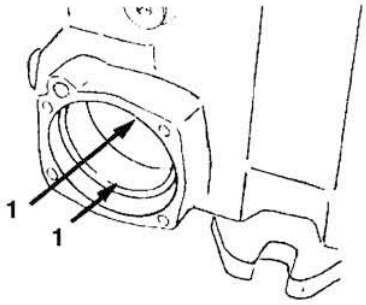
Alle Lager erneuern.

Replace all bearings.



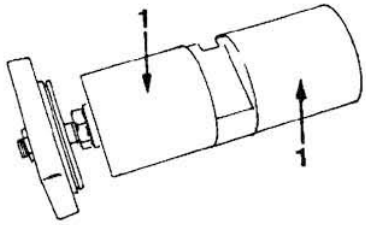
Kontrolle!
1. Verzahnung, ausgeschlagen, Passungsrost.
2. Lauffläche.
3. Einlaufrillen vom Wellendichtring.

Check!
1. Splines, wear steps, corrosion.
2. Running surfaces.
3. Grooves made by the shaft seal.



Stellkolbenlaufbüchse (1) riefenfrei, nicht ausgelaufen.

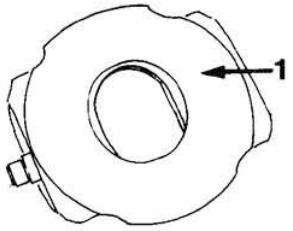
Check that the control piston guide bush (1) is free of grooves and is free of wear.



Kontrolle!
Stellkolben (1) riefenfrei.

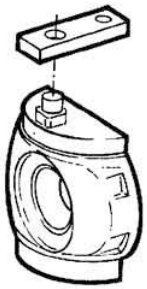
Check!
Control piston (1) is not scored.

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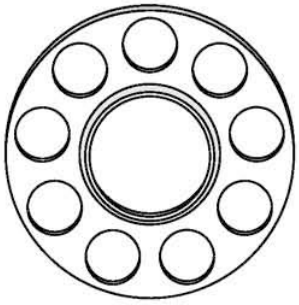
Kontrolle!
Gleitfläche riefenfrei.

Check!
Sliding surface free of grooves.



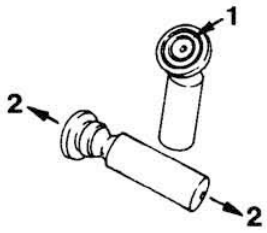
Kontrolle!
Verbindung Gleitstein/Schwenkzapfen spielfrei.

Check!
That the connection of slide ring/swivel pin is free of play.



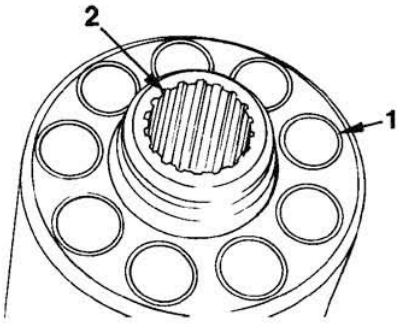
Kontrolle!
Rückzugeinrichtung riefenfrei (1), keine Einlaufspuren (2) im Gleitschuhbereich.

Check!
That the retaining plate is free of grooves (1) and that there is no wear (2) in the slipper pad area.



Kontrolle!
Lauffläche (1) keine Kratzer, keine Metalleinlagerungen, kein Axialspiel (2), (Kolben nur satzweise tauschen).

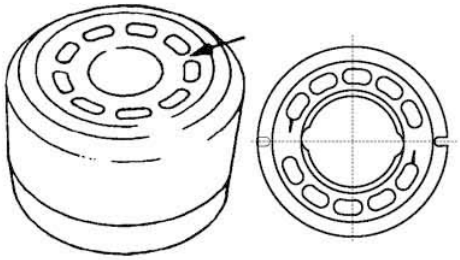
Check!
Check to see that there are no scratches or metal deposits on the sliding surface (1), and that there is no axial play (2), (pistons must only be replaced as a set).



Kontrolle!
Zylinderbohrungen (1), Verzahnungen (2).

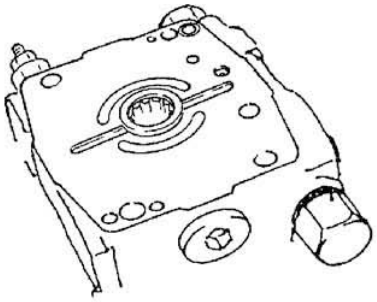
Check!
Cylinder bores (1), splines (2).

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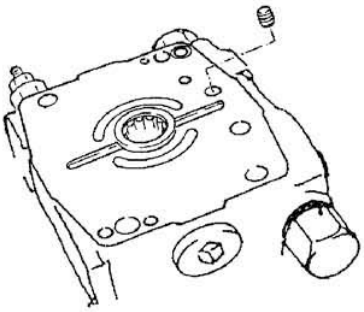
Kontrolle!
Zylindergleitfläche (1) riefenfrei, nicht eingelaufen, keine Einlagerungen, Steuerplatte (2) nicht riefig (nur satzweise austauschen).

Check!
Cylinder sliding surface (1) free of grooves, no wear, no embedded foreign particles. That there are no scratches on the control plate (2). (Only replace them as a set).



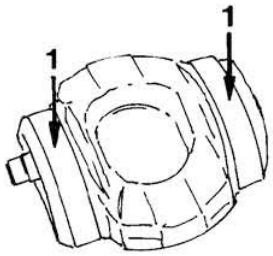
Kontrolle!
Auflagefläche - Steuerplatte ohne Beschädigung.

Check!
Mounting surface - control plate undamaged



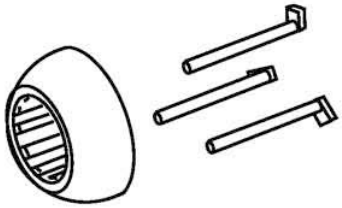
Hinweis:
Bohrung bei DA-Regelung offen. (gültig nur bei A10VG 45).

Information:
Hole for DA-control is open, without DA control valve it is plugged.



Kontrolle!
Lagerbahnen (1)

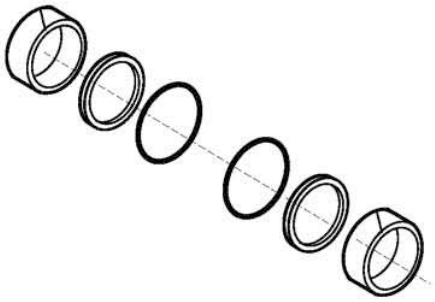
Check!
Bearing surfaces (1)

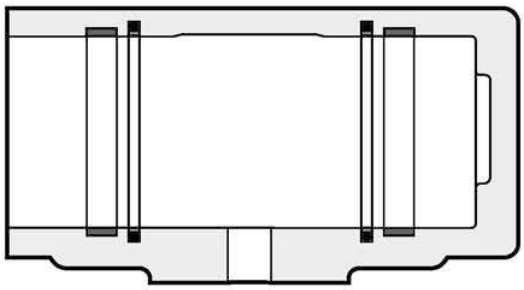


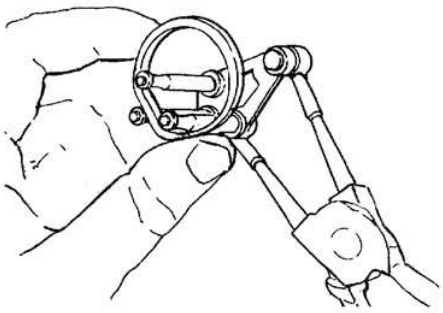
Riefenfrei, keine Einlaufspuren

Free of grooves, no wear.

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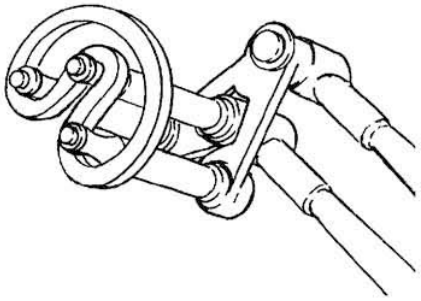






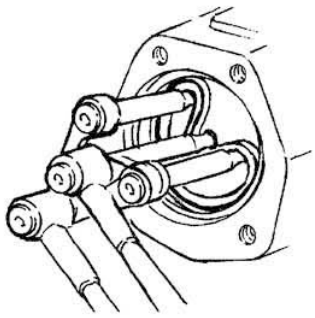
Dichtring in die Montagezange einlegen.

Fit the seal ring into the assembly tool.



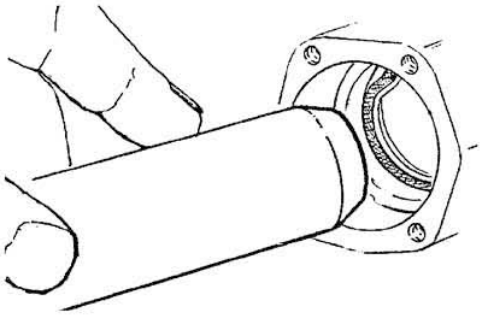
Dichtring mit Zangenschenkel nierenförmig zusammendrücken. Die Verformung von Turcon-Dichtungen ist sorgfältig vorzunehmen, damit die Dichtkanten nicht beschädigt werden.

Press the seal ring into the kidney shape using the assembly tool. The deformation of the Turcon seal has to be done with care so as not to damage the sealing edges.



O-Ring in Nut einlegen.
Dichtring ins Gehäuse einführen und in der Aufnahmenut plazieren. Dann Spannung lösen und Montagezange heraus ziehen. Lage des Dichtringes prüfen - eventuell mit dem Finger egalisieren.

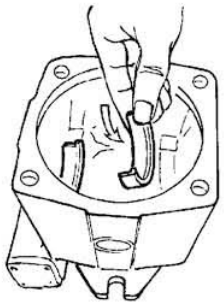
Position the seal ring into the groove.
Position the seal ring into the housing and place it into the groove. Release the tension and withdraw the assembly tool.
Check the position of the seal ring if necessary straighten using a finger.



Kalibrieren des Dichtringes mit einem Kalibrierdorn (Stellkolben) - mit langer Schräge 10° bis 15°.

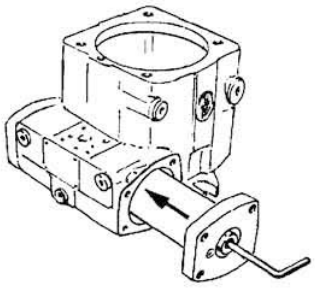
Calibrate the seal ring using a cylindrical plug gauge (positioning piston) at an angle of 10° to 15°.

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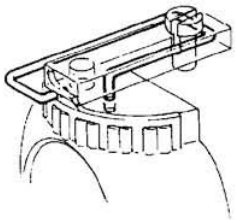
Lagerschalenpaar einsetzen.

Insert bearing shells.



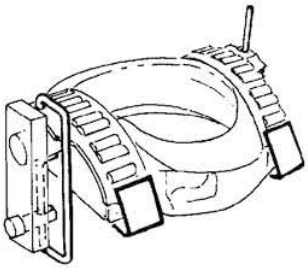
Stellkolben ins Gehäuse einsetzen.
Hinweis:
Stellkolben vor Einbau einölen.

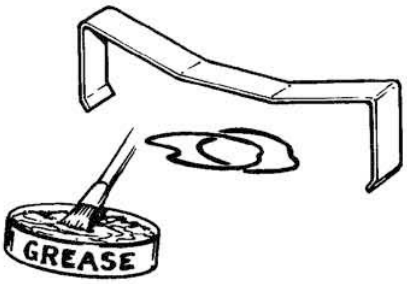
Insert positioning piston into the housing.
Instruction:
Oil positioning piston before assembly.

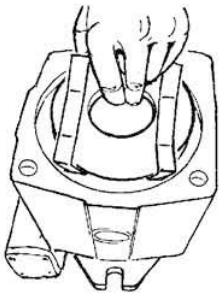


Lager, Draht, Gleitstein und Gelenkstift montieren.
Montagehilfe: z.B. - Klammer / Gummiringe / Fett

Assemble the bearing, wire, slide ring and joint pin .
Assemble aids:
e.g. - clips / rubber rings / grease







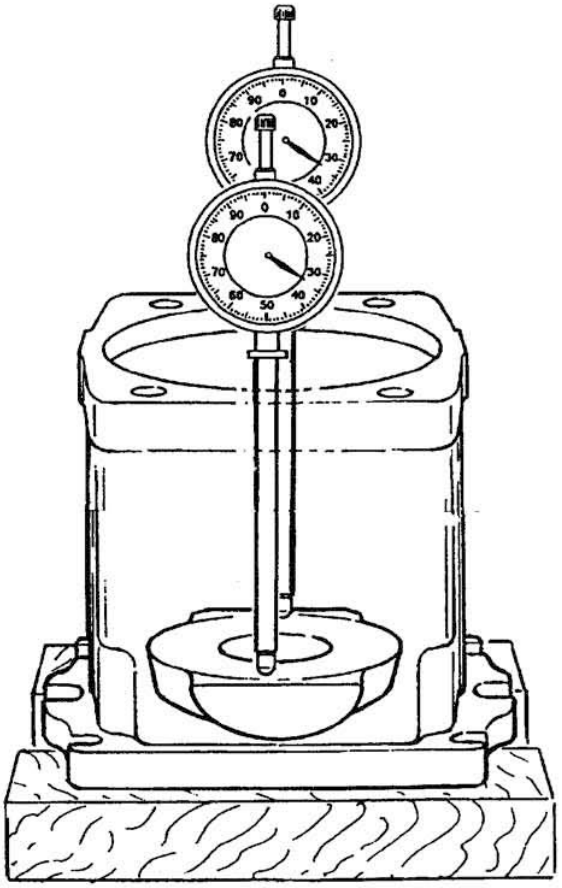
Schwenkwiege komplett ins Gehäuse einsetzen.
Auf korrekten Sitz der Schwenklager im Gehäuse "achten".

⚠ Montagehilfe ausbauen.

Insert the swash plate into the housing.
Ensure that the swivel-bearing is correctly located in the housing.

⚠ Remove assembly aid.

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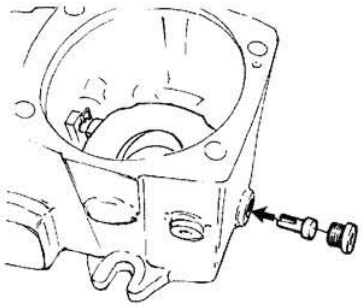


⚠ Kontrolle: Sitz der Schwenklager in der Lagerbahn.

Schwenkwiege mit Stellkolben verschwenken "Leichtgängig".
Mittig stellen mit Meßvorrichtung (Uhr oder Tiefenmaß)
Punkt 1 und 2 kontrollieren - gleiches Maß.

⚠ Check: Location of the swivel-bearing in the bearing.

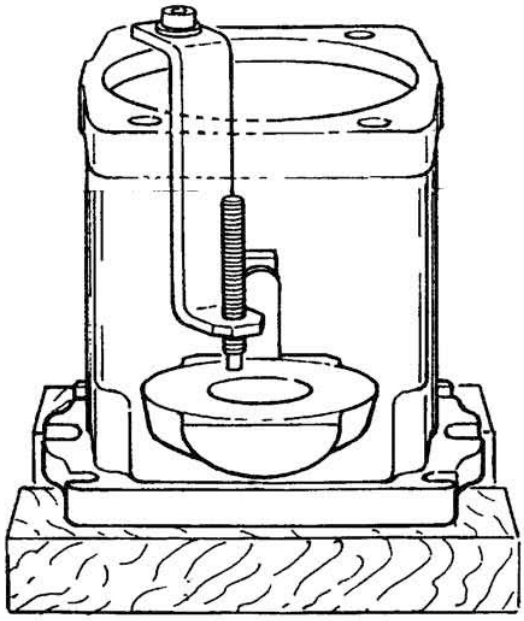
Swivel the swivel bearing by using the control piston "it should move easily".
Centralise by using a measuring device (dial gauge or depth measurement).
Check points 1 and 2 - they should have the same dimension.



Gelenkstift montieren.

Fit joint pin.

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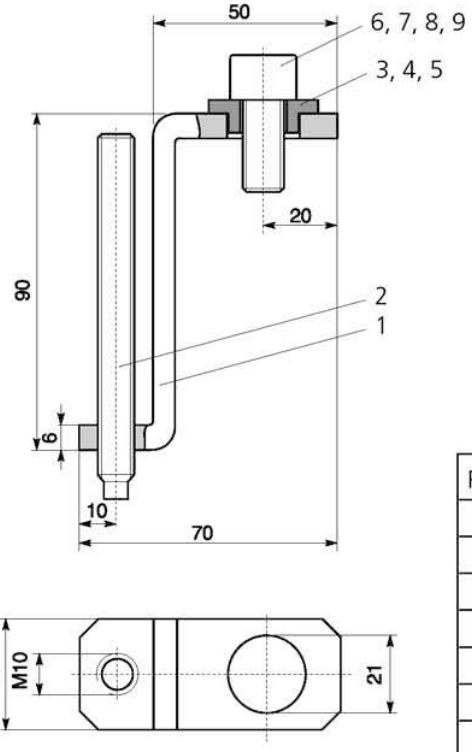
Haltevorrichtung montieren.
Mit Gewindestift Schwenkwiege festhalten.

⚠ Keine Gewaltanwendung.

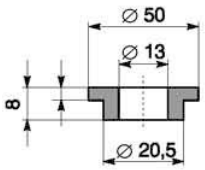
Fit holding device.
Hold swash plate in position utilising the set screw.

⚠ Do not use force.

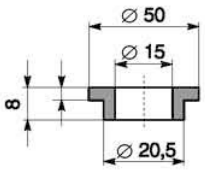
Haltevorrichtung "Schwenkwiege" A4V
Holding device "swivel cradle" A4V



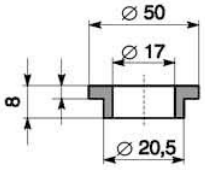
Teil/Part 3



Teil/Part 4

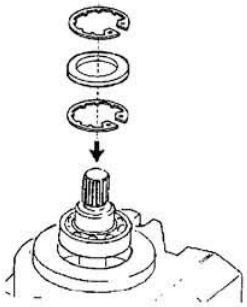


Teil/Part 5



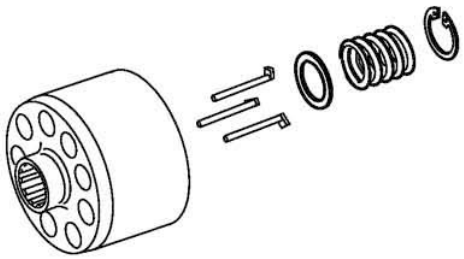
Pos./Item	Benennung/Designation	Stck./Qty.
1	Winkel/Angle	2
2	Gewindestift/Threaded pin	2
3	Scheibe/Shim	2
4	Scheibe/Shim	2
5	Scheibe/Shim	2
6	Zyl. Schraube/Cyl. screw M12 x 25 DIN 912	2
7	Zyl. Schraube/Cyl. screw M14 x 25 DIN 912	2
8	Zyl. Schraube/Cyl. screw M16 x 30 DIN 912	2
9	Zyl. Schraube/Cyl. screw M20 x 35 DIN 912	2

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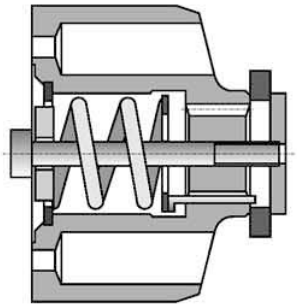
Neue Montageposition!
Triebwelle mit Lager und Wellendichtring einbauen.

Assemble drive shaft with bearings and radial seal rings.



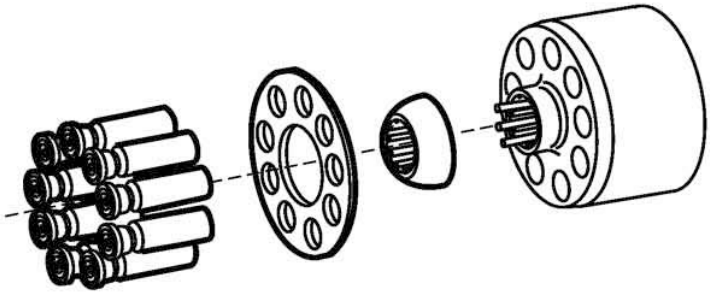
Mit Vorrichtung Druckstifte montieren.

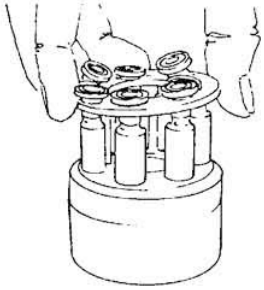
Fit pressure pins using an assembly aid.



Feder mit Vorrichtung vorspannen.

Pre-tension the spring using a suitable device.

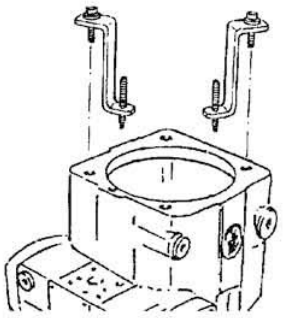




Kolben mit Rückzugeinrichtung montieren.
Hinweis:
Kolben, Gleitschuhe einölen.

Assemble piston with retaining plate.
Note:
Oil piston and piston pad.

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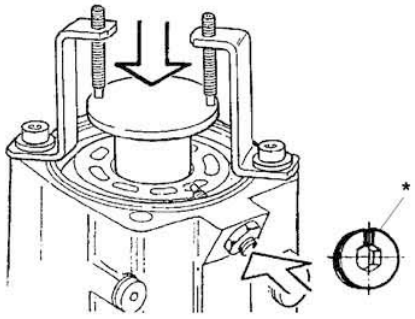
Vorrichtung ausbauen.
Zylinder mit Kolben und Rückzugeinrichtung einbauen.

Remove holding device.
Fit cylinder complete with pistons and retaining device.



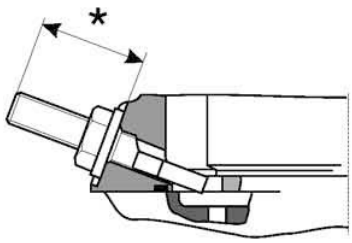
Montagehilfe:
Mit O-Ring Kolben festhalten.

Assembly aid:
Hold the pistons by using an O-ring.



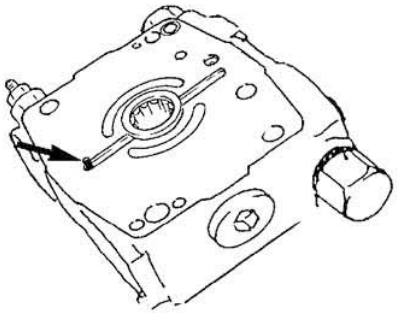
Bei Ausführung mit Verdrillschraube:
Zylinder nach unten drücken - Verdrillschraube
auf Maß x einschrauben.
* Kerbe in Montageposition.

For the version with eccentric screw:
Push the cylinder down - screw in the eccentric
screw in the eccentric screw until dimension x is reached.
* groove in assembled position.



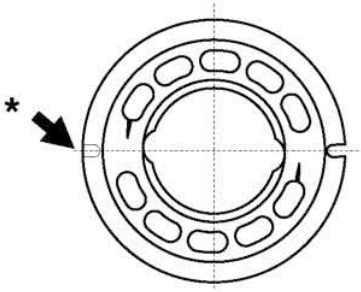
NG / Size 28 = 31 ± 0,75 mm
NG / Size 45 = 32 ± 0,75 mm

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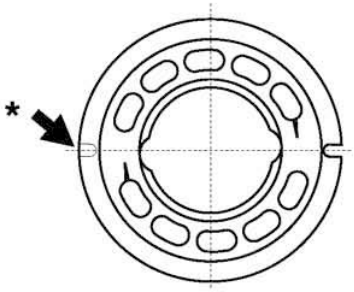
Fixierstift für Steuerplatte einsetzen.
Bei DA - Ausführung mit Verdrillschraube ohne Fixierstift.

Fit locating pin for control plate.
For the DA version with eccentric screw without locating pin.



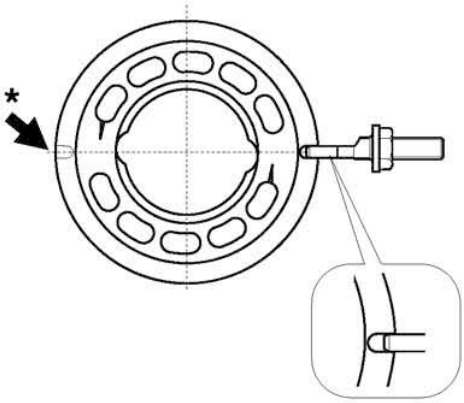
Steuerplatte Rechtslauf
* Fixierstift

Control plate, clockwise rotation
* Locating pin



Steuerplatte Linkslauf
* Fixierstift

Control plate, anti-clockwise rotation
* Locating pin



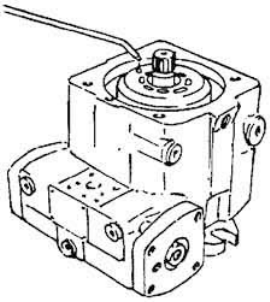
Steuerplatte Rechtslauf mit Verdrillschraube

Control plate, clockwise rotation with eccentric screw

Max. Einschraubtiefe beachten.

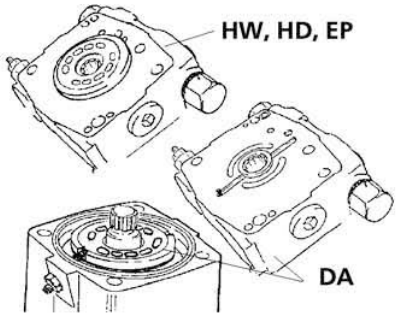
Max. depth - take into account!

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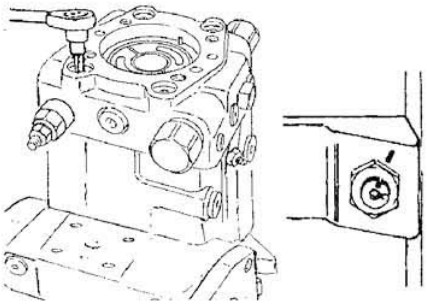
Zylinderflächen einölen, neue O-Ringe
mit Fett einreiben und einsetzen.

Oil the cylinder surfaces, grease the new O-rings and fit into place.



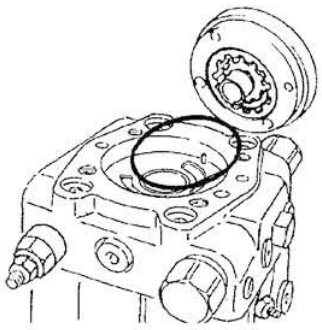
Lagerichtig aufsetzen.
Hinweis:
HW, HD, EP Steuerplatte mit Fett auf Anschlußplatte.
Bei DA Steuerplatte auf Zylinderfläche legen.

Place in correct position.
Note:
HW, HD, EP - Locate the control plate on the connection plate using grease.
For the DA version, place control plate on the cylinder surface.



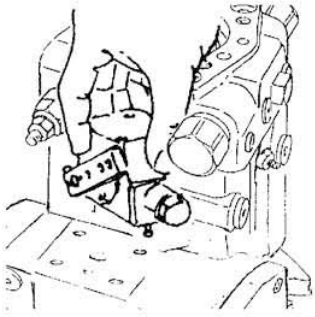
Schrauben über Kreuz anziehen.
Verdrillschraube auf Markierung drehen.

Tighten the screws aross corners.
Turn the eccentric screw until the marker is reached.



Hilfspumpe montieren.

Fit boost pump.



Ansteuergerät mit Dichtung montieren.

Fit control device with seal.

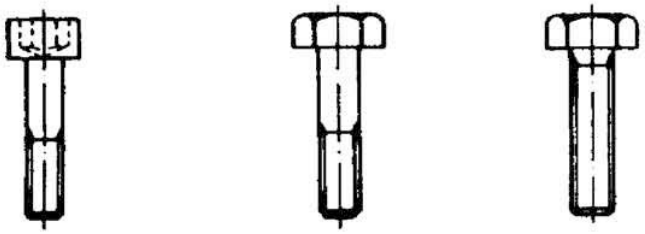
https://truckmanualshub.com/

1. Schaftschrauben (nach N 08.001)

Die Werte gelten für Schaftschrauben mit metrischem ISO-Gewinde nach DIN 13 Teil 13, sowie Kopfauflagemaßen nach DIN 912 Zylinderschrauben, DIN 931 Sechskantschrauben mit Schaft bzw. DIN 933 Sechskantschrauben mit Gewinde bis Kopf.

1. Bolts (to N 08.001)

The values stated are valid for bolts with metric ISO threads to DIN 13 part 13, as well as head areas to DIN 912 socked head cap screws, DIN 931 hexagon bolt or DIN 933 hexagon bolts with threads up to the head.

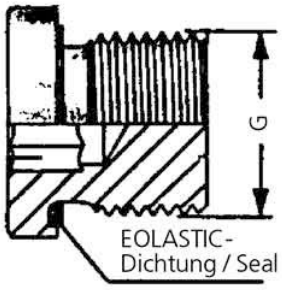


Gewinde / Thread	Festigkeitsklassen / Tensile strength class		
	8.8	10.9	12.9
	Anziehdrehmoment / Tightening torque M_A in Nm		
M 3	1,1	1,6	1,9
M 4	3,1	4,5	5,3
M 5	6,1	8,9	10,4
M 6	10,4	15,5	18
M 8	25	37	43
M 10	51	75	87
M 12	87	130	150
M 14	140	205	240
M 16	215	310	370
M 18	300	430	510
M 20	430	620	720
M 22	580	830	970
M 24	740	1060	1240

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2. **Verschlußschrauben** mit Innensechskant und Profildichtring (nach N 02.009).

2. **Plugs** with internal hexagon and profile seal ring (to N 02.009).

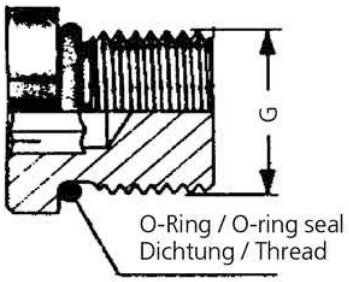


Gewinde / Thread	Anziehdrehmoment / Tightening torque M_A in Nm	Gewinde / Thread	Anziehdrehmoment Tightening torque M_A in Nm
M8 x 1	5	G 1/8 A	10
M10 x 1	10	G 1/4 A	30
M12 x 1,5	20	G 3/8 A	35
M14 x 1,5	30	G 1/2 A	60
M16 x 1,5	35	G 3/4 A	90
M18 x 1,5	40	G 1 A	140
M20 x 1,5	50	G 1 1/4 A	240
M22 x 1,5	60	G 1 1/2 A	300
M26 x 1,5	70		
M27 x 2	90		
M30 x 1,5	100		
M33 x 2	140		
M42 x 2	240		
M48 x 2	300		

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5. Verschlußschrauben mit Innensechskant, O-Ring und UNF-, UN-Gewinde nach SAE J 514 (nach N 02.106)

5. Plugs with internal hexagon, O-ring and UNF-, UN- threads to SAE J 514 (nach N 02.106)

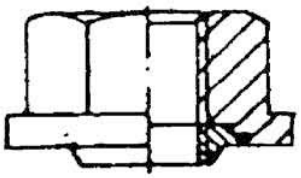


Gewinde / Thread	Anziehdrehmoment M_A in Nm Tightening torque M_A in Nm	Gewinde / Thread	Anziehdrehmoment M_A in Nm Tightening torque M_A in Nm
7/16 - 20 UNF	15	M12 x 1,5	20
1/2 - 20 UNF	20	M14 x 1,5	30
9/16 - 18 UNF	25	M27 x 1,5	90
3/4 - 16 UNF	72		
7/8 - 14 UN	127		
1 1/16 - 12 UN	147		
1 3/16 - 12 UN	173		
1 5/16 - 12 UN	198		
1 5/8 - 12 UN	320		
1 7/8 - 12 UN	390		

6. SEAL-LOCK-Dichtmuttern (nach N 02.100)

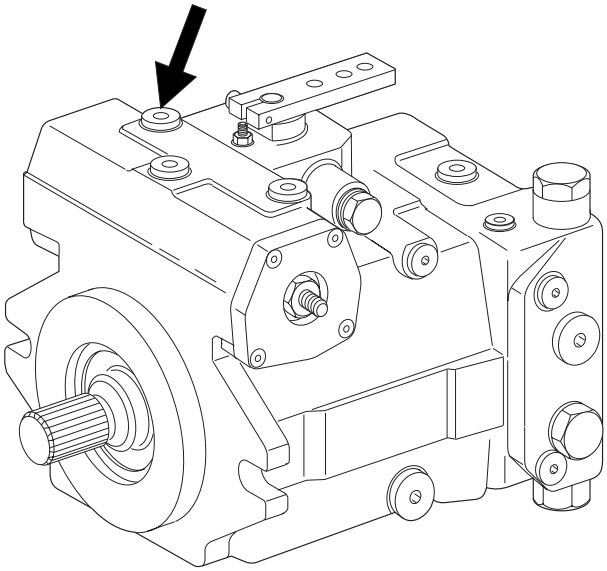
6. SEAL-LOCK - sealing nuts (to N 02.100)

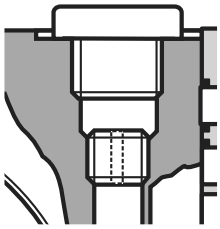
Gewinde / Thread	Anziehdrehmoment M_A in Nm Tightening torque M_A in Nm
M6	10
M6 x 0,5	11
M8	22
M8 x 1	24
M10	40
M10 x 1	44
M12	69
M12 x 1,5	72
M14	110
M14 x 1,5	120
M16	170
M16 x 1,5	180

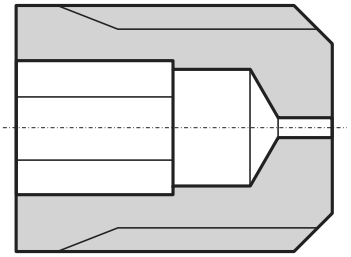


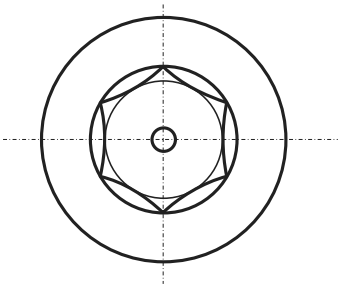
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A10V - Düsen / orifices









Gewinde / Thread	Anziehdremomente Nm / Tightening torques Nm	
	bisher / up to	**neu / new**
M6	6,5	**3**
M10	28	**12**

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Allgemein

- Machen Sie sich mit der Ausstattung der Maschine vertraut.
- Fahren Sie die Maschine nur, wenn Sie sich völlig mit den Bedien- und Steuerelementen sowie der Arbeitsweise der Maschine vertraut gemacht haben.
- Benutzen Sie Ihre Schutzausrüstung wie Schutzhelm, Sicherheitsschuhe und Gehörschutz.
- Machen Sie sich mit Ihrem Arbeitsgebiet vertraut.
- Benutzen Sie die Maschine nur für den ihr zugedachten Zweck.

Beachten Sie bitte die Richtlinien der Berufsgenossenschaft und des Maschinenherstellers



Vor dem Start

- Beachten Sie die Bedienungshinweise vor dem Starten.
- Prüfen Sie die Maschine aut auffällige Fehler.
- Fahren Sie die Maschine nicht mit defekten Instrumenten, Kontrolleuchten oder Steuerorganen.
- Alle Schutzvorrichtungen müssen fest auf ihrem Platz sein.
- Nehmen Sie keine losen Gegenstände mit bzw. befestigen Sie diese an der Maschine.
- Halten Sie die Maschine von öligem und zündfähigem Material frei.
- Prüfen Sie vor dem Besteigen der Maschine, ob sich Personen oder Hindernisse neben oder unter der Maschine befinden.
- Vorsicht beim Besteigen der Maschine, benützen Sie Treppen und Griffe.
- Stellen Sie vor dem Start Ihren Sitz ein.

General advice

- Familiarise yourself with the equipment which the machine is fitted.
- Only operate the machine if your are completely familiar with the operating and control elements as well as the function of the machine.
- Use your safety equipment, such as safety helmet, safety shoes and ear protectors.
- Make yourself familiar with your work area.
- Only operate the machine for its intended purpose.

Please observe the guidelines of the Professional Association and the machine manufacturer.



Before starting

- Observe the operating instructions before starting.
- Check the machine for obvious faults.
- Do not operate the machine with defective instruments, warning lights or control elements.
- All safety devices must be in place and secure.
- Do not carry with you loose objects, if necessary fix them to the machine.
- Keep the machine free of oily and inflammable material.
- Before entering thc driver's cabin, check if persons or obstacles are beside or beneath the machine.
- Be careful when entering the driver's cabin, use steps and handles.
- Adjust your seat before starting.

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Starten

- Beim Starten müssen alle Bedienhebel in "Neutralstellung" stehen.
- Die Maschine nur vom Fahrersitz aus Starten.
- Prüfen Sie die Anzeigeinstrumente nach dem Start, um sicher zu gehen, daß alles ordnungsgemäß funktioniert.
- Lassen Sie die Maschine nicht unbewacht, während der Motor läuft.
- Beim Start mit Batterieverbindungskabeln verbinden Sie Plus mit Plus und Minus mit Minus. Massekabel (Minus) immer zuletzt anschliesen und zuerst abtrennen.

Start

- When starting all operating levers must be in "neutral position".
- Only start the machine from the driver's seat
- Check the indicating instruments after start-up to assure that all functions are in order.
- Do not leave the machine unattended when the motor is running.
- When starting with battery jumper cables connect plus with plus and minus with minus. Always connect negative (-) cable last and disconnect negative cable first.

Vorsicht

- Auspuffgase sind lebensgefährlich. Bei Start in geschlossenen Räumen für ausreichende Luftzufuhr sorgen!

Attention

- Exhaust gas is life threatening. Ensure that there is sufficient fresh air when starting in closed rooms!

Hydraulikanlage

1. Hydraulikanlage steht unter hohem Druck!

⚠ Unter hohem Druck austretende Hochdruck-Flüssigkeiten (Kraftstoff, Hydrauliköl) können die Haut durchdringen und schwere Verletzungen verursachen. Daher sofort einen Arzt aufsuchen, da anderenfalls schwere Infektionen entstehen können!

2. Bei der Suche nach Leckstellen wegen Ver letzungsgefahr geeignete Hilfsmittel verwenden!
3. Vor Arbeiten an der Hydraulikanlage diese unbedingt drucklos machen und angebaute Geräte absenken!
4. Bei Arbeiten an der Hydraulikanlage unbedingt Motor abstellen und Traktor gegen Wegrollen sichern (Feststellbremse, Unterlegkeil)!
5. Beim Anschließen von Hydraulikzylindern und -motoren ist auf vorgeschriebenen Anschluß der Hydraulikschläuche zu achten!
6. Bei Vertauschen der Anschlüsse umgekehrte Funktionen (z.B. Heben/Senken) - Unfallgefahr!
7. Hydraulikschlauchleitungen regelmäßig kontrollieren und bei Beschädigung und Alterung austauschen! Die Austauschschlauchleitungen müssen den technischen Anforderungen des Geräteherstellers entsprechen!

⚠ Öle, Kraftstoffe und Filter ordnungsgemäß entsorgen!

Hydraulic equipment

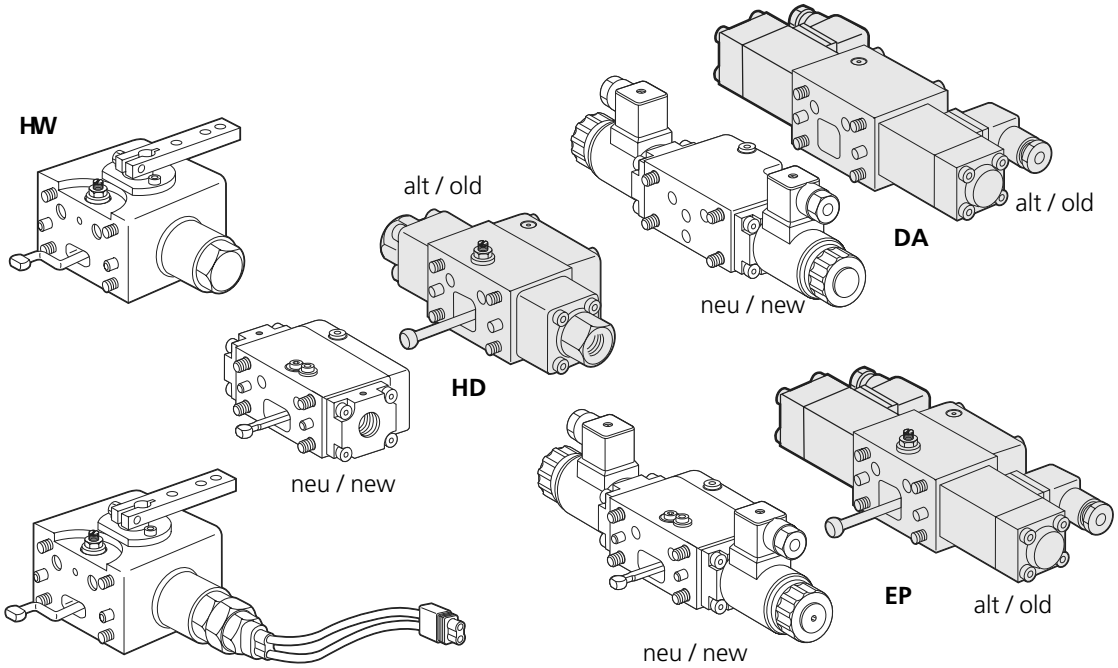
1. Hydraulic equipment is under high pressure.

⚠ High pressure fluids (fuel, hydraulic oil) which escapes under high pressure can penetrate the skin and cause serious injuries.
Therefore, immediately consult a doctor otherwise serious infections could result.

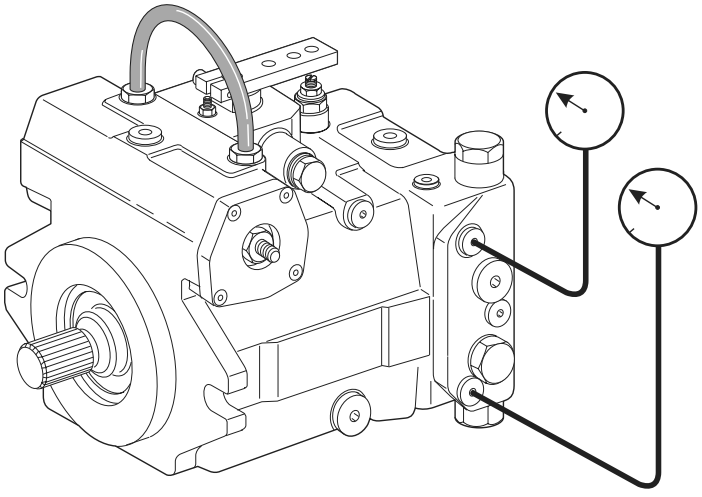
2. When searching for leaks use the appropriate aids due to the danger of accidents.
3. Before working at the hydraulic equipment, always de-pressurise the system and lower the working elements.
4. When working on the hydraulic equipment, always stop motor and secure tractor to prevent rolling away (parking brake, wedges)!
5. When connecting hydraulic cylinders and motor pay close attention to correct connection of hydraulic flexible hoses.
6. If the ports are exchanged, then the functions are reversed (i.e.. lifting/lowering) - hazardous situation!
7. Check the hydraulic flexible hoses regularly and replace them in case of dammage, wear or ageing! The new hose pipes must comply with the technical requirements of the machine manufacturer!

⚠ Ensure orderly disposal or recycling of oil, fuel and filters!

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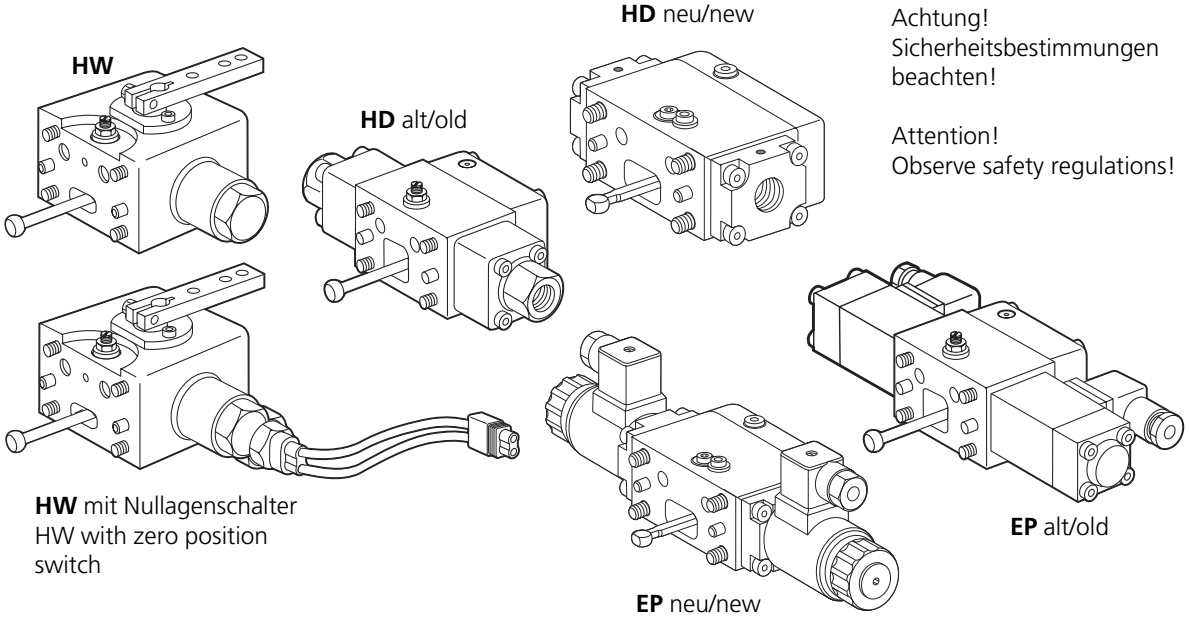
HW mit Nullagenschalter
HW with zero position switch

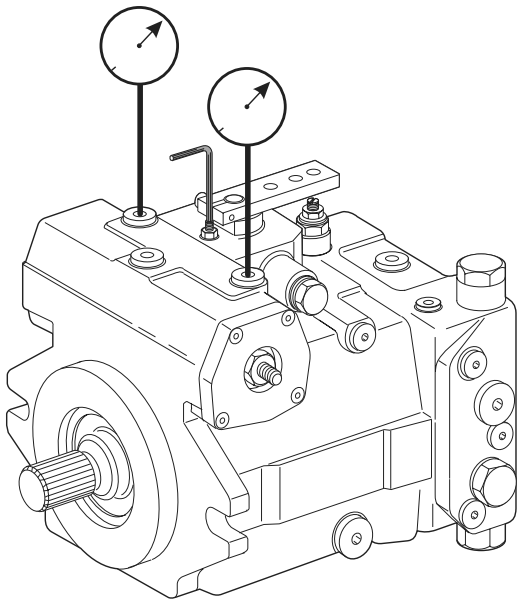


Achtung!
Sicherheitsbestimmungen beachten!
Mit Schlauch NW6 beide Stellkammern verbinden. Vermeidung von Restsignal aus hydraulischer Nullage.
Manometer an M_A und M_B anschließen.
Nullage so einstellen, daß bei blockiertem Antrieb beide Manometer auf gleichem Druckwert stehen.
Hinweis:
Totband der Nullage - vermitteln.

Attention!
Observe safety regulations!
Connect both control chambers with a nominal size 6 hose. Avoidance of residual signals from hydraulic zero position.
Connect pressure gauges to M_A and M_B. Adjust the zero position so that with at blocked drive both pressure gauges indicate the same pressure valve.
Note:
Ascertain the zero position dead band.

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Manometer an X_1 und X_2 anschließen.
Nullage so einstellen, daß bei blockiertem Antrieb beide Manometer auf gleichem Druckwert stehen.
Hinweis:
Excenterjustierung
- nicht über ±90 verdrehen.

Connect pressure gauges to X_1 and X_2.
Adjust the zero position so that with a block drive both pressure gauges indicate the same pressure value.
Note:
Eccentric adjusting
- Do not turn more than ±90 .

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Achtung!
Sicherheitsbestimmungen beachten!

Hinweis:
Nachjustierung nur bei Betriebstemperatur.

Manometer an "G" anschließen.

Achtung!
***** Speisedruckeinstellung!
Nenndruck p_H - 18 bar
Höchstdruck p_H - 40 bar
Bei Max.-Drehzahl.

Hinweis:
Einstelldaten nach Werksauftrag.

* bei DA-Ausführung

Attention!
Observe safety regulations!

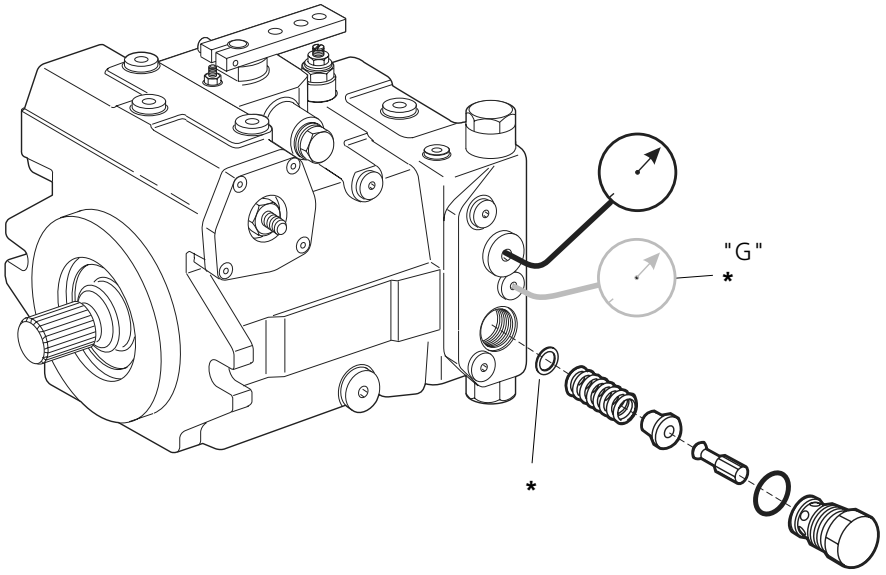
Note:
Readjusting only at operating temperature.

Connect pressure gauge to "G".

Attention!
***** Boost pressure setting!
Nominal pressure p_H - 18 bar
Peak pressure p_H - 40 bar
at max. speed.

Note:
Setting data is in accordance to the works order.

* with the DA version

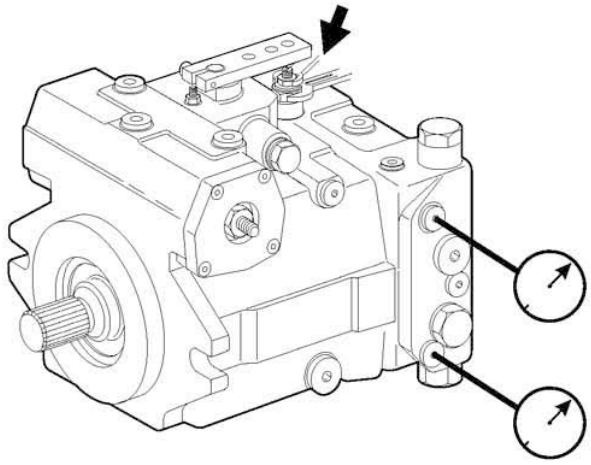


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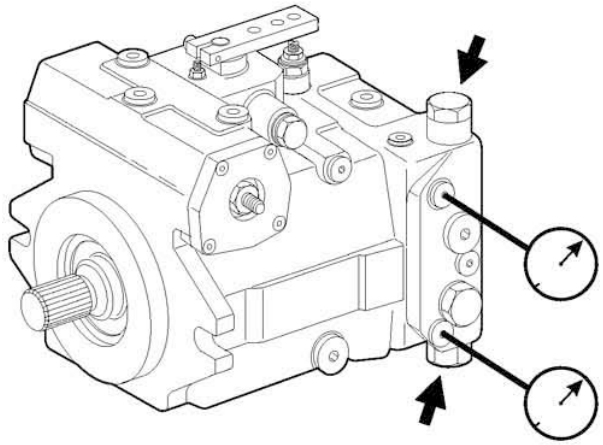
Zum Blockieren der Druckabschneidung beim Überprüfen der Hochdruckventile die Einstellschraube Pos. 1 mit gelöster Kontermutter Pos. 2 bis zum Anschlag mit **max. 2 Nm im drucklosen Zustand eindrehen!**

To block the pressure cut-off when testing the high pressure valves, the adjustment screw (item 1), with the lock-nut (item 2) loosened, has to be screwed in **with a max. torque of 2 Nm in the depressurised condition** until the end stop is reached.

Druckabschneidung
Pressure cut-off



HD- Ventile
HP- valves



Achtung!
Sicherheitsbestimmungen beachten!

HD-Ventil ohne Bypass

1 . HD- Ventile sind immer 10% höher eingestellt als die Druckabschneidung.
Bei Veränderung eines Einsteilwertes immer beide kontrollieren.
2. Nachjustierung nur bei Betriebstemperatur

Manometer an M_A und M_B anschließen.
Druckabschneidung: Maß X Einstellschrauben notieren!
Einstellschraube auf Block drehen.

HD- Ventile: Mit geringer Pumpenmenge über Ventile fahren. Einstellwert kontrollieren.
(Nur kurzzeitig "Temperatur".)
Drucklos "Einstellwert" verändern - Kontrolle

Druckabschneidung:
Einstellschraube auf Maß (*) zurückdrehen.
Druckwert kontrollieren bzw. nachjustieren.
Achtung! Differenz von 10% HD- Ventile und Druckabschneidung beachten!
Hinweis: Einstelldaten nach Werksauftrag.

Attention!
Observe safety regulations.

HP valve without bypass-function

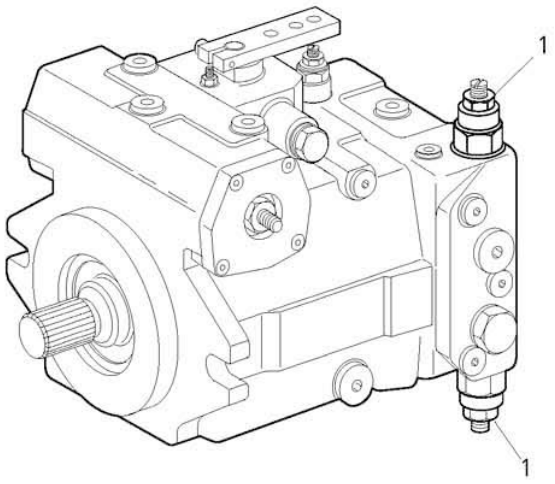
1 . HP valves are always adjusted 10% higher than the pressure cut-off.
If one setting value is changed, always check both values.
2. Readjusting only at operating temperature.

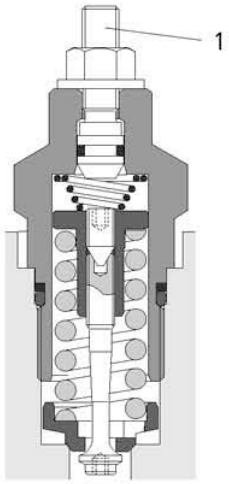
Connect pressure gauge M_A and M_B.
Pressure cut-off: Note measurement X for setting screw!
Turn setting screw to the blocked position.
HP valves: Operate the valves with small pump flow over the valves.
Check setting value. (only for a short time "temperature").
Change zero pressure "setting value" - then check.

Pressure cut-off:
Turn back setting screw to measurement (*).
Check pressure value and readjust if necessary.
Attention! Observe the 10% pressure difference between the HP valves and the pressure cut-off!

Note: Setting data is in accordance with the works order.

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Fahrzeuge mit rein-hydrostatischem Fahrantrieb bzw. mit hydrostatischem Fahrantrieb und Schalt-**getriebe ohne Leerlaufstellung (Freilauf).**

Hydrostatischer Antrieb / Bypaß-Schaltung

In diesem Fall wird der Fahrantrieb auf freien Umlauf geschaltet. Zu diesem Zweck haben die in der Verstellpumpe integrierten Hochdruck-begrenzungsventile eine sogenannte Bypaß-Funktion. D.h. durch Drehen der entsprechenden Schraube (Pos.1) wird der Ventil-Einsatz so entspannt, daß ein freier Öl-Umlauf möglich ist.

⚠ Bypass: Pos.1 einschrauben bis eben mit Mutter. Mutter wieder anziehen.

Schleppgeschwindigkeit
Die maximale Schleppgeschwindigkeit sollte 2 km/h nicht überschreiten.

- Höhere zulässige Schleppgeschwindigkeiten sind abhängig von der Hydromotordrehzahl bzw. dem eingelegten Gang.

Abschleppdistanz
Die Schleppentfernung sollte 1 km nicht überschreiten.

- Bei fehlender Einspeisung entleert sich der Hydraulik-Kreislauf.
  Zu beachten ist die Wärmeentwicklung im Hydromotor-Triebwerk.

Abschleppvorgang beendet
Nach beendetem Abschleppvorgang Pos.1 zurück-drehen. Der ursprüngliche Einstellwert der Hochdruck-ventile liegt somit wieder vor.

⚠ Ventilfunktion: Pos.1 zurückschrauben bis Anschlag. Mutter anziehen.

Vehicle with a pure hydrostatic transmission or with a hydrostatic drive with gear box without free wheel position.

Hydrostatic transmission / Bypass condition

In this case the travel drive is switched on to the free wheel position. For this purpose the high pressure valves of the variable displacement pump have a so-called bypass function.
By turning the relevant screw (item 1) the valve is so released that free oil circulation is made possible.

⚠ Bypass: Screw in item1 until it is level with the nut.

Towing speed
The max. towing speed of 2 km/h should not be exceeded.

- Higher permissible speeds are depended on the hydraulic motor speed or the selected gear.

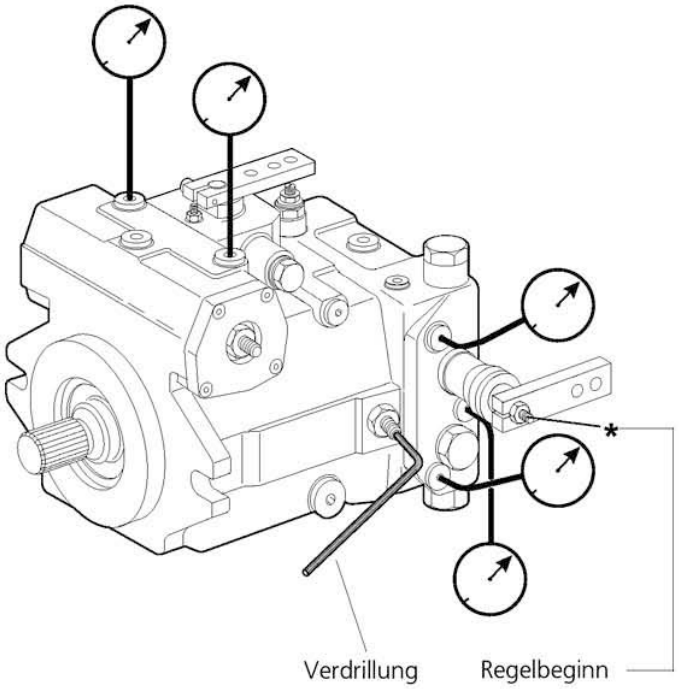
Towing distance
The towing distance should not exceed 1 km.

- With no boost avaiable the hydraulic circuit drains.
  The heat generation in the hydraulic motor rotary group has to be taken into account.

Termination of the towing operation
After termination of the towing operation turn back item 1. The original set pressure value is thereby avaiable.

⚠ Valve function: Screw back item 1 up to stop. Screw up the nut.

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Achtung!
Sicherheitsbestimmungen beachten!

Überprüfung der Einstelldaten
Betriebstemperatur soll während des Überprüfungsvorgangs weitgehend konstant gehalten werden.
Antriebsmotor starten, Leerlaufdrehzahl

Blockzustand
Fahrtrichtungsschalter **"0"**
Motordrehzahl langsam steigern bis zur max. Motordrehzahl, dabei Meßgeräte beobachten.
Speisedruck:
Leerlaufdrehzahl
Psp = ca. 15-20 bar
max. Motordrehzahl
Psp = ... bar*

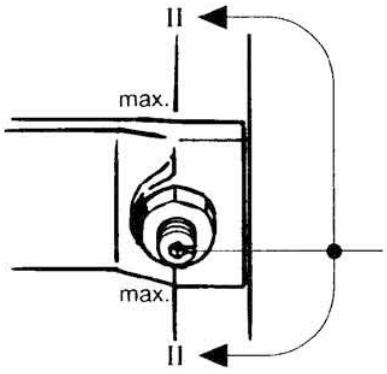
Blockzustand
Fahrtrichtungsschalter - vorwärts
(Straßengang und Festgebremst)

Einstelldaten Pumpe A4V/DA überprüfen

*** Regelbeginn**
HD 40 - 50 bar
Motordrehzahl . min.[1] * Psp . . . . . bar*
HD . . . . . bar
Nachjustierung - Regelbeginnschraube

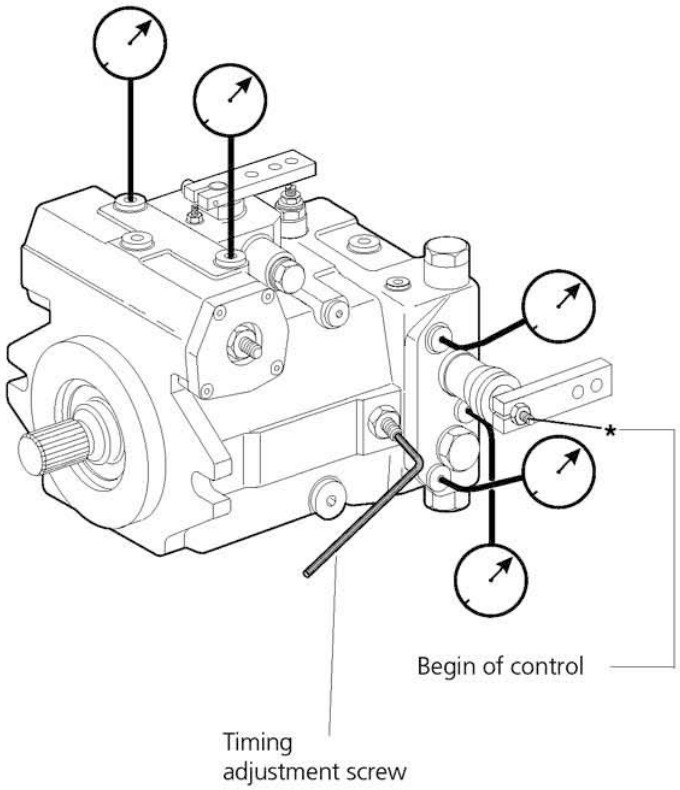
Regelende
HD . . . . . bar*
Motordrehzahl . . . . . min.[1] * Psp . . . . . bar*
Nachjustierung - Verdrillschraube

Hinweis:
Excenterjustierung - Drehrichtung beachten



Hinweis: * Einstelldaten nach Werksauftrag!

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Attention!
Observe safety regulations!

Check setting data.
Operating temperature should be generally kept constant during the checking procedure.
Start prime mover, idle speed.

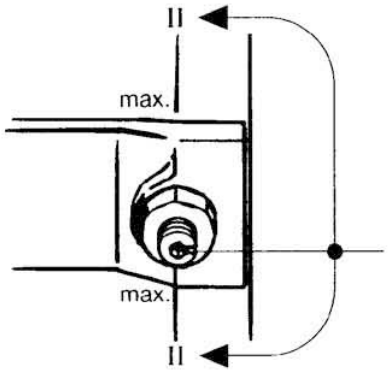
Block position
Drive direction switch - **"0"**.
Slowly increase motor speed up to the max. motor speed and observe measuring instruments.

Boost pressure:
Idle speed of prime mover
Psp = approx. 15 - 20 bar
max. motor speed
Psp = ... bar*

Block position
Drive direction switch - **forwards**
(Road gear and fully applied brake)

Check setting data pump A4VIDA
*** Start of control:**
HD 40 - 50 bar
Motor speed . . . . . rpm* Psp . . . . . bar*
HD . . . . . bar*
Readjustment of start of control screw

End of control
HD . . . . . bar
Motor speed . . . . . rpm* Psp . . . . . bar*
Readjustment of the indexing screw



Note:
Eccentric adjusting - observe direction of rotation.

Note: * Setting data is in accordance to the order work!

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7.2 MS/MSE 02 to 18

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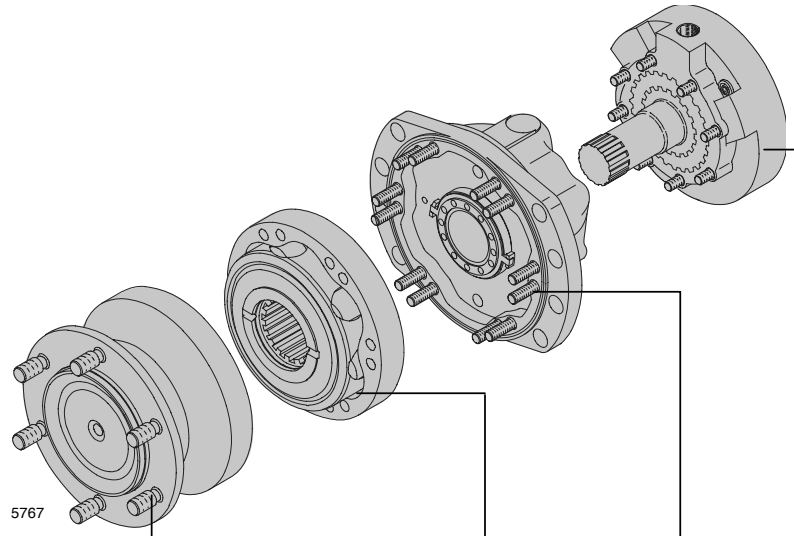
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Hydraulikmotoren
Hydraulic motors

MS

Reparaturen
Repairs

	02	05	08	11	18
MS	■	■	■	■	■
MSE	■	■	■	■	■

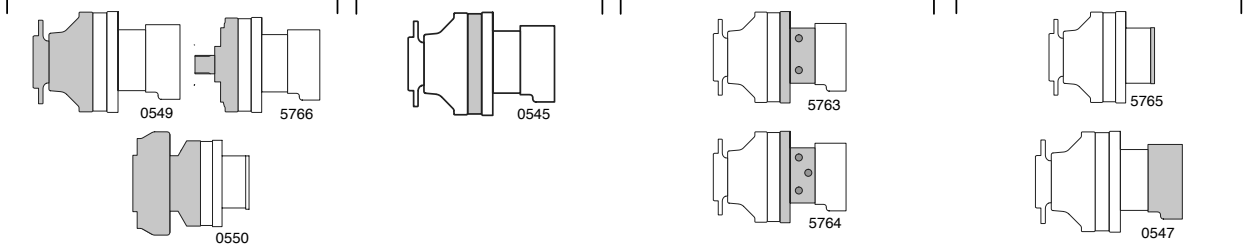


Störungsbeseitigung
Trouble Shooting

Wartungsarbeiten
Maintenance

Reparaturen
Repairs

Ersatzteile
Spare Parts



Ref : 800378128J

REPAR MS2-18 D/GB

Rev : A - Avr - 00

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Certifié ISO 9001

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Dieses Dokument enthält wichtige Hinweise zur Sicherheit. Sie werden auf folgende Weise gekennzeichnet:



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Die Maße sind in metrischen Einheiten angegeben. Die Entsprechungen in anderen Meßsystemen (vor allem angelsächsisch) werden zur Unterrichtung angegeben.
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It is recommended that all operations be performed by technicians trained accordingly. The technicians should read and understand the information given in this document and be authorized by the machine manufacturer.
It is essential that the technicians comply with safety instructions to prevent injury.

This document includes major safety warnings announced in this way:



Safety warning.

Additionally, this document includes instructions essential to product function as well as those providing general information. Both are announced similar to the following examples:



Essential instruction.



General information.

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*Subsequently **POCLAIN HYDRAULICS** disclaims liability for consequences of improper integration of its products and of improper set-up of adjustable devices. In the same way, **POCLAIN HYDRAULICS** may not be liable for incomplete or improper operating and maintenance instructions provided to the end user by the machine manufacturer nor for failures resulting from operations performed by any person using these suggested procedures.*

A re-certification of the machine may be required for every change in set-up of adjustable devices.

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Opening of products voids the warranty contract.
*Use only **POCLAIN HYDRAULICS** genuine spare parts. Using parts from different sources could reduce the performance of the product and pose a safety hazard..*

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All measures are expressed in metric units. Converted values to other systems (notably US and UK) are given for reference only.

The illustrations for information only.

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Sicherheit und Qualität

Vor den Wartungsarbeiten

Alle notwendigen Sicherheitsvorkehrungen treffen (Menschen und Material) und die geltenden Sicherheitsvorschriften beachten.

Parkbremse betätigen und Maschine mit Keilen festsetzen.

Energieerzeugung (Motor) des Hydrauliksystems abstellen und die Stromversorgung ausschalten.

Gegebenenfalls eine Sicherheitszone einrichten.

Die Außenflächen der Bauteile reinigen, um Schmutz und Fett restlos zu entfernen.

Warten, bis das Hydrauliksystem vollständig abgekühlt und druckentlastet ist (die Speicher entlasten).

Das heiße oder unter Druck stehende Öl kann zu schweren Verbrennungen mit Entzündung führen.
Bei einem Unfall einen Arzt hinzuziehen.

Während der Wartungsarbeiten

Bestimmte Bauteile sind sehr schwer. Sie müssen bei der Abnahme vom Rahmen mit einer angemessen ausgelegten Hebevorrichtung gehalten werden.

Die Sauberkeit ist wesentlich beim Betrieb der Hydraulikbauteile. Die meisten Teile können mit einem sauberen Lösungsmittel gereinigt werden.

Während der Handhabung alle empfindlichen Oberflächen gegen Stöße schützen (Zentrierungen, gleitende Teile, Auflagen, Dichtungs- und Lagerauflagen usw.).

Diese Flächen vor dem Wiederzusammenbau reinigen.

Systematisch die demontierten Dichtungen beim Wiederzusammenbau durch neue ersetzen. Wir empfehlen, vor der Montage alle Dichtungen zu fetten.

Alle gleitenden Flächen durch Aufbringen eines Films sauberer Hydraulikflüssigkeit ölen, der eine korrekte Schmierung beim ersten Neustart gewährleistet.

Niemals die Hydraulikflüssigkeit, die sich bei hohen Temperaturen entzünden kann, erwärmen. Einige Lösungsmittel sind ebenfalls entzündlich.

Während der Arbeiten nicht rauchen.

Nach den Wartungsarbeiten

Die Bauteile wieder einbauen und das Hydrauliksystem gemäß den Anweisungen in den folgenden Dokumenten wieder in Betrieb nehmen:

INSTALLATION MS D/GB (ref: 800078173V)

INSTALLATION CIRCUITS D/GB (ref. 677777853U)

Die Einstellung der Sicherheitsventile nicht erhöhen.

Safety and Quality

Before servicing

Be extremely careful to prevent personal injury and to avoid damage to material. Comply with all safety regulations.

Apply the parking brake and prevent the machine from rolling with tire blocks.

Stop the hydraulic system power source (engine) and disconnect the battery.

If necessary, block off the safety area.

Wash dirt and grease from exterior of the components.

Await the complete cooling down and depressurization of the hydraulic system (accumulators must be purged).

Hot or pressurized hydraulic fluid may cause serious burns & infections to the human body.
Consult a physician in case of accident.

During servicing

Some hydraulic components are very heavy. Secure them with a lifting device of adequate capacity when removing from the machine frame.

Cleanliness is essential to functioning of the hydraulic components. Most of the parts may be cleaned with a clean solvent.

During handling, protect all sensitive surfaces from shocks (piloting and interface surfaces, thrust & bearings surfaces, seal races, etc...)

Clean up these surfaces before reassembling.

Always install new O-rings, seals & gaskets discarding the old ones. We recommend lubricating all seals prior to assembly.

Lubricate all surfaces which have relative motion between parts by coating them with a film of clean hydraulic fluid to assure lubrication at first start.

Never heat hydraulic fluid, as it may flame at high temperature. Some solvents are also flammable.

Do not smoke during servicing.

After servicing

Reinstall the components and restart the hydraulic system according to instructions defined in the following documents:

INSTALLATION MS F/GB (ref. 677777844K)

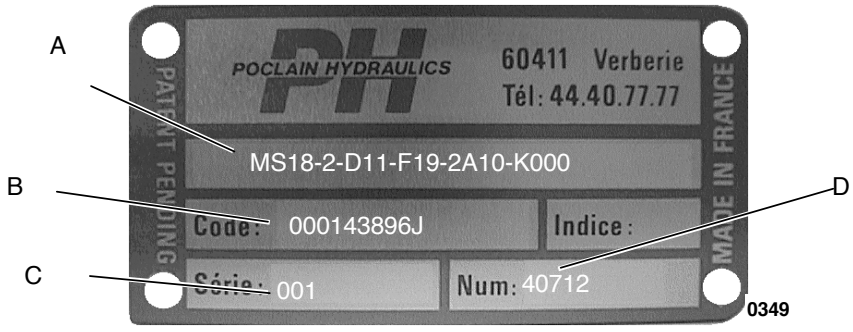
INSTALLATION CIRCUITS F/GB (ref. 677777831V)

Do not overset relief valves.

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Identifizierung des Bauteils

Identification of the component



A : Handelsbezeichnung:
Ex : MSE18-2-D11-F19-2A10-K000

B : Code : Artikelnr.:
Ex : 000143896J

C : Serie : Herstellungsnummer
Ex : 001

D : Num : Chronologische Ordnungsnummer
Ex : 40712

Bei sämtlichen Ersatzteilbestellungen müssen die Artikelnummer und die chronologische Ordnungsnummer angegeben werden.

A: Commercial description:
E.g : MSE18-2-D11-F19-2A10-K000

B: Code: Part number.
E.g : 000143896J

C: Series: Manufacturing batch number.
E.g : 001

D: Num: Chronological serial number.
E.g : 40712

The part number and the chronological serial number must be specified to order spare parts.

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Störungsbeseitigung

BECHÄDIGUNG → ABRIEB → ERKENNUNG DURCH FILTER → VORBEUGUNG……

Störung		Ursachen		Abhilfe
LAUTE GERÄUSCHE DES MOTORS	Ohne Last	Regelmäßiges Brummen	Lagerteil verschlissen	Lagerteil ersetzen
		Vibrationen	Lockere Befestigungen und / oder Anschlüsse	Mit entsprechendem Drehmoment anziehen
	Unter Last	Klappern	Speisedruck zu niedrig	Speise- und Austauschdruckventil kontrollieren.
		Kavitation	Interne Lecks zu groß	Zylinderblock und Ölverteiler ersetzen
MOTOR DREHT SICH NICHT			Der Motor wird nicht versorgt	Den Antrieb der Pumpe und ihre Versorgung überprüfen
			Kein Druckanstieg im Kreis	Hochdruck-Begrenzungsventile kontrollieren (Regler)
			Interne Lecks zu groß	Zylinderblock und Ölverteiler ersetzen
			Die Bremse bleibt angezogen	Den Steuerkreis der Bremse kontrollieren
DER MOTOR DREHT SICH NICHT MIT NORMALER LAST-DREHZAHL			Der Fördermenge der Pumpe ist unzureichend	Die Antriebsdrehzahl und den Zustand der Pumpe kontrollieren
			Interne Lecks zu groß	Den Zustand des Zylinderblocks und des Ölverteilers überprüfen
			Der Betriebsdruck ist zu niedrig	Den Zustand des Sicherheitsventils kontrollieren (Regler)
DER MOTOR DREHT SICH UNREGELMÄSSIG			Die Fördermenge der Pumpe schwankt	Steuerdruck und Fördermenge der Pumpe kontrollieren
			Interne Lecks zu groß	Den Zustand des Zylinderblocks und des Ölverteilers überprüfen.
ÄUSSERE ÖLUNDICHTIGKEITEN			Gehäusedruck zu groß	Den Leckagekreis und den Zustand des Filters überprüfen
			Dichtungen beschädigt	Die Dichtungen ersetzen
			Fehlerhafte Montage	Das Anziehmoment der Montageschrauben, der Entlüftungsschrauben und der Anschlüsse kontrollieren

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Trouble shooting

DAMAGE → IRON PARTICLES → DETECTION BY FILTERS → PREVENTION……

Troubles		Causes		Remedies
NOISY MOTOR	Without load	Regular rumbling	Worm bearing support	Replace the bearing support
		Vibrations	Mountings and/or hydraulic piping becoming loose	Tighten to torque
	Under load	Clattering	Boost pressure too low	Check the setting and condition of counter-pressure valve
		Cavitation	Excessive internal leaks	Replace the cylinders- block and distribution valve assembly
THE MOTOR DOES NOT REVOLVE			No supply to the motor	Check pump drive and pump inlet
			The circuit does not reach working pressure	Check condition of safety valve (regulator)
			Excessive internal leaks	Replace the cylinders block and distribution valve assembly
			The brake stays engaged	Check the brake pilot circuit
THE MOTOR DOES NOT REVOLVE AT ITS NORMAL SPEED UNDER LOAD			Pump flow is too low	Check drive speed and condition of the pump
			Excessive internal leaks	Check condition of cylinders-block and distribution valve assembly
			Working pressure is too low	Check safety valve setting pressure (regulator)
THE MOTOR REVOLVES IRREGULARLY			Irregular flow	Check the pump flow
			Excessive leaks	Check condition of cylinders-block and distribution valve assembly
EXTERNAL OIL LEAKS			Too high casing pressure	Check the leakage circuit and filter condition
			Seals damaged	Replace seals
			Incorrect assembling	Check tightening of mounting screws, bleed screws and unions

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Wartungsarbeiten

Austauschen des Motors

Ausbau

Druck im Arbeitskreis abbauen.
Leckageleitung am Tank abschrauben, um ein Leerlaufen zu verhindern.
Die Rohre oder Schläuche, die am Motor angeschlossen sind, abklemmen.
Drehzahlsensor abklemmen.
Die Befestigungsschrauben demontieren und den Motor ausbauen.
Das Motorgehäuse entleeren.

Einbau

Die zum Ausbau angegebenen Arbeitsgänge in umgekehrter Reihenfolge ausführen.
Für weitere Informationen beziehen Sie sich bitte auf folgende Dokumente:

INSTALLATION MS D/GB (ref: 800078173V)
INSTALLATION CIRCUITS D/GB (ref: 677777853U)

Maintenance

Replacing the motor

Removal

Release the pressure in the supply circuit.
Disconnect the drain line at the tank level to avoid its siphoning.
Disconnect and plug the pipes or hoses which are connected to the motor.
Disconnect the speed sensor.
Disconnect the mounting screws, and remove the motor.
Drain the casing.

Installation

Execute the removal operations in the reverse order.

Please refer to the following documentation brochures:

INSTALLATION MS F/GB (ref: 677777844K)
INSTALLATION CIRCUITS F/GB (ref: . 677777831V)

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Mechanische Bremslösung

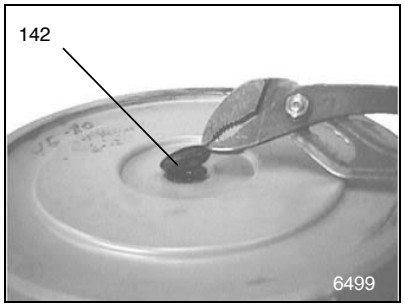
Mechanical brake release

Bei bestimmten Reparaturfällen oder zum Abschleppen der Maschine muß die integrierte Parkbremse gelöst werden.

In certain service situations, it may be necessary to release the motor brake.

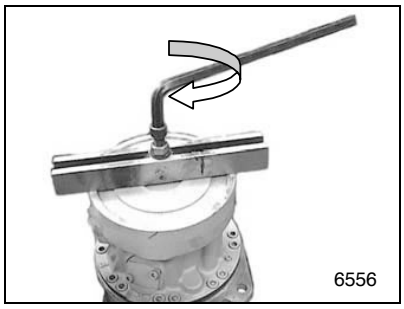
Stopfen (142) aus der Schutzkappe (141) herausziehen.

Extract and release the plug (142) from the brake cover (141).



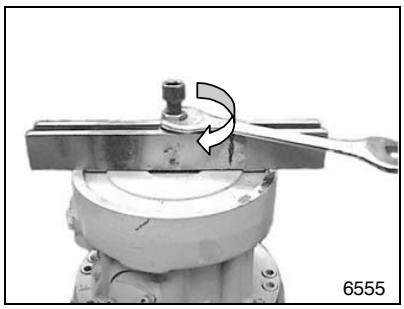
Schraube im Kolben festziehen

Tighten the screw in the piston



Mutter so weit anziehen, bis die Welle frei dreht.

And tighten the nut until the motor shaft turns freely.



Bremsen *Brakes*	Kraft N *Force [lbf]*	Entsprechendes Drehmoment Nm *Equivalent torque [lbf.ft]*	Mutter *Nut*
F02-F04	18000 *[4.000]*	42 *[30.9]*	M12
F05-F07	20000 *[4.500]*	47 *[34.6]*	M12
F08	34000 *[7.600]*	110 *[81.1]*	M16
F11	45000 *[10.000]*	140 *[103]*	M16
F12	45000 *[10.000]*	140 *[103]*	M16
F19	45000 *[10.000]*	140 *[103]*	M16

Nach Bremslösung, einen neuen Stopfen (142) einbauen.

After brake release, mount a new plug (142).

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Kontrolle der statische Haltebremse.

Bei fahrbaren Maschinen den Test auf ebenem Grund durchführen.

Bremssteuerdruck: mini 12 bar
Maxi 30 bar.

Sich vergewissern, daß der Bremsversorgungsdruck gleich Null ist,

Die Bremse über die höchstgelegene Schraube (112) entlüften,

Den Motor mit Maximaldruck beaufschlagen,

Die Motorwelle darf sich nicht drehen, da andernfalls die Bremse ausgetauscht werden muß :

Mehrscheibenbremsen nicht einfahren.

Checking the parking brake efficiency.

For a rolling machine, make the test on a horizontal ground.

Pilot brake pressure : minimum 12 bar [174 PSI]
Maximum 30 bar [435 PSI]

Make sure that the brake supply pressure is zero,

Purge the brake using the screw (112) located at the highest level,

Supply the motor up to the setting pressure.

The motor shaft must not turn, otherwise it is necessary to replace the brake :

Do not run multidisc brakes in.

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Reparaturen. *Repairs.*

Auswechseln der Bremskolbendichtung

Replacement of the O-ring of the brake piston.

Demontage

Disassembly

Den Motor ausbauen.
Motor auf das Lagerteil stellen.

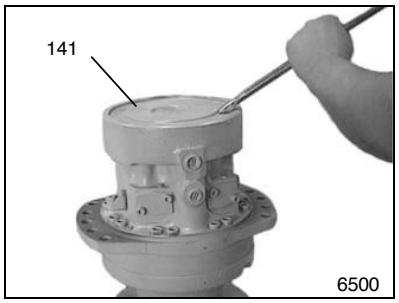
Remove the motor.
Place the motor on the bearing support.

Muttern zum Schutz der Gewindebolzen wieder aufsetzen

Protect the studs by reinstalling the nuts

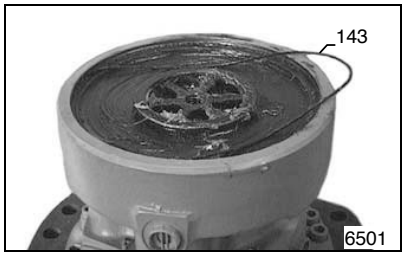
Schutzkappe (141) abnehmen und beseitigen.

Remove and discard the brake cover.(141)



O-Ring (143) herausziehen und beseitigen.

Extract and discard the O-ring (143).

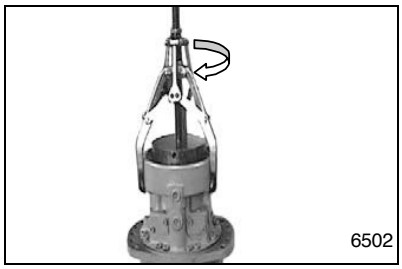


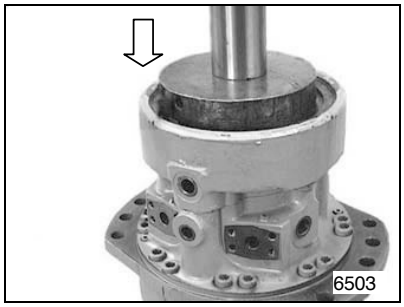
Tellerfeder (108) zusammendrücken:

Mit Hilfe des Dorns und Abziehers (siehe Werkzeug Seite 36) (fig 6502)
Mit Hilfe des Dorns und einer Schraube Klasse 12.9 (siehe Werkzeug Seite 36)
Mit Hilfe des Dorns und einer Presse (fig 6503). Die Kraft F beibehalten (siehe Schaubild Seite 9)

Compress the washer (108).

Using a mandrel and an extractor (see tools page 36) (fig 6502)
Using a mandrel and a screw class 12.9 (see tools page 36)
Using a mandrel and a press (fig 6503). Respect the force F (see table page 9)





Einsatzrichtung des Sicherungsrings markieren.

Mark the mounting direction of the snap ring.

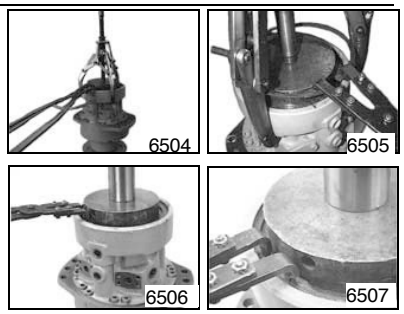
https://truckmanualshub.com/

Sicherungsring (109) mit Hilfe einer Zange für Innenringe herausnehmen (siehe Werkzeuge Seite 36)

Remove the snap ring (109) using internal snap ring pliers. (see tools page 36)

Abzieher und Zange (fig 6504 und 6505)
Presse und Zange (fig 6506 und 6507)

Extractor and pliers (fig 6504 and 6505)
Press and pliers (fig 6506 and 6507)

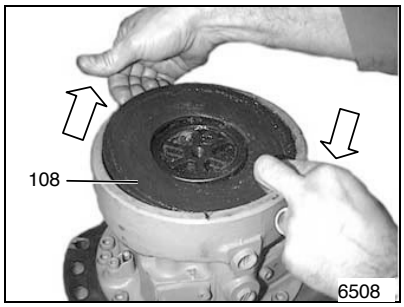


Bei Verwendung der Presse das Lagerteil nicht auf den Gewindebolzen abstützen.

If you use the press do not place the bearing support on the studs.

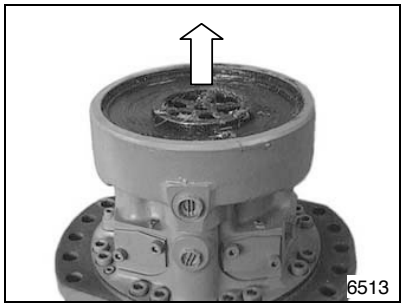
Tellerfeder (108) herausziehen.

Extract the washer (108).



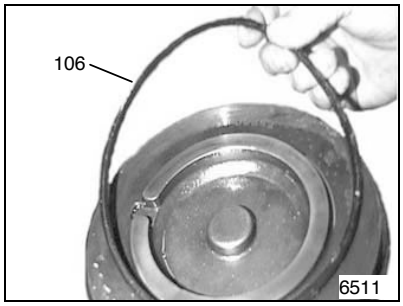
Bremskolben (107) herausziehen.

Extract the brake piston (107)



O-Ring (106) beseitigen.

Discard the O-ring (106).



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Wiedereinbau.

Vor dem Wiedereinbau ist unbedingt sicherzustellen, daß alle Teile, Nuten und Dichtungs-Auflageflächen sauber sind.

Es dürfen keine Rost-, Schmutz- oder Wasserspuren vorhanden sein

Mit Korrosionsschutzfett (siehe Werkzeug Seite 36) einschmieren: die Nut, die obere Fläche des Bremskolbens, die Tellerfeder, den Sicherungsring und die Auflagefläche der Kolbendichtung im Bremsgehäuse.

Neuen O-Ring (106) auf den Kolben (107) montieren.

Der Ring muß fest an den Kolben gepreßt und nicht verdreht werden.

Bremskolben (107) einsetzen.

Achtung, wenn die Dichtung über die Nut des Sicherungsrings geführt wird.

Tellerfeder (108) einlegen.

Reassembly.

Before reassembling, it is necessary to ensure that all parts, the surface condition of the piston seal contact surface and the grooves are clean.

All traces of rust, mud, water must be removed.

Coat with anti-oxidizing grease (see tools page 36), the grooves, the top of the brake piston, the spring washer, the snap ring and the piston seal contact surface in the brake body.

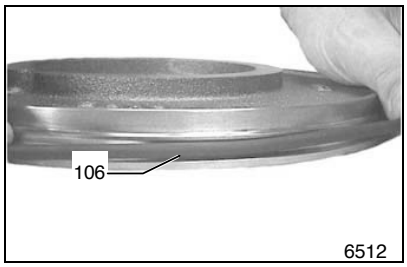
Install a new O-ring (106) on the piston (107).

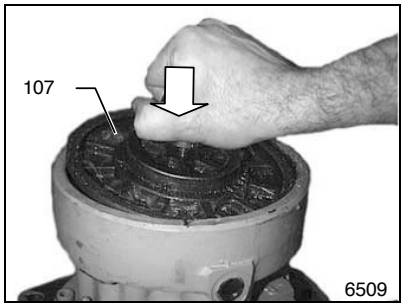
The ring should be tight on the piston and not twisted.

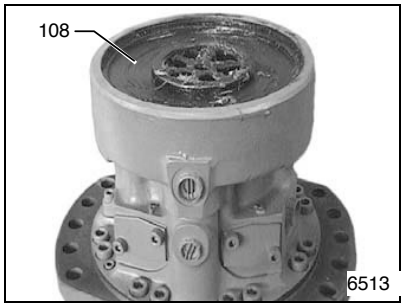
Install the brake piston (107).

Take care when passing the seal over the snap ring groove.

Install the spring washer (108).







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Tellerfeder (108) zusammendrücken:

Mit Hilfe des Dorns und Abziehers (siehe Werkzeug Seite 36) (fig 6502)

Mit Hilfe des Dorns und einer Presse (fig 6503). Die Kraft F einbehalten (siehe Schaubild Seite 9)

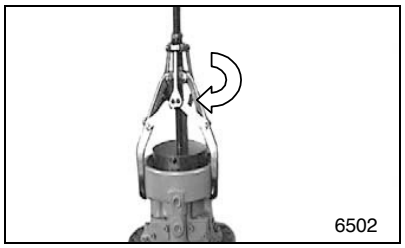
Bei Verwendung der Presse das Lagerteil nicht auf den Gewindebolzen abstützen.

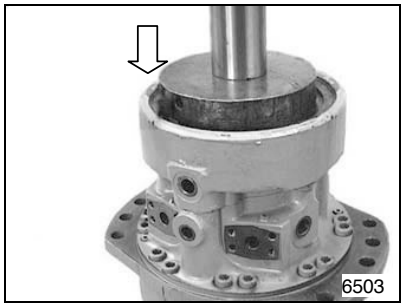
Compress the spring washer (108).

Using a mandrel and an extractor (see tools page 36) (fig 6502)

Using a mandrel and a press (fig 6503). Respect the force F (see table page 9)

If you use the press do not place the bearing support on the studs.





Sicherungsring (109) mit Hilfe einer Zange für Innenringe gemäß der bei der Demontage angebrachten Kennzeichnung montieren: (siehe Werkzeuge Seite 36)

Abzieher und Zange (fig 6504 und 6505)

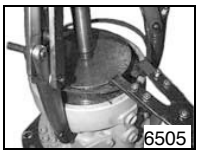
Presse und Zange (fig 6506 und 6507)

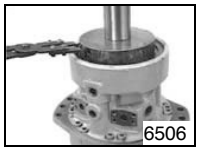
Install the snap ring (109) using internal snap ring pliers in line with the mark made during disassembly . (see tools page 36)

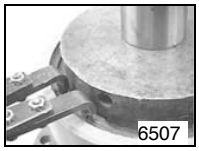
Extractor and pliers (fig 6504 and 6505)

Press and pliers (fig 6506 and 6507)



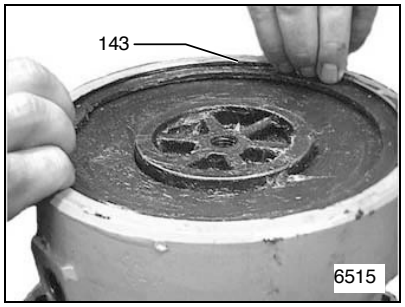






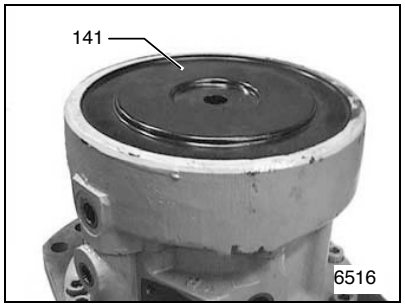
Neuen, mit Korrosionsschutzfett eingeschmierten O-Ring (143) in die Nut einsetzen (siehe Werkzeuge Seite 36).

Install a new O-ring (143) coated with anti-oxidizing grease in its groove. (see tools page 36)



Neue Schutzkappe (141) auf den Anschnitt legen.

Place the new cover (141) on the entry chamfer .



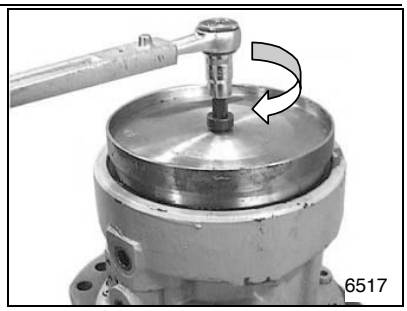
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Schutzkappe mit Hilfe des Dorns einrasten lassen (siehe Werkzeug Seite 36).

Sich vergewissern, daß der Außenrand des Schutzkappe in die Nut eingreift ist.

Click the cover into place using the right mandrel. (see tools page 36).

Make sure that the outer edge of the cover is engaged in the groove.

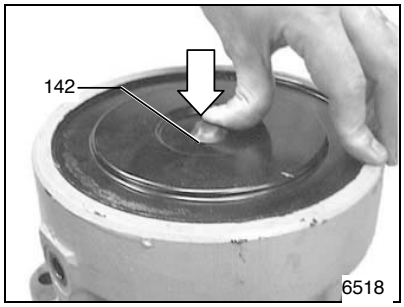


Neuen Stopfen (142) einsetzen.

Install a new plug (142).

Sich vergewissern, daß zwischen Schutzkappe und Stopfenrille einwandfreier Kontakt besteht.

Make sure about the contact between the cover and the plug groove.



Motor wieder einsetzen.

Install the motor.

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Auswechseln des Lagerteiles (070)

Replacement of the bearing support (070)

Demontage

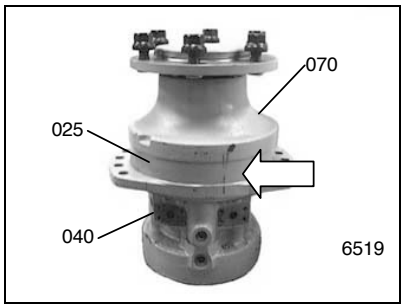
Disassembly

Motor herausnehmen.
Motor auf der Bremse oder Verschlussplatte abstützen (Motor ohne Bremse).

Remove the motor.
Place the motor on the brake or on the end cover (motor without brake).

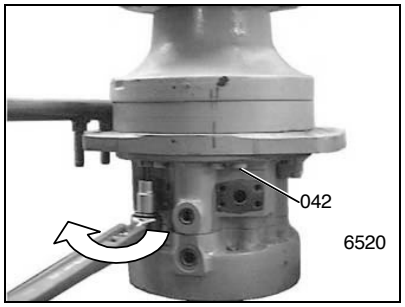
Position des Lagerteiles (070) in Bezug auf Nockenring (026) und Verteilerdeckel (040) kennzeichnen.

Mark the position of the bearing support (070) in relation to the cam (026) and to the valving cover (040).



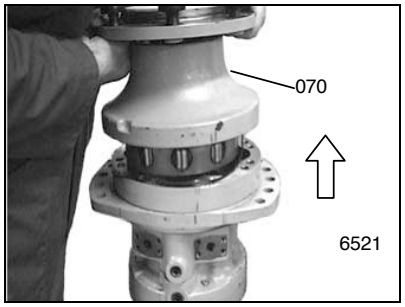
Schrauben (042) herausnehmen.

Remove the screws (042).



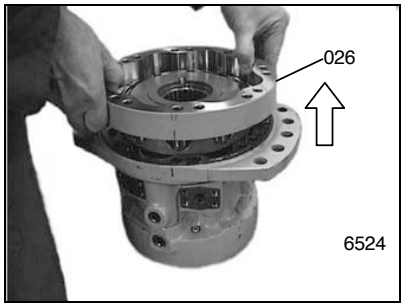
Lagerteil (070) herausnehmen.

Remove the bearing support (070).



Nockenring (026) herausnehmen.

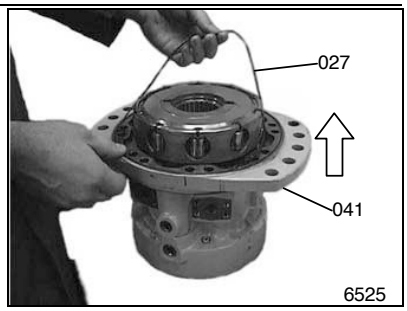
Remove the cam (026).



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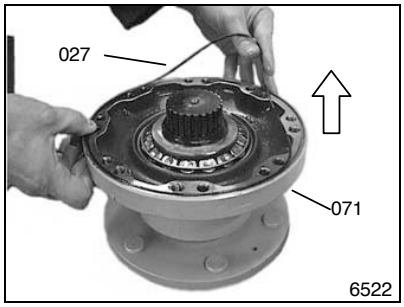
O-Ring (027) vom Verteilerdeckel (041) entfernen.

Discard the O-ring (027) from the valving cover (041).



O-Ring (027) vom Lagerteil (071) entfernen.

Discard the O-ring (027) from the bearing support (071)



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Wiedereinbau

Vor dem Wiedereinbau ist unbedingt sicherzustellen, daß die Nut sauber ist

Es dürfen keine Rost-, Schmutz- oder Wasserspuren vorhanden sein.

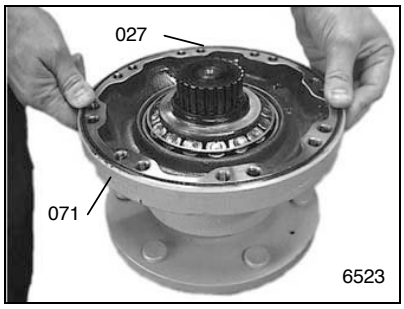
Reassembly

Before reassembling it is necessary to ensure that the groove is clean

All traces of rust, mud, water must be removed

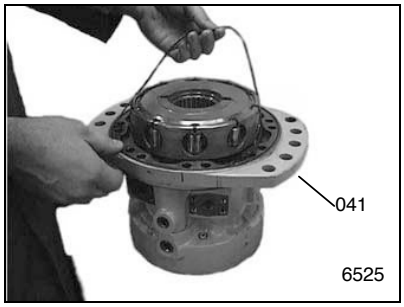
Neuen, mit Korrosionsschutzfett eingeschmierten O-Ring (027) in die Nut des Lagerteiles (071) einsetzen (siehe Werkzeuge Seite 36) .

Install a new O-ring (027) coated with anti-oxidizing grease (see tools page 36) in the groove of the bearing support (071).



Neuen, mit Korrosionsschutzfett eingeschmierten O-Ring (027) in die Nut des Verteilerdeckels (041) einsetzen (siehe Werkzeuge Seite 36) .

Install a new O-ring (027) coated with anti-oxidizing grease (see tools page 36) in the groove of the valving cover (041)



Nockenring (026) gemäß der bei der Demontage markierten Kennzeichnung montieren.

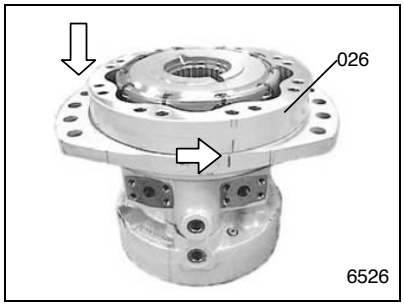
Große Ansenkungen in Richtung Lagerteil

Install the cam (026) in line with the marks made during disassembling.

The big chamfers oriented towards bearing support

Den Nockenring anhand von zwei einander gegenüberliegenden Schrauben (042) zentrieren.

Center the cam using two screws (042) diametrically opposite.



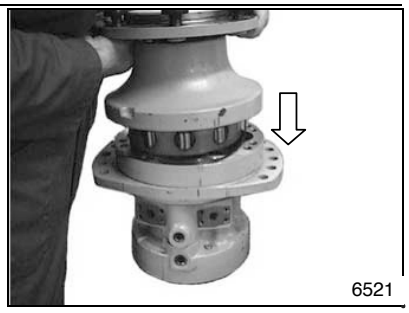
https://truckmanualshub.com/

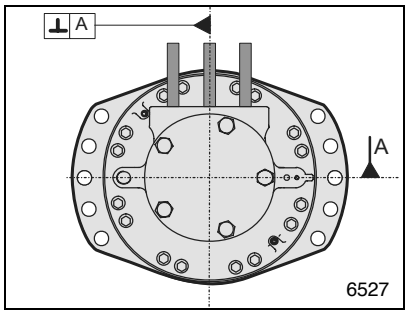
Lagerteil montieren

Bei Wellenmotoren müssen die Anschlüsse quer zur Einbauachse des Motors liegen. (Abb. 6521)

Install the bearing support

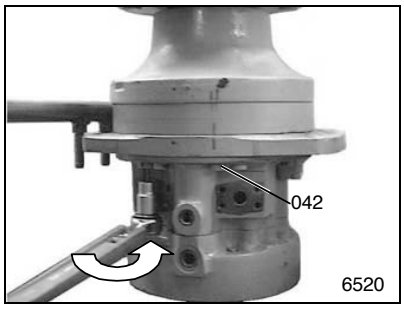
For shaft motors the ports must be perpendicular to the mounting axis of the motor. (Fig 6521)





Befestigungsschrauben (042) einsetzen und mit dem angegebenen Drehmoment anziehen. (siehe Schaubild Seite 38).

Install and tighten the mounting screws (042) to the right torque. (see table page 38).



Motor wieder einsetzen.

Install the motor.

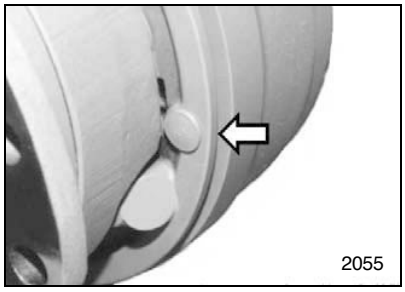
https://truckmanualshub.com/

Auswechseln der Bremsbacken

Replacing the brake shoes.

Vor der Demontage kann man die Abnutzung der Bremsbeläge durch die Inspektionsöffnungen kontrollieren.

Before disassembling it is possible to make a visual checking of the brake pads wear via the inspection ports.



Demontage

Disassembly

Das Auswechseln des Bremsbacken und das Schleifen der Trommeln muß auf allen Motoren der gleichen Achse vorgenommen werden.

The same repairs should be made on each motor of the same axle when replacing shoes and brake drums.

Befestigungsmuttern der Felge lösen.

Maschine auf der Höhe der auszubauenden Felge hochheben.

Rad abnehmen (Reifen).

Mechanische Bremse lösen.

Loosen the wheel rim retaining nuts.

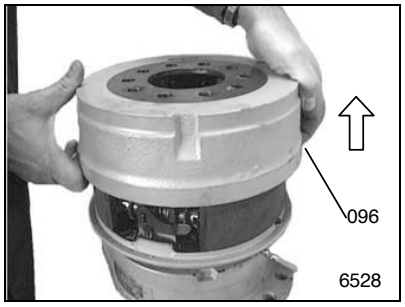
Raise the machine on the side of the wheel rim to be removed.

Remove the wheel rim (tyre).

Release the mechanical brake.

Trommel (096) abziehen.

Extract the drum (096).



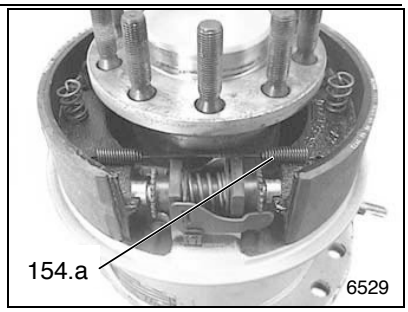
Reibfläche der Trommel überprüfen, die weder tiefe Rillen (tiefer als 0,2 mm) noch abnormale Abnutzungserscheinungen aufweisen darf, sonst muß sie geschliffen werden. (Ra 1,6 bis 3,2)

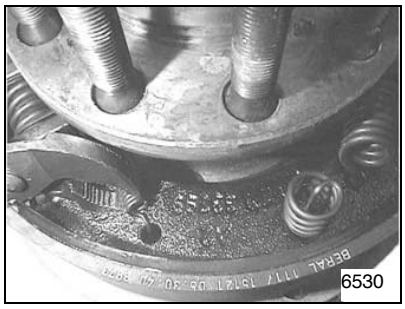
Check the friction surface condition of the drum which should show no deep scratches (deeper than 0,2 mm [0.0078 in]) nor abnormal wear. Otherwise, the brake drum should be replaced. (Ra 1.6 to 3.2)

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Rückholfeder (154.a) abbauen.

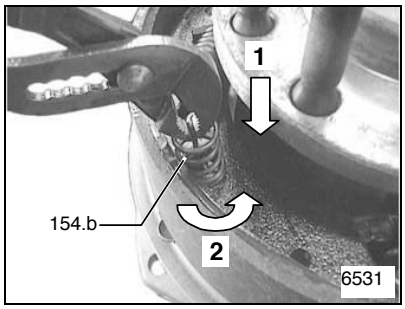
Remove the return spring (154.a).





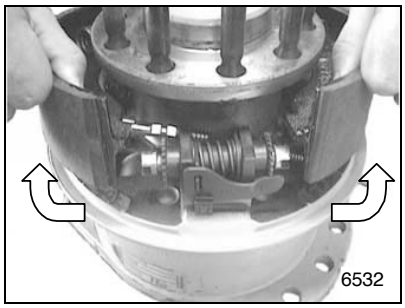
Halterungsfedern (154.b) abbauen.

Remove the retention springs (154.b).



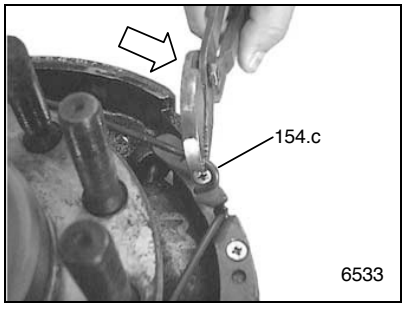
Bremsbacken aus der Betätigungsvorrichtung lösen.

Release the brake shoes from the regulating mechanism.



Rückholfedern (154.c) abbauen.

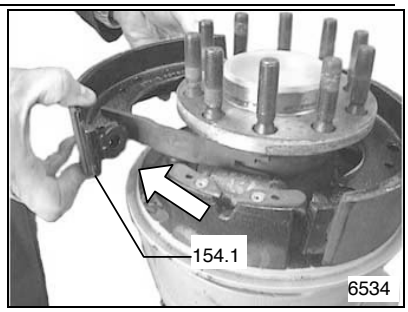
Remove the return springs (154.c).



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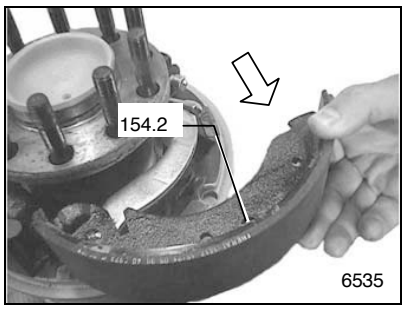
Bremsbacke (154.1) abbauen.

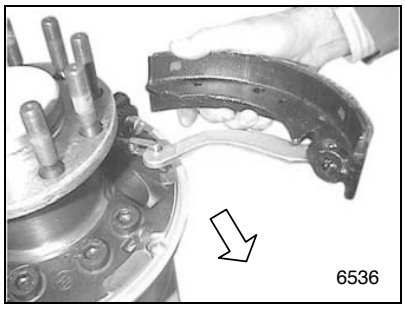
Remove the brake shoe (154.1)



Den mechanischen Bremshebel vom Bremsseil lösen und Bremsbacke (154.2) entfernen

Releasing the mechanical brake control lever from its cable, remove the brake shoe (154.2)





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Wiedereinbau

Vorrichtung entstauben, sich vergewissern, daß der Radzylinder dicht ist.

Reibfläche der Trommel überprüfen, die weder tiefe Rillen (tiefer als 0,2 mm) noch abnormale Abnutzungserscheinungen aufweisen darf, sonst muß sie geschliffen werden.

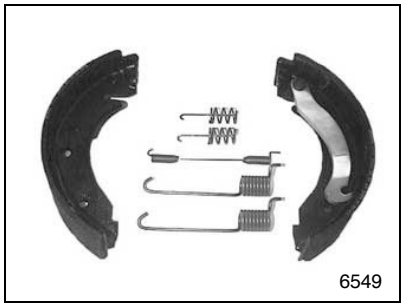
Den Bremshebel am Bremsseil (098) befestigen und Bremsbacke (154.2) einbauen

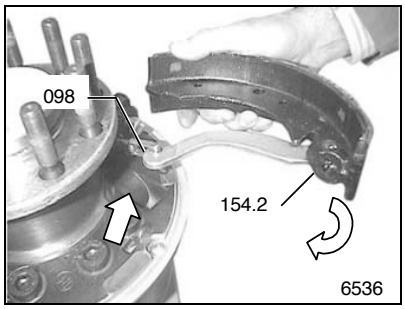
Reassembly

Remove all dust from the whole assembly. Make sure there are no leaks at the wheel cylinder.

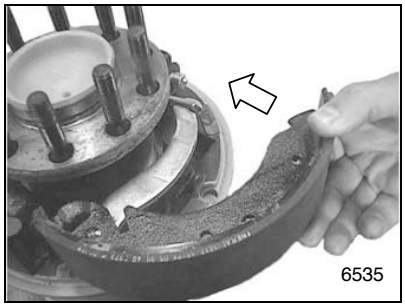
Check the friction surface condition of the drum which should show no deep scratches (deeper than 0.2 mm) [0.0078in] nor abnormal wear. Otherwise, the brake drum should be replaced.

Attaching the control lever on the brake cable (098), install the brake shoe (154.2)


6549



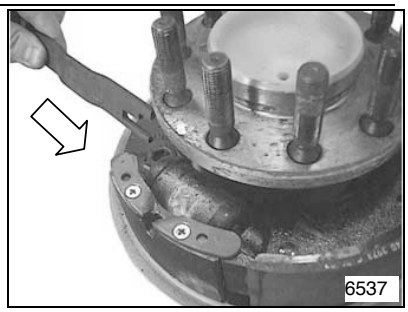
6536

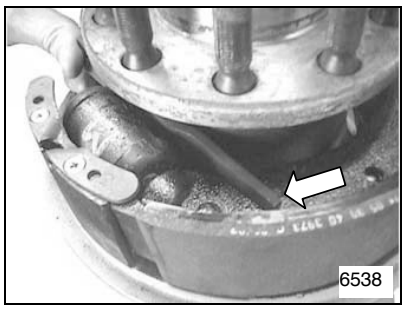

6535

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Rückholplatte an die Bremsbacke (154.2) montieren.

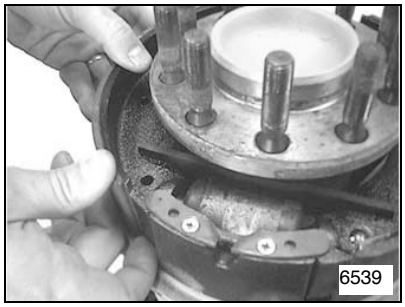
Mount the return plate on the brake shoe (154.2)





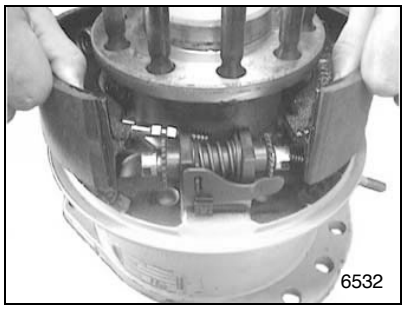
Bremsbacke (154.1) einsetzen.

Install the brake shoe (154.1)



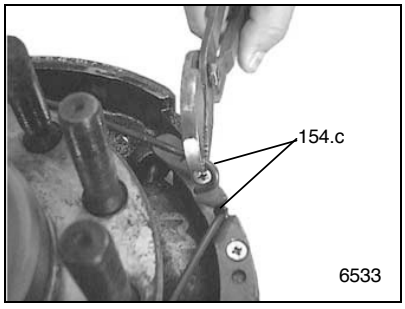
Bremsbacken auf der Betätigungseinrichtung positionieren.

Position the brake shoes on the regulating mechanism.



Rückholfedern (154.c) einsetzen.

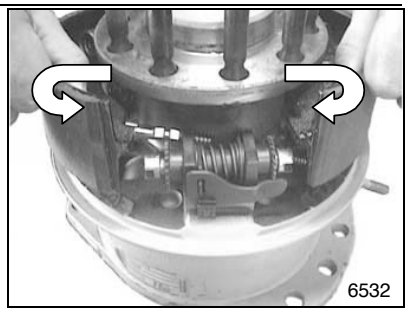
Install the return springs (154.c)



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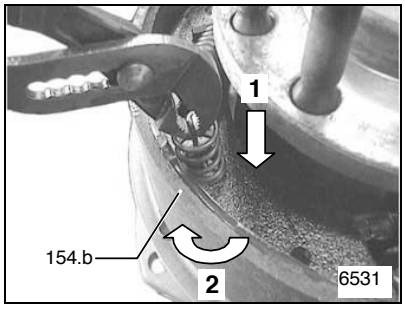
Bremsbacken in die Betätigungseinrichtung einbauen.

Install the brake shoes in the regulating mechanism



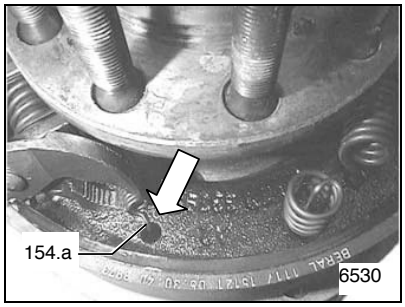
Halterungsfedern (154.b) einsetzen.

Install the retention springs (154.b).



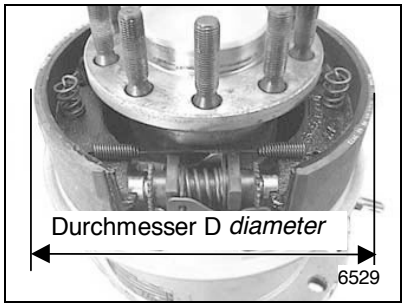
Rückholfedern (154.a) einsetzen.

Install the return spring (154.a).



Reibungsdurchmesser D der Trommel und der eingesetzten Backen messen.

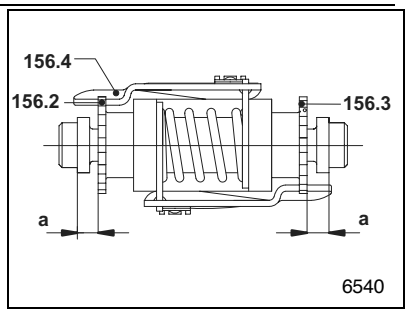
Measure the brake drum friction diameter D and that of the brake shoes, which have been installed.



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Backendurchmesser anpassen, um bei Bremsen mit mechanischer Einstellvorrichtung mit Hilfe des einen Zahnrads (156.1), oder bei Bremsen mit automatischer Bremsennachstellung mit Hilfe der zwei Zahnräder (156.2 und 156.3), das nötige Spiel zwischen Belag und Trommel zu erzielen. In diesem Fall muß die Wirkung auf die Zahnräder symmetrisch (a) sein. Den Hebel (156.4) muss zu diesem Zweck freigängig sein.

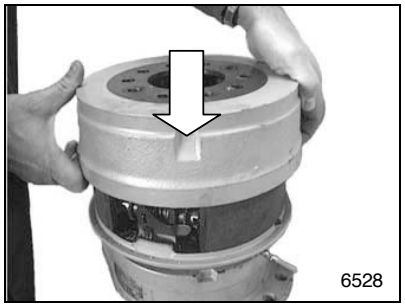
Adjust the brake shoes diameter to obtain correct clearance between the brake padding and the drum using the adjusting wheel (156.1) for brakes equipped with mechanical adjustment system or two adjusting wheels (156.2 and 156.3) for brakes equipped with automatic clearance adjustment. In this case, the adjusting wheels should be adjusted symmetrically (a). Release the lever slightly (156.4) to enable this operation to take place.



Bremsen ***Brake***	**Trommeldurchmesser (mm)** ***Drum diameter [in]*** nominal	maximum	**Total Spiel (mm)** ***Total clearance [in]***
250 x 60	250 *[9.84]*	252 *[9.92*]	0.55 *[0.02]*
270 x 60	270 *[10.63]*	272 *[10.70*]	0.80 *[0.03]*
325 x 80	325 *[12.79*]	327 *[12.87]*	0.80 *[0.03]*
350 x 60	350 *[13.78]*	352 [*13.85]*	0.80 *[0.03]*

Trommel aufsetzen und überprüfen, ob sie frei dreht.

Install the drum, check that it can turn freely.



Wenn nötig, den Radzylinder entlüften.

Felge montieren.

Siehe Dokument INSTALLATION MS D/GB (ref: 800078173V)

Bleed the wheel cylinder, if necessary.

Install the wheel rim.

See documentation INSTALLATION MS F/GB (ref 677777844K)

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Auswechseln des Nockenrings (026)

Demontage

Dazu die im Kapitel « Auswechseln des Lagerteils » unter « Demontage » beschriebenen Arbeiten ausführen, Seite 16

Wiedereinbau

Dazu die im Kapitel « Auswechseln des Lagerteils » unter " Wiedereinbau " beschriebenen Arbeiten ausführen, Seite 18.
Allerdings muß bei Motoren mit 2 Schluckvolumen mit einem Schluckvolumenverhältnis über oder unter 2 die Winkelposition berücksichtigt werden.
Beispiel: Motor MS18, Schluckvolumen 1747-1049-698
Kleines Schluckvolumen: 698 cm^3 Buchstabe P
Mittleres Schluckvolumen: 1 049 cm^3 Buchstabe M
Die Buchstaben P oder M müssen sich in der Achse befinden und in Richtung des Schiebers für das Wechseln des Schluckvolumens zeigen, auf der der Nockenring auf dem Lagerteil befestigt ist.

Replacement of the cam (026)

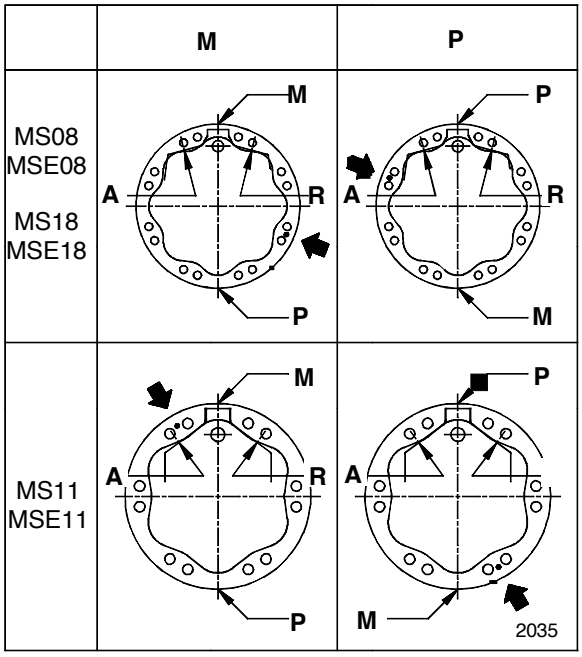
Disassembly

Do operations described in chapter "replacement of the bearing support" section "disassembly" page 16

Reassembly

Do operations described in chapter "replacement of the bearing support" section "reassembly" page 18.
The angular position of the cam must be respected on dual displacement motors with a displacement ratio different from 2.

Example : Motor MS18 with displacement 1747-1049-698.
Small displacement : 698 cm^3 [42.59 cu.in] letter P
Medium displacement : 1049 cm^3 [64.01 cu.in] letter M.
The letter P or M must be located in the axis and towards the displacement change spool, with the blind hole towards the fixing of the cam on the bearing support.



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Auswechseln des kompletten Zylinderblocks (010)

Replacement of the cylinders block assembly (010)

Demontage

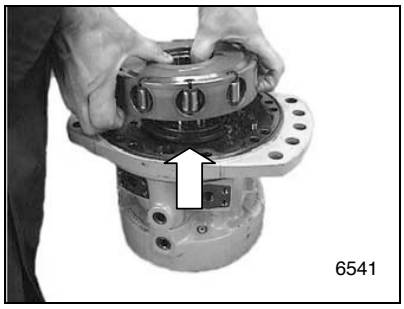
Disassembly

Dazu die im Kapitel « Auswechseln des Lagerteils » unter « Demontage » beschriebenen Arbeiten ausführen, Seite 16

Do operations described in chapter "replacement of the bearing support" section "disassembly" page 16

Nach Demontage des Nockenrings den Zylinderblock ausbauen.

After removing the cam, remove the cylinders block.

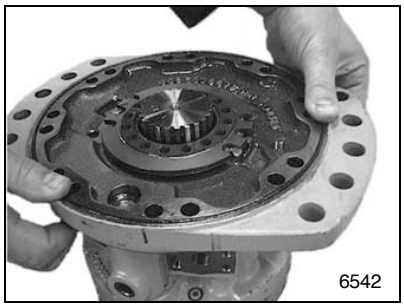


Wiedereinbau

Reassembly

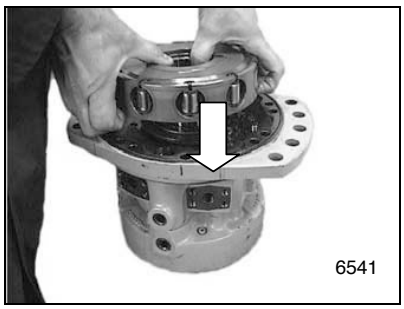
Neuen O-Ring (027) einsetzen.

Install a new O-ring (027).



Kompletten Zylinderblock (010) einsetzen.

Install the cylinders block assembly (010).



Dazu die im Kapitel « Auswechseln des Lagerteils » unter "Wiedereinbau" beschriebenen Arbeiten ausführen, Seite 18

Do operations described in chapter "replacement of the bearing support" section "reassembly" page 18

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Auswechseln des Verteilers (047).

Demontage

Dazu die im Kapitel « Auswechseln des kompletten Zylinderblocks (010)» unter « Demontage » beschriebenen Arbeiten ausführen, Seite 28.

Position des Verteilers (047) in Bezug auf Verteilerdeckel (041) kennzeichnen. (Motor mit 2 Hubvolumen).

Den Verteiler (047) durch Anheben an den Ausrichtungszapfen oder am Flansch vom Verteilerdekkel (041) abmontieren.

Den Verteiler vor Staub schützen.

Federn (052) ausbauen.

Dichtungen und Gegendichtungen (048) vom Verteilerdeckel (041) herausziehen und beseitigen.

Wiedereinbau

Es dürfen keine Rost-, Schmutz- oder Wasserspuren vorhanden sein.

Neue Dichtungen und Gegendichtungen (048) ölen und einsetzen; dabei die Gegendichtungen so wenig wie möglich verformen.

Die Federn (052) in ihr zuvor mit Fett gefülltes Gehäuse einsetzen.

Die Dichtungsauflageflächen des Verteilers (047) fetten.

Den Verteiler(047) in den Verteilerdeckel (041) drücken

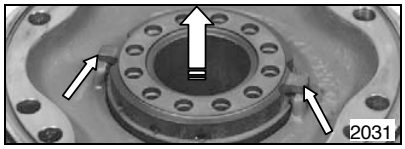
Replacement of the valving (047).

Disassembly

Do operations described in chapter "replacement of the cylinders bloc assembly (010)" section "disassembly" page 28.

Mark location to the valving (047) in relation to the valving cover (041) (Dual displacement motor).

Separate the valving (047) from the cover (041) by levering at the indexing pins or at the flange.



Protect the valving from dusts.

Remove the springs (052).

Remove and discard the seals and back-up rings (048) from the cover (041).

Reassembly

All traces of rust, mud, water must be removed.

Lubricate and install new seals and back-up rings (048), ensuring the back up rings are twisted as little as possible.



Place the springs (052) in their housings, previously filled with grease.

Lubricate the faces of the seals of the valving (047).

Press the valving (047) into the cover (041).

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Die Einbaurichtung des Verteilers (047) in bezug auf den Verteilerdeckel (041) beachten).

Respect the assembly sense of the valving (047) in relation to the cover (041).

Den Einsatz des Verteilers (047) in den Verteilerdeckel (041) nicht forcieren.

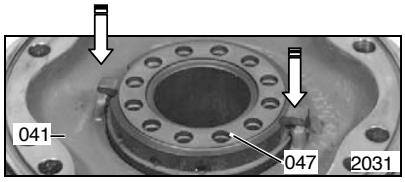
Do not force when installing the valving (047) into the cover (041).

Montage der Verteilerausführung 1C (konstanter Hubvolumen).

Keine besondere Montagerichtung.

Valving assembly type single displacement motor.

No particular assembly sense.



Montage der Verteilerausführung 2C (umschaltbarer Hubvolumen).

Den gewählten Buchstaben, der die Drehrichtung anzeigt, gegenüber dem Steuerkolben (053) anordnen.

Valving assembly type Dual displacement motor.

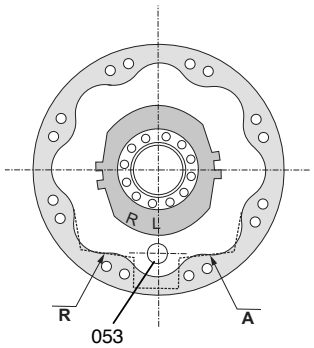
Write the chosen letter indicate the rotation sense in front of the displacement change spool (053).

POSITIONIERUNG DES VERTEILERS

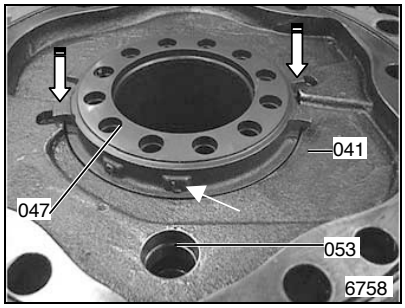
G/L Links

VALVING POSITIONING

G/L Left



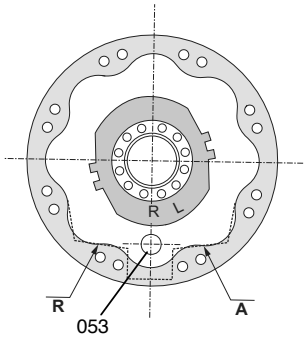
3227



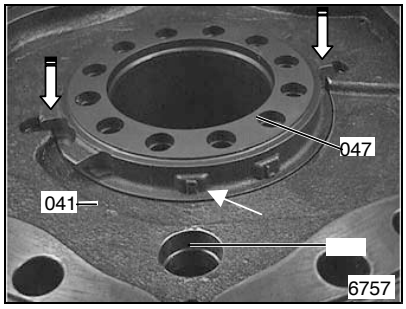
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D/R Rechts

D/R Right



3228



Falls kein Buchstabe vorhanden ist, die Ausrichtung anhand der beim Ausbau festgelegten Markierungen vornehmen.

If there is no letter, do the indexing according to the marks made during disassembly.

Dazu die im Kapitel « Auswechseln des kompletten Zylinderblocks (010)» unter « Wiedereinbau » beschriebenen Arbeiten ausführen, Seite 28.

Do operations described in chapter "replacement of the cylinders block" section "reassembly" page 28.

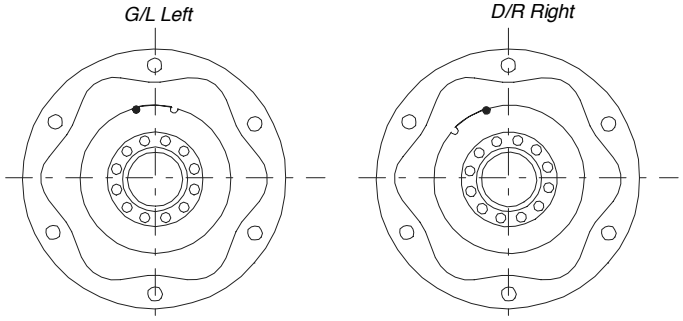
Motoren SE02 und S05

Situation of SE02 and S05 motors

SE02 Motor :
SE02 motor :

G/L Links
G/L Left

D/R Rechts
D/R Right

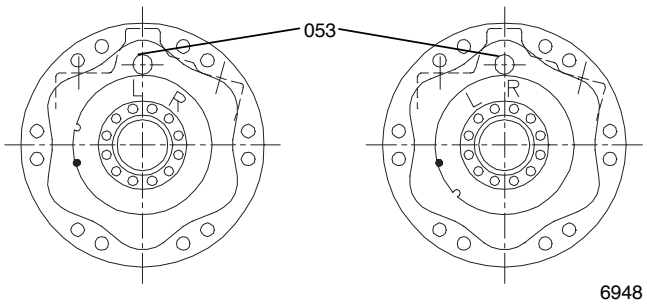


6959

S05 Motor :
S05 motor

G/L Links
G/L Left

D/R Rechts
D/R Right



6948

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Auswechseln der Deckeldichtung (045)

Replacement of the O-ring (045) of the end cover

Demontage

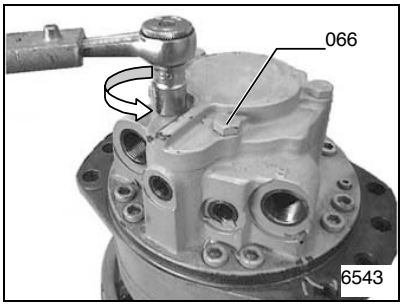
Disassembly

Motor auf Lagerteil stellen (Muttern sind zum Schutz der Gewindebolzen aufgesetzt)

Place the motor on the bearing support (fitted with nuts for studs protection)

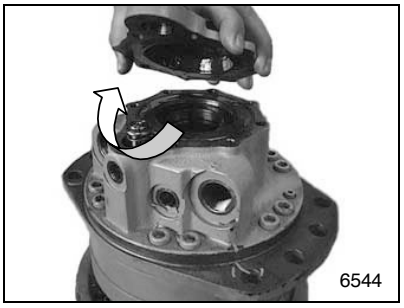
Schrauben (066) herausnehmen.

Remove the screws (066)



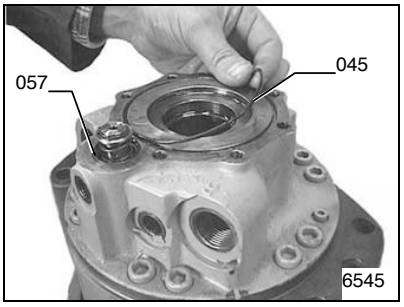
Verschlussplatte abnehmen.

Remove the end cover



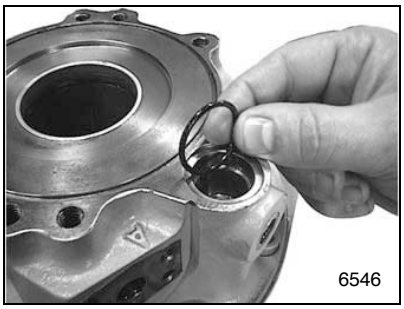
O-Ring (045) entfernen.

Discard the O-ring (045)



Wenn Motor mit 2 Hubvolumen, O-Ring (057) entfernen

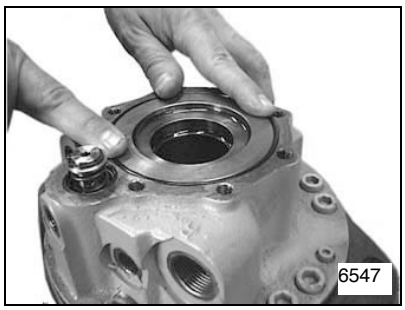
Discard the O-ring (057) if the motor has 2-displacement



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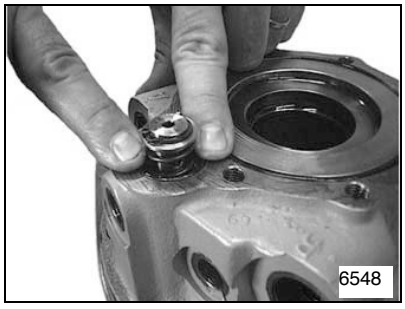
Wiedereinbau ***Reassembly***

Neuen O-Ring (045) einsetzen. *Install a new O-ring (045).*

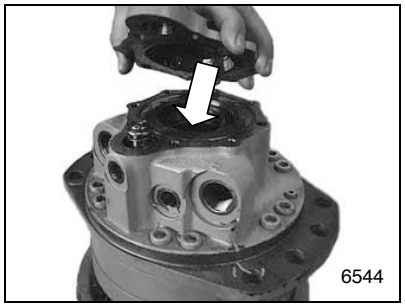


Wenn Motor mit 2 Hubvolumen, neuen O-Ring (057) einsetzen, andernfalls zum nächsten Schritt übergehen

Install a new O-ring (057) if the motor has 2-displacement. If not go to the next section

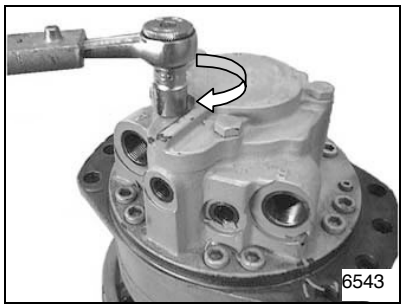


Verschlussplatte montieren. *Install the end cover*



Schrauben (066) einsetzen und mit entsprechendem Drehmoment anziehen (siehe Schaubild Seite 38)

Install and tighten the screws (066) to the right torque (see table page 38)



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Auswechseln des Drehzahlsensors (Option)

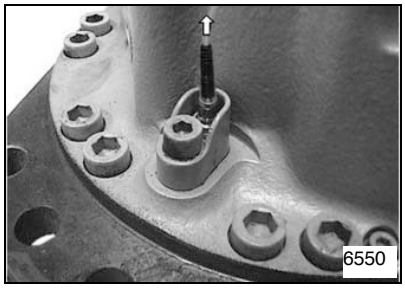
Replacing the sensor (optional)

Demontage

Disassembly

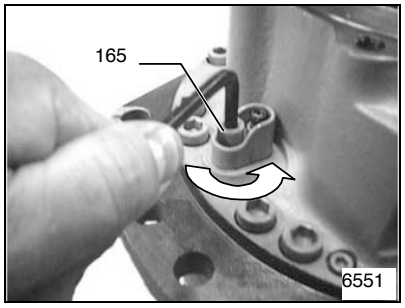
Stecker (161.3) abziehen

Disconnect the connector (161.3)



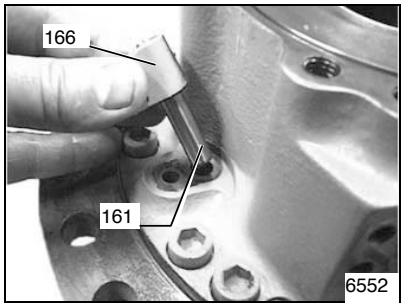
Schraube (165) aufschrauben und ausbauen

Unscrew and remove the screw (165)



Sensor (161) mit dem Träger (166) abziehen

Extract the sensor (161) with its support (166)



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Wiedereinbau

Reassembly

Der Dichtung (164) auf Sauberkeit der Auflagefläche dem Verteilerdeckel (041) prüfen.

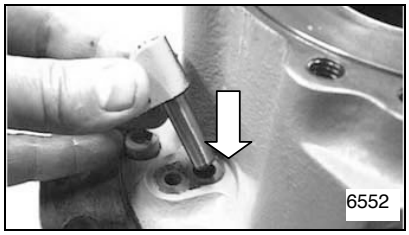
Make sure that the seal mounting surface (164) on the valving cover (041) is clean.

Neuen Haltering (163) und neue Dichtung (164) auf den Sensor (161) mit seiner Distanzscheibe (167) schieben.

Install the new brake washer (163) and the new seal (164) on the sensor (161) fitted with its adjusting sticker (167).

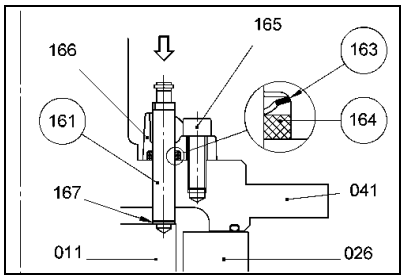
Den Sensor in die Halterung (166) stecken, so daß die Dichtung (164) korrekt in ihrer Aufnahme sitzt.

Push the sensor assembly into the support (166) until the seal (164) is in its housing.



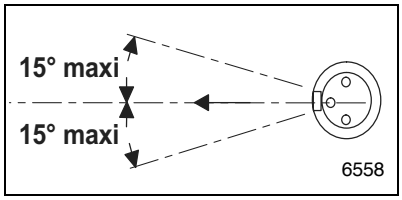
Sensor (041) in die Bohrung des Verteilerdeckels bis zum Kontakt mit dem Zylinderblock (011) schieben.

Push the sensor into the valving cover (041) until it comes in contact with the cylinders block (011),



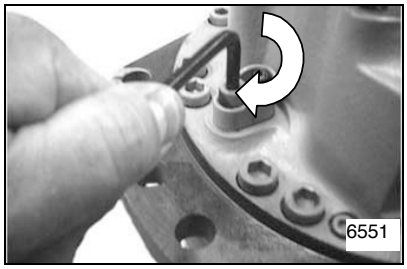
Die Kerbe im Steckeranschluss des Sensors muss radial zur Mitte des Motors (Richtung Welle) zeigen.

the notch of the sensor should be oriented towards the center of the motor.



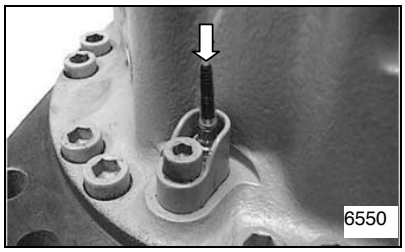
Schrauben (165) einsetzen und mit entsprechendem Drehmoment anziehen (siehe Schaubild Seite 38)

Install and tighten the screw (165) to the right torque (see table page 38)



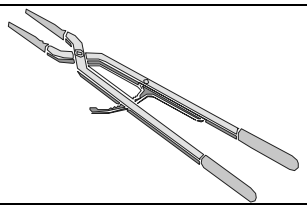
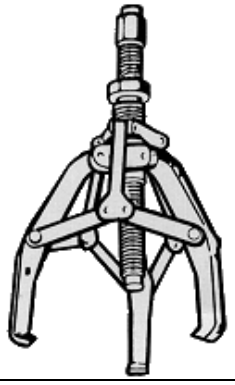
Stecker (161.3) wieder anschließen.

Reconnect the connector (161.3).



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Werkzeug-Liste — *Tooling inventory*

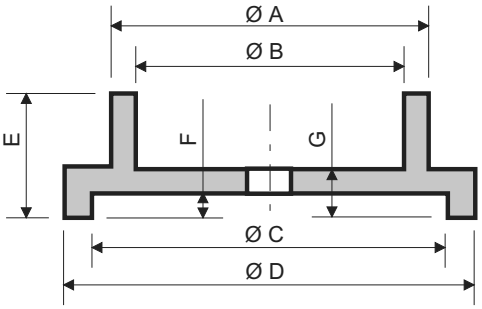
Standard Werkzeug		***Standard tools***	
Innensechskant-Schlüssel		*Hollow head wrench*	5 6 8 10 12 14
Ring-/Maulschlüssel für Sechskantschraube		*Hex head wrench*	13 17 19 22 24
Drehmoment-Schlüssel	FACOM J 250 A	*Torque wrench*	6 bis 30 N.m *[4.4 to 22.1 lbf.ft]*
Drehmoment-Schlüssel	FACOM S 250 A	*Torque wrench*	50 bis 240 N.m *[35 to 175 lbf.ft]*
Drehmoment-Schlüssel	FACOM K 250 A	*Torque wrench*	160 bis 800 N.m *[120 à 600 lbf.ft]*
Korrosionsschutzfett	Auto-top 2000 origine AGIP	*Anti-oxidizing grease*	Leuchtend grüne Farbe / *fluorescent green color*
Zange für Innenringe	FACOM 499.32	*Internal snap ring pliers*	
Abzieher	FACOM U 20 B	*Extractor*	 6553
Sechskantschlüssel für Innensechskantschraube		*Hex head wrench*	13 17 19 22 24
Drehmoment-Schlüssel	FACOM J 250 A	*Torque wrench*	6 à 30 N.m *[4.4 to 22.1 lbf.ft]*
Drehmoment-Schlüssel	FACOM S 250 A	*Torque wrench*	50 à 240 N.m *[35 to 175 lbf.ft]*
Drehmoment-Schlüssel	FACOM K 250 A	*Torque wrench*	160 à 800 N.m *[120 à 600 lbf.ft]*

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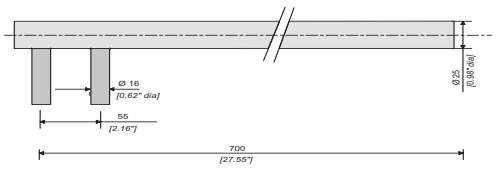
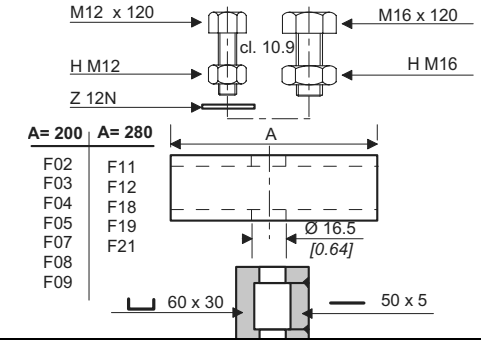
Spezialwerkzeuge	***Special tools***

Montagewerkzeug zum Anheben der Schutzkappe oder zum Komprimieren der Tellerfeder.

Mandrel for reassembling the brake cover or to compress the spring washer.



		Ø A		Ø B		Ø C		Ø D		E		F		G	
		mm	*[inch]*	mm	*[inch]*	mm	*[inch]*	mm	*[inch]*	mm	*[inch]*	mm	*[inch]*	mm	*[inch]*
F02	M12	110	*[4.3]*	100	*[4.0]*	125	*[4.9]*	135	*[5.3]*	50	*[1.96]*	10	*[0.39]*	20	*[0.78]*
F03															
F04		125	*[4.92]*	115	*[4.52]*	151	*[5.94]*	159	*[6.25]*						
F05															
F07															
F08	M16	125	*[4.92]*	115	*[4.52]*	151	*[5.94]*	159	*[6.25]*	50	*[1.96]*	10	*[0.39]*	20	*[0.78]*
F09															
F11		190	*[7.48]*	180	*[7.08]*	205	*[8.07]*	215	*[8.46]*	50	*[1.96]*	10	*[0.39]*	20	*[0.78]*
F12															
F18										70	*[2.75]*			30	*[1.18]*
F19															
F21															

Rohr zum Festsetzen des Motors		*Tube to immobilize the motor*	
Werkzeuge zur mechanischen Bremslösung.		*Tools for mechanical brake release*	

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	**Anziehdrehmomente Nm ± 10%** (Gemäß Norm DIN 912)			***Tightening torques in [lbf.ft] ± 10%*** *(According to the standard DIN 912)*		
Größe *Size*	**8.8**	**10.9**	**12.9**	**8.8**	**10.9**	**12.9**
M6	10	14	17	7.5	10	12.5
M8	25	35	41	18.4	26	30
M10	49	69	83	36	51	61
M12	86	120	145	63.4	88.4	107
M14	135	190	230	100	140	170
M16	210	295	355	155	218	262
M18	290	405	485	214	299	358
M20	410	580	690	302	428	509

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Ersatzteile

Nummer	Bezeichnung
● 010	Kompletter Zylinderblock
012	Kompletter Kolben Cl. 0
013	Kompletter Kolben Cl. 1
015	Reparatursatz
● 026	Kompletter Nockenring
027	O-Ring
● 040	Komplettes Verteilerdeckel
041	Verteilerdeckel
042	Schraube
043	Dichtungsring
044	Schraube
045	O-Ring
047	Verteiler
048	Dichtungssatz
050	Stopfen
051	O-Ring
052	Feder
053	Umschaltkolben
054	Scheibe
055	Sicherungsring
056	Feder
057	O-Ring
059	Stift
● 065	Kompletter Verschlussplatte
066	Schraube
067	Dichtring
● 070	Komplettes Lagerteil
071	Lagerteil
072	Innerer Lippendichtring
073	Rollenlager
074	Rollenlager
075	Scheibensatz
076	Stützring
077	Sicherungsring
078	Äußerer Dichtring
079	Abweiser
081	Dichtungsträger
087	Passfeder
090	Welle
091	Radbolzensatz
096	Bremstrommel
097	Schraube
098	Bremsseil
099	Sicherungsring
154	Komplette Bremsbacke
155	Kompletter Radzylinder
156	Gegenhalter

Spare parts list

Item	*Description*
● *010*	*Cylinders-block assembly*
012	*Piston Cl 0 assembly*
013	*Piston Cl 1 assembly*
015	*Repair kit*
● *026*	*Cam assembly*
027	*O-ring*
● *040*	*Valving cover assembly*
041	*Valving cover part*
042	*Screw*
043	*Seal washer*
044	*Screw*
045	*O-ring*
047	*Valving*
048	*Seal kit*
050	*Plug*
051	*O-ring*
052	*Spring*
053	*Valve spool*
054	*Washer*
055	*Snap ring*
056	*Spring*
057	*O-ring*
059	*Pin*
● *065*	*End cover assembly*
066	*Screw*
067	*Sealing ring*
● *070*	*Bearing support assembly*
071	*Bearing support part*
072	*Radial lip seal*
073	*Roller bearing*
074	*Roller bearing*
075	*Set of shims*
076	*Thrust ring*
077	*Snap ring*
078	*Lip seal*
079	*Deflector*
081	*Seal support*
087	*Key*
090	*Shaft*
091	*Set of studs*
096	*Drum brake*
097	*Screw*
098	*Brake cable*
099	*Snap ring*
154	*Brake shoe sub-assembly*
155	*Brake cylinder sub-assembly*
156	*Brake adjustment*

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Nummer	Bezeichnung
⊙ 100	Komplette Bremse
101	Bremsgehäuse
102	Schraube
106	O-Ring
107	Kolben
108	Tellerfeder
109	Sicherungsring
110	Welle
111	Dichtsatz Bremswelle
112	Schraube
113	Dichtungsring
135	Satz Bremslamellen
141	Schutzkappe
142	Stopfen
143	O-Ring
⊙ 150	Drehzahlsensor-Vorbereitung
152	Scheibe
153	Scheibe
⊙ 160	Kompletter Sensor
161	Sensor
162	Mutter
163	Scheibe
164	Dichtung
⊙	Als Satz lieferbare Baugruppe

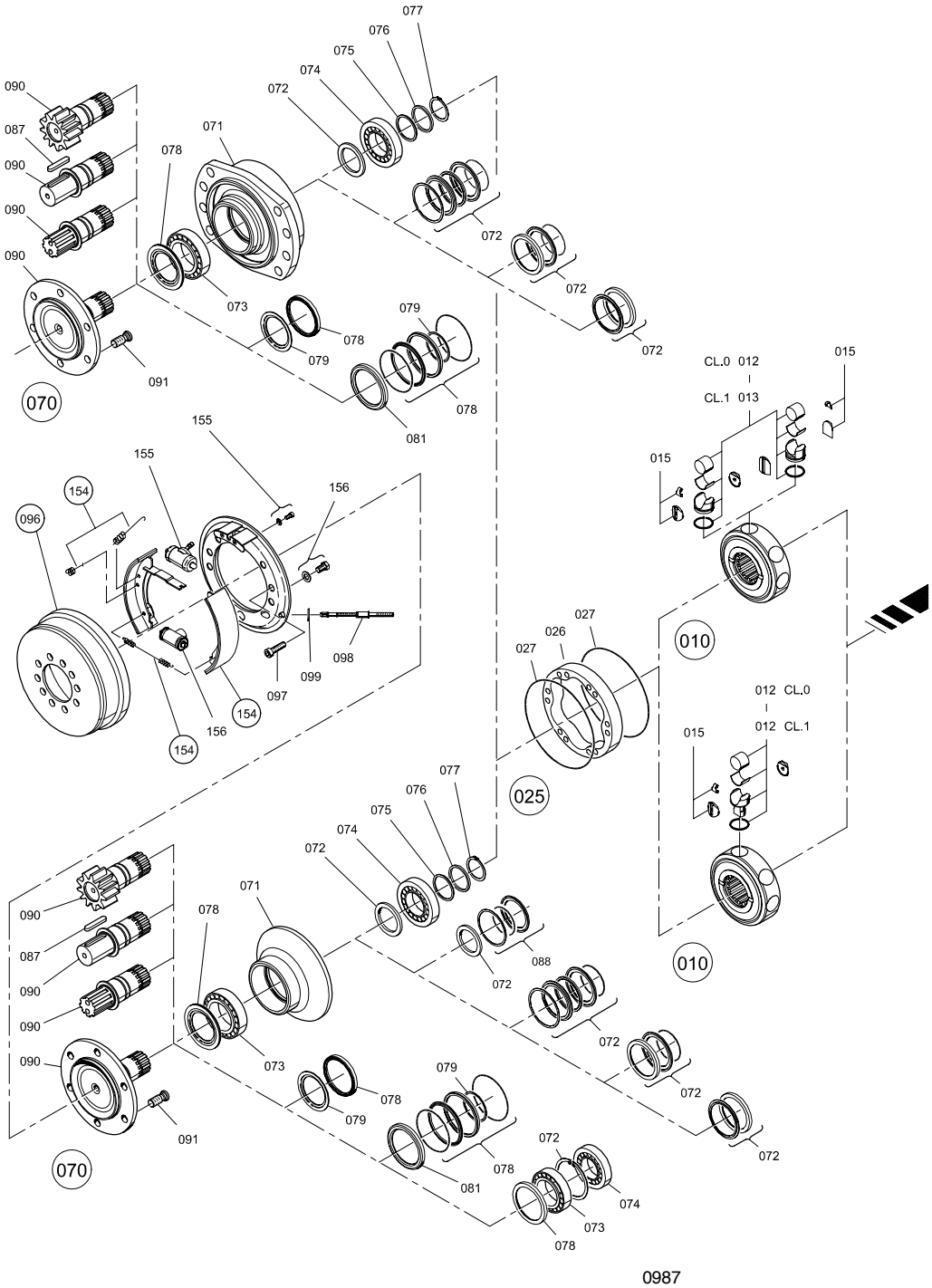
Item	*Description*
⊙ *100*	*Brake assembly*
101	*Brake body*
102	*Screw*
106	*O-ring*
107	*Brake piston*
108	*Spring washer*
109	*Snap ring*
110	*Brake shaft*
111	*Seal*
112	*Screw*
113	*Seal washer*
135	*Brake kit*
141	*Cover*
142	*Plug*
143	*O-ring*
⊙ *150*	*Speed sensor predisposition*
152	*Washer*
153	*Washer*
⊙ *160*	*Speed sensor assembly*
161	*Speed sensor part*
162	*Nut*
163	*Washer*
164	*Seal*
⊙	*Sub-assembly sold assembled*

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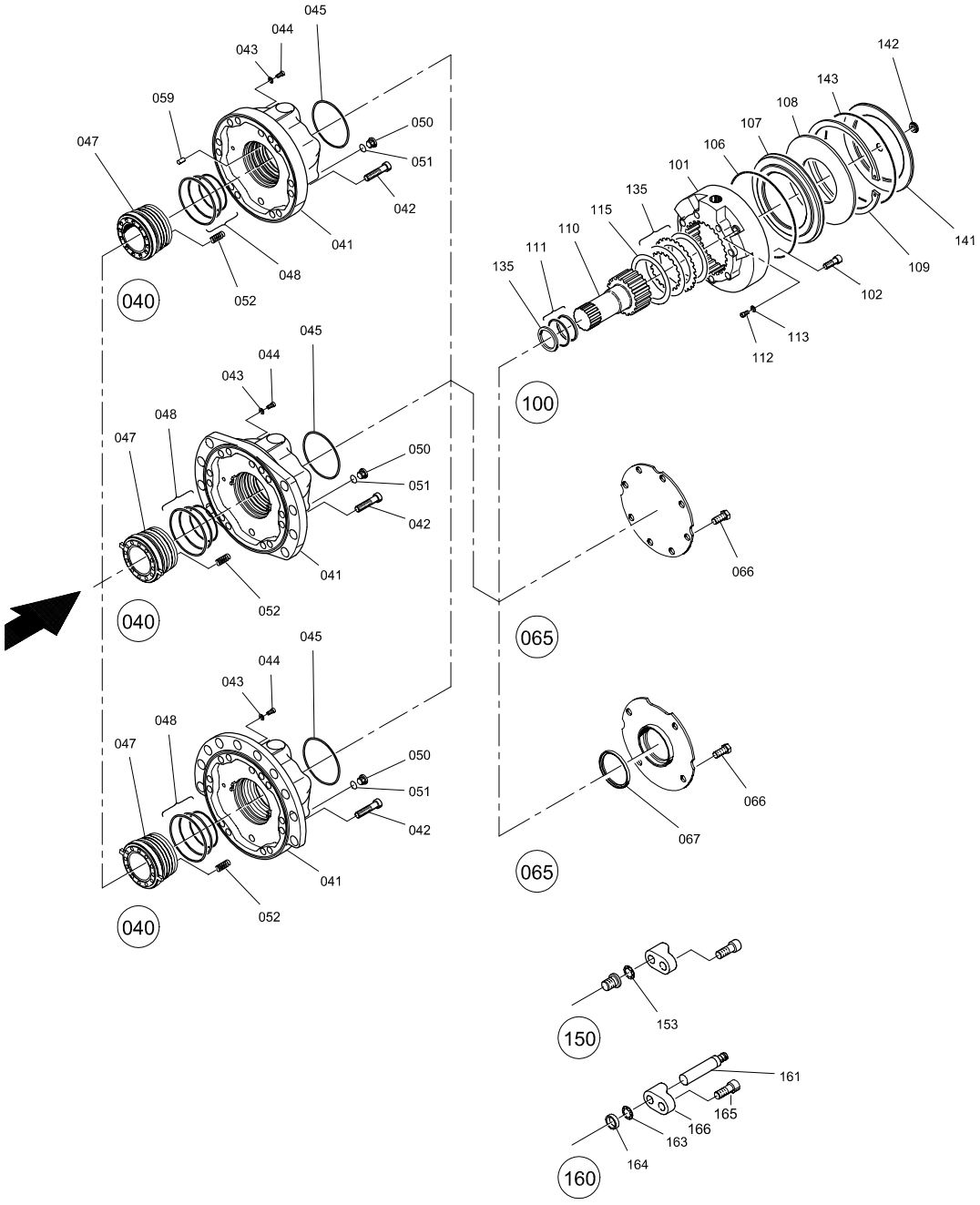
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Motoren mit konstantem Hubvolumen MS, MSE 02-05-08-11-18.

Single displacement motors MS, MSE 02-05-08-11-18.



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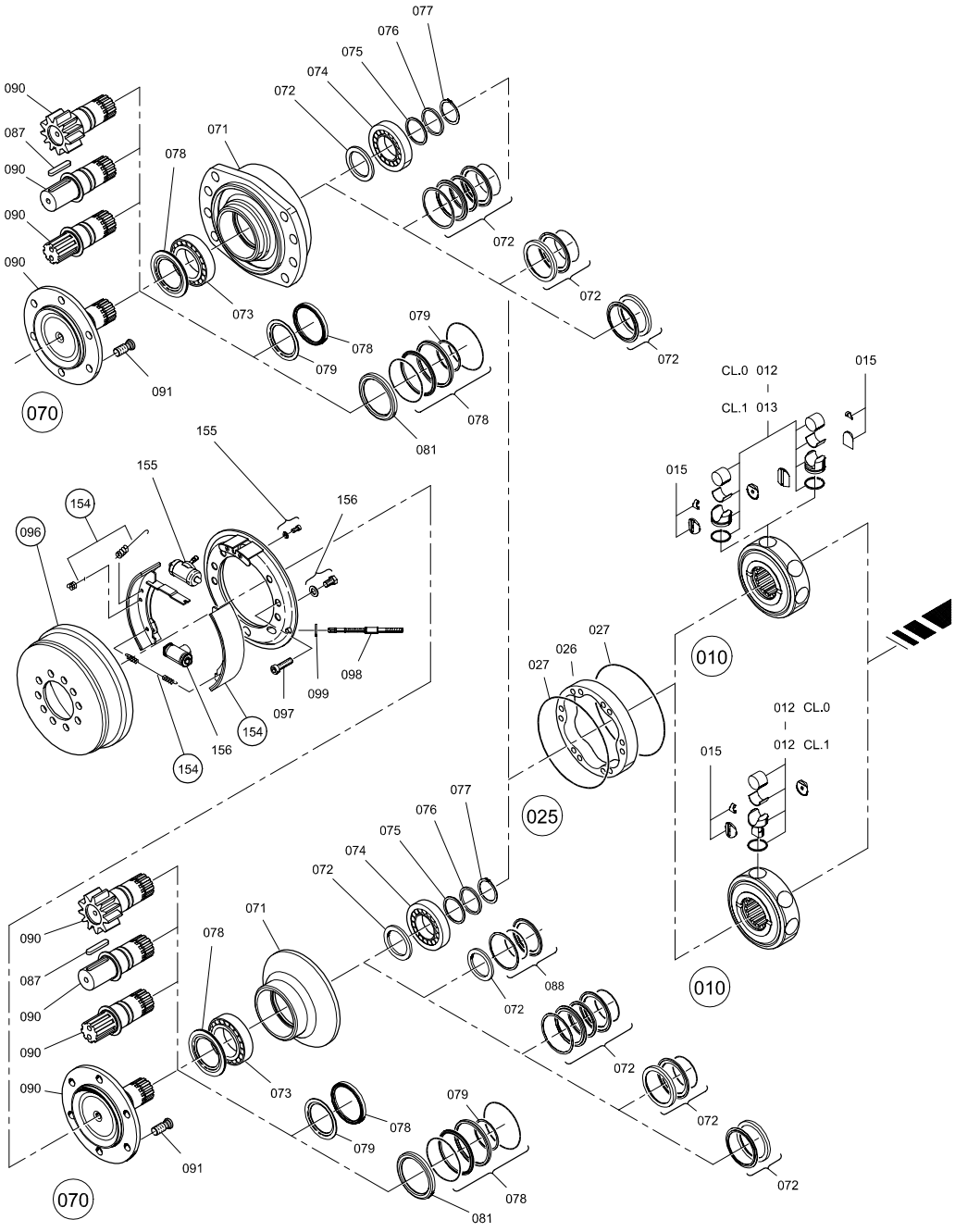
(027) + (043) + (045) + (057) + (058) + (106) + (111) + (113) + (141) + (142) + (143) + (153) + (163) = (001) **Dichtungssatz**
Seal kit

0988

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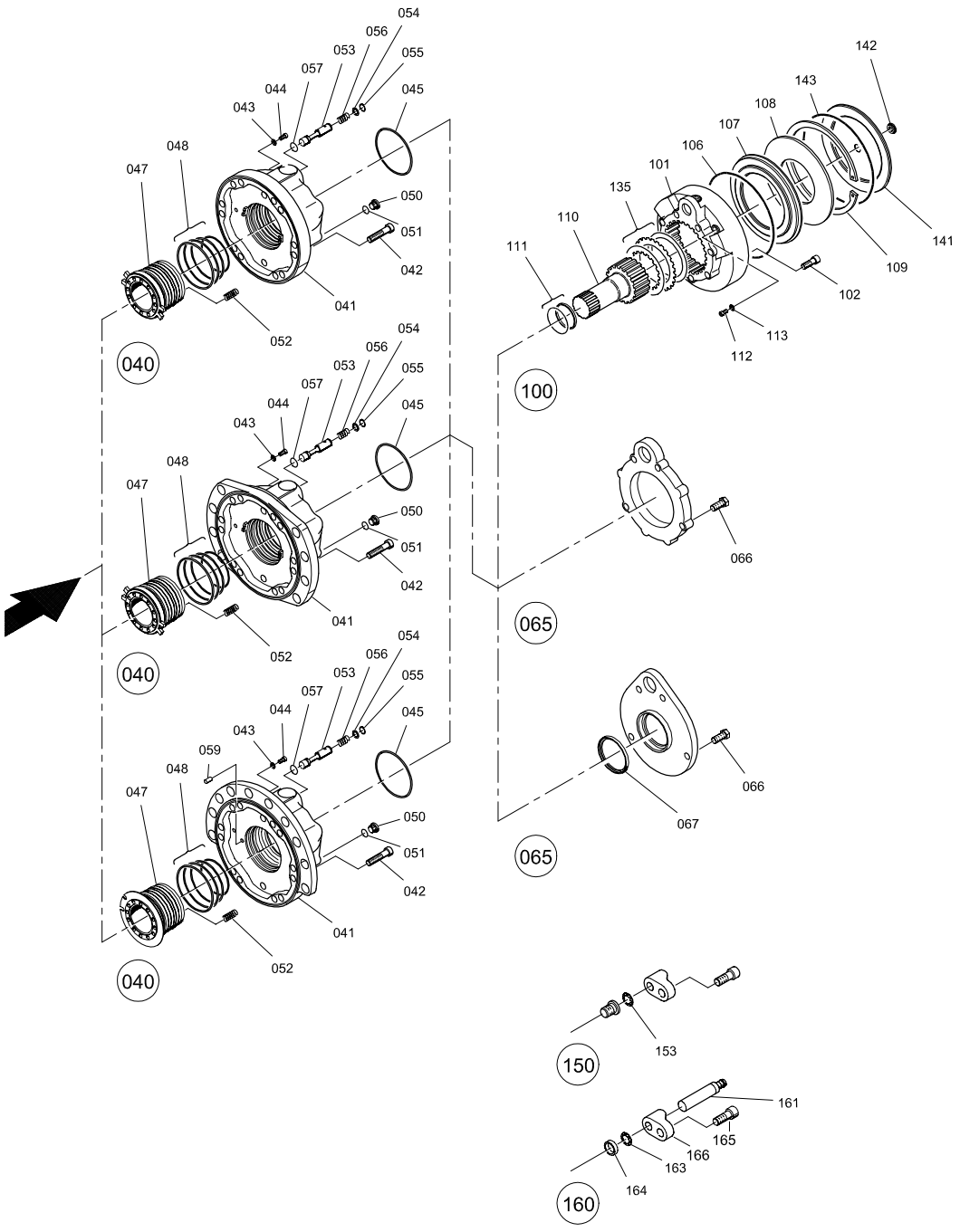
Motoren mit umschaltbarem Hubvolumen MS, MSE 02-05-08-11-18.

Dual displacement motors MS, MSE 02-05-08-11-18.



0990

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(027) + (043) + (045) + (057) + (058) + (106) + (113) + (141) + (142) + (143) + (153) + (163) = (001) **Dichtungssatz**
Seal kit

0989

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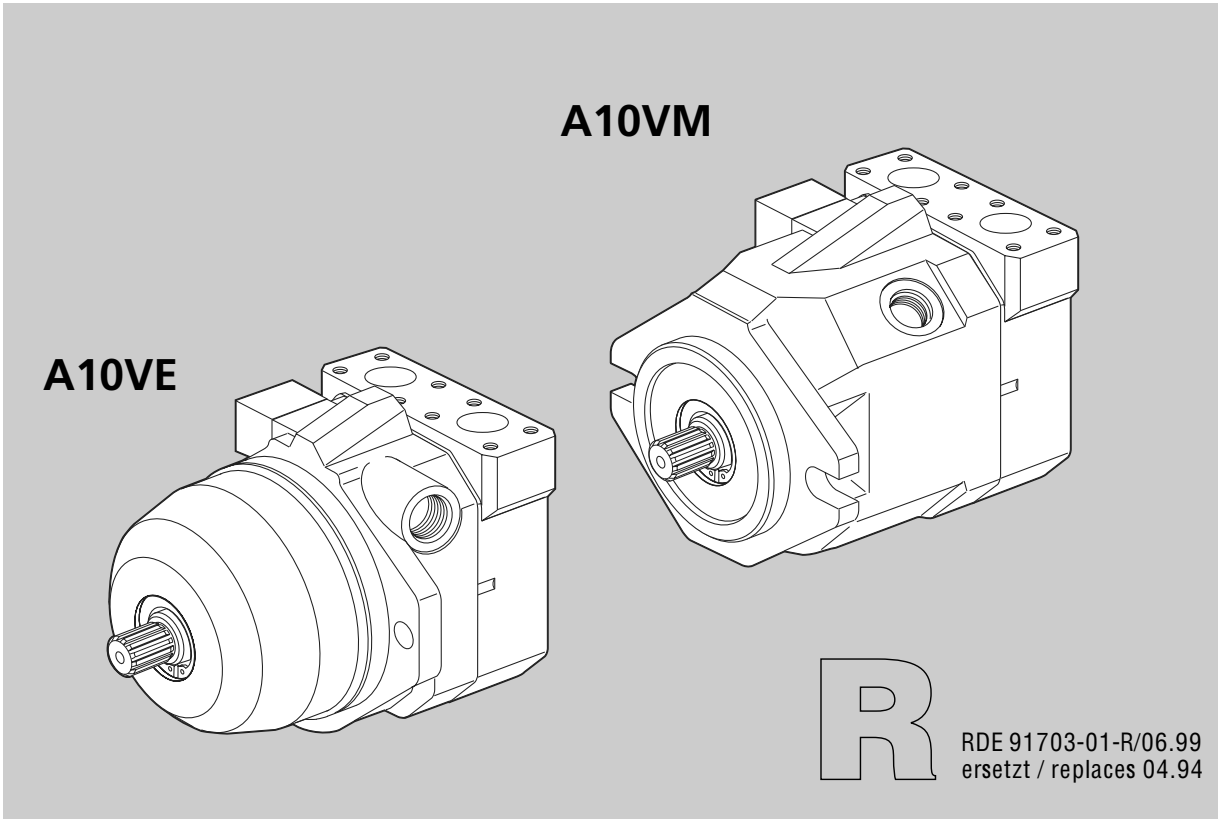
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7.3 A10VM

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engineering
mannesmann
Rexroth



Reparaturanleitung - A10VM 28 - 60 Baureihe 5
A10VE 28 - 60 Baureihe 5
Repair instructions - A10VM 28 - 60 Series 5
A10VE 28 - 60 Series 5

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Brueninghaus
Hydromatik

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HINWEIS

Bezeichnungen, Beschreibungen und Darstellungen entsprechen dem Informationsstand zum Zeitpunkt der Drucklegung dieser Unterlage.

Änderungen können den Service am Produkt beeinflussen, Verpflichtungen entstehen uns daraus nicht.

Methoden und Vorrichtungen sind Empfehlungen, für deren Resultat wir keine Haftung übernehmen können.

BRUENINGHAUS HYDROMATIK- Baugruppen, mit Angabe der Fabrik-Nr. bestellt, sind die Basis guter Reparaturen.

Einstell- und Prüfarbeiten sind bei Betriebstemperatur auf dem Teststand vorzunehmen.

Schutz von Personen und Eigentum ist durch Vorkehrungen sicherzustellen.

Sachkenntnis, die Voraussetzung für jede Service-arbeit, vermitteln wir in unseren Schulungskursen.

NOTICE

Specifications, descriptions and illustrative material shown herein were as accurate as known at the time this publication was approved for printing.

BRUENINGHAUS HYDROMATIK reserves the right to discontinue models or options at any time or to change specifications, materials, or design without notice and without incurring obligation.

Optional equipment and accessories may add cost to the basic unit, and some options are available only in combination with certain models or other options.

For the available combinations refer to the relevant data sheet for the basic unit and the desired option.

Adjustment and tests have to be carried out on the test bench under operating temperatures.

Protection of personnel and property has to be guaranteed by appropriate measures.

Expert knowledge, the precondition of any service work, can be obtained in our training courses.

INHALT

Seite/ Page

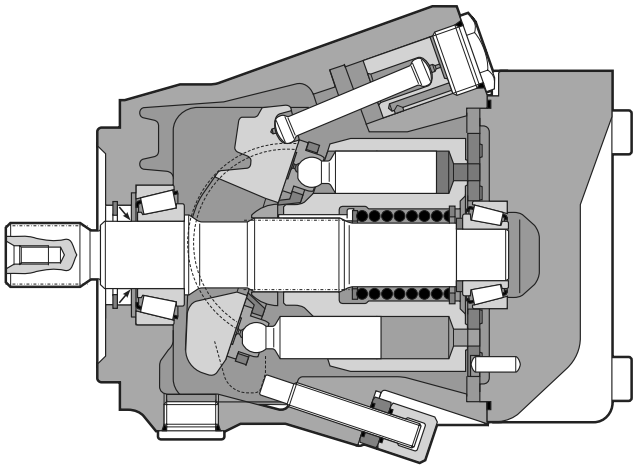
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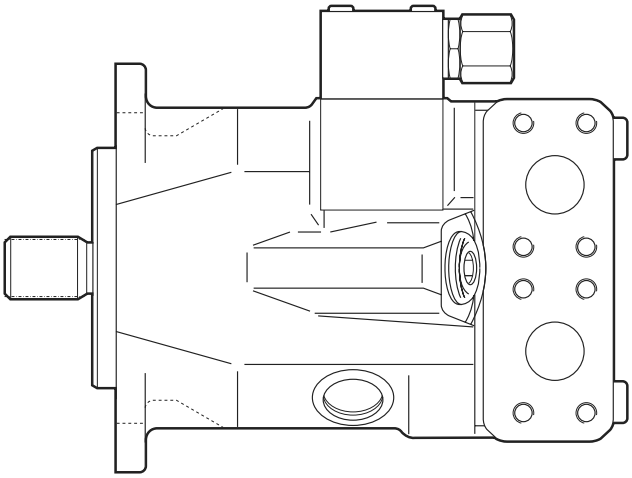
A10VM / A10VE

Schnittbild	3	Sectional view
Allgemeine Reparaturhinweise	4	General repair guidelines
Dichtsätze und Baugruppen	5-6	Seal kits and sub-assemblies
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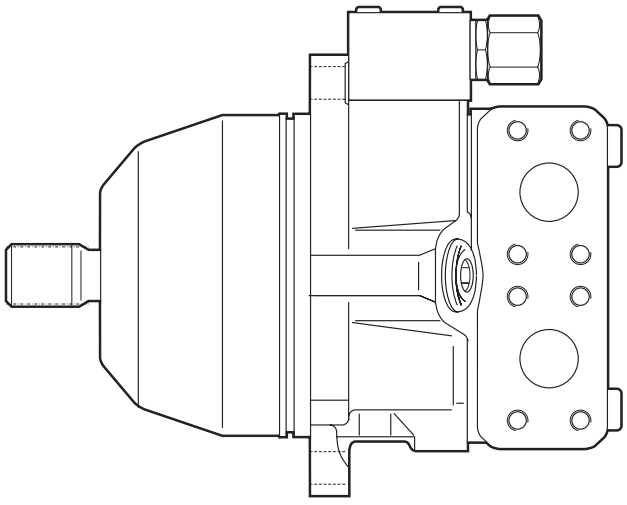
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A10VM

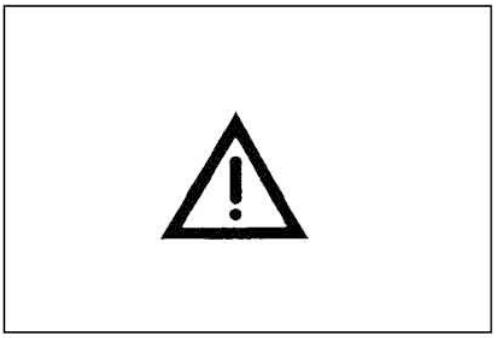




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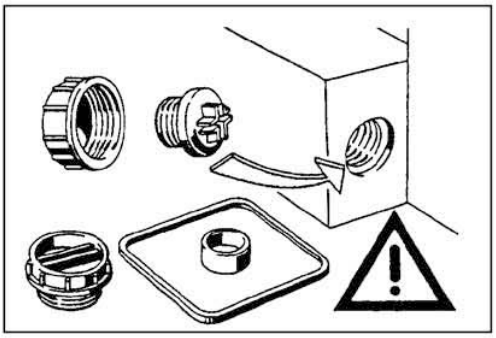


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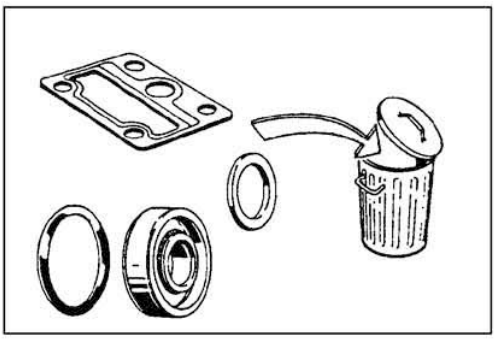
Achtung!
Nachfolgend Hinweise bei allen Reparaturarbeiten an Hydraulikaggregaten beachten!

Attention!
Observe the following guidelines when carrying out repairs on hydraulic units!



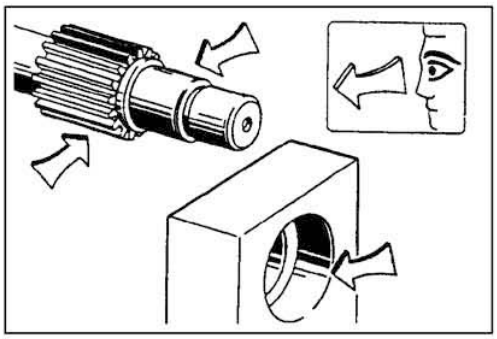
Alle Öffnungen der Hydraulikaggregate verschließen.

Close off all openings of the hydraulic unit.



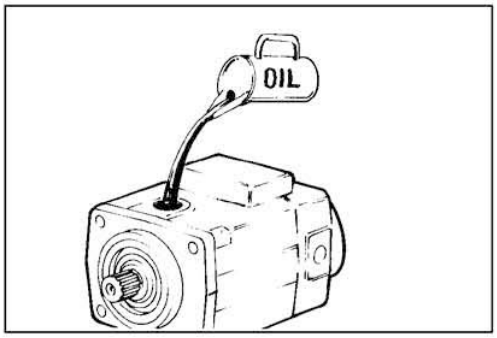
Alle Dichtungen erneuern.
Nur original BRUENINGHAUS HYDROMATIK Ersatzteile verwenden.

Replace all of the seals.
Use only original BRUENINGHAUS HYDROMATIK spare parts.



Alle Dicht- und Gleitflächen auf Verschleiß prüfen.
Achtung: Nacharbeiten an Dichtflächen z.B. durch Schleifpapier kann die Oberfläche beschädigen.

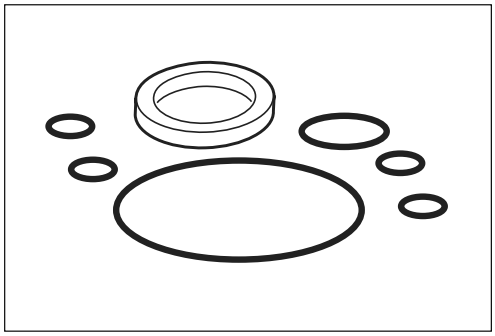
Check all sealing and sliding surfaces for wear.
Attention: Re-work of the sliding surfaces by using, for example abrasive paper, can damage the surface.



Hydraulikaggregate vor Inbetriebnahme mit Hydrauliköl befüllen.

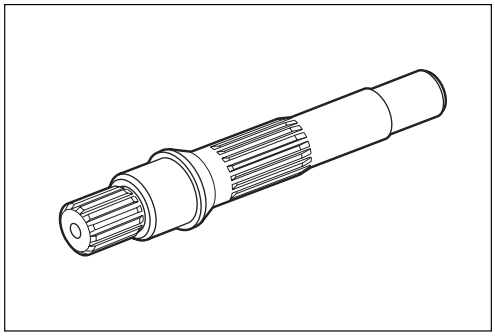
Fill the hydraulic unit with hydraulic oil before commissioning.

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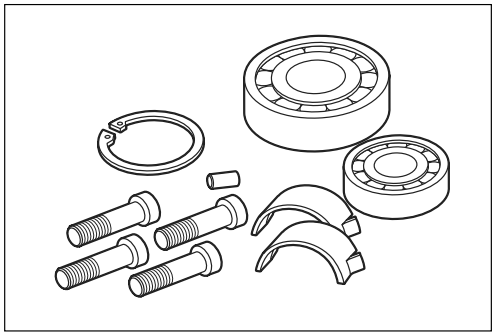
K1 Dichtsatz bestehend aus: Wellendichtring und diversen O-Ringen (6 Stück). Dichtungsmaterial WDR aus Viton, übrige aus NBR.

Sealing set: drive shaft sealing ring and diff. O-rings (6 pieces). Sealing material: drive shaft sealing ring Viton, others NBR.



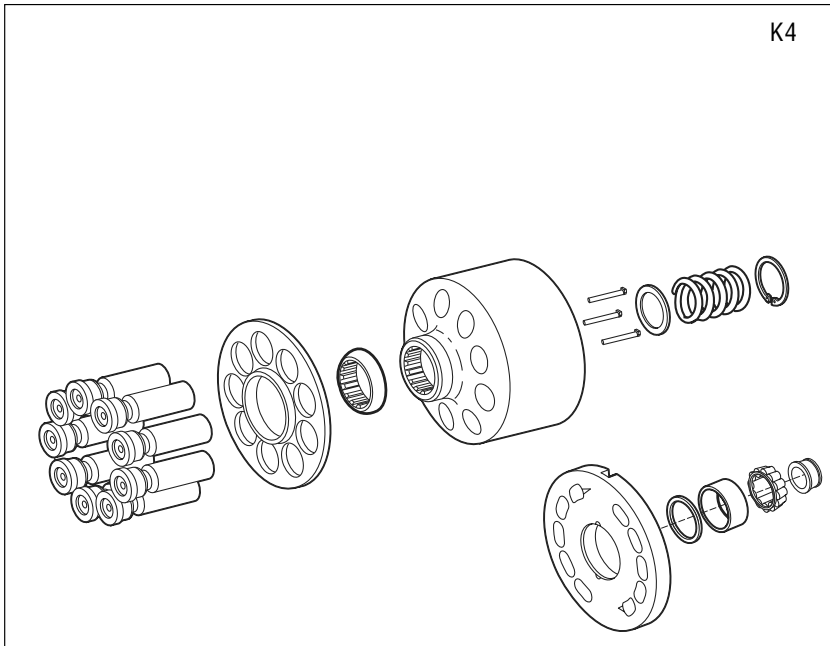
K2 Antriebswelle

Drive shaft



K3 Lagersatz / Kleinteile

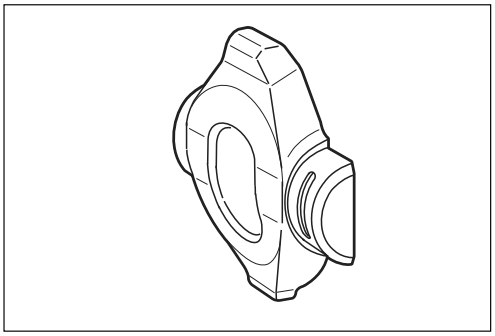
Bearing set / miscellaneous parts



K4 Triebwerk bestehend aus 9 Kolben (komplett), Zylinder (komplett montiert) Motor-Verteilerplatte und Rückzugplatte und -kugel.

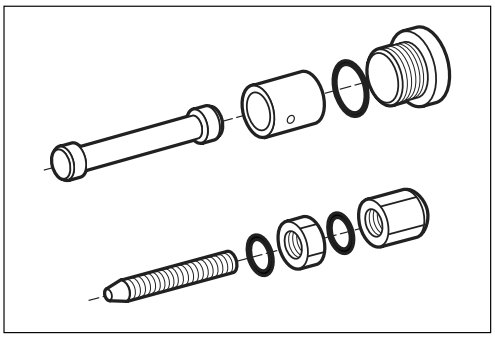
Rotary group completely with 9 pistons (completely), cylinder (mounted completely), motor-control plate, retaining plate and retaining ball.

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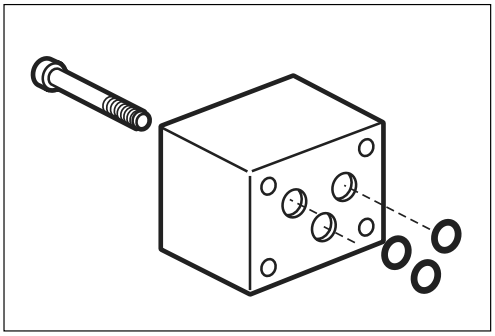
K5 Schwenkwiege

Swash plate



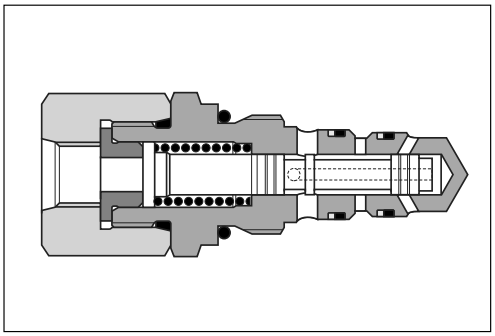
K6 Verstellteile bestehend aus: Verstellkolben und Kolbenstange sowie Anschlagschraube für Q_{min}, Mutter und Hutmutter.

Parts of control device: control piston, piston rod and the stopper min flow: threaded pin, hex. nut and hex. head nut.



K7 Steuerplatte mit O-Ringen

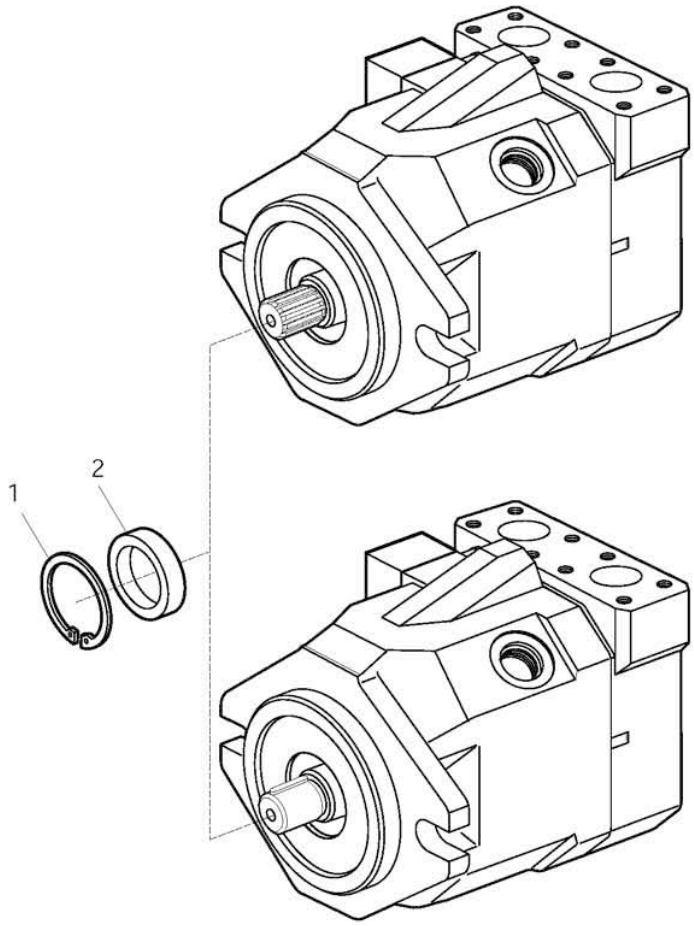
Control plate with O-rings



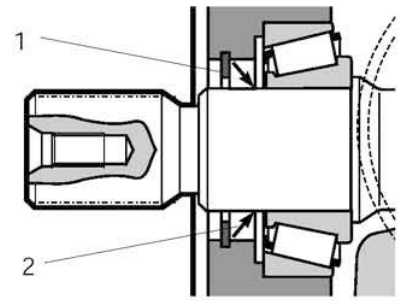
K8 Hydraulische Zweipunkt-Verstellung: HZ-Patrone

HZ-pilot valve

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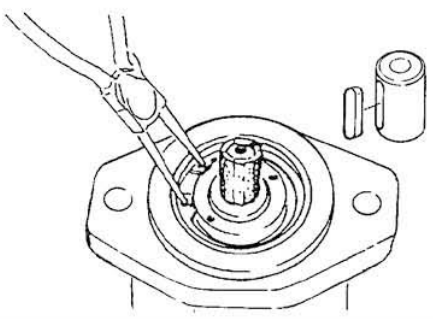


1



2 1. Sicherungsring, 2. Wellendichtring

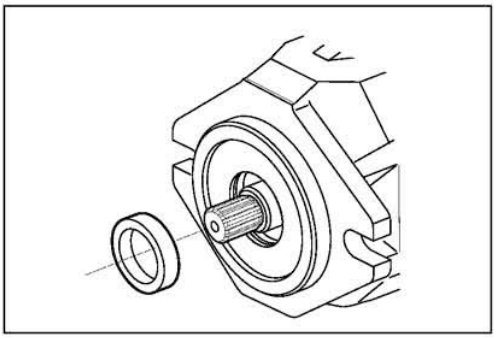
1. Circlip, 2. Shaft seal



3 (Paßfeder ausbauen bei Ausführung Paßfeder)
Triebwelle abkleben.
Sicherungsring ausbauen.

(Remove key, version with keyway)
Protect the drive shaft.
Remove the circlip.

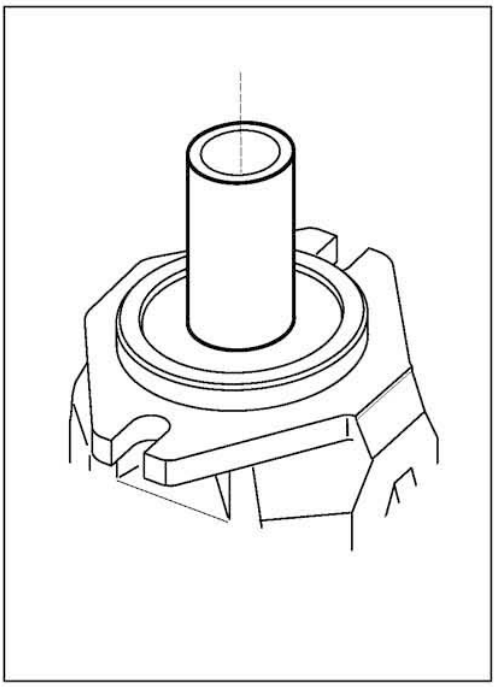
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4 Nach der Demontage des gelaufenen Wellendichtringes, einfetten des neuen WDR.

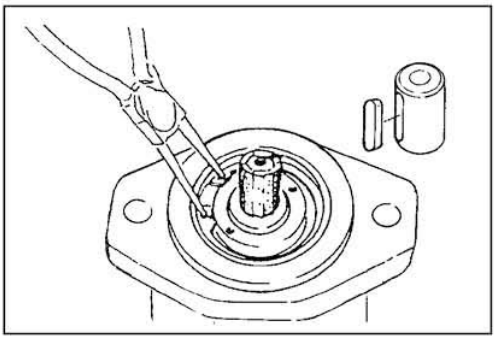
⚠ Kontrolle der Laufflächen, Welle, Gehäuse.

Change the shaft seal and check its sliding surface (drive shaft) and housing, grease the sealing ring.



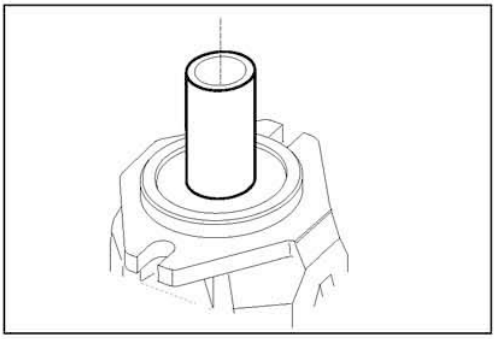
5 Wellendichtring einpressen, Anschlag des Montagewerkzeugs entspricht der Einpresstiefe.

Assemble the sealing ring, fitting tool holds the correct position of the sealing ring in the pump housing.



6 Sicherungsring einsetzen.

Assemble the snap ring.



7 Sicherungsring ganz einrasten.

Assemble the snap ring in the correct position.

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Hinweis!

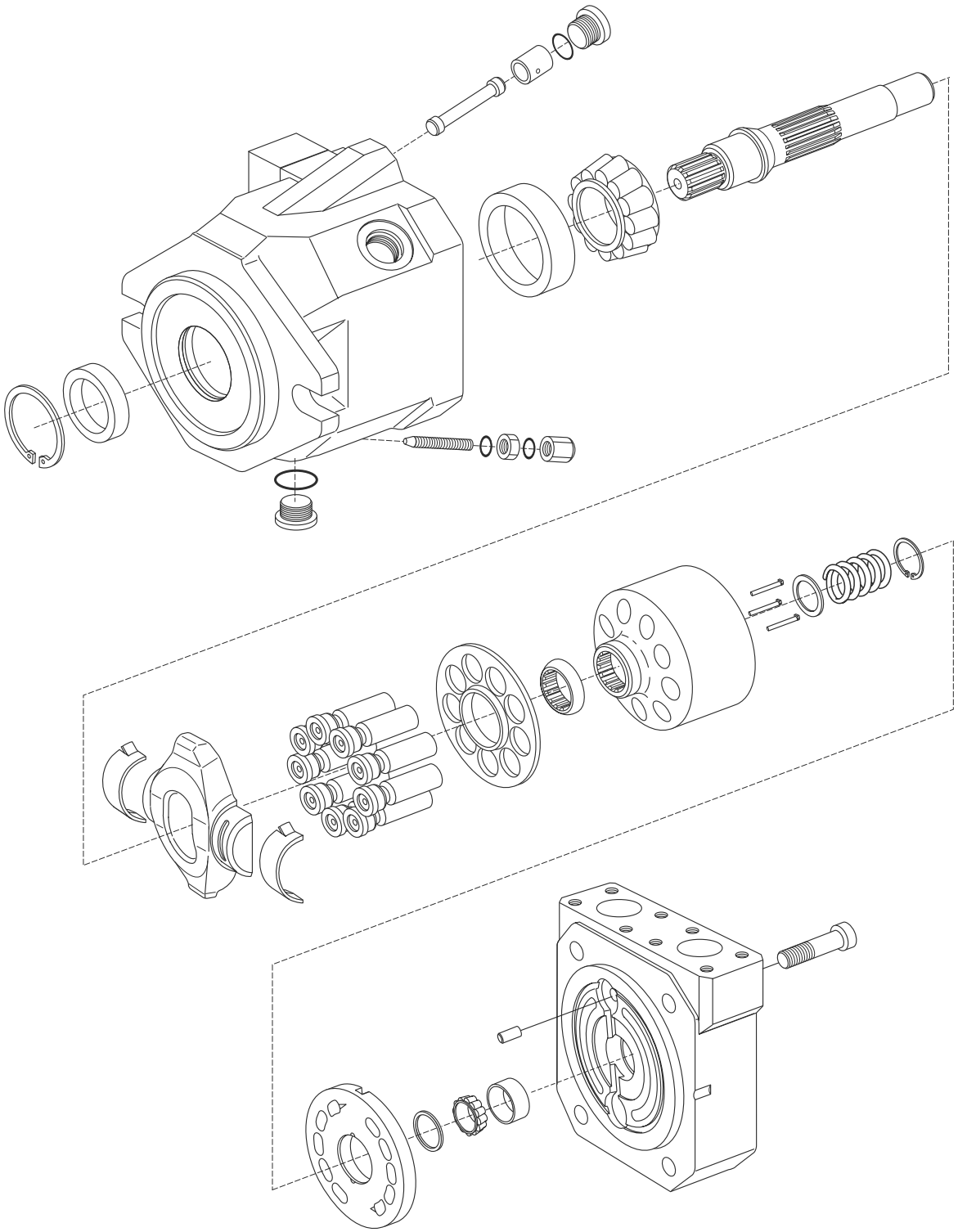
Die hier beschriebene Möglichkeit zum Wechsel der Antriebswellen - Abdichtung stellt nicht die serienmäßige Montage dar. Für sicheres Dichtungsverhalten ist eine Montage des Dichtringes zusammen mit dem Kegelrollenlager von innen her durch das Montagegehäuse durchzuführen. Soll aus Gründen der Vereinfachung im Reparaturfall die vorgehend beschriebene Vorgehensweise durchgeführt werden, so ist beim Ausbau der Dichtung besonders darauf zu achten, daß die Antriebswelle nicht beschädigt wird.

Note!

This discription showes how th change the drive shaft sealing ring but it isn't the way of serial assembly.
The sealing ring is assembled together with the taper roller bearing from inside the motor housing normally to get a secure sealing condition. If you decide to repair the motor in the shown way be very careful while handling so that the drive shaft wouldn't be damaged during disassembly of the shaft sealing ring.

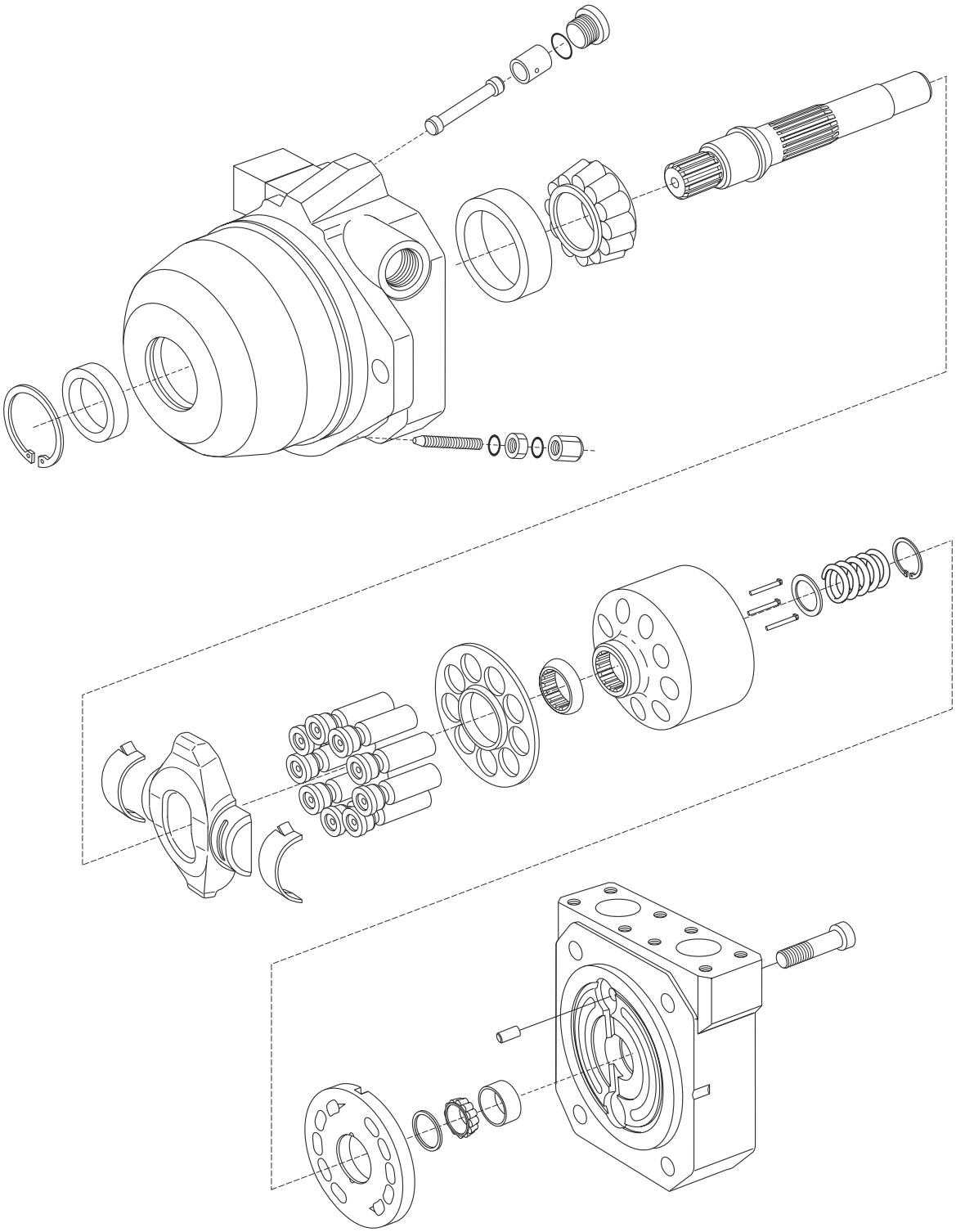
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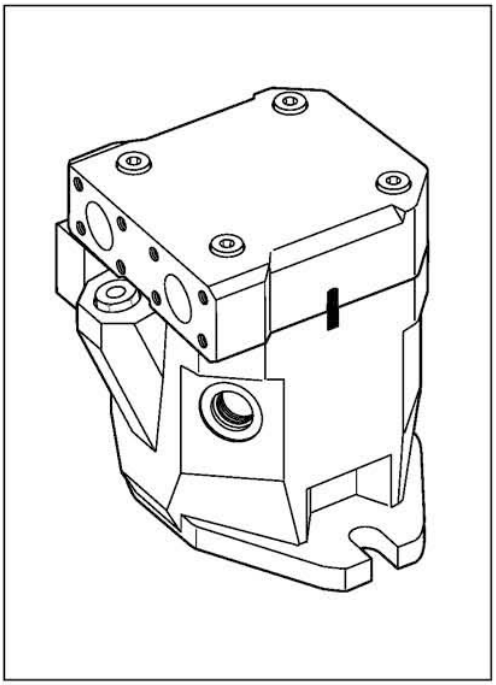


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A10VE

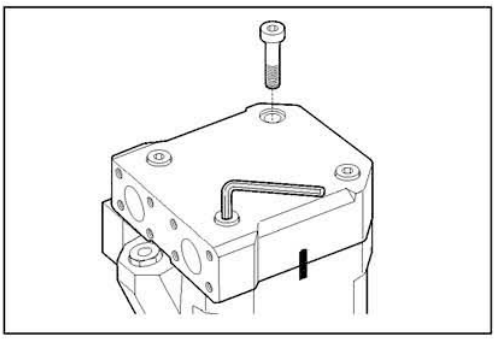


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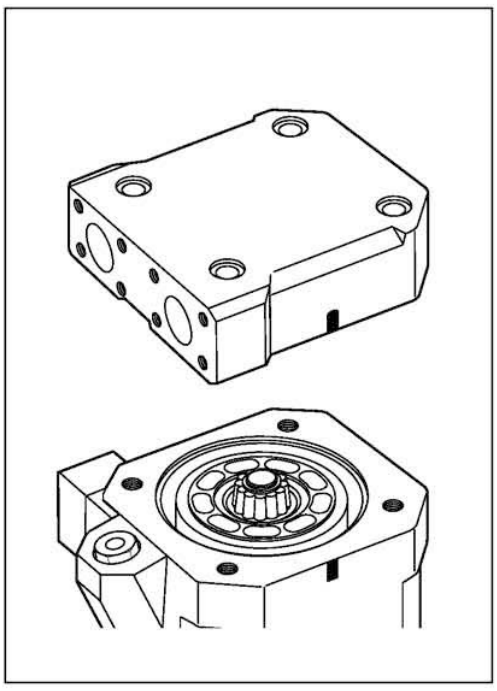
10 Demontageposition
Lage der Anschlußplatte zum Gehäuse kennzeichnen.

Disassembly position
Mark the location of the connection plate on the housing.



11 Anschlußplattenbefestigung über Kreuz lösen.

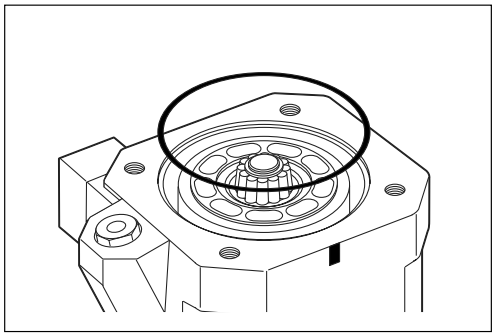
Remove the connection plate fixing bolts crosswise.



12 Anschlußplatte abheben.
⚠ Verteilerplatte
kann herunterfallen - festhalten.
Verteilerplatte abheben.

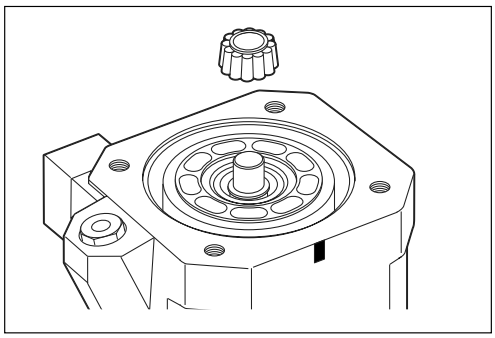
Remove the connection plate.
⚠ Distributor plate
can drop down - hold tight.
Remove distributor plate.

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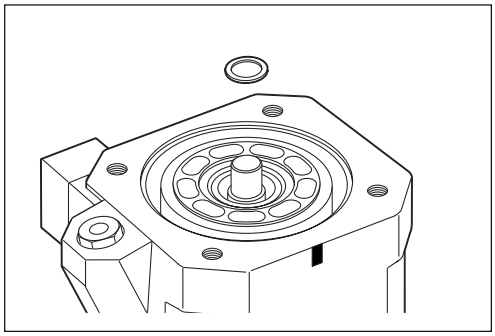
13 O-Ring entfernen.

Remove O-ring



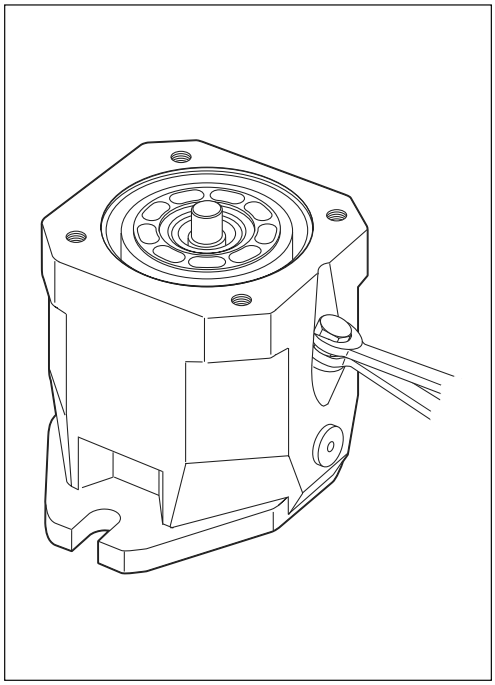
14 Abheben des Kegelrollenlagers (anschlußplattenseitig)

Disassemble the taper roller bearing (near by port plate)



15 Entfernen der Abstimmscheibe.

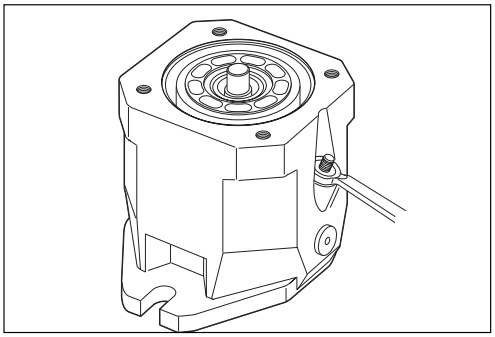
Remove the adjustment shim.



16 Lösen und Entfernen der Hutmutter für Anschlag Q min
(Ringschlüssel für die Kontermutter leicht nachgeschliffen).

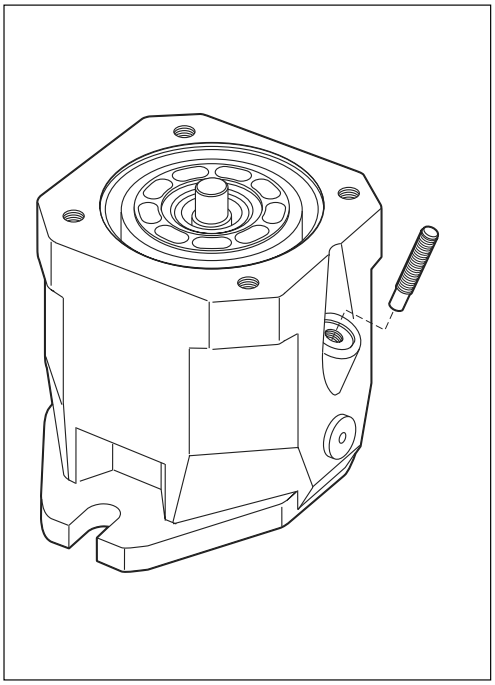
Unscrew the cap nut of stopper min flow and remove it.
(ring wrench is ground a little bit).

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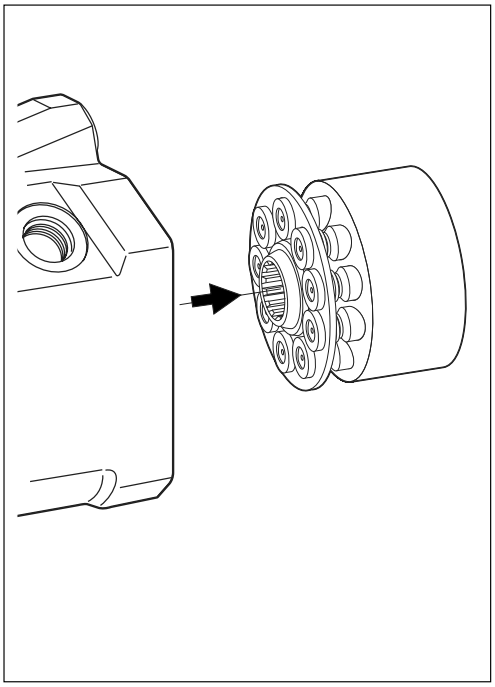
17 Mutter zur Fixierung der Anschlagschraube Q min lösen und entfernen.

Loosen the fixing nut of the stopper min flow and disassemble it.



18 Anschlagschraube Q min entfernen.

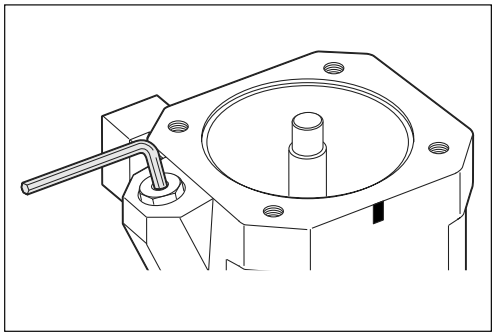
Unscrew stopper min flow and remove it.



19 Triebwerk in horizontaler Lage herausziehen.

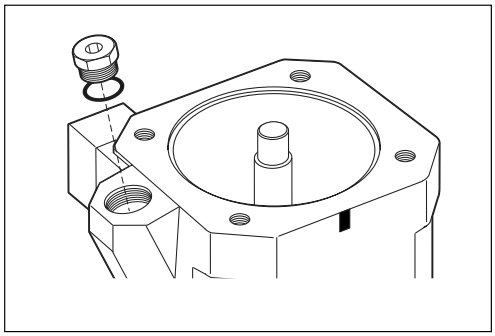
Remove the rotary group in a horizontal position.

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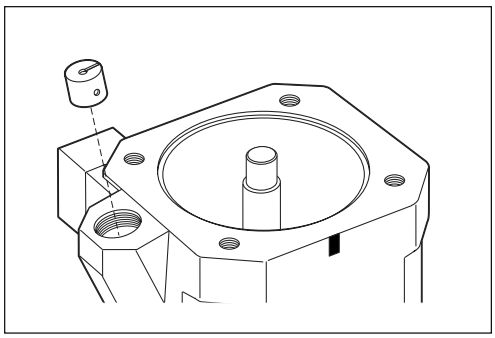
20 Lösen der Verschlußschraube der Stellkolbenkammer.

Loosen the plug of the control piston chamber.



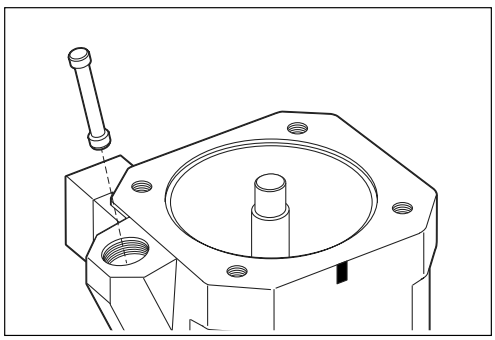
21 Entfernen der Verschlußschraube.

Remove the plug.



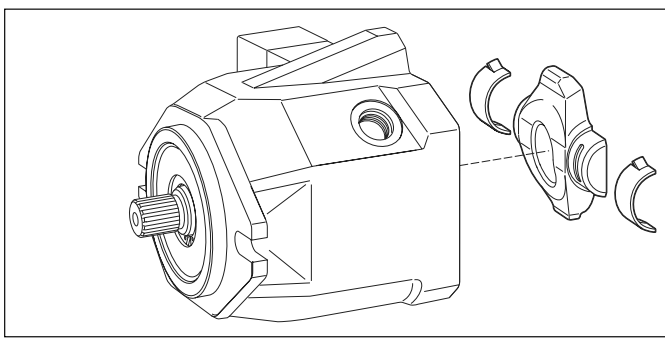
22 Verstellkolben entnehmen.
(mit Schwenkwiege über Kolbenstange nachhelfen).

Disassemble the control piston while moving the swash plate.



23 Kolbenstange entnehmen.
(Schwenkwiege zum Ausbau in leichte Schräglage bringen).

The swash plate must be lifted a little bit to disassemble the piston rod.

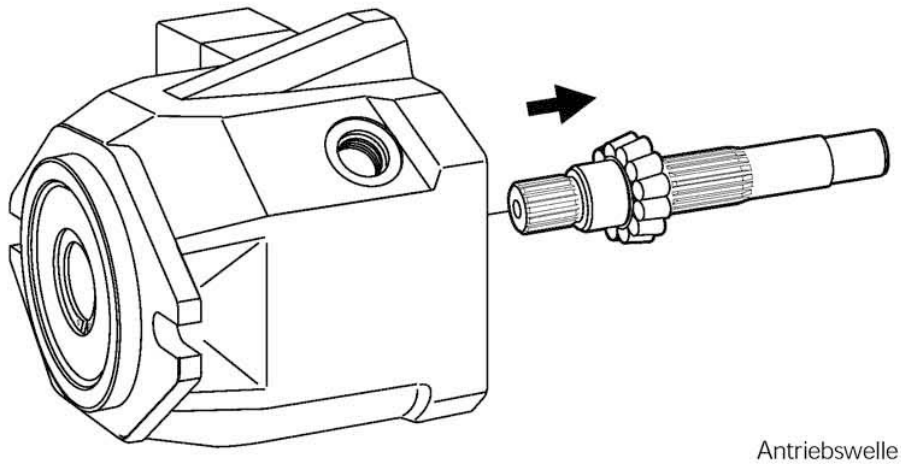


Ausbau der Schwenkwiege und Lagerschalen.

Disassembly of the swash plate and bearing shells.

24

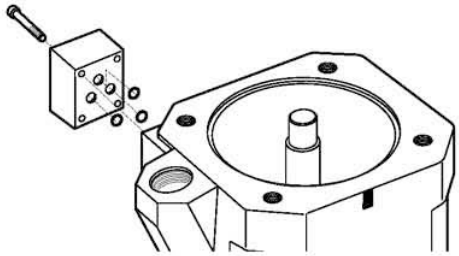
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Antriebswelle herausnehmen.

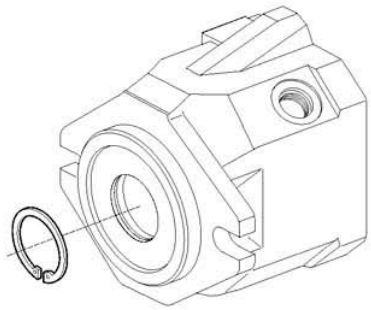
Remove the drive shaft

25



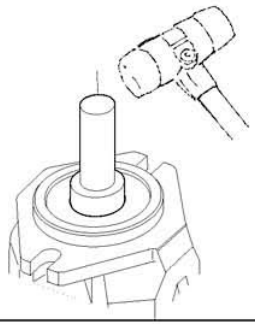
26 Befestigungsschrauben für Steuerplatte lösen, Steuerplatte entfernen.

Loosen the screws of the control plate and remove them.



27 Sicherungsring ausbauen.

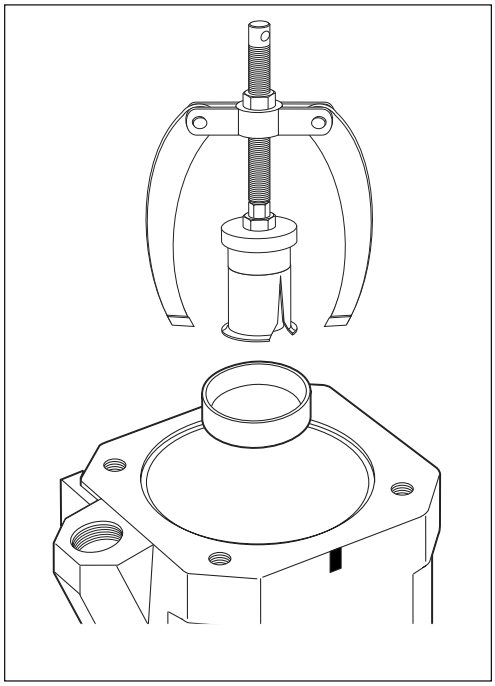
Disassemble the snap ring.



28 Wellendichtring austreiben.

Disassemble the sealing ring.

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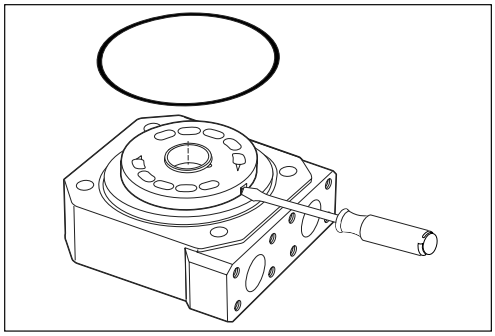


29 Abziehen des Lageraußenringes im Pumpengehäuse. Zweckmäßige Unterlage benutzen, zur Vermeidung von Gehäusebeschädigungen (s. a. Hinweis Abb.xx).

The external front bearing ring is pulled out of the pump housing (tool and surface infos see picture xx, too).

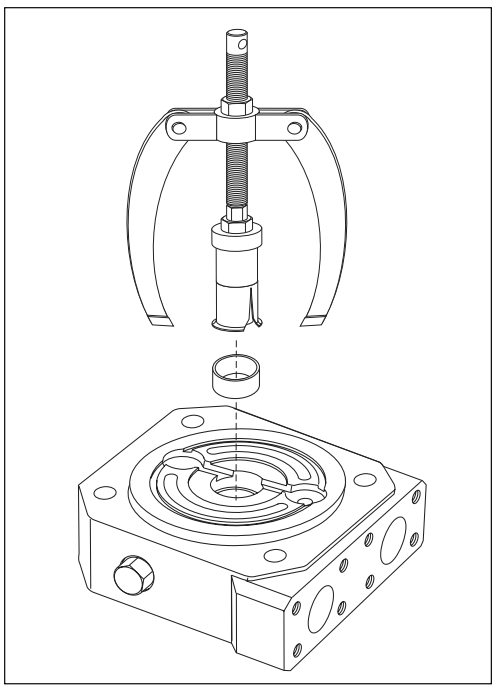
Die folgenden Abbildungen xx bis xx zeigen das weitere Zerlegen von Bauteilen bzw. Baugruppen z.B. Anschlußplatte, Zylinder.

The following pictures show how to disassemble parts or sub assemblys e.g. port plate, cylinder.



30 Anschlußplatte: Entfernen des O-Ringes. Abheben der Verteilerplatte mit Schraubenzieher.

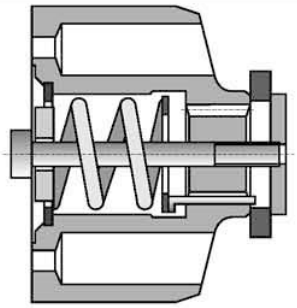
Port plate: Remove the O-ring. Lifting of the valve plate with a screw driver.



31 Abziehen des Lageraußenringes mit serienmäßiger Abziehvorrichtung. Beschädigung der Anschlußplatte durch Kunststoffunterlagen vermeiden.

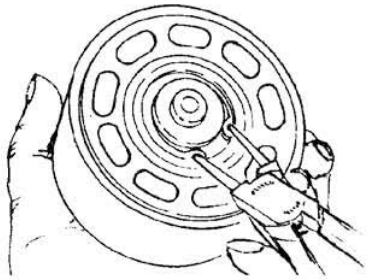
A usual commercial bearing puller is used to disassemble the external bearing ring of the taper roller bearing inside the port plate. Take care of the surface of the port plate.

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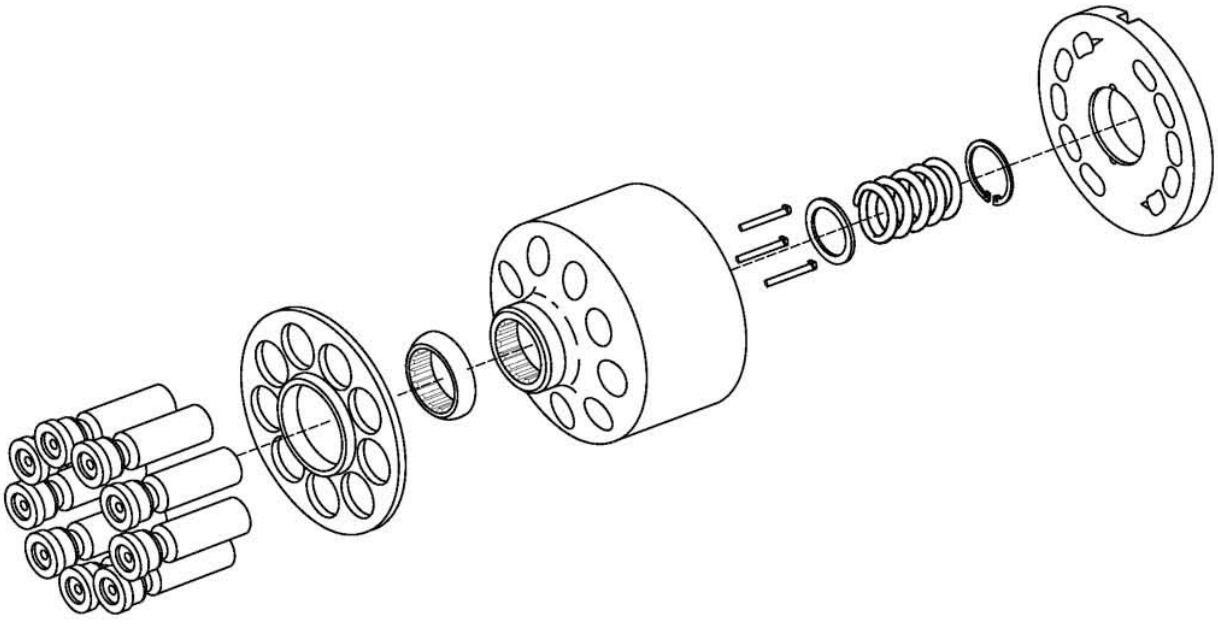
32 Feder mit Vorrichtung vorspannen.

Pre-tension the spring using a suitable device.



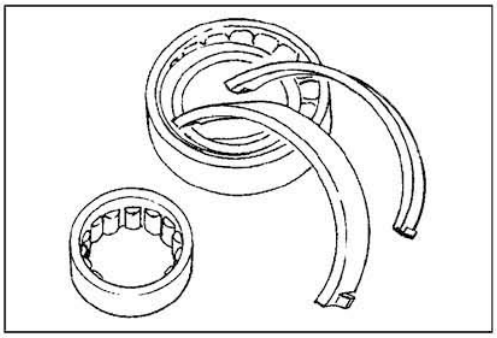
33 Sicherungsring demontieren.
Feder und Druckstifte ausbauen.

Remove circlip.
Remove spring and pressure pins.



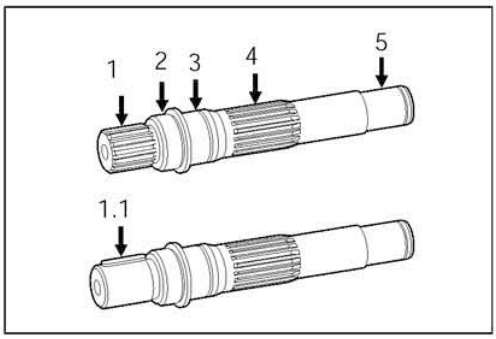
34

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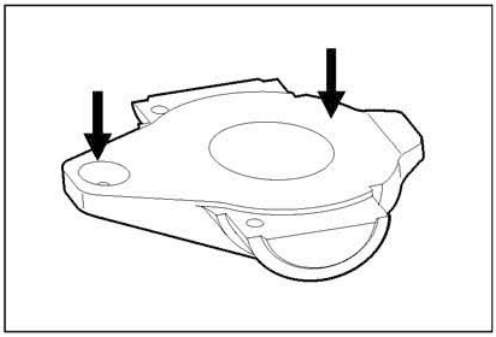
35 Alle Lager erneuern.

Renew all bearings.



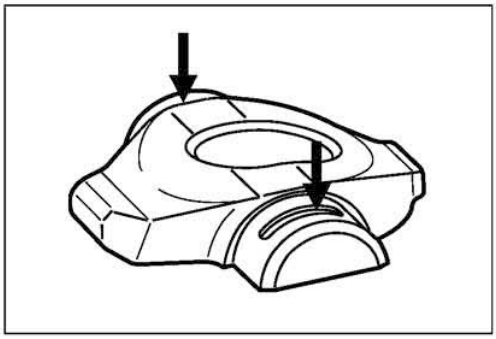
36 Kontrolle:
1. Verzahnung ausgeschlagen, Passungsrost
1.1 Paßfedersitz
2. Einlaufrille vom Wellendichtring
3. Lagersitz
4. Verzahnung - Mitnahme Zylinder
5. Lagersitz

Check:
1. Wear on slines, fretting
1.1 Key set
2. Drive shaft seal wear grooves
3. bearing seat
4. Splines for cylinder drive
5. Bearing seat



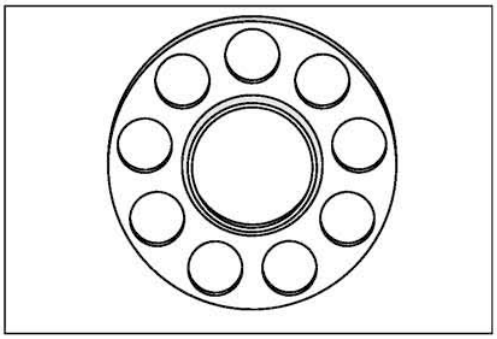
37 Kontrolle:
Gleitfläche riefenfrei.
Beweglichkeit Kolbenstange prüfen.

Check:
Sliding surface free of grooves.
Check for freedom of piston rod movement.



38 Kontrolle:
Lagerbahnen

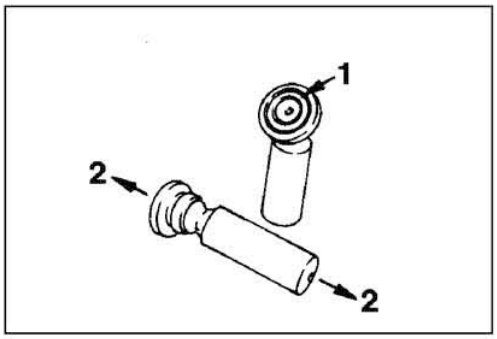
Check:
Bearing surfaces



39 Kontrolle!
Rückzugeinrichtung riefenfrei, keine Einlaufspuren im Gleitschuhbereich.

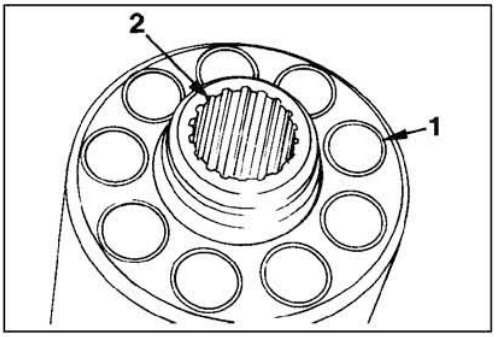
Check!
That the retaining plate is free of grooves and that there is no wear in the slipper pad area.

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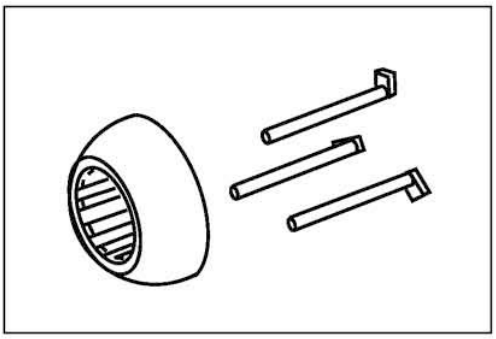
40 Kontrolle!
Lauffläche (1) keine Kratzer, keine Metalleinlagerungen, kein Axialspiel (2), (Kolben nur satzweise tauschen).

Check!
Check to see that there are no scratches or metal deposits on the sliding surface (1), and that there is no axial play (2), (pistons must only be replaced as a set).



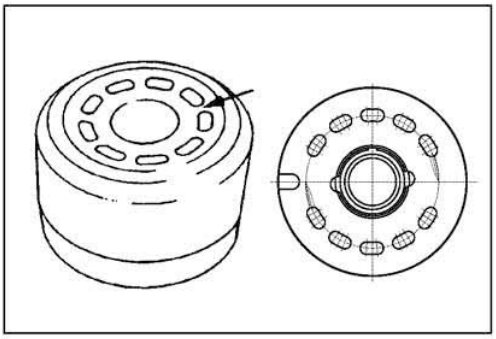
41 Kontrolle!
Zylinderbohrungen (1), Verzahnungen (2).

Check!
Cylinder bores (1), splines (2).



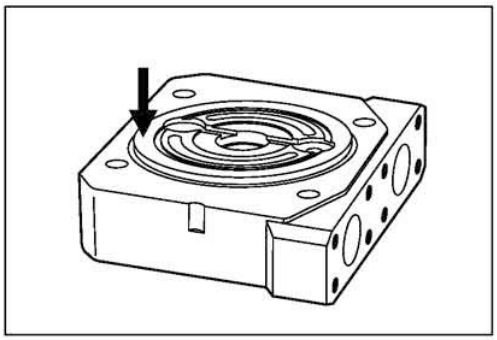
42 Riefenfrei, keine Einlaufspuren

Free of grooves, no signs of wear.



43 Kontrolle!
Zylindergleitfläche riefenfrei, nicht eingelaufen, keine Einlagerungen, Steuerplatte nicht riefig.

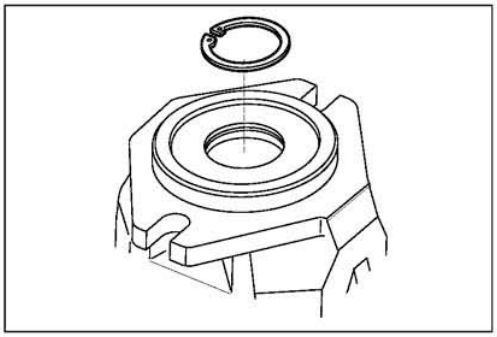
Check!
Cylinder sliding surface free of grooves, no wear, no embedded foreign particles. That there are no scratches on the control plate.



44 Kontrolle!
Auflagefläche - Steuerplatte ohne Beschädigung.

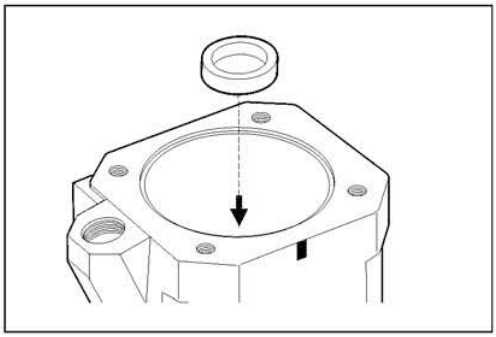
Check!
Mounting surface - control plate undamaged

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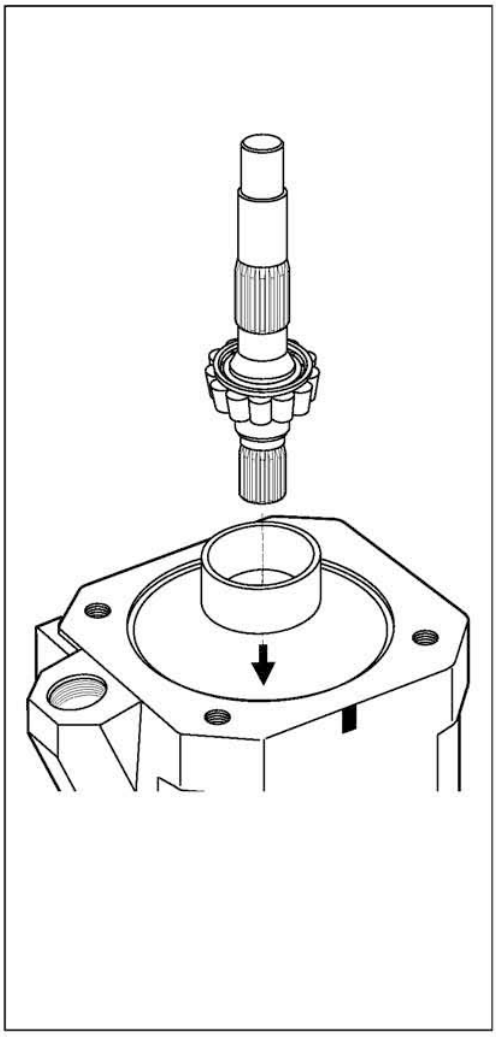
45 Sicherungsring ins Gehäuse montieren.

Fit the circlip into the housing.



46 Wellendichtring gegen Sicherungsring einsetzen.

Assemble the shaft seal against the circlip.



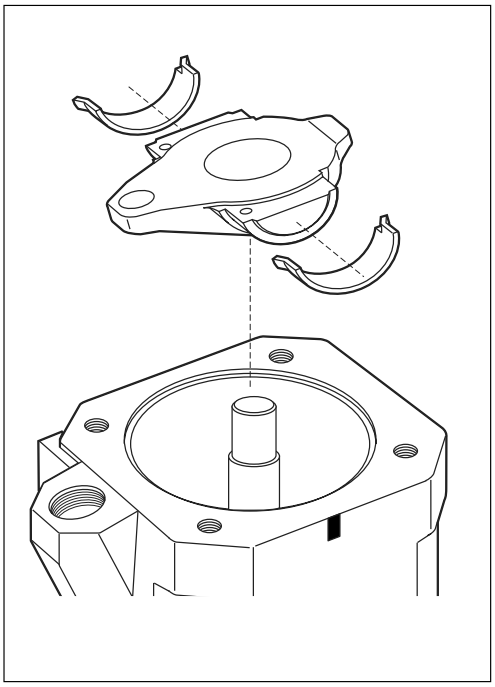
47 Lageraußenring ins Gehäuse pressen.
Welle mit Lager vormontiert ins Gehäuse einstecken.

⚠ Wellendichtring nicht beschädigen.
Wellenverzahnung mit Klebeband umwickeln.

Press outer bearing ring into housing.
Shaft seal with pre-assembled bearing into housing.

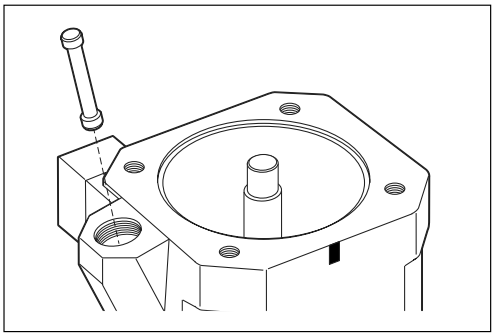
⚠ Protect splines of the shaft with plastic strip against damage of the seal lip.

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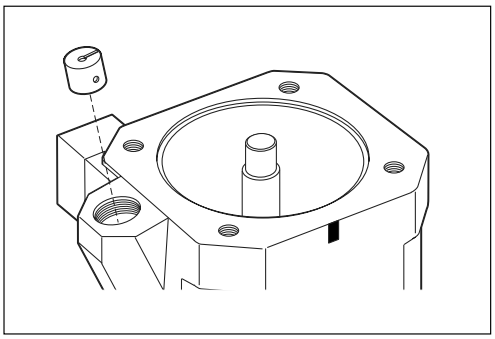
48 Lagerschalen montieren.
Montagehilfe: Mit Fett einsetzen.
Schwenkwiege lagerichtig einsetzen.

Fit bearing shells.
Assembly aid: Hold them into position using grease.
Fit the cradle into the correct location.



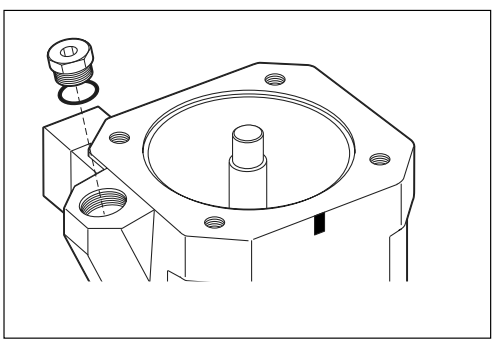
49 Kolbenstange einsetzen.
(Schwenkwiege zum Einbau in leichte Schräglage bringen).

The swash plate must be lifted a little bit to assemble the piston rod.



50 Verstellkolben einsetzen.

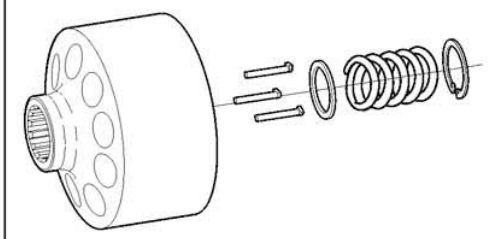
Assemble the control piston.



51 Verschlußschraube mit O-Ring montieren.

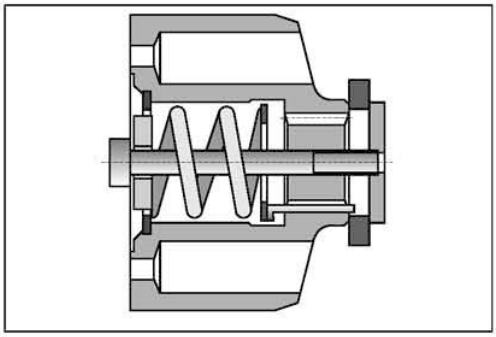
Fit the plug with an O-ring.

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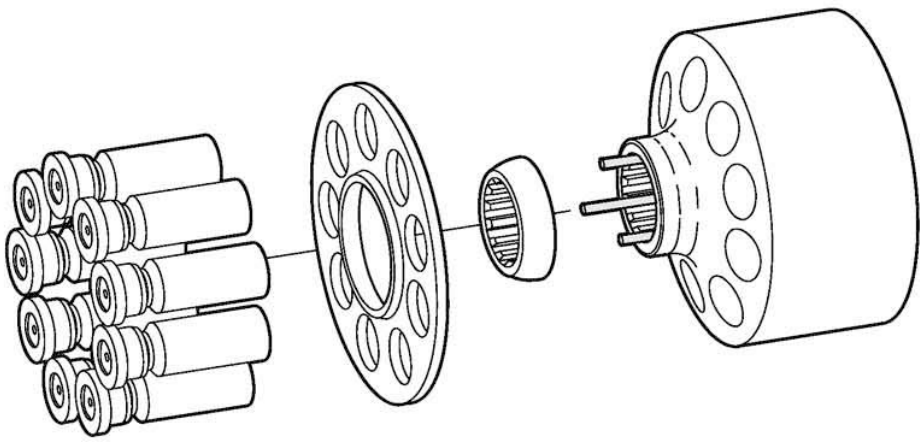
52 Mit Vorrichtung Druckstifte montieren.

Fit pressure pins using an assembly aid.

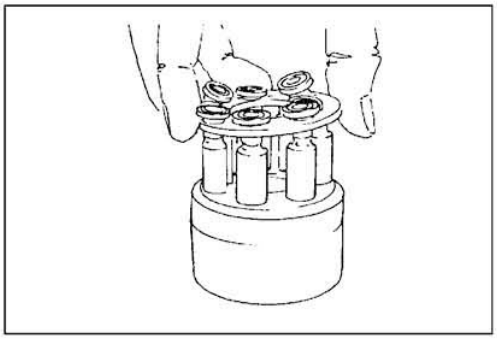


53 Feder mit Vorrichtung vorspannen.

Pre-tension the spring using a suitable device.



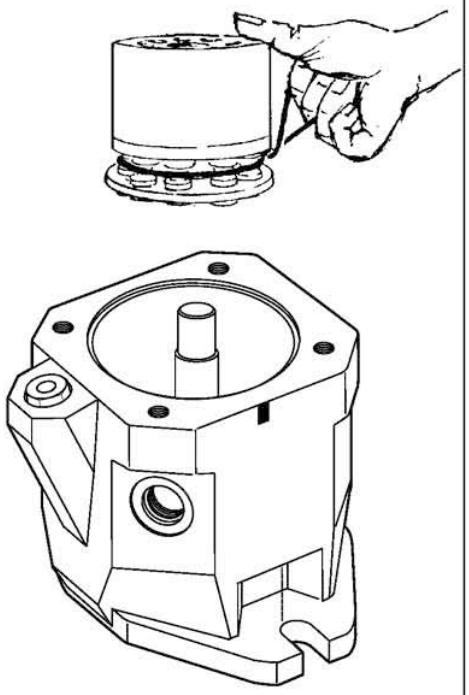
54



55 Kolben mit Rückzugeinrichtung montieren.
Hinweis:
Kolben, Gleitschuhe einölen.

Assemble piston with retaining plate.
Note:
Oil piston and slipper pad.

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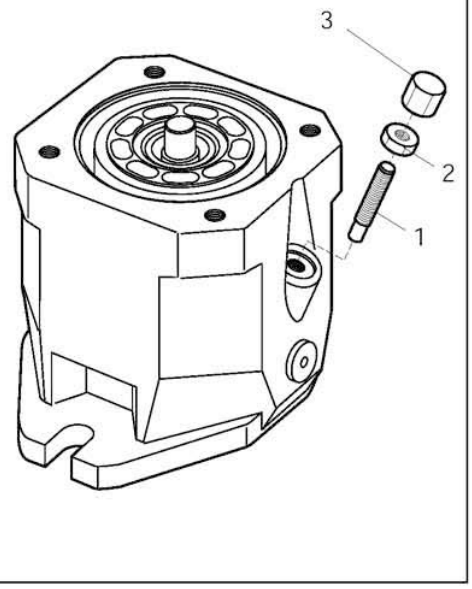


56 Rotationsgruppe montieren!

⚠ Montagehilfe:
Mit O-Ring Kolben festhalten.

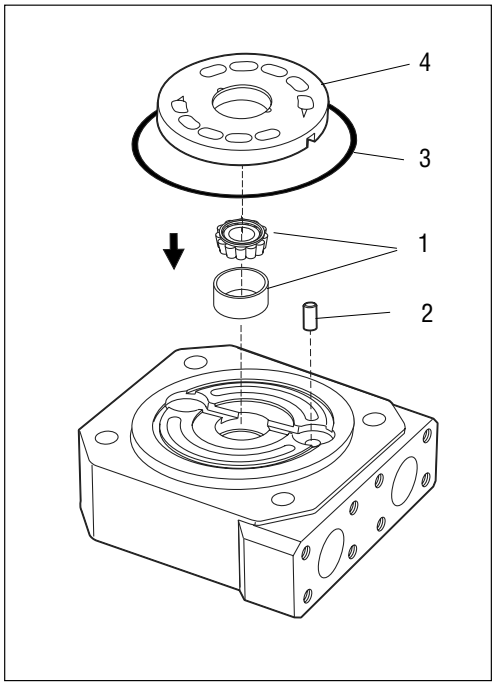
Fit rotary group!

⚠ Assembly aid:
Hold the pistons by using an O-ring.



57 Anschlagschschraube Q_{min} (1), Mutter (2) und Hutmutter (3) montieren.

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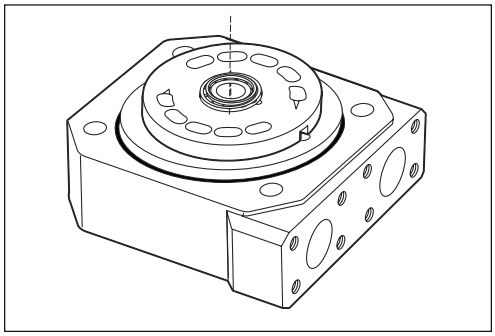


58 Lager (1) in Anschlußplatte montieren.
Zylinderstift (2) einsetzen.
O-Ring (3) einsetzen.
Verteilerplatte (4) aufsetzen (Drehrichtungsbezogen)

Montagehilfe:
Teile mit Fett fixieren.

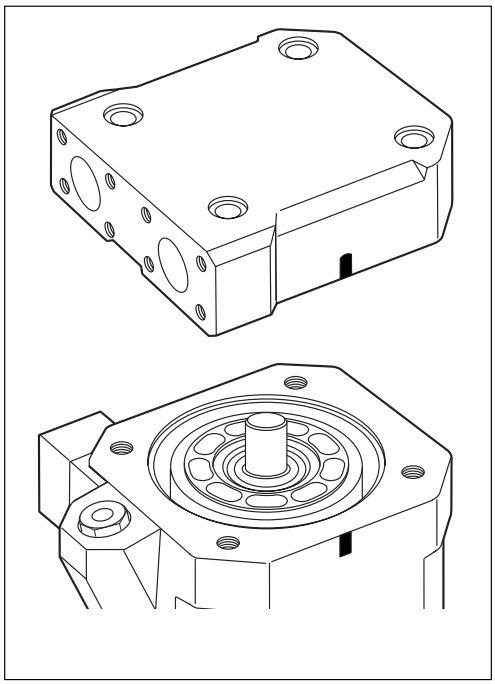
Fit bearing (1) in connection plate.
Fit cyilindrical pin (2).
Fit O-ring (3).
Fit distributor plate (4) (direction of rotation dependent)

Assembly:
Hold the components in place with grease.



59 Verteilerplatte montieren.
Montagehilfe: Fett

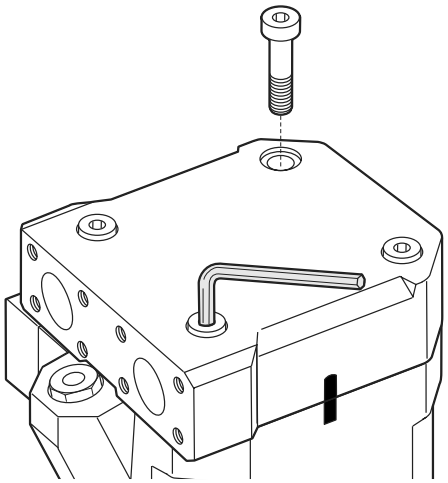
Fit distributor plate.
Assembly aid: Grease



60 Anschlußplatte aufsetzen.

Fit connection plate.

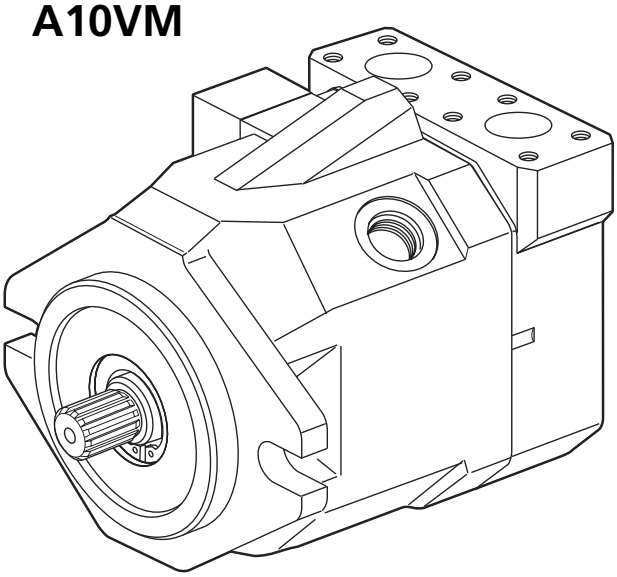
https://truckmanualshub.com/



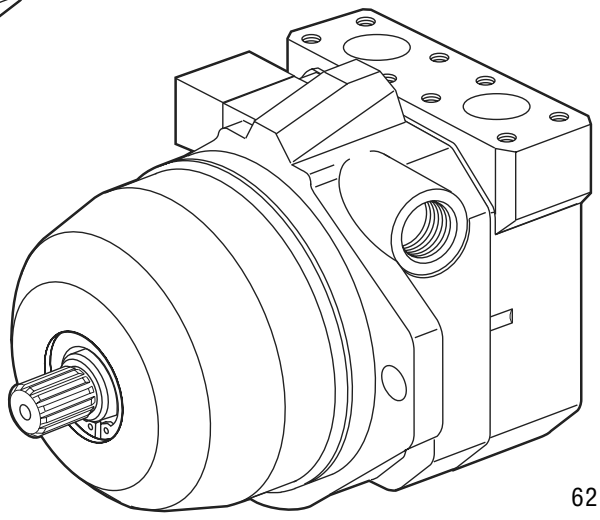
61 Anschlußplatte mit Schrauben über Kreuz befestigen.

Fit the connection plate with screws crosswise.

A10VM



A10VE

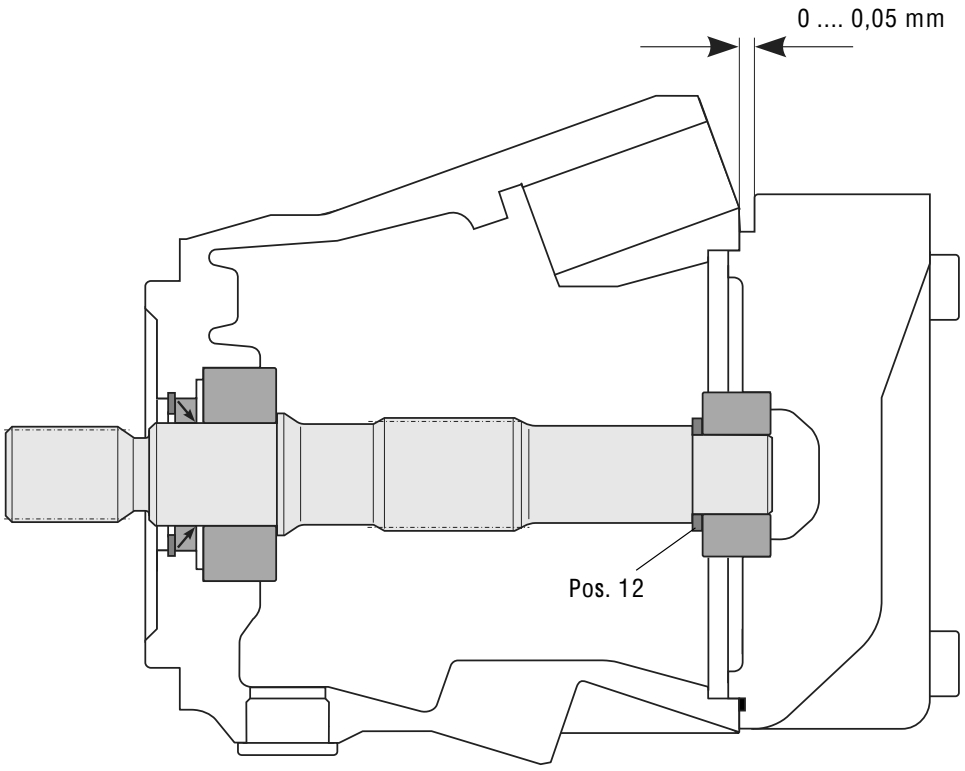


62

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Montage - Abstimmung (Kegelrollenlager) / Taper roller bearing initial tension

AA10 VM Baureihe 50
AA10VM Series 50



Abstimmung der Triebwerkslagerung
Die Vorspannung der Triebwerkslagerung muß im Gußgehäuse von 0 bis 0,05 mm durch Abschleifen der Abstimmscheibe Pos. 12 hergestellt werden.

Einstellhinweis: Q_{min}-Anschlag
Bei gegebenem Zusatzstrom wird bei drucklosem Umlauf der Anschlag Q_{min} so eingestellt, daß die gemessene Drehzahl des Motors einem Schluckvolumen von 12 cm³ entspricht (v_{gmin}).
Eine kontinuierliche Verstellung bis v_{gmax} = 45 cm³ ist möglich - Volumenänderung pro Gewindestiftumdrehung ca. 3,1 cm³ (s. a. Seite 3).

$$\textbf{Schluckvolumen } v_{gmin} = \frac{\textbf{Q Zulauf x 1000}}{\textbf{Meßdrehzahl}}$$

Achtung: Falsch eingestellte Q_{min} Anschläge können zu überhöhten Drehzahlen bis hin zum Ausfall der Bauteile führen.

Adjustment of stopper min displacement
Cast iron housing must have initial tension of bearings: 0 ..... 0,05 mm , grind Pos. 12 if necessary.

Adjustment: Q_{min}- stopper
With a given inflow and pressureless circulation adjust the stopper Q_{min} displacement so that the measured speed of the motors results in a displacement of 12 cm³ (v_{gmin}).
Increase of adjustment is possible to v_{gmax} = 45 cm³
Differential volume is appr. 3,1 cm³ (see page 3).

$$\textbf{Displacement } v_{gmin} = \frac{\textbf{Q inflow x 1000}}{\textbf{Measurement speed}}$$

Attention: Wrong adjustments of stopper Q_{min} displacement increases the speed of the motor up to a possible failure of parts of the unit.

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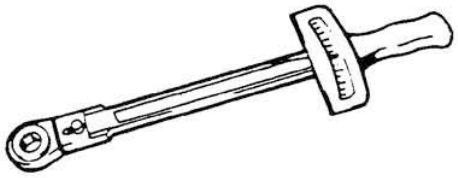
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Verwendete Loctite-Sorten

alle Abreißstopfen	Nr. 601
sonst	Nr. 242

Loctite types used:

For all break-off plugs	No. 601
For all other parts	No. 242



Anziehdrehmomente /
Tightening torques

Festigkeitsklassen 8,8; 10,9; 12,9
Bolt tensile strength grade:

		M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M24	M30
M_a	8,8	2,3	5,0	8,5	21	41	72	115	176	240	350	600	1220
	10,9	3,2	7,2	12	29	58	100	165	250	350	490	840	1670
	12,9	4,1	8,5	14,5	35	70	121	195	300	410	590	990	2000

Ma (Nm) = max. Anziehdrehmoments (geölte Schrauben μ = 0,125)
Ma (Nm) = max. tightening torques (lubricated screws μ = 0,125)

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7.4 Vibration motors MMF 025

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SAUER DANFOSS

Series 40

M25 - Axial Piston Pumps, Motors, and Transmissions Service and Repair Manual

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Introduction

The purpose of this manual is to provide information necessary for the service and repair of the SAUER-SUNDSTRAND Series 40 - M25 Pumps, Motors, and "U" Style Transmissions.

This manual includes unit and component description, troubleshooting, adjustments, and minor and major repair procedures.

Minor Repairs are those repairs which can be performed without removing the housing(s) from the end cap or center section. These repairs can be performed by any customer without affecting the unit warranty.

Major Repairs are those repairs which require the removal of the housing(s) from the end cap or center section. These repairs are to be performed only by SAUER-SUNDSTRAND Authorized Service Centers and/or original equipment manufacturers who have been adequately trained by SAUER-SUNDSTRAND to perform these repairs. Performing major repairs on Series 40 products may affect the unit warranty status, thus the factory should be consulted prior to undertaking such repairs.

Many repairs or adjustments can be completed without removing the unit from the vehicle or machine, provided the unit is accessible and can be thoroughly cleaned before beginning any procedures.

Dirt or contamination is the greatest enemy of any type of hydraulic equipment. The greatest possible cleanliness is necessary when starting up the system, changing filters, or performing any other service procedure.

For Technical Information on Series 40 pumps and motors, refer to SAUER-SUNDSTRAND publications BLN-9989 and BLN-9990.

For Fluid Quality Requirements, refer to publication BLN-9987 or 697581.

SAUER-SUNDSTRAND provides a complete repair service for its products. Contact any SAUER-SUNDSTRAND Authorized Service Center for details. SAUER-SUNDSTRAND Authorized Service Center locations are listed in publication BLN-2-40527 or 698266.



40250001

Fig. 0-1 - Series 40-M25 Variable Displacement Pump and Tandem Pump



40250118

Fig. 0-2 - Series 40-M25 Fixed Displacement Motor



40250002

Fig. 0-3 - Series 40-M25 "U" Style Transmission

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System Circuit Description

The Series 40 - M25 pumps, motors, and "U" style transmission can be applied in drive systems to transfer and control power. These units provide an infinitely variable speed range between zero and maximum, in both forward and reverse modes of operation.

Series 40 - M25 pumps, motors, and transmissions incorporate a compact, state-of-the-art design, using the parallel axial piston / slipper design in conjunction with a tiltable swashplate to vary the pump's displacement. Reversing the direction of tilt of the variable pump swashplate reverses the flow of oil from the pump and thus reverses the direction of the motor output rotation.

A direct displacement control system is used on the Series 40 - M25 pumps and M25 "U" transmission pump. The swashplate control shaft is connected directly to the swashplate. Movement of the control shaft causes a proportional swashplate movement and change in pump flow. This control can be located on either side of the unit.

A charge relief valve and charge check valves are included in the variable pump end cap and tandem pump center section to control the makeup and cooling oil flow for the system. The charge check valves also incorporate the bypass valve function and high pressure relief valve function into their design.

The Series 40 - M25 variable and tandem pumps do not have an integral charge pump. They are equipped with an SAE "A" auxiliary pad, which may be used to drive a fixed displacement gear pump to provide charge flow and other services.

The Series 40 - M25 fixed displacement motor also incorporates the parallel axial piston / slipper design, utilizing a fixed swashplate angle.

The Series 40 - M25 "U" transmission incorporates a variable pump and a fixed motor in a common housing. This unit includes a 5.98 cc/rev (0.365 in^3/rev) integral gerotor type charge pump. The transmission center section includes the charge pressure relief valve, an oil cooler bypass valve, a filter bypass valve and reverse flow check valve, and the charge check/ high pressure relief valves.

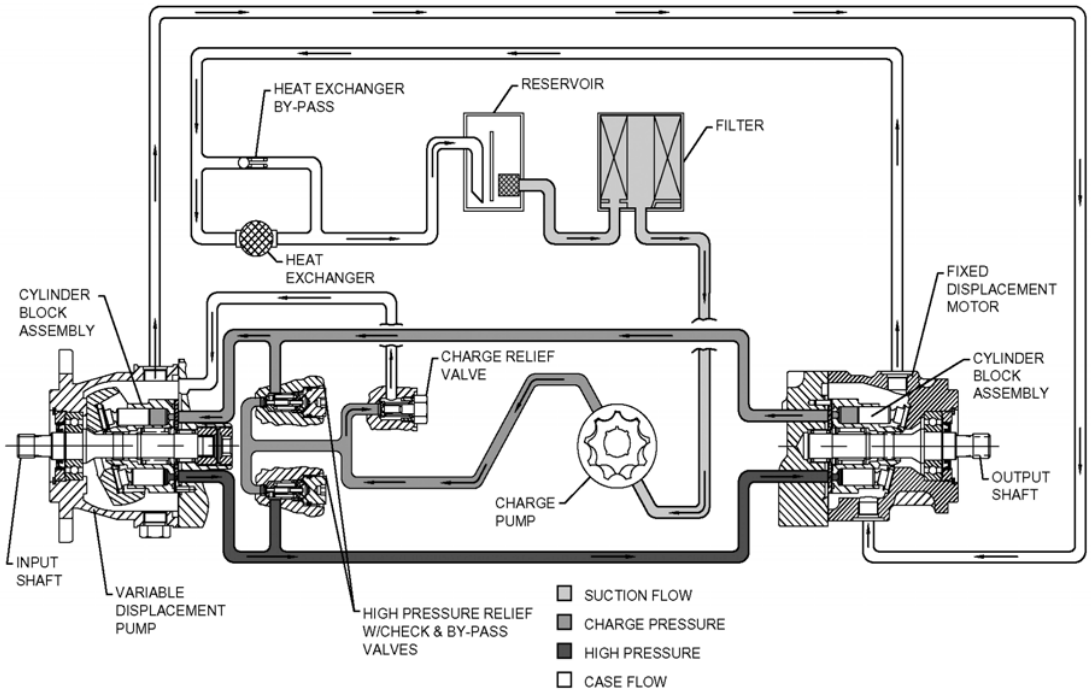


Fig. 10-1 - Typical Series 40 - M25 Variable Pump – Fixed Motor Transmission Schematic

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Functional Description

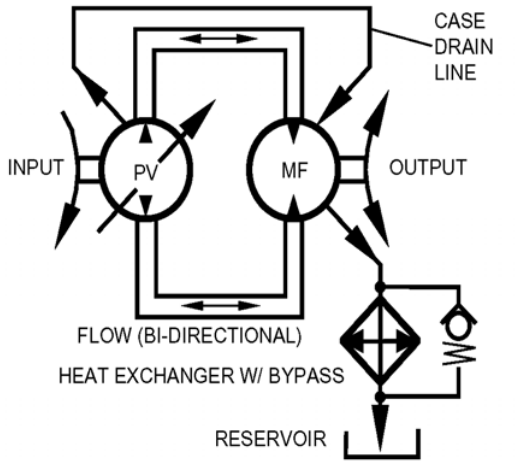


Fig. 10-2 - Basic Closed Circuit

Basic Closed Circuit

The main ports of the pump are connected by hydraulic lines (or passages in the M25U transmission center section) to the main ports of the motor. Fluid flows, in either direction, from the pump to the motor then back to the pump in this closed circuit. Either of the hydraulic lines can be under high pressure. The direction and speed of fluid flow (and the motor output shaft rotation) depends on the position of the pump swashplate. The system pressure is determined by the machine load.

Case Drain and Heat Exchanger

The variable pump, tandem pump, and transmission require case drain connections to remove hot fluid from the system.

The variable pump case should be drained from the upper drain port insure the case remains full of fluid. The tandem pump case should be drained from the upper drain port of the rear pump section. The pump case drain is connected to the lower drain port on the motor housing. The upper motor housing drain port is then connected to the reservoir. A heat exchanger, with a bypass valve, may be required to cool the case drain fluid before it returns to the reservoir.

The M25U transmission case is usually drained through the output and PTO shaft bearings. Ports for connecting a heat exchanger into the charge circuit are located in the transmission center section. A heat exchanger bypass valve is incorporated into the transmission center section.

CAUTION

Continuous case pressure should not exceed 1.7 bar (25 psi).

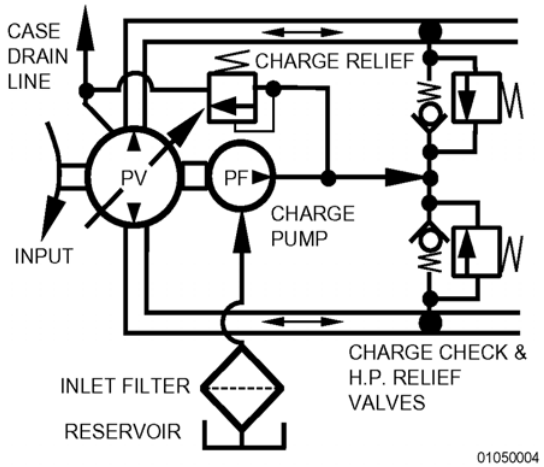


Fig. 10-3 - Charge System (Typical for Variable Pump and Tandem Pump)

Charge System and Filter

The charge pump is used to supply cool fluid to the system and keeps the closed loop charged to prevent cavitation. The charge pump draws its fluid from the system reservoir.

CAUTION

Sufficient charge flow MUST be provided to the charge inlet port of the M25 variable pump or tandem pump to ensure that charge pressure is maintained whenever the pump is operating.

A filter is required to insure that only clean fluid enters the closed loop.

Either suction or pressure filtration may be used with the M25 variable and tandem pump.

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Functional Description (Continued)

The M25U transmission includes an integral pressure filter mount on the transmission center section. A filter bypass valve and a filter bypass reverse flow check valve are incorporated into the transmission center section.

CAUTION

For the M25 "U" style transmission, the charge pump inlet vacuum should not exceed .8 bar abs. (5 in. Hg), except during cold starts. For the M25 pumps, refer to the specifications for the specific charge pump being used.

Since either of the main hydraulic lines can be at high pressure, charge check valves are used to direct the charge supply into the low pressure side of the closed loop. These check valves (located in the tandem pump center section or transmission center section) may also incorporate the high pressure relief valve function. Any charge flow not being used for the closed circuit is discharged over a direct operating charge relief valve, through the tandem pump or transmission housing, and back to the system reservoir.

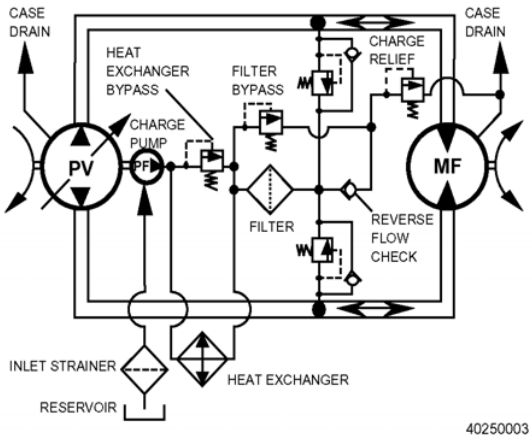


Fig. 10-4 - Charge System ("U" Style Transmission)

High Pressure Relief Valves

Optional combination check / high pressure relief valves may be provided in the variable pump end cap or tandem pump center section for overload protection. Combination check / high pressure relief valves are provided in the "U" style transmission center section. These cartridge type relief valves are factory set, and are not field adjustable. Changing the maximum system pressure can be accomplished by installing different cartridges with the desired setting.

Direct Displacement Control

The direct displacement control (DDC) may be located on either side of the unit, and provides a simple method of control. Movement of the swashplate control shaft produces a proportional swashplate movement and change in pump flow and motor shaft speed and/or direction.

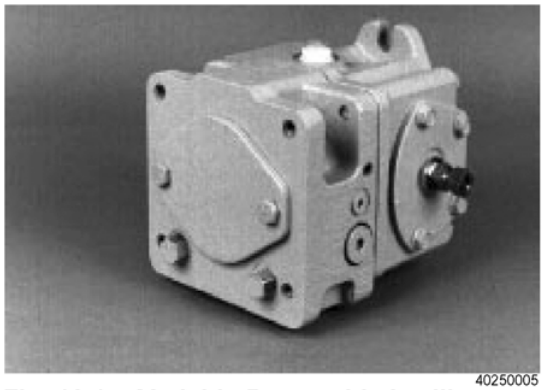
The vehicle / machine control system must be designed to return the swashplate to its neutral position.



Fig. 10-5 - Tandem Pump with Direct Displacement Control

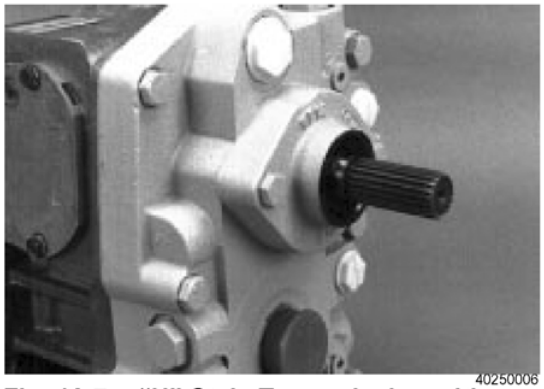
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Functional Description (Continued)



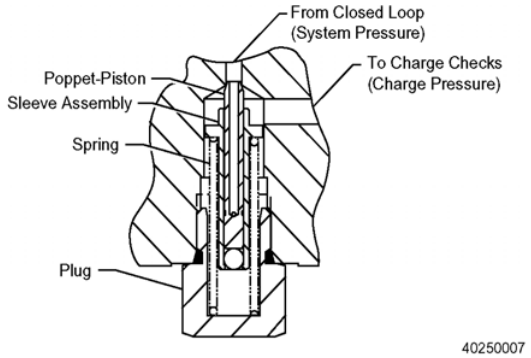
40250005

Fig. 10-6 - Variable Pump with Auxiliary Mounting Pad



40250006

Fig. 10-7 - "U" Style Transmission with Charge Pump



40250007

Fig. 10-8 - Cross-Section View of Easy-Ride Valve

Auxiliary Mounting Pads

An SAE "A" auxiliary mounting pad is standard on Series 40 - M25 variable and tandem pumps. This pad is used for mounting an auxiliary hydraulic pump or separate charge pump. Either a 9 tooth or 11 tooth drive spline is available

The M25U transmission includes a 22 tooth, 24/48 pitch splined PTO drive on the rear end of the pump drive shaft.

Charge Pumps

The M25 variable pump and tandem pump do not include integral charge pumps, and require that a separate, fixed displacement charge pump be provided as part of the system.

A fixed displacement, gerotor type charge pump is provided as a part of the M25U transmission.

Easy-Ride Valves (Variable Pump)

The M25 variable pump is available with optional Easy-Ride valves to reduce the rate of change in acceleration ("jerkiness") in vehicle propel applications. These valves limit the rate of pressure rise in the closed loop by permitting flow from the high to the low pressure side (through the charge circuit) when system pressure increases suddenly.

Each Easy-Ride valve consists of a poppet-piston, sleeve assembly, spring, and plug, which are installed in the pump end cap. The poppet-piston and its seat form a valve to close off the passage between one side of the closed loop and the charge pressure passage. The spring pre-loads the sleeve assembly and holds the poppet-piston closed against its seat in the end cap when loop pressure is low.

A sudden increase in loop pressure will force the poppet-piston off its seat, allowing some high pressure fluid to flow to the opposite side of the loop through the charge check. This limits the pressure rise rate in the loop and reduces the acceleration rate of the vehicle.

Loop pressure is orificed into the space between the poppet-piston and the sleeve assembly through ports in the poppet-piston and the clearance between it and the sleeve. The sleeve moves, compressing the spring until the spring force equals the hydraulic force.

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Functional Description (Continued)

Once the sleeve assembly stops moving, the pressure between the poppet-piston and sleeve moves the poppet-piston toward its seat, sealing off the passage. If the loop pressure is above the functional range of the valve (approximately 103 bar [1500 psi]), the sleeve assembly will contact the plug and the poppet-piston will be rapidly forced onto its seat.

A typical Easy-Ride valve cycle requires 0.5 to 1.0 seconds, depending on system oil viscosity and loop pressure.

Bypass Valve (Variable Pump and Tandem Pump)

In some applications it is desirable to bypass fluid around the variable displacement pump allowing, for example, a vehicle to be moved short distances at low speeds without running the prime mover. This is accomplished by manually operated bypass valves incorporated into the charge check / high pressure relief valves in the variable pump or tandem pump.

When open (unscrewed 4 turns maximum), these valves connect both sides of the pump/motor closed circuit, allowing the motor to turn. Both valves must be opened for bypass operation., and must be fully closed for normal operation. The system prime mover should be shut down when opening or closing the bypass valves.

NOTE: Opening the bypass valves more than 4 turns may result in external leakage.

WARNING

Opening the bypass valves will result in a loss of hydrostatic braking capacity. Take precautions to prevent unexpected machine movement when opening the valves.

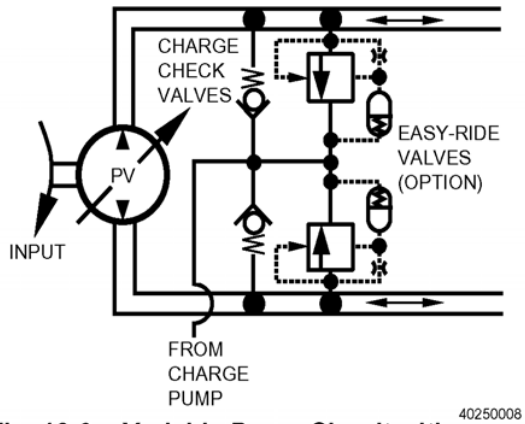


Fig. 10-9 - Variable Pump Circuit with Easy-Ride Valves

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Technical Data - Pumps, Motors, and "U" Style Transmission

Product Type	M25 Variable Pump	M25 Tandem Pump	M25 Fixed Motor	M25 "U" Style Transmission
Displacement				
cc/rev	25	25 (each section)	25	25 (Pump & Motor)
in^3/rev	1.5	1.5 (each section)	1.5	1.5 (Pump & Motor)
Maximum Allowable Speed				
Full Angle (variable units) - rpm	5000	ALL UNITS →		
Mounting Flange (per SAE J744)	SAE B	SAE B	SAE B	DNA
Input Shaft (Std. Spline) Number of Teeth and Pitch	13T, 16/32	15T, 16/32	DNA	Input: 20T, 24/48 PTO: 22T, 24/48
Output Shaft (Std. Spline) Number of Teeth and Pitch	DNA	DNA	13T, 16/32	18T, 16/32
Weight				
kg	19	24.9	11	25.4
lbs	41.5	55	25	56
Pressure				
Maximum bar	345	ALL UNITS →		
psi	5000			
Continuous bar	210			
psi	3000			
Case Pressure				
Continuous bar	1.7	ALL UNITS →		
psi	25			
Maximum bar	5.2			
(Cold Start) psi	75			
Temperature at Hottest Point in Transmission (normally at case drain)				
Maximum °C	104	ALL UNITS →		
°F	220			
Continuous °C	82			
°F	180			
Fluid Viscosity Limits mm^2/sec (SUS)				
Optimum	13 (70)	ALL UNITS →		
Min. Continuous	9.0 (55)			
Min. Intermittent	6.4 (47)			
Max. Continuous	110 (500)			
Max. Cold Start	1600 (7500)			
Suggested Filtration				
Dedicated Reservoir	Beta 10 = 1.5 to 2.0	ALL UNITS →		
Common Reservoir	Beta 10 = 10 to 20			
Charge Inlet Vacuum at Sea Level				
Normal bar (abs.)	Refer to specifications for specific Charge Pump being used.	Refer to specifications for specific Charge Pump being used.	DNA	.8
in. Hg				5
Cold Start bar (abs.)				.7
in. Hg				10

DNA = Does Not Apply

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Safety Precautions

- When Series 40 units are used in vehicular hydrostatic drive systems, the loss of hydrostatic drive line power in any mode (acceleration, deceleration, or "neutral" mode) of operation may cause a loss of hydrostatic braking capacity. A braking system, redundant to the hydrostatic transmission must, therefore, be provided which is adequate to stop and hold the system should the condition develop.
- Certain service procedures may require the vehicle/machine to be disabled (wheels raised off the ground, work function disconnected, etc.) while performing them in order to prevent injury to the technician and bystanders.
- Use caution when dealing with hydraulic fluid under pressure. Escaping hydraulic fluid under pressure can have sufficient force to penetrate your skin causing serious injury. This fluid may also be hot enough to burn. Serious infection or reactions can develop if proper medical treatment is not administered immediately.
- Some cleaning solvents are flammable. To avoid possible fire, do not use cleaning solvents in an area where a source of ignition may be present.

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Notes

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Gauge Installation

Gauge Ports

Various pressure and vacuum gauge readings can be a great asset in troubleshooting problems with the Series 40 - M25 transmission or support system.

It will be necessary to connect a high pressure gauge to the system pressure gauge ports (variable pump, fixed motor, and "U" style transmission) or tee into the system high pressure lines (tandem pump) to check the setting of the system pressure relief valves.

Measuring the charge pump inlet vacuum will help locate restrictions in the inlet lines, filter, etc.

Case pressure readings can help locate restrictions in the return lines, return oil cooler, and return filter.

Gauge Information		
M1 or "A"	System Pressure Port "A"	600 bar or 10,000 psi Gauge 7/16 — 20 O-Ring Fitting (PV/U) 9/16 — 18 O-Ring Fitting (MF) Tee into high press. line (PT)
M2 or "B"	System Pressure Port "B"	600 bar or 10,000 psi Gauge 7/16 — 20 O-Ring Fitting (PV/U) 9/16 — 18 O-Ring Fitting (MF) Tee into high press. line (PT)
M3 or "E"	Charge Pressure	60 bar or 1000 psi Gauge Tee into Charge Supply (PV/PT) 7/16 — 20 O-Ring Fitting (U)
"L1" "L2"	Case Pressure	60 bar or 1000 psi Gauge 7/8 — 14 O-Ring Fitting (PV/PT) 3/4 — 16 O-Ring Fitting (MF)
"S"	Charge Pump Inlet Vacuum	Vacuum Gauge Tee into Charge Pump Inlet Line

NOTE: Tandem pumps have two (2) additional system ports in the rear section.

Snubbers are recommended to protect pressure gauges. Frequent gauge calibration is necessary to insure accuracy.

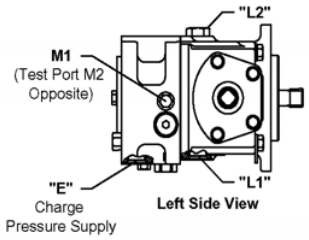
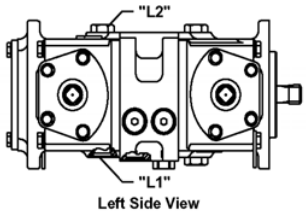


Fig. 30-1 - Gauge Connections — Variable Pump



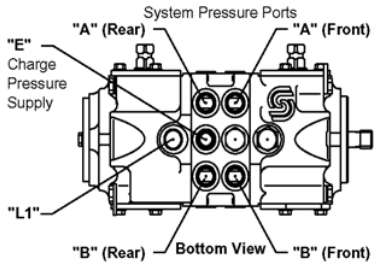


Fig. 30-2 - Gauge Connections — Tandem Pump

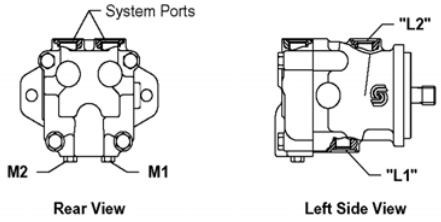


Fig. 30-3 - Gauge Connections — Fixed Motor

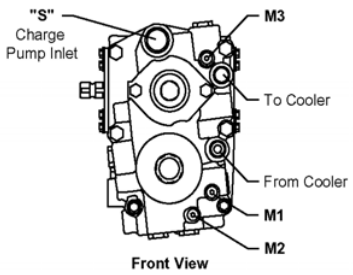


Fig. 30-4 - Gauge Connections — "U" Style Transmission

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Start-Up Procedure and Maintenance

Fluids

Hydraulic fluids used with Sauer-Sundstrand products should be carefully selected with assistance from a reputable supplier, following the guidelines presented in SAUER-SUNDSTRAND Bulletin BLN-9887 or Publication SDF (Id. No. 697581).

Start-Up Procedure

The following start-up procedure should always be followed when starting-up a new installation or when restarting an installation in which either the pump or motor had been removed from the system.

WARNING

The following procedure may require the vehicle/machine to be disabled (wheels raised off the ground, work function disconnected, etc.) while performing the procedure in order to prevent injury to the technician and bystanders.

Prior to installing the pump or transmission, inspect the unit for damage incurred during shipping and handling. Make certain all system components (reservoir, hoses, valves, fittings, heat exchanger, etc.) are clean prior to filling with fluid.

Fill the reservoir with recommended hydraulic fluid which should be passed through a 10 micron (nominal, no bypass) filter prior to entering the reservoir.

The inlet line leading from the reservoir to the charge pump must be filled prior to start up. Check inlet line for properly tightened fittings and make sure it is free of restrictions and air leaks.

Be certain to fill the pump, motor, and/or transmission housing with clean hydraulic fluid prior to start up. Fill the housing by pouring filtered oil into the upper case drain port.

Install a 0 to 60 bar or 0 to 1000 psi pressure gauge in the charge pressure gauge port to monitor the charge pressure during start-up.

With the pump swashplate in its neutral (0 angle) position, "jog" or slowly rotate prime mover until charge pressure starts to rise. Start the prime mover and run at the lowest possible RPM until charge pressure has been established. Excess air may be bled from the high pressure lines through the high pressure gauge ports or by carefully loosening the high pressure lines.

WARNING

Do not start prime mover unless pump is in neutral position (0 swashplate angle). Take precautions to prevent machine movement in case pump is actuated during initial start up.

Once charge pressure has been established, increase speed to normal operating RPM. Charge pressure should be a minimum of 7 bar (100 psi) above case pressure. If charge pressure is incorrect, shut down and determine cause for improper pressure.

With motor output shaft disconnected or drive wheels raised off of the ground, run system at full input and output speeds in both directions. Operate system for at least fifteen (15) minutes.

Shut down prime mover, remove gauges, and plug ports. Check reservoir level and add fluid if necessary.

The transmission is now ready for operation.

Maintenance

To insure optimum service life on Series 40 - M25 products, regular maintenance of the fluid and filter must be performed.

Check the reservoir daily for proper fluid level, the presence of water (noted by a cloudy to milky appearance, or free water in bottom of reservoir), and rancid fluid odor (indicating excessive heat).

The fluid and filter must be changed per the vehicle/machine manufacturer's recommendations. In the absence of such recommendations, the following intervals may be used:

- System with a sealed type reservoir - 2000 hrs.
- System with a breathing type reservoir - 500 hrs.

It may be necessary to change the fluid more frequently than the above intervals if the fluid becomes contaminated with foreign matter (dirt, water, grease, etc.) or if the fluid has been subjected to temperature levels greater than the maximum recommended. Never reuse fluid.

The filter should be changed whenever the fluid is changed or whenever the filter indicator shows that it is necessary to change the filter.

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Component Inspections and Adjustments

Direct Displacement Control

Inspect the connection of the control linkage to the swashplate control shaft to insure that the linkage is properly attached. Neutral position of the swashplate is determined by the vehicle/machine control linkage.

Check / High Pressure Relief Valves

When a problem occurs in one direction, interchange the charge check or check/relief valves to see if the problem changes to the other direction. If so, one valve is malfunctioning or the check/relief valve cartridge does not have the proper setting.

CAUTION

The relief valves are factory set and should not be tampered with except for replacing the entire cartridge. Disassembly may change the setting and cause erratic unit operation or premature failure.

The pressure setting of the valve (in bar) is indicated by a three (3) digit code stamped on the cartridge. For the M25 PV and PT, the cartridge must be removed from the special plug in order to read the code.

When reinstalling, torque the plugs to 41 to 68 Nm (30 to 50 lbsf•ft) for the M25 PV and PT, or 41 to 95 Nm (30 to 70 lbsf•ft) for the M25 "U" style transmission.

Bypass Valves (Variable Pump / Tandem Pump)

The bypass function is accomplished by manually opening the charge check / high pressure relief valves. If the system is operating hot, check that the valves are fully seated by turning the special plugs (four [4] on tandem pumps) clockwise with a 5/16" internal hex wrench. Torque the plugs to 41 to 68 Nm (30 to 50 lbsf•ft).

Pump Charge Relief Valve

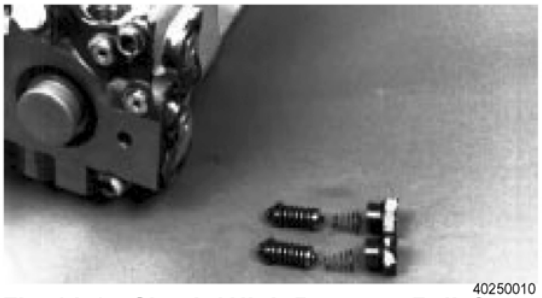
If charge pressure is low, the charge relief valve should be inspected. Inspect for foreign material holding the poppet open, and for scoring or wear on the poppet and seat in the end cap or center section.

Adjustment of the charge pressure is accomplished by changing the shim thickness behind the spring. The variable pump and tandem pump charge pressure relief valve is usually factory set at 13.8 bar Δ (200 psi) above case pressure under test conditions. The "U" style transmission charge pressure relief valve is usually factory set at 11.7 bar Δ (170 psi) above case pressure under test conditions. Exact charge pressure may vary in various applications.



40250009

Fig. 30-5 - Check / High Pressure Relief Valves (PV / PT)



40250010

Fig. 30-6 - Check / High Pressure Relief Valves (U)



40250011

Fig. 30-7 - Charge Relief Valve (PV / PT)

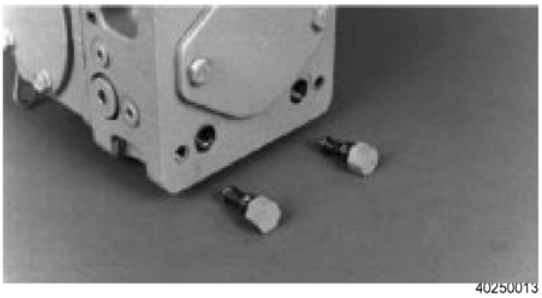


40250012

Fig. 30-8 - Charge Relief Valve (U)

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Component Inspections and Adjustments (Continued)



40250013

Fig. 30-9 - Easy-Ride Valves (PV)

Easy-Ride Valves (Variable Pump)

When a problem occurs in one direction, interchange the Easy-Ride valves to see if the problem changes to the other direction. If so, one valve is malfunctioning.

Inspect for foreign material holding the poppet/piston off its seat, and for roughness or wear on the poppet surface and its seat in the end cap. The poppet/piston must slide freely in the sleeve assembly.



40250014

Fig. 30-10 - Heat Exchanger Bypass Valve (U)

Heat Exchanger Bypass Valve ("U" Style Transmission)

If the M25U transmission is operating hot, the heat exchanger bypass valve (in the transmission center section) should be inspected. Inspect for foreign material holding the poppet open, and for scoring or wear on the poppet and seat in the housing.

Earlier production transmissions use a heat exchanger bypass valve with a nominal setting of 7.4 bar Δ (107 psi). The spring for this valve has a yellow dye mark and requires a force of approximately 22 N (5.5 lbsf) to compress it to a length of 45.7 mm (1.28 inches).

Later production transmissions use a heat exchanger bypass valve with a nominal setting of 4.8 bar Δ (70 psi). The spring used in this valve has a red dye mark and requires a force of approximately 10 N (2.2 lbsf) to compress it to a length of 45.7 mm (1.28 inches).



40250015

Fig. 30-11 - Filter Bypass Valve (U)

Filter Bypass and Reverse Flow Check Valves ("U" Style Transmission)

Inspect the filter bypass and reverse flow check valves for foreign material holding the poppet open, and for scoring or wear on the poppet and seat in the housing.

The filter bypass valve has a nominal setting of 4.8 bar Δ (70 psi). The spring used in this valve has a red dye mark and requires a force of approximately 10 N (2.2 lbsf) to compress it to a length of 45.7 mm (1.28 inches).



40250016

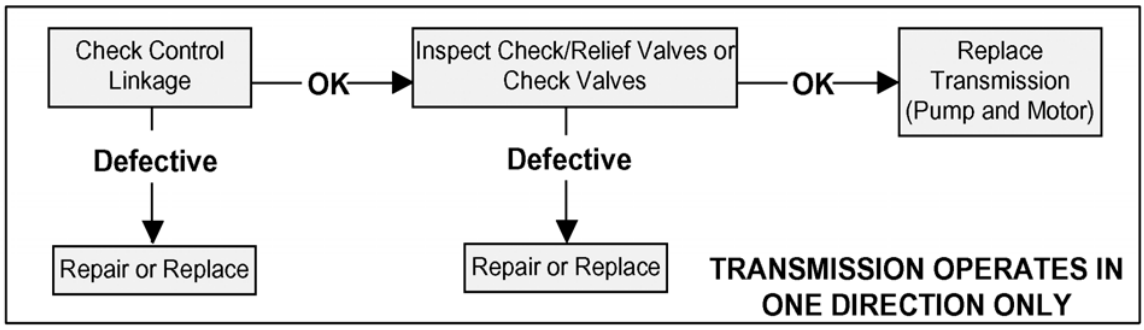
Fig. 30-12 - Filter Bypass Reverse Flow Check Valve (U)

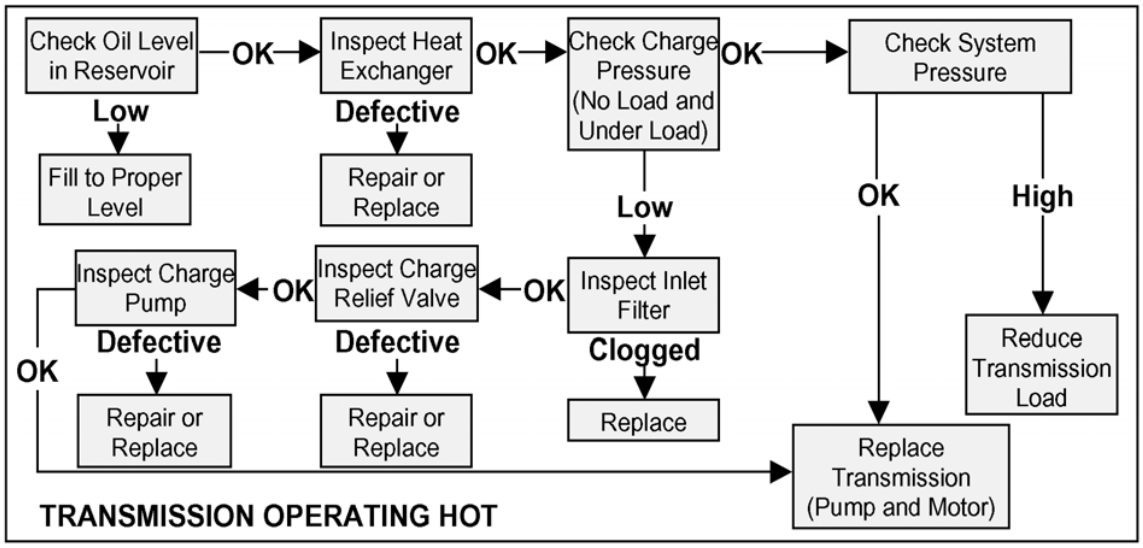
The spring used in the reverse flow check valve has a blue dye mark and requires a force of approximately 1.3 N (0.3 lbsf) to compress it to a length of 45.7 mm (1.28 inches).

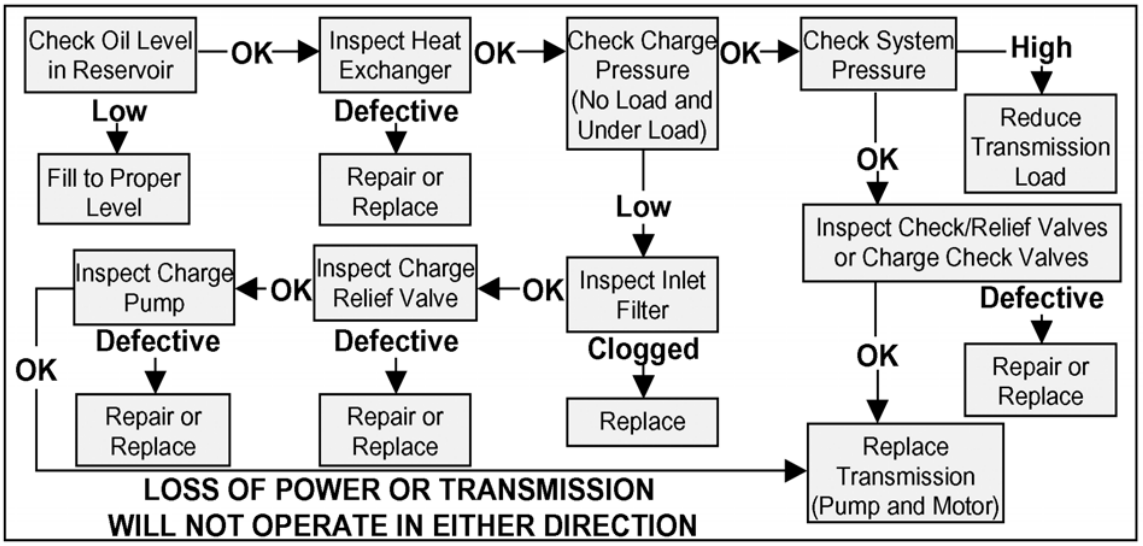
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Troubleshooting

Fault-Logic Diagrams







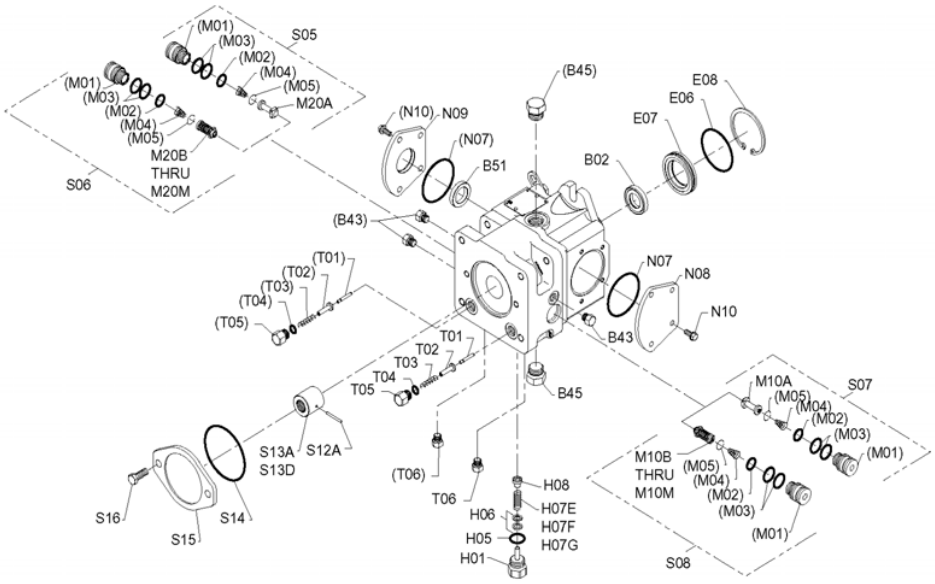
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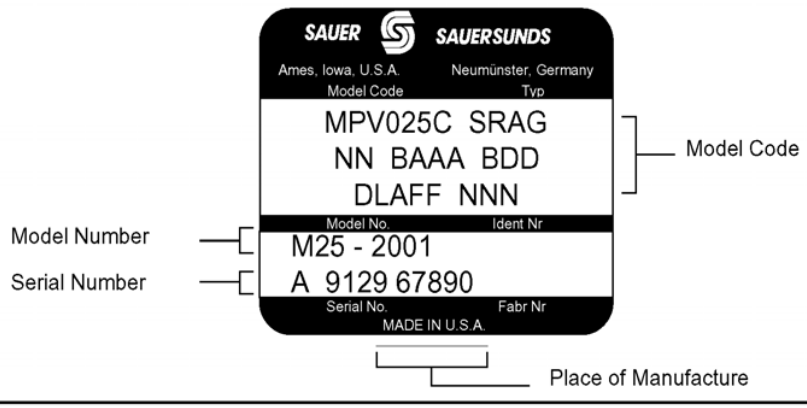
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Exploded View of the M25 Variable Pump

The following information is for general parts identification ONLY. Refer to the applicable Service Parts List when ordering service parts.

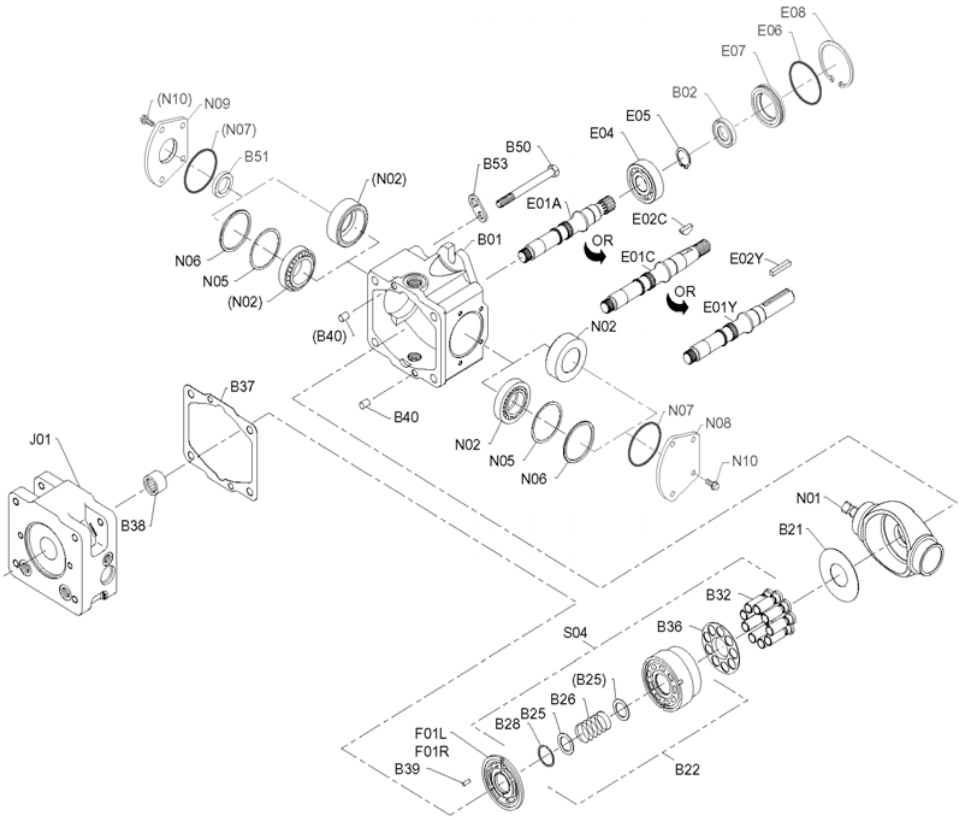


Name Plate



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Exploded View of the M25 Variable Pump (Continued)



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Exploded View of the M25 Variable Pump (Continued)

Item	Description	Qty
B01	HOUSING, VARIABLE	1
B02	SEAL, LIP	1
B21	PLATE, THRUST	1
B22	CYLINDER BLOCK KIT	1
B32	PISTON ASSY	9
B36	RETAINER, SLIPPER	1
B26	SPRING	1
B25	WASHER	2
B28	RING, RETAINING	1
B37	GASKET, END CAP	1
B38	BEARING, NEEDLE	1
B39	PIN, ST HDLS	1
B40	PIN	2
B42	PLUG, PLASTIC	1
B44	PLUG, PLASTIC	3
B45	PLUG, ST THD	1
B49	SCREW, DRIVE	2
B50	SCREW, HEX HD	4
B51	SEAL, LIP	1
B52	WASHER	3
B53	LIFTING BRACKET	1
E04	BEARING, BALL	1
E05	RING, RETG	1
E06	O-RING	1
E07	CARRIER, SEAL	1
E08	RING, INTERNAL RETAINING	1
H01	PLUG ASSY, CHG RELIEF	1
H05	O-RING	1
H06	SHIM, CHG. RELIEF	AR
H08	POPPET, CHG.RELIEF	1
J01	END CAP	1
M01	PLUG, SPECIAL	2
M02	O-RING	2
M03	O-RING	2
M04	SPRING, CONICAL COMP	2
M05	RING, INTERNAL RETAINING	2
N07	O-RING	2
N08	COVER, TRUNNION (PLAIN)	1
N09	COVER, TRUNNION	1
N10	SCREW	8
S14	O-RING	1
S15	PLATE, PAD COVER	1
S16	SCREW, HEX HD	2

Item	Description	Qty
H07F	SPRING, HEL COMP (7 BAR/100PSI)	1
H07G	SPRING, HEL COMP (14 BAR/200PSI)	1
M10A	POPPET-CHECK VALVE	1
M20A	POPPET-CHECK VALVE	1
M10B THRU M10M	VALVE, RELIEF	1
M20B THRU M20M	VALVE, RELIEF	1
E01C	SHAFT, PUMP - TAPERED	1
E02C	KEY	1
E01K	SHAFT, PUMP - STR KEYED	1
E02K	KEY, SQUARE	1
E01S	SHAFT, PUMP - SPLINED 13T	1
F01L	PLATE, VALVE (LH)	1
F01R	PLATE, VALVE (RH)	1
S12A	PIN	1
S13A	COUPLING - 9T AUX DRIVE	1
S13D	COUPLING - 11T AUX DRIVE	1
T01	PISTON	2
T02	SLEEVE ASSY	2
T03	SPRING, HEL COMP	2
T04	O-RING	2
T05	PLUG, SPECIAL	2
N01	SWASHPLATE, VARIABLE	1
N02	BEARING CARRIER ASSY	2
N01	SWASHPLATE-VARIABLE	1
N02	BEARING-TAPER ROLLER	2
N05	SHIM-TRUNNION	AR
N06	SPACER-TRUNNION	2

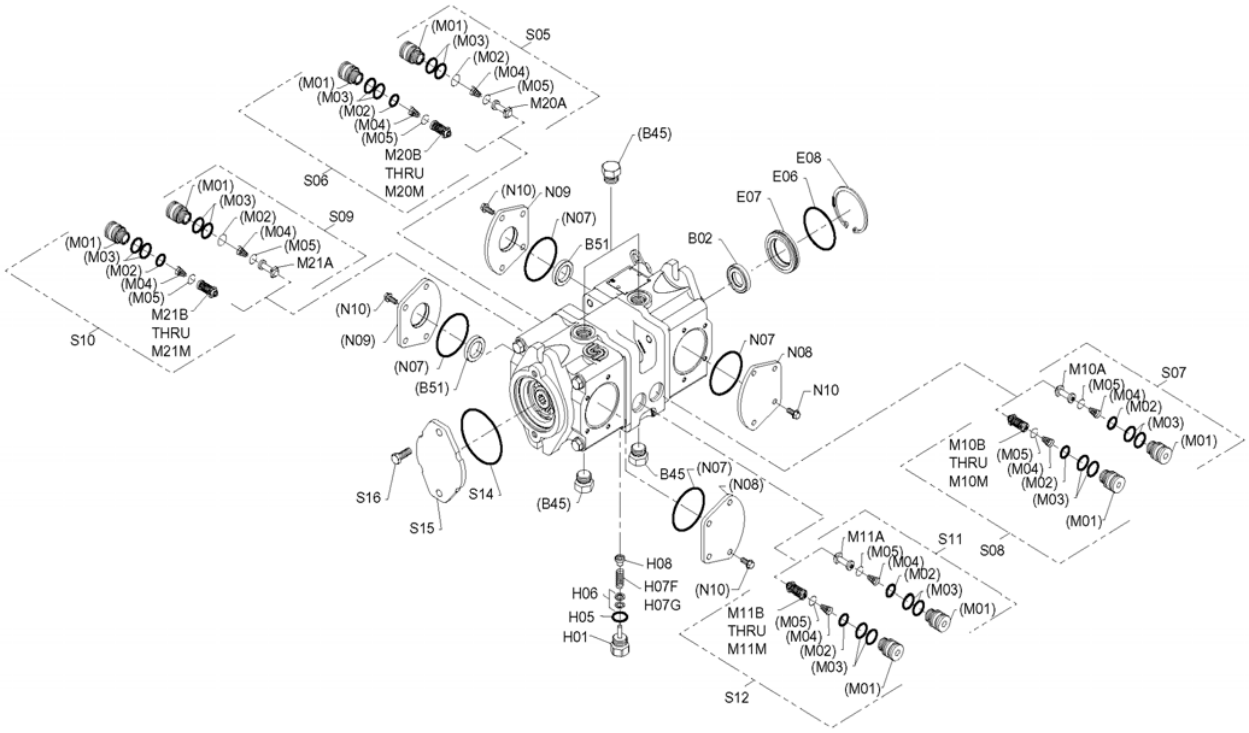
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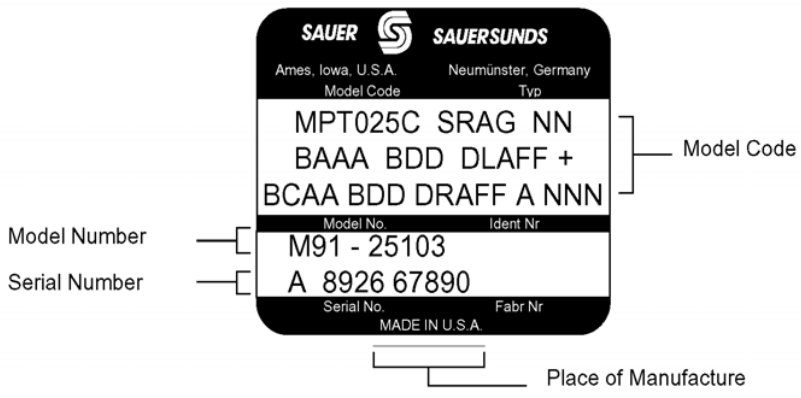
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Exploded View of the M25 Variable Tandem Pump

The following information is for general parts identification ONLY. Refer to the applicable Service Parts List when ordering service parts.

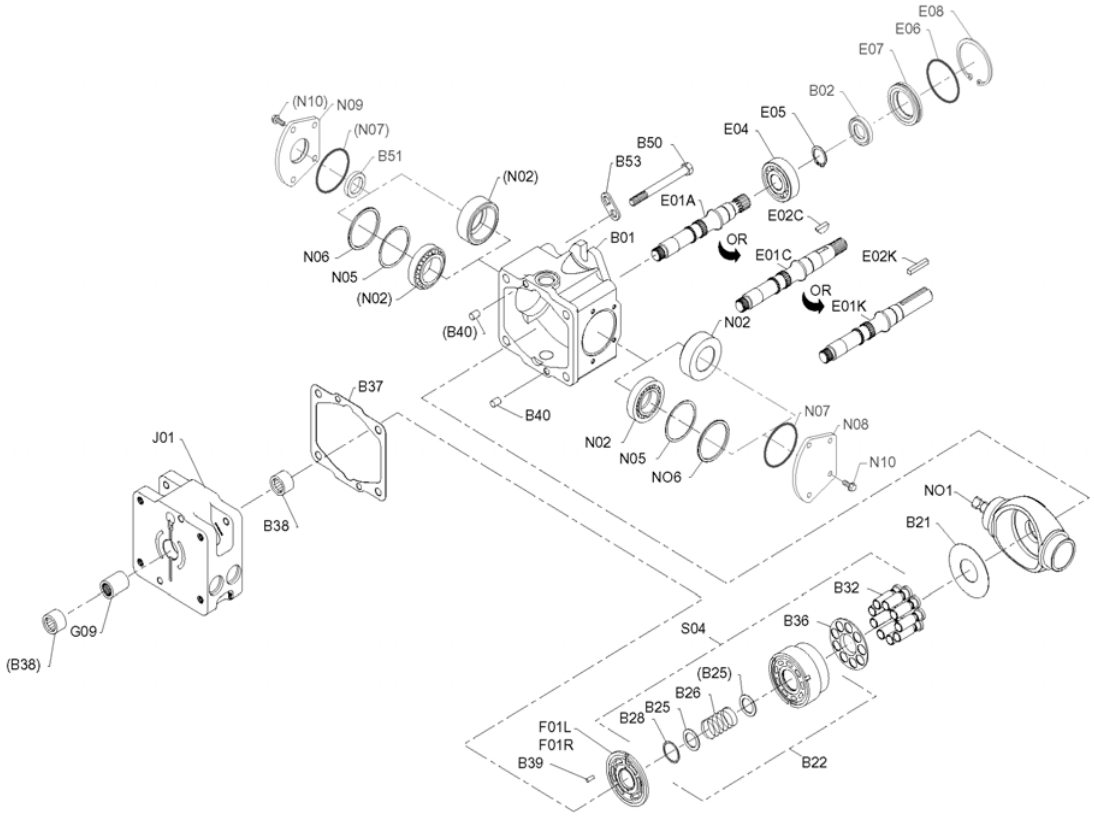


Name Plate



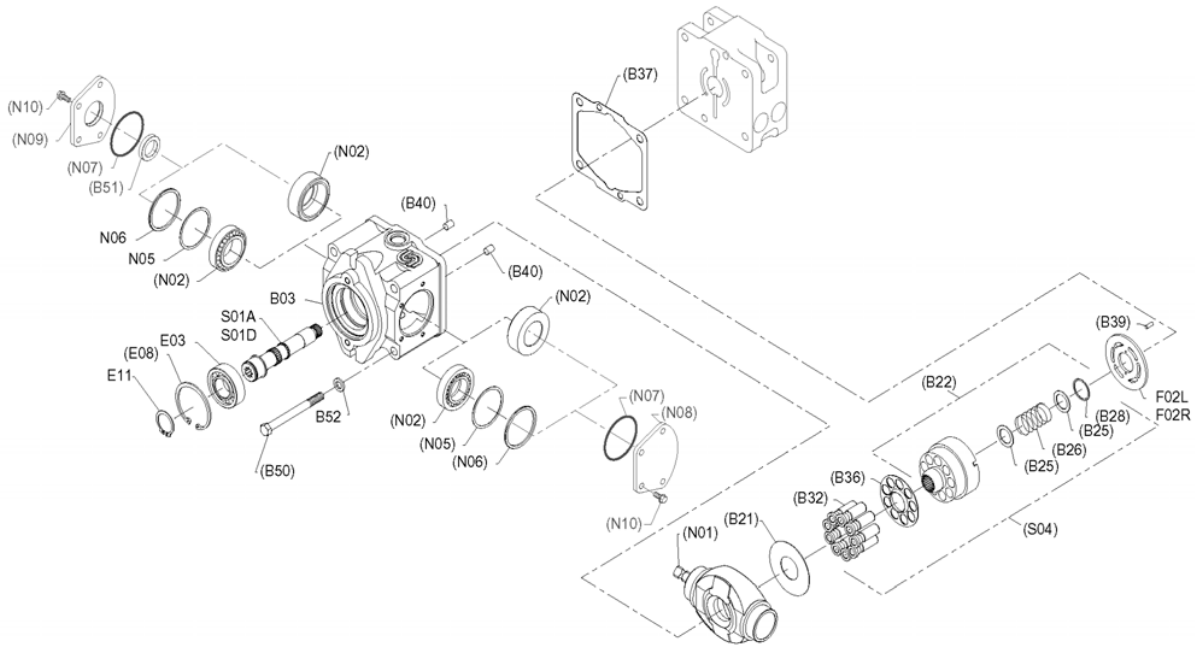
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Exploded View of the M25 Variable Tandem Pump (Continued)



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Exploded View of the M25 Variable Tandem Pump (Continued)



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Exploded View of the M25 Variable Tandem Pump (Continued)

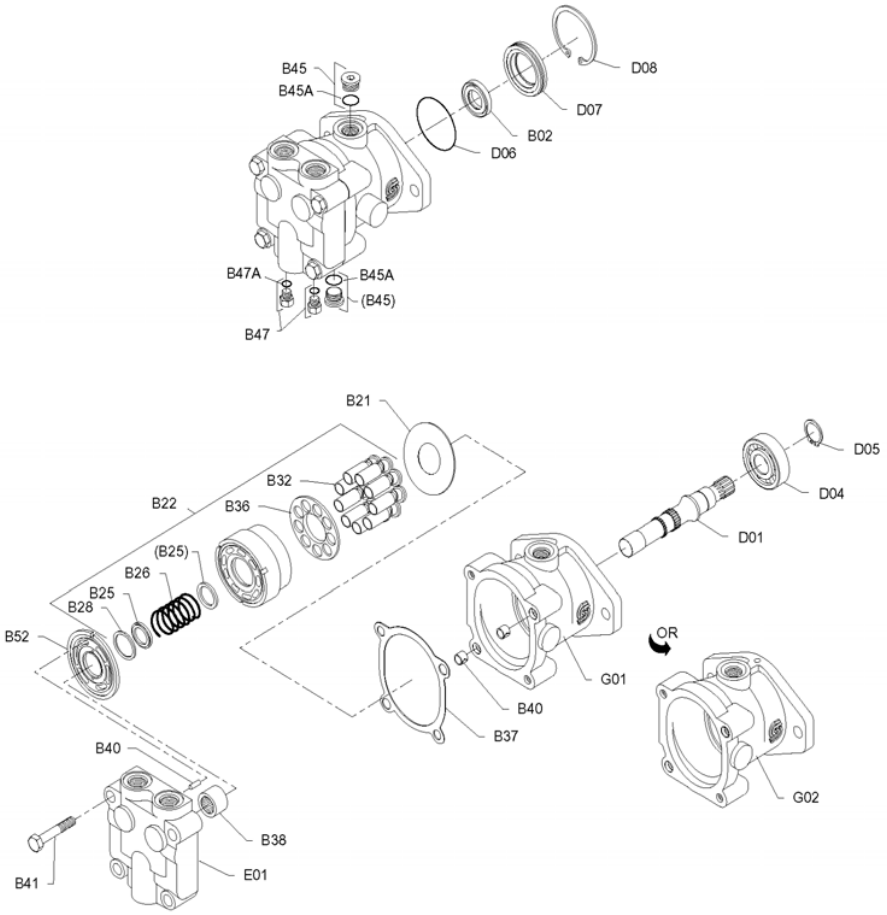
Item	Description	Qty
B01	HOUSING, VARIABLE (FRONT)	1
B02	SEAL, LIP	1
B03	HOUSING, VARIABLE (REAR)	1
B21	PLATE, THRUST	2
B22	CYLINDER BLOCK KIT	2
B32	PISTON ASSY	18
B36	RETAINER, SLIPPER	2
B26	SPRING	2
B25	WASHER	4
B28	RING, RETAINING	2
B37	GASKET, END CAP	2
B38	BEARING, NEEDLE	2
B39	PIN, ST HDLS	2
B40	PIN	4
B42	PLUG, PLASTIC	1
B44	PLUG, PLASTIC	5
B45	PLUG, ST THD	3
B49	SCREW, DRIVE	2
B50	SCREW, HEX HD	8
B51	SEAL, LIP	2
B52	WASHER	7
B53	LIFTING BRACKET	1
E03	BEARING, BALL	1
E04	BEARING, BALL	1
E05	RING, RETG	1
E06	O-RING	1
E07	CARRIER, SEAL	1
E08	RING, INTERNAL RETAINING	2
E11	RING, EXTERNAL RETAINING	1
G09	COUPLING	1
H01	PLUG ASSY, CHG RELIEF	1
H05	O-RING	1
H06	SHIM, CHG. RELIEF	1
H08	POPPET, CHG.RELIEF	1
J01	END CAP	1
M01	PLUG, SPECIAL	4
M02	O-RING	4
M03	O-RING	4
M04	SPRING, CONICAL COMP	4
M05	RING, INTERNAL RETAINING	4
N07	O-RING	4
N08	COVER, TRUNNION (PLAIN)	2
N09	COVER, TRUNNION	2
N10	SCREW	16
S14	O-RING	1
S15	PLATE, COVER	1
S16	SCREW, HEX HD	2

Item	Description	Qty
H07F	SPRING, HEL COMP (7 BAR/100PSI)	1
H07G	SPRING, HEL COMP (14 BAR/200PSI)	1
M10A	POPPET-CHECK VALVE	1
M20A	POPPET-CHECK VALVE	1
M10B THRU M10M	VALVE, RELIEF	1
M20B THRU M20M	VALVE, RELIEF	1
E01C	SHAFT, PUMP - TAPERED	1
E02C	KEY	1
E01K	SHAFT, PUMP - STR KEYED	1
E02K	KEY, SQUARE	1
E01S	SHAFT, PUMP - SPLINED 13T	1
F01L	PLATE, VALVE (LH)	1
F02L	PLATE, VALVE (RH)	1
F01R	PLATE, VALVE (RH)	1
F02R	PLATE, VALVE (LH)	1
S01A	SHAFT, VARIABLE - 9T AUX DRIVE	1
S01D	SHAFT, VARIABLE - 11T AUX DRIVE	1
N01	SWASHPLATE, VARIABLE	2
N02	BEARING CARRIER ASSY	4
N01	SWASHPLATE-VARIABLE	2
N02	BEARING-TAPER ROLLER	4
N05	SHIM-TRUNNION	AR
N06	SPACER-TRUNNION	4

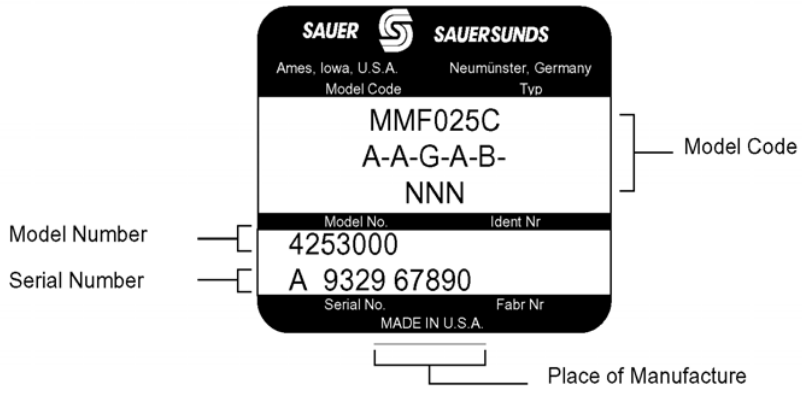
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Exploded View of the M25 Fixed Motor

The following information is for general parts identification ONLY. Refer to the applicable Service Parts List when ordering service parts.



Name Plate



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Exploded View of the M25 Fixed Motor (Continued)

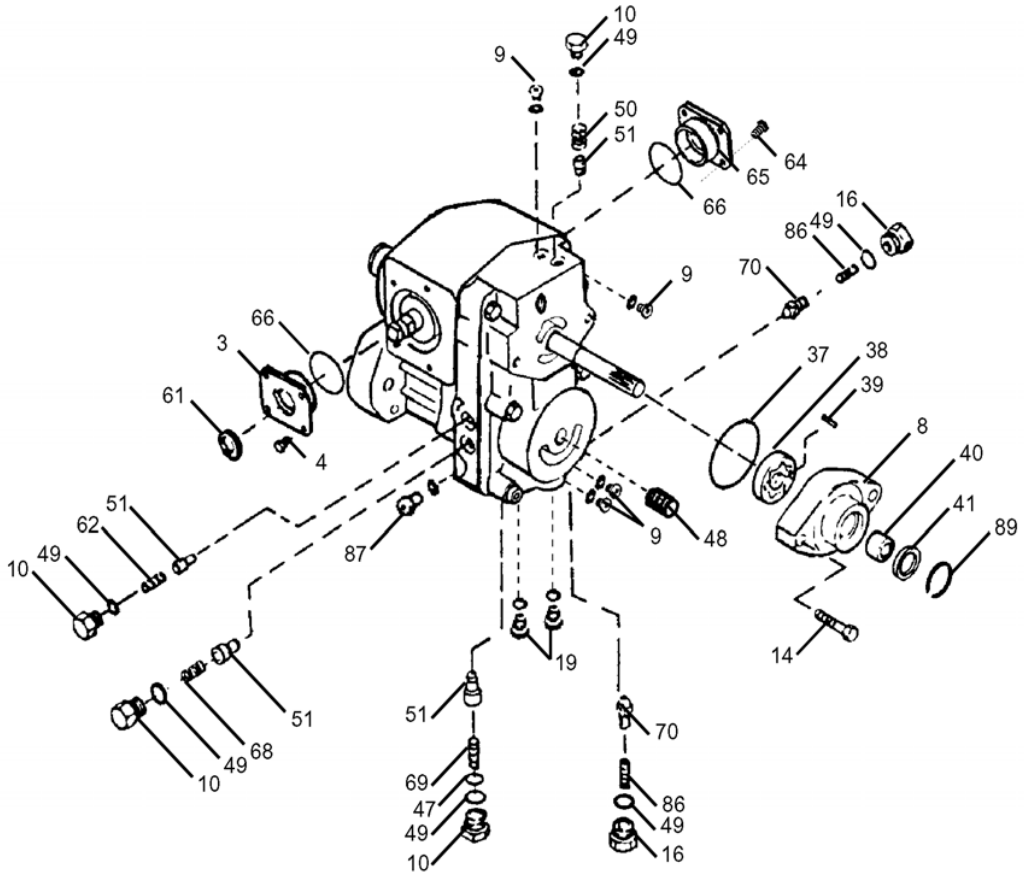
Item	Description	Qty
B02	SEAL, LIP	1
B21	PLATE, THRUST	1
B22	CYLINDER BLOCK KIT-M25	1
B37	GASKET, END CAP-MF	1
B38	BEARING, NEEDLE	1
B39	PIN	1
B40	SLEEVE	2
B41	SCREW, HEX HEAD	4
B45	PLUG	2
B47	PLUG	2
B52	PLATE, VALVE, MOTOR	1
B53	BRACKET, LIFTING	1

Item	Description	Qty
D04	BEARING, BALL	1
D05	RING, RETAINING	1
D06	O-RING	1
D07	CARRIER, SEAL	1
D08	RING, RETAINING	1
D01	SHAFT-MF	1
E01	END CAP-MF	1
G01	HOUSING-MF	1
G02	HOUSING-MF (20CC)	1

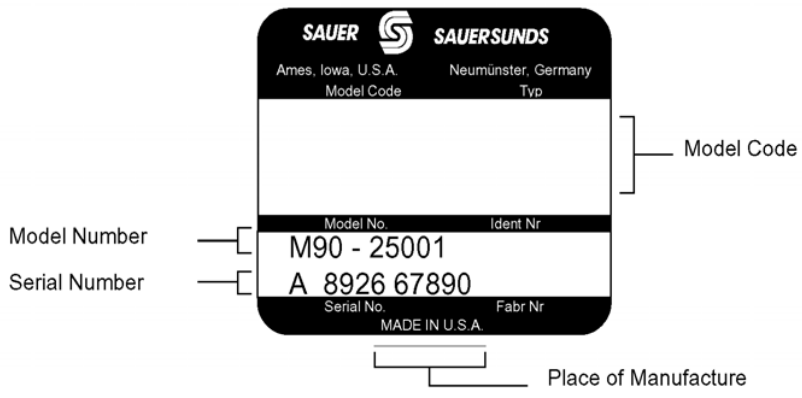
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Exploded View of the M25 "U" Style Transmission

The following information is for general parts identification ONLY. Refer to the applicable Service Parts List when ordering service parts.

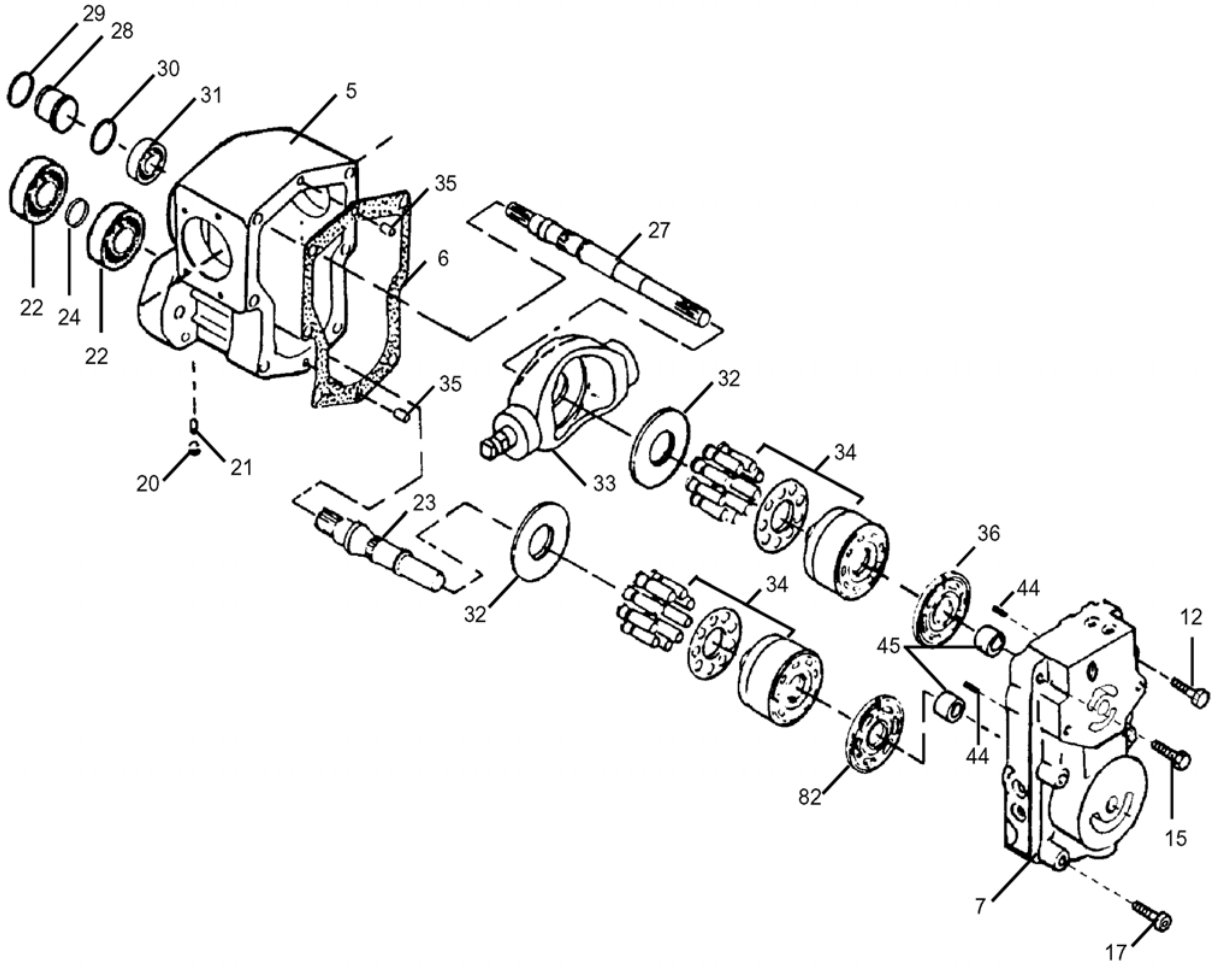


Name Plate



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Exploded View of the M25 “U” Style Transmission (Continued)



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Exploded View of the M25 "U" Style Transmission (Continued)

Item	Description	Qty
0008	HOUSING, CHARGE PUMP	1
0004	SCREW	4
0005	HOUSING, TRANSMISSION	1
0006	GASKET, HOUSING	1
0007	CENTER SECTION	1
0008	HOUSING, CHARGE PUMP	1
0009	PLUG, ST THD	4
0010	PLUG	4
0012	SCREW, HEX HD	3
0013	PLUG, PLASTIC	2
0014	SCREW, HEX HD	2
0015	SCREW, HEX HD	1
0016	PLUG, SPECIAL	2
0017	SCREW	2
0019	PLUG, ST THD	2
0020	PLUG, PIPE	1
0021	PIN	1
0022	BEARING, BALL	2
0024	COLLAR	1
0027	SHAFT, PUMP (U)	1
0028	SEAL GUIDE	1
0029	RING, RETG	1
0030	O-RING	1
0031	BEARING, BALL	1
0032	PLATE, THRUST	2
0033	SWASHPLATE, VARIABLE	1
0034	CYLINDER BLOCK KIT	2
	PISTON ASSEMBLY	18
	RETAINER, SLIPPER	2
	SPRING	2
	WASHER	4
	RING, RETAINING	2
0035	PIN	2
0037	O-RING	1
0038	GEROTOR	1
0039	PIN, ST HDLS	1
0040	BEARING, NEEDLE	1
0041	SEAL, LIP	1
0042	SEAL, PACKAGING	1
0043	NIPPLE	1
0044	PIN, ST HDLS	2
0045	BEARING, NEEDLE	2
0046	PLUG, PLASTIC	1
0047	SHIM	1
0048	CAP, PLASTIC	1
0049	O-RING	6
0050	SPRING	1
0051	VALVE, RELIEF	4

Item	Description	Qty
0061	SEAL, LIP	1
0062	SPRING	1
0064	SCREW	4
0066	O-RING	2
0068	SPRING	1
0069	SPRING	1
0082	PLATE, VALVE (MOTOR)	1
0084	PLUG	1
0085	SEAL	1
0086	SPRING, CONICAL COMP	2
0087	PLUG, ST THD	1
0089	RING, RETAINING	1
0003L	TRUNNION KIT (SEAL SIDE)	1
0065L	TRUNNION KIT (PLAIN)	1
0003R	TRUNNION KIT (PLAIN)	1
0065R	TRUNNION KIT (SEAL SIDE)	1
0036L	PLATE, VALVE - PUMP (LH)	1
0036R	PLATE, VALVE - PUMP (RH)	1
0023	SHAFT, MOTOR - SPLINED 18T (U)	1
0023	SHAFT, MOTOR - SPLINED 17T (U)	1
0070	VALVE, CHECK/RELIEF	2

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Minor Repair and Replacement

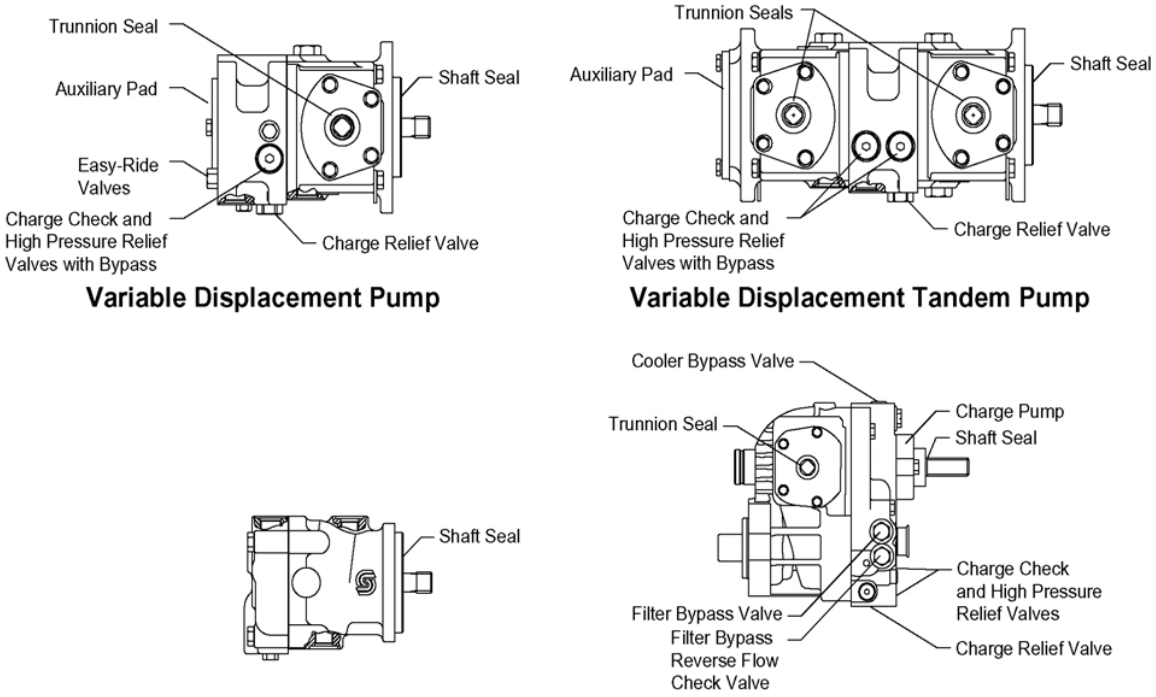


Fig. 50-1 - Minor Repairs

General

Minor Repairs may be performed, following the procedures in this section, without voiding the unit warranty.

Cleanliness is a primary means of assuring satisfactory transmission life, on either new or repaired units. Cleaning parts by using a clean solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals.

Protect all exposed sealing surfaces and open cavities from damage and foreign material.

It is recommended that all gaskets and O-rings be replaced. Lightly lubricate all O-rings with clean petroleum jelly prior to assembly. All gasket sealing surfaces must be cleaned prior to installing new gaskets.

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Minor Repair and Replacement - Pumps and Motors



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Fig. 50-2 - Remove Seal Carrier Retaining Ring (PV / PT / MF)



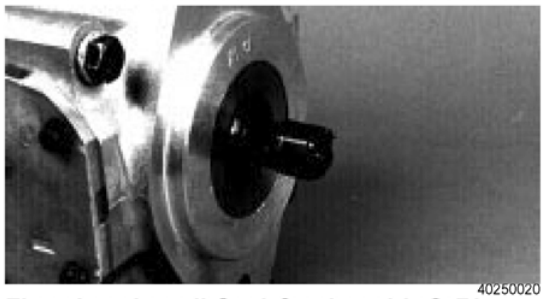
40250018

Fig. 50-3 - Tapping Shaft with Soft Hammer to Remove Seal Carrier from Housing (PV / PT / MF)



40250019

Fig. 50-4 - Shaft Seal Removed (PV / PT / MF)



40250020

Fig. 50-5 - Install Seal Carrier with O-Ring (PV / PT / MF)

Shaft Seal Replacement - PV / PT / MF

Lip type shaft seals are used on the Series 40 - M25 variable pump, tandem pump, and fixed motor. These seals can be replaced without major disassembly of the unit.

Replacement of the shaft seal generally requires removal of the pump from the machine.

Remove the retaining ring from the housing.

NOTE: It may be necessary to hold inward pressure against the shaft to compress the cylinder block spring while removing the retaining ring.

After removing the retaining ring, the seal carrier will move out approximately 6 mm (1/4 in.) due to the cylinder block spring force on the shaft. Lightly tap the end of the shaft with a soft mallet until the seal carrier can be removed from the housing.

NOTE: After the seal carrier is removed, the shaft and bearing assembly are free in the housing. Do not remove shaft unless unit is positioned with the mounting flange UP. If the unit is positioned horizontally when the shaft is removed, the cylinder block could move out of place, making shaft installation difficult.

Remove the O-ring from the seal carrier.

Place the seal carrier in an arbor press and press out the old seal . An appropriately sized pipe spacer or socket wrench can be used as a press tool. Once removed, the seal is not reusable.

Inspect the seal carrier, the new seal, and the O-ring for damage. Inspect the sealing area on the shaft for rust, wear, or contamination. Polish the sealing area on the shaft if necessary.

Using the arbor press, press the new seal into the seal carrier. Be careful not to damage seal.

NOTE: The outside diameter of the new seal may be coated with a sealant (such as Loctite High Performance Sealant #59231) prior to installation.

Wrap the spline or key end of shaft with thin plastic to prevent damage to the seal lip during installation. Lubricate the inside diameter of the new seal with petroleum jelly.

Install the O-ring onto the seal carrier and lubricate with petroleum jelly.

Slide the seal carrier assembly over the shaft and into the housing bore. Hold inward pressure against the shaft to compress the cylinder block spring while pressing the seal carrier into position. Install the retaining ring.

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Minor Repair and Replacement - Pumps and Motors (Cont.)

Trunnion Seal - PV / PT (Control Shaft Side)

Remove the control linkage from the swashplate control shaft. With a 7/16" or 1/2" wrench, remove the hex screws retaining the trunnion seal cover to the unit housing.

Remove the trunnion seal cover (with lip seal) and the O-ring. On units with tapered roller bearing trunnions, the bearing spacer and shims may be removed from the housing after removing the trunnion seal cover.

Place the seal cover in an arbor press and press out the old seal. Once removed, the seal is not reusable.

Inspect the seal cover for damage. Inspect the sealing area on the shaft for rust, wear, or contamination. Polish the sealing area on the shaft if necessary.

Using the arbor press, press the new seal into the seal cover from the inside until it bottoms in its bore. Be careful not to damage the seal or the cover.

NOTE: The outside diameter of the new seal may be coated with a sealant (such as Loctite High Performance Sealant #59231) prior to installation.

When reassembling units with tapered roller bearing trunnions, install the bearing shims and spacer into the housing in their original order. Install the O-ring onto the housing, and retain with petroleum jelly. Lubricate the inside diameter of the new seal with petroleum jelly.

Wrap the end of the swashplate control shaft with thin plastic to prevent damage to the seal lip during installation.

Slide the seal cover assembly over the swashplate control shaft and onto the housing. Install new hex head screws and torque to 15 to 20 Nm (11 to 15 lbsf•ft). Reinstall the control linkage onto the swashplate control shaft.

Trunnion Cover - PV / PT (Plain)

The O-ring under the plain trunnion cover may be replaced after removing the hex screws (with a 7/16" or 1/2" hex wrench) and the cover. On units with tapered roller bearing trunnions, the bearing spacer and shims may be removed from the housing after removing the trunnion cover.

When reassembling units with tapered roller bearing trunnions, install the bearing shims and spacer into the housing in their original order. Install the O-ring onto the housing, and retain with petroleum jelly. Install the trunnion cover with the stamped identification mark ("O") out. Install new hex screws and torque to 15 to 20 Nm (11 to 15 lbsf•ft).

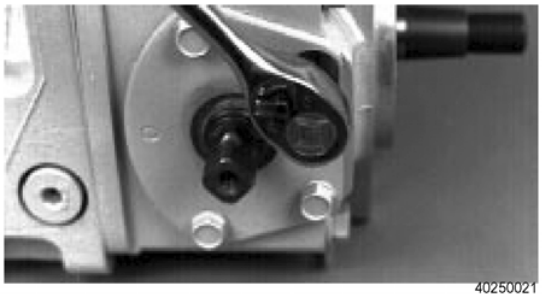


Fig. 50-6 - Remove Trunnion Seal Cover (PV / PT)



Fig. 50-7 - Trunnion Cover Components - Journal Bearings (PV / PT)



Fig. 50-8 - Trunnion Cover Components - Tapered Roller Bearings (PV / PT)

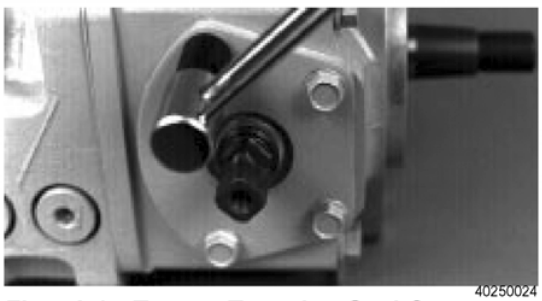


Fig. 50-9 - Torque Trunnion Seal Cover Screws (PV / PT)

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Minor Repair and Replacement - Pumps and Motors (Cont.)



Fig. 50-10 - Remove Check and Relief Valve Plug (PV)

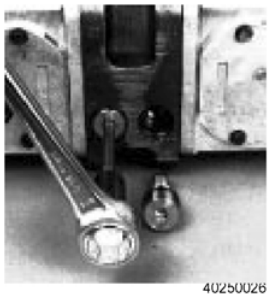


Fig. 50-11 - Remove Check and Relief Valve Plug (PT)



Fig. 50-12 - Check and Relief Valve Components (PV / PT)



Fig. 50-13 - Remove Charge Relief Valve Plug (PV)



Fig. 50-14 - Remove Charge Relief Valve Plug (PT)



Fig. 50-15 - Charge Relief Valve Components (PV / PT)

Check and High Pressure Relief Valves - PV / PT

Remove the check and high pressure relief valves with a 5/16" internal hex wrench.

Remove the valve cartridge assembly from the pump end cap or center section. Inspect the valve and mating seat in the end cap or center section for damage or foreign material. It will be necessary to replace the end cap or center section if the seats are damaged.

The check poppet or relief valve is retained in the special plug by a circlip. The poppet or valve and check valve spring may be removed from the special plug by pulling out at a slight angle. When reassembling, install the check valve spring into the special plug with its larger diameter toward the plug, and snap the poppet or valve into position in the plug.

Reinstall the valve cartridges (with O-rings) into the center section. Torque the plugs to 41 to 68 Nm (30 to 50 lbsf•ft).

CAUTION

The relief valves are factory set and should not be tampered with except for replacing the entire valve.

Charge Pressure Relief Valve - PV / PT

Remove the charge relief valve hex plug with a 1" wrench.

Remove the spring and poppet from the end cap or center section.

Do not alter the shims (which may be installed between the spring and valve plug) or interchange parts with another valve. Inspect the poppet and mating seat in the end cap for damage or foreign material.

Reinstall the poppet, spring, and plug (with shims and O-ring) into the center section. Torque the plug to 54 to 135 Nm (40 to 100 lbsf•ft).

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Minor Repair and Replacement - Pumps and Motors (Cont.)

Easy-Ride Valves - PV

Remove the Easy-Ride valve by removing the hex plug using a 11/16″ hex wrench. Remove the spring and sleeve assembly with the poppet/piston. Remove the poppet/piston from the sleeve assembly.

Inspect the seat area in the end cap and the seat end of the poppet/piston for damage or foreign material. The poppet/piston must slide freely in the sleeve assembly. Inspect the spring for damage.

Reinstall the poppet/piston into the sleeve assembly. Install the sleeve assembly, spring, and plug with O-ring. Torque the plug to 20 to 47 Nm (15 to 35 lbsf•ft).



Fig. 50-16 - Remove Easy Ride Valves (PV)

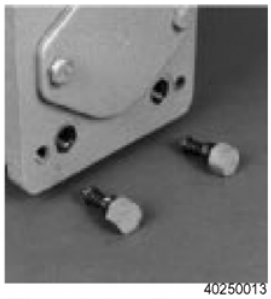


Fig. 50-17 - Easy-Ride Valves Removed (PV)



Fig. 50-18 - Easy-Ride Valve Components (PV)

Auxiliary Pump Mounting Pad - PV / PT

Remove the two (2) hex screws retaining the flange cover or auxiliary pump using a 9/16" wrench, and remove the cover or pump and the sealing ring.

On variable pumps, the drive coupling may be removed at this time. If a locating pin is present, it may be removed from the coupling at this time.

Pumps with steel pad covers use a single square cut sealing ring. If an auxiliary pump is installed, an O-ring seal must be installed on the pump pilot.

On variable pumps, reinstall the drive coupling with its locating pin, if used.

Reinstall the sealing ring and flange cover (with the identifying mark OUT) or auxiliary pump. Torque the screws to 27 to 34 Nm (20 to 25 lbsf•ft).

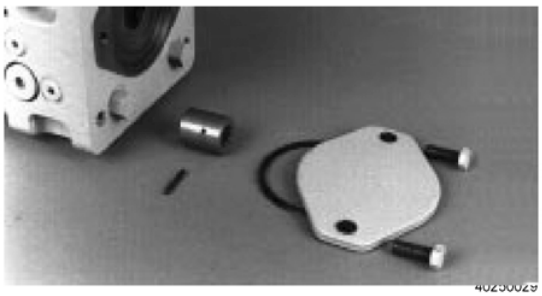


Fig. 50-19 - Auxiliary Pad Cover and Drive Coupling Removed (PV)



Fig. 50-20 - Pad Cover Removed (PT)

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Minor Repair and Replacement - Pumps and Motors (Cont.)

Plug / Fitting Torques - PV / PT / MF

If any plugs or fittings are removed from the unit during servicing, they should be torqued as indicated in the following table.

Item	Torque
Pressure Gauge Ports (PV & PT) (7/16 —20 O-Ring)	12 Nm (9 lbsf•ft)
Pressure Gauge Ports (MF) (9/16 —18 O-Ring)	20 Nm (15 lbsf•ft)
Case Outlet Fittings / Housing Plugs (PV & PT) (7/8 — 14 O-Ring)	57 Nm (42 lbsf•ft)
Case Outlet Fittings / Housing Plugs (MF) (3/4 — 16 O-Ring)	68 Nm (50 lbsf•ft)
Charge Pressure Inlet / System Ports (7/8 — 14 O-Ring)	95 Nm (70 lbsf•ft)

M25 Variable Pump, Tandem Pump, and Fixed Motor Conversion Information

Changing high pressure relief valves and charge pressure relief settings are considered to be Minor Repairs.

The auxiliary mounting flange drive spline on variable pumps may be changed by changing the coupling.

It is possible to change the variable pump, tandem pump, or fixed motor shaft without major disassembly of the unit. Remove the shaft seal. Then, with the unit positioned with the mounting flange UP, remove the shaft and bearing assembly. Install the replacement shaft and bearing assembly into the housing. Replace the shaft seal carrier.

The rear tandem pump section shaft (with auxiliary mounting flange drive spline) may be changed in a similar manner.

CAUTION

Do not remove both the front and rear pump section shafts from tandem pumps at the same time. The coupling between the pump sections will move out of position, requiring disassembly of the unit.

Changing the direction of pump rotation or changing the location of the control trunnions in the housing(s) requires major disassembly of the unit.

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Minor Repair and Replacement - "U" Style Transmission

Shaft Seal Replacement

If the shaft seal is accessible with the charge pump installed on the transmission, proceed as follows:

Remove the seal retaining ring (used on later production units) from the charge pump cover.

Carefully remove the seal from the bore in the charge pump cover. The face of the seal may be punctured with a sharp instrument (such as a screwdriver) to aid in prying the seal out, or a slide hammer type puller may be used to remove the seal. Care must be taken so as not to damage the charge pump cover or shaft. Once removed, the seal is not reusable.

Inspect the charge pump cover, the new seal, and the shaft for damage. Inspect the sealing area on the shaft for rust, wear, or contamination. Polish the sealing area on the shaft if necessary.

Lubricate the inside diameter of the new seal with petroleum jelly. Wrap the spline end of the shaft with thin plastic to prevent damage to the seal lip during installation.

NOTE: The outside diameter of the new seal may be coated with a sealant (such as Loctite High Performance Sealant #59231) prior to installation.

Press the new seal into the charge pump cover, being certain the seal is perpendicular to the shaft. Be careful not to damage seal. On earlier production units, the outer face of the seal should be located from 1.42 to 2.44 mm (0.056 to 0.096 in.) below the outer surface of the charge pump cover. On later production units, the seal must be pressed in far enough to allow the retaining ring to be installed.

Install the seal retaining ring (used on later production units) into the charge pump cover.

If the shaft seal is not accessible with the charge pump cover installed on the transmission, proceed as follows:

Remove the charge pump cover from the transmission as outlined in the "Charge Pump" section.

Carefully remove the seal from the bore in the charge pump cover. Once removed, the seal is not reusable.

Inspect the charge pump cover, the new seal, and the shaft for damage. Inspect the sealing area on the shaft for rust, wear, or contamination. Polish the sealing area on the shaft if necessary.

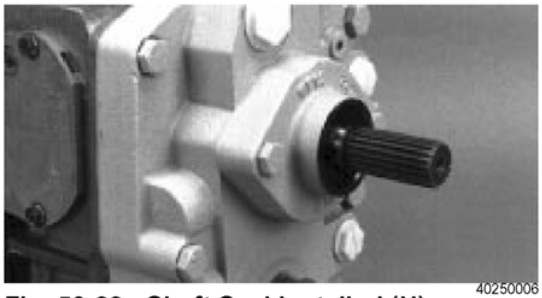
Install the new seal into the charge pump cover, as previously described.

Lubricate the inside diameter of the new seal with petroleum jelly, Reinstall the charge pump cover as outlined in the "Charge Pump" section, being careful not to damage the seal on the shaft splines.



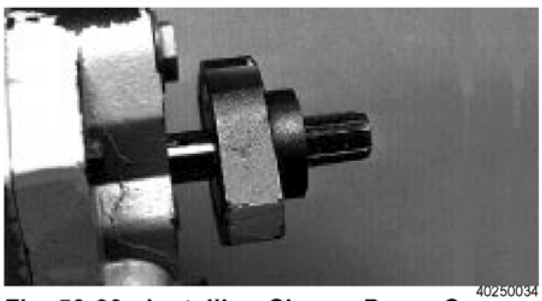
40250033

Fig. 50-21 - Installing Shaft Seal with Charge Pump Installed (U)



40250006

Fig. 50-22 - Shaft Seal Installed (U)



40250034

Fig. 50-23 - Installing Charge Pump Cover with Shaft Seal (U)

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Minor Repair and Replacement - "U" Style Transmission (Continued)



Fig. 50-24 - Remove Trunnion Seal Cover (U)

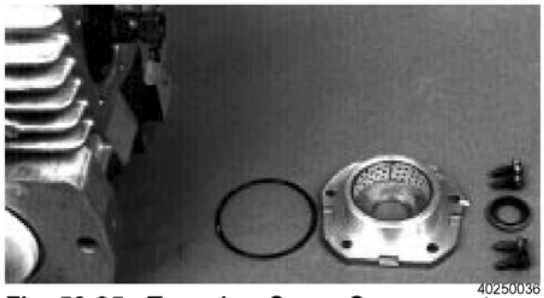


Fig. 50-25 - Trunnion Cover Components - Journal Bearings (U)



Fig. 50-26 - Install Trunnion Seal Cover (U)

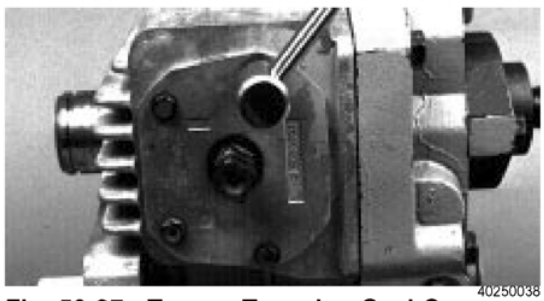


Fig. 50-27 - Torque Trunnion Seal Cover Screws (U)

Trunnion Seal Cover (Control Shaft Side)

Remove the control linkage from the swashplate control shaft. With a 3/8" wrench, remove the hex tapping screws retaining the trunnion seal cover and bearing carrier to the unit housing.

Remove the trunnion seal cover and bearing carrier (with lip seal) and the O-ring.

Place the seal cover and bearing carrier in an arbor press and press out the old seal. Once removed, the seal is not reusable.

Inspect the seal cover and bearing carrier for damage. Inspect the sealing area on the shaft for rust, wear, or contamination. Polish the sealing area on the shaft if necessary.

Using the arbor press, press the new seal into the seal cover and bearing carrier until the outside face of the seal is flush with the outer surface of the cover. Be careful not to damage the seal.

NOTE: The outside diameter of the new seal may be coated with a sealant (such as Loctite High Performance Sealant #59231) prior to installation.

Install the O-ring onto the bearing carrier, and retain with petroleum jelly. Lubricate the inside diameter of the new seal with petroleum jelly.

Wrap the end of the swashplate control shaft with thin plastic to prevent damage to the seal lip during installation.

Slide the seal cover and bearing carrier assembly over the swashplate control shaft and onto the housing. Install the hex head tapping screws and torque to 8 to 12 Nm (6 to 9 lbsf•ft). Reinstall the control linkage onto the swashplate control shaft.

Trunnion Cover (Plain)

The O-ring under the plain trunnion cover may be replaced after removing the hex tapping screws (with a 3/8" hex wrench) and the cover and bearing carrier.

Install the O-ring onto the bearing carrier, and retain with petroleum jelly. Install the trunnion cover and bearing carrier. Install the hex head tapping screws and torque to 8 to 12 Nm (6 to 9 lbsf•ft).

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Minor Repair and Replacement - "U" Style Transmission (Continued)

Check and High Pressure Relief Valves

Remove the check and high pressure relief valve plugs with a 7/8" hex wrench.

Remove the springs and valve cartridges from the center section. Inspect the valves and mating seats in the center section for damage or foreign material. It will be necessary to replace the center section if the seats are damaged.

Several designs of the charge check and high pressure relief valve have been used in the M25U transmission. Do not attempt to mix different vintage parts.

The valve cartridge, spring, plug, and transmission center section were changed at date code 87-39, and are not individually interchangable with earlier design parts.

NOTE: If the center section must be replaced on a unit with a date code prior to 87-39, the latest design charge check and high pressure relief valves must also be installed. Refer to the appropriate Service Parts Manual for more information.

Reinstall the valve cartridges into the center section. Install the check valve springs with their larger diameter toward the plugs.

Reinstall the plugs (with O-rings) into the center section. Torque the plugs to 41 to 95 Nm (30 to 70 lbsf•ft).

CAUTION

The relief valves are factory set and should not be tampered with except for replacing the entire valve.



Fig. 50-28 - Remove Check and Relief Valve Plug "A" (U)



Fig. 50-29 - Remove Check and Relief Valve Plug "B" (U)

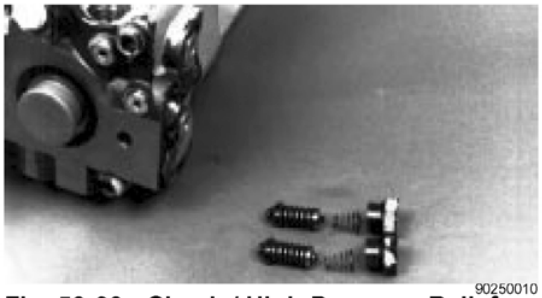


Fig. 50-30 - Check / High Pressure Relief Valves (U)



Fig. 50-31 - Remove Charge Relief Valve Plug (U)

Charge Pressure Relief Valve

Remove the charge relief valve hex plug with a 7/8" wrench.

Remove the spring and poppet from the center section.

Do not alter the shims (which may be installed between the spring and plug) or interchange parts with another valve. Inspect the poppet and mating seat in the end cap for damage or foreign material.

Reinstall the poppet, spring, and plug (with shims and O-ring) into the center section. Torque the plug to 41 to 95 Nm (30 to 70 lbsf•ft).



Fig. 50-32 - Charge Relief Valve Components (U)

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Minor Repair and Replacement - "U" Style Transmission (Continued)



Fig. 50-33 - Remove Heat Exchanger Bypass Valve Plug (U)



Fig. 50-34 - Heat Exchanger Bypass Valve (U)



Fig. 50-35 - Remove Filter Bypass Valve Plug (U)



Fig. 50-36 - Filter Bypass Valve (U)

Heat Exchanger Bypass Valve

Remove the heat exchanger bypass valve plug with a 7/8" hex wrench.

Remove the spring and poppet from the center section.

Do not interchange parts with another valve.

Earlier production transmissions use a spring in the heat exchanger bypass valve which is identified by a yellow dye mark and requires a force of approximately 22 N (5.5 lbsf) to compress it to a length of 45.7 mm (1.28 inches).

Later production transmissions use a spring in the heat exchanger bypass valve which is identified by a red dye mark and requires a force of approximately 10 N (2.2 lbsf) to compress it to a length of 1.28 inches (45.7 mm).

Inspect the poppet and mating seat in the end cap for damage or foreign material.

Reinstall the poppet, spring, and plug (with O-ring) into the center section. Torque the plug to 41 to 95 Nm (30 to 70 lbsf•ft).

Filter Bypass Valve

Remove the filter bypass valve hex plug with a 7/8" wrench.

Remove the spring and poppet from the center section.

Do not interchange parts with another valve. The spring used in the filter bypass valve is identified by a red dye mark, and requires a force of approximately 10 N (2.2 lbsf) to compress it to a length of 45.7 mm (1.28 inches). Inspect the poppet and mating seat in the end cap for damage or foreign material.

Reinstall the poppet, spring, and plug (with O-ring) into the center section. Torque the plug to 41 to 95 Nm (30 to 70 lbsf•ft).

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Minor Repair and Replacement - "U" Style Transmission (Continued)

Filter Bypass Reverse Flow Check Valve

Remove the reverse flow check valve plug with a 7/8" hex wrench.

Remove the spring and poppet from the center section.

Do not interchange parts with another valve. The spring used in the reverse flow check valve is identified with a blue dye mark and requires a force of approximately 1.3 N (0.3 lbsf) to compress it to a length of 45.7 mm (1.28 inches). Inspect the poppet and mating seat in the end cap for damage or foreign material.

Reinstall the poppet, spring, and plug (with O-ring) into the center section. Torque the plug to 41 to 95 Nm (30 to 70 lbsf•ft).



Fig. 50-37 - Remove Filter Bypass Reverse Flow Check Valve Plug (U)



Fig. 50-38- Filter Bypass Reverse Flow Check Valve (U)

Integral Charge Pump

Remove the two (2) screws retaining the charge pump cover, using a 9/16" hex wrench. Remove the charge pump assembly.

Remove the gerotor drive pin from the groove in the shaft.

Remove the gerotor assembly from the charge pump cover. Remove the retaining ring (if used) and the shaft seal from the cover.

Inspect all parts that are to be reused. If either of the gerotor assembly parts needs to be replaced, they must both be replaced. Always replace the O-rings.



Fig. 50-39 - Remove Charge Pump Cover Screws (U)



Fig. 50-40 - Remove Charge Pump Assembly (U)

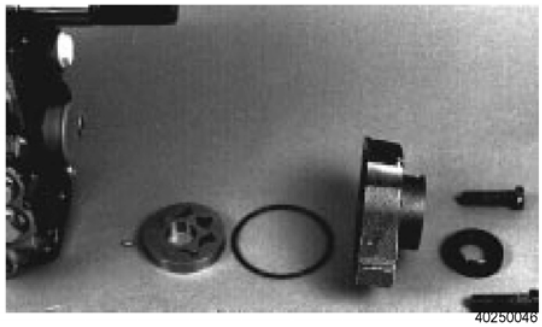


Fig. 50-41 - Charge Pump Components (U)

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Minor Repair and Replacement - "U" Style Transmission (Continued)



Fig. 50-42 - Bearing Installed in Charge Pump Cover (U)



Fig. 50-43 -Install Gerotor Drive Pin (U)

Inspect the shaft bearing in the charge pump cover for wear or damage. If replacement is necessary, remove the needle bearing from the cover using a suitable puller. Press a new needle bearing into the cover using a suitable press pin. When installed correctly, the bearing cage will be flush to 0.51 mm (0.02 in.) below the surface of the seal counterbore in the front of the cover.

CAUTION

When installing the needle bearing, the printed (numbered) end of the bearing cage must face the press pin.



Fig. 50-44 - Install Gerotor Assembly in Pump Cover (U)



Fig. 50-45 - Install Charge Pump Assembly (U)

Install the gerotor drive pin in the groove in the drive shaft, and retain with petroleum jelly.

Prior to assembly, lubricate the gerotor assembly with clean hydraulic oil. Install the gerotor assembly into the charge pump cover. Install the O-ring and retain with petroleum jelly.

NOTE: The charge pump rotation is determined by the position of the charge pump cover on the transmission center section.

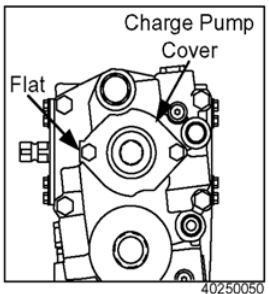


Fig. 50-46 - Orienting Charge Pump Cover (CW) (U)

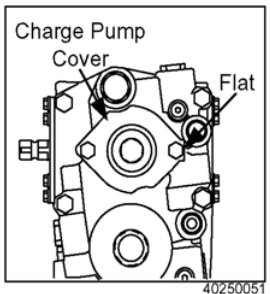


Fig. 50-47 - Orienting Charge Pump Cover (CCW) (U)

Install the charge pump assembly over the drive shaft and onto the transmission center section, orienting it for the proper input shaft rotation direction. Be certain the gerotor engages the drive pin in the shaft.

The flat on the charge pump cover should be located away from the heat exchanger ports for clockwise (CW) input rotation, and next to the heat exchanger ports for counterclockwise (CCW) input rotation.



Fig. 50-48 - Torquing Charge Pump Cover Screws (U)



Fig. 50-49 - Installing Shaft Seal (U)

Torque the charge pump cover screws to 37 to 50 Nm (27 to 37 lbsf•ft).

Install a new shaft seal as outlined in the “Shaft Seal Replacement” section.

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Minor Repair and Replacement - "U" Style Transmission (Continued)

Plug / Fitting Torques

If any plugs or fittings are removed from the unit during servicing, they should be torqued as indicated in the following tables.

Item	Torque
Charge Pump Inlet (1-1/16 — 12 O-Ring)	95 to 230 Nm (70 to 170 lbs•ft)
Oil Cooler Ports (3/4 — 16 O-Ring)	41 to 95 Nm (30 to 70 lbsf•ft)
Pressure Gauge Ports (7/16 — 20 O-Ring)	11 to 14 Nm (8 to 10 lbsf•ft)
Loop Passage Plugs (3/4 — 16 O-Ring)	41 to 95 Nm (30 to 70 lbsf•ft)
Loop Passage Plug (9/16 — 16 O-Ring)	20 to 27 Nm (15 to 20 lbsf•ft)

M25 "U" Style Transmission Conversion Information

Changing high pressure relief valves and charge pressure relief settings are considered to be Minor Repairs.

Changing the direction of rotation or changing the location of the control trunnion in the housing requires major disassembly of the unit.

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Notes

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Major Repair - Variable Pump

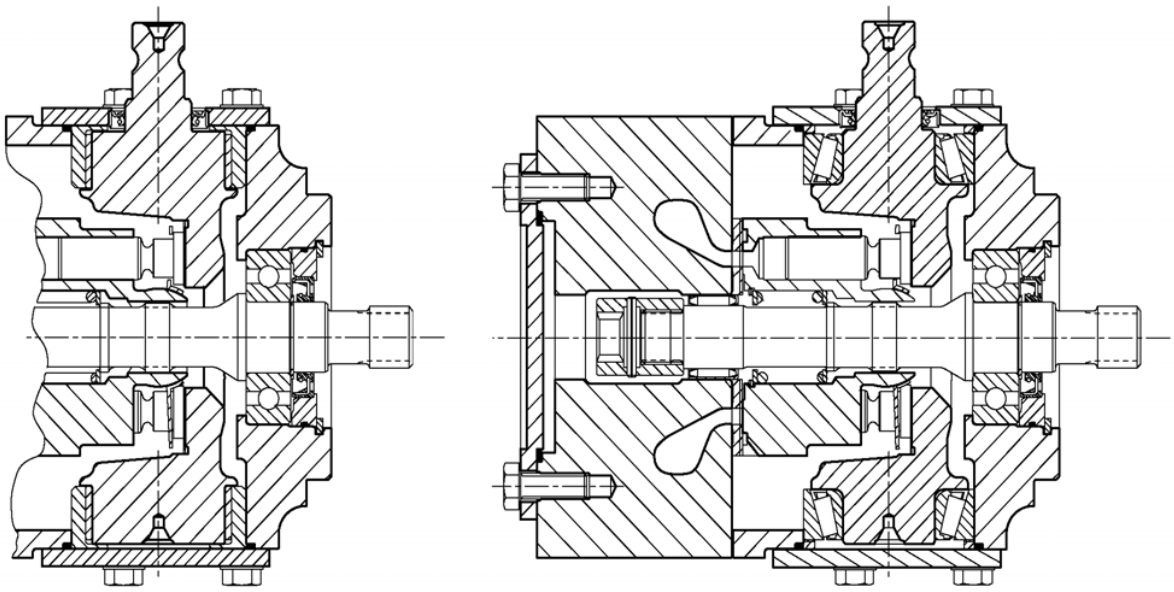
General

The following procedures are for the complete disassembly and reassembly (Major Repair) of the Series 40 - M25 Variable Pump.

Cleanliness is a primary means of assuring satisfactory hydraulic pump life, on either new or repaired units. Cleaning parts by using a clean solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals. Protect all exposed sealing surfaces and open cavities from damage and foreign material.

During the assembly of the Series 40 - M25 variable pump, all surfaces which have relative motion between two parts should be coated with a film of clean hydraulic oil. This will assure that these surfaces will be lubricated during start-up.

It is recommended that all O-rings and gaskets be replaced. Lightly lubricate all O-rings with clean petroleum jelly prior to assembly. All gasket sealing surfaces must be cleaned prior to installing new gaskets.



With Journal Trunnion Bearings

With Tapered Roller Trunnion Bearings

40250053

Fig. 61-1 - Cross Section View of Series 40 - M25 Variable Displacement Pump

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Major Repair - Variable Pump (Continued)


40250054

Fig. 61-2 - Remove Housing Screws


40250055

Fig. 61-3 - Remove End Cap


40250056

Fig. 61-4 - Remove Valve Plate


40250057

Fig. 61-5 - Remove Cylinder Block


40250058

Fig. 61-6 - Cylinder Block Kit Disassembled


40250059

Fig. 61-7 - Remove Thrust Plate


40250060

Fig. 61-8 - Remove Shaft Seal Cover


40250061

Fig. 61-9 - Remove Shaft and Bearing

Disassembly Procedures for Variable Displacement Pump

Prior to performing Major Repairs on the Series 40 - M25 Variable Pump, remove the external components as described in the “Minor Repair” section. These include the following:

- Auxiliary Mounting Pad Cover and Coupling
- Easy-Ride Valves (Where Applicable)
- Charge Relief Valve
- Charge Check / High Pressure Relief Valves

After removal of these components, mark the orientation of the pump housing and end cap, and remove the four (4) screws (using a 5/8" hex wrench) and washers which retain the housing to the end cap.

Remove the housing from the end cap and valve plate. Do not allow the valve plate to fall from the end cap. Remove the gasket and alignment pins from the end cap.

Carefully remove the valve plate from the end cap. It may be necessary to pry the valve plate off with a small screwdriver.

CAUTION

Caution must be exercised to prevent damage to the valve plate and end cap surfaces.

Remove the valve plate pin from the end cap.

Lay the pump housing on its side and remove the cylinder block from the housing.

Remove the slipper guide and the piston assemblies from the cylinder block.

Using an O-ring pick or wire, remove the thrust plate from the swashplate.

Remove the retaining ring and remove the shaft seal cover per the instructions in the “Minor Repair” section.

Remove the drive shaft and bearing assembly from the housing.

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Major Repair - Variable Pump (Continued)

Remove the retaining ring and press the shaft out of the bearing.

Mark the positions of the trunnion seal cover and trunnion cover on the housing. With a 7/16" or 1/2" hex wrench, remove the hex screws retaining the trunnion seal cover and trunnion cover to the housing.

Remove the trunnion seal cover assembly and trunnion cover from the housing. Remove the O-rings.



Fig. 61-10 - Remove Bearing from Shaft



Fig. 61-11 - Remove Trunnion Covers

On units with journal bearings, remove the swashplate bearing assemblies from the housing and swashplate. The assemblies are a slip fit in the housing.

On units with tapered roller bearings, remove the bearing spacers and shims from the housing. Do not alter the shim thickness. Remove the bearing cups from the housing and the bearing cones from the swashplate. The cups and cones are a slip fit in the housing and on the swashplate.

Tilt and lift the swashplate from the housing.



Fig. 61-12 - Swashplate Bearing Components



Fig. 61-13 - Remove Swashplate

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Major Repair - Variable Pump (Continued)

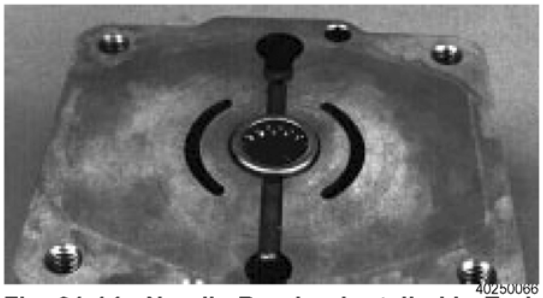


Fig. 61-14 - Needle Bearing Installed in End Cap

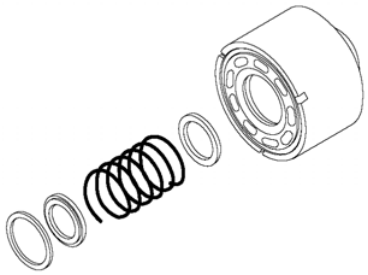


Fig. 61-15 - Cylinder Block Spring Components

Reconditioning and Replacement of Parts

After disassembly all parts should be thoroughly cleaned in a suitable solvent. Replace all O-rings, gaskets, and seals.

Inspect all parts for damage, nicks, or unusual wear patterns. Replace all parts having unusual or excessive wear or discoloration.

Cracks are not allowed in any surface of the valve plate or cylinder block. The running and sealing surfaces of the valve plate and cylinder block must be flat and free of nicks and burrs. Replace valve plates or cylinder blocks that show evidence of metal transfer, wear, or erosion on the running surface.

If scratches, which can be felt with a fingernail or pencil lead, are found on the bronze surface of the valve plate or the running surface of the cylinder block, polish or replace the parts.

Inspect the needle bearing in the end cap. If replacement is necessary, remove the shaft needle bearing using a suitable puller. Do not damage the valve plate surface of the end cap.

Press a new needle bearing into the end cap using a suitable press pin. When installed correctly, the bearing cage will protrude from 2.0 to 2.5 mm (0.08 to 0.10 in.) from the surface of the end cap to serve as a pilot for the valve plate.

CAUTION

When installing the needle bearing, the printed (numbered) end of the bearing cage must face the press pin.

Replace any bearing cups or cones that show spalling or wear. Tapered roller bearing cups and cones should be kept together and not mixed. If replacement is necessary, always replace both the cup and the cone.

Replace all piston assemblies if brass slippers are scored or excessively rounded at the edges.

Compress the cylinder block spring and remove the spiral retaining ring, outer washer, spring, and inner washer. Reassemble in the reverse order.

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Major Repair - Variable Pump (Continued)

Assembly Procedures for Variable Displacement Pump

Clean and lightly oil parts prior to assembling the pump. Be sure to torque all threaded parts to recommended torque levels.

CAUTION

Most parts have critical, high tolerance surfaces. Caution must be exercised to prevent damage to these surfaces during assembly. Protect exposed surfaces, openings, and ports from damage and foreign material.

Begin the assembly of the pump by installing the swashplate in the housing. Make sure the swashplate control shaft is located on the correct side of the housing (note the marks made during disassembly).

For units with journal type swashplate bearings, install the bearings into the housing and onto the swashplate trunnions.

For units with tapered roller type swashplate bearings, install the bearing cones onto the swashplate trunnions and install the bearing cups into the housing.

If the housing, swashplate, or swashplate bearings were not replaced on units with tapered roller type swashplate bearings, the original shims will be reinstalled between the bearing cups and the bearing spacers. If any of these parts were replaced, the following procedure must be performed to determine the proper shim thickness.

1. Install the bearing spacers into the housing with no shims.
2. Install the trunnion covers onto the housing. Install the hex head screws and tighten.
3. Install a magnetic base dial indicator onto the seal cover and read the swashplate end play while moving the swashplate back and forth by hand. Add shims to provide 0.05 to 0.1 mm (0.002 to 0.004 in.) preload on the swashplate bearings.

   For example, if the indicator reads 1.02 mm (0.040 in.) end play when moving the swashplate back and forth, shims of 1.07 to 1.12 mm (0.042 to 0.044 in.) total thickness should be installed between the bearing cups and the spacers. Refer to the appropriate Service Parts Manual for available shim thicknesses and part numbers.
4. Remove the trunnion covers from the housing. Remove the bearing spacers.



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Fig. 61-16 - Install Swashplate



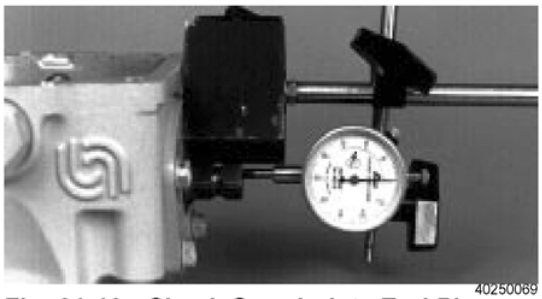
40250067

Fig. 61-17 - Install Trunnion Bearings (Journal)



40250068

Fig. 61-18 - Install Trunnion Bearings (Tapered Roller)



40250069

Fig. 61-19 - Check Swashplate End Play (Tapered Roller)

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Major Repair - Variable Pump (Continued)



Fig. 61-20 - Trunnion Cover Components (Tapered Roller)



Fig. 61-21 - Torque Trunnion Cover Screws



Fig. 61-22 - Install Shaft Bearing Retaining Ring



Fig. 61-23 - Install Shaft and Bearing into Housing



Fig. 61-24 - Install Shaft Seal Cover



Fig. 61-25 - Install Thrust Plate



Fig. 61-26 - Install Piston Assemblies into Cylinder Block



Fig. 61-27 - Install Cylinder Block Kit

Using an arbor press, press a new seal into the trunnion seal cover. Be careful not to damage the seal.

For units with tapered roller type swashplate bearings, install the the trunnion shims into the housing next to the swashplate bearing cups, and retain with petroleum jelly. Locate the shims so that there is no more than 0.20 mm (0.008 in.) difference in shim thickness from one side of the swashplate to the other. Install the trunnion bearing spacers.

Install the O-rings and trunnion covers, as described in the “Minor Repair” section of the Service Manual. Install new hex head screws and torque to 15 to 20 Nm (11 to 15 ft.lbsf.).

NOTE: When units with tapered roller type swashplate bearings are properly assembled, a torque of 0.56 to 2.26 Nm (5 to 20 lbsf•in) will be required to rotate the swashplate.

Using caution to not damage the sealing surface, press the ball bearing onto the drive shaft. Install the bearing retaining ring onto the shaft.

Install the drive shaft and bearing into the housing.

Install the input shaft seal, seal cover, and O-ring, as described in the “Minor Repair” section of the Service Manual. Install the retaining ring.

Coat the thrust plate with petroleum jelly and install onto the swashplate. The thrust plate is reversible.

Assemble the piston assemblies into the slipper guide. Lubricate the pistons and cylinder block bores. Install the assembled guide and pistons into the cylinder block by inserting the piston assemblies into the cylinder block bores. The pistons and bores are not selectively fitted, therefore no specific piston and bore orientation is required.

Lay the pump housing on its side and install the cylinder block kit into the housing.

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Major Repair - Variable Pump (Continued)

Install the valve plate locating pin into the end cap.

Coat the back (steel side) of the valve plate with petroleum jelly to hold it in position, and install the valve plate onto the end cap , with the bronze face visible. The notch on the valve plate must engage the locating pin. Be certain the correct valve plate is installed on the end cap for the pump rotation and configuration. Refer to the appropriate Service Parts Manual for more information.



Fig. 61-28 - Install Valve Plate Pin



Fig. 61-29 - Install Valve Plate



c c w **c w**

Fig. 61-30 - Pump Valve Plates

Install the two (2) alignment pins, and install a new gasket onto the housing .

Install the end cap (with valve plate installed) onto the housing, aligning the marks made at disassembly.

When the end cap is properly installed, the cylinder block spring will hold the end cap away from the housing approximately 3 mm (1/8 in.).

Install the four (4) screws and washers that retain the housing to the end cap and torque evenly to 61 to 73 Nm (45 to 54 lbsf•ft).

CAUTION

Be certain all parts are properly aligned. Do not force the end cap into position on the housing.

Rotate the shaft to assure correct assembly. When properly assembled, a maximum torque of 9.5 Nm (7 lbsf•ft) should be required to turn the shaft.

Assemble the following components as described in the “Minor Repair” section:

- Auxiliary Mounting Pad Coupling and Cover
- Easy-Ride Valves
- Charge Relief Valve
- Charge Check / High Pressure Relief Valves



Fig. 61-31 - Install End Cap Gasket and End Cap



Fig. 61-32 - End Cap Installed

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Notes

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Major Repair - Tandem Pump

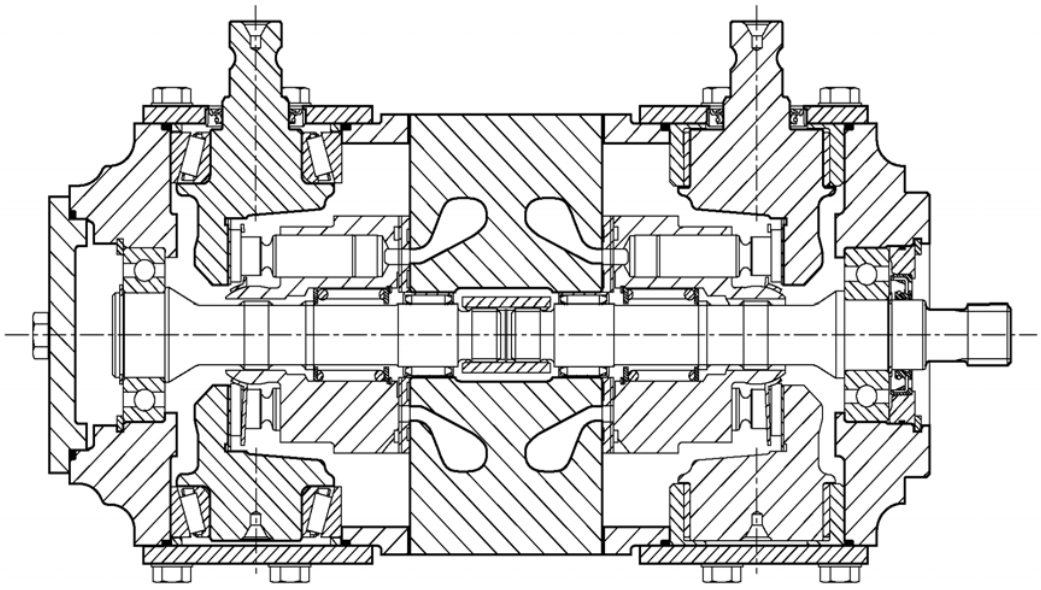
General

The following procedures are for the complete disassembly and reassembly (Major Repair) of the Series 40 - M25 Tandem Pump.

Cleanliness is a primary means of assuring satisfactory hydraulic pump life, on either new or repaired units. Cleaning parts by using a clean solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals. Protect all exposed sealing surfaces and open cavities from damage and foreign material.

During the assembly of the Series 40 - M25 tandem pump, all surfaces which have relative motion between two parts should be coated with a film of clean hydraulic oil. This will assure that these surfaces will be lubricated during start-up.

It is recommended that all O-rings and gaskets be replaced. Lightly lubricate all O-rings with clean petroleum jelly prior to assembly. All gasket sealing surfaces must be cleaned prior to installing new gaskets.



With Tapered Roller Trunnion Bearings With Journal Trunnion Bearings

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Fig. 62-1 - Cross Section View of Series 40 - M25 Variable Displacement Tandem Pump

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Major Repair - Tandem Pump (Continued)

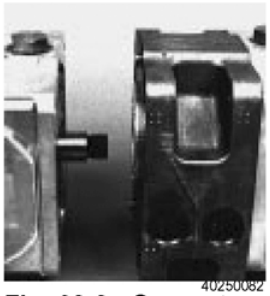


Fig. 62-2 - Separate Front Housing from Center Section

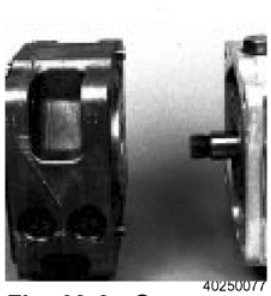


Fig. 62-3 - Separate Rear Housing from Center Section

Disassembly Procedures for Tandem Pump

Prior to performing Major Repairs on the Series 40 - M25 Tandem Pump, remove the external components as described in the “Minor Repair” section. These include the following:

- Auxiliary Mounting Pad Cover
- Charge Relief Valve
- Charge Check / High Pressure Relief Valves

After removal of these components, mark the location of the pump housings and center section, and remove the four (4) screws (using a 5/8" hex wrench) and washers which retain each pump housing to the center section.

Remove the housings from the center section and valve plates. Do not allow the valve plates to fall from the center section. Remove the gaskets and alignment pins from the center section.

Once the pump sections are removed from the center section, they may be disassembled using the procedures outlined in the "Major Repair - Variable Pump" section of this manual. The center section serves as the end cap for both pump sections.

NOTE: A drive shaft seal cover assembly is used only on the front pump section. The rear pump section shaft bearing is held in the housing with a retaining ring only.

Reconditioning and Replacement of Parts

The following procedures apply to the tandem pump center section:

Inspect the needle bearings and drive coupling in the center section. If replacement is necessary, remove the shaft needle bearings using a suitable puller. Do not damage the valve plate surface of the end cap. Remove the drive coupling located between the bearings.

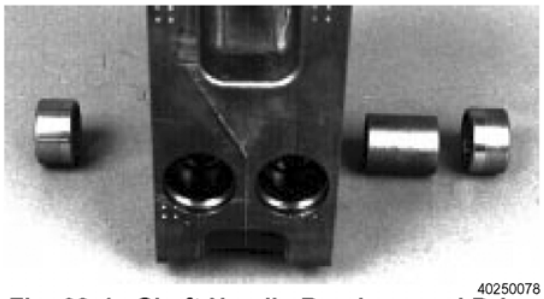


Fig. 62-4 - Shaft Needle Bearings and Drive Coupling Removed (Tandem Pump)

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Major Repair - Tandem Pump (Continued)

Press a new needle bearing into the center section using a suitable press pin. When installed correctly, the bearing cage will protrude from 2.0 to 2.5 mm (0.08 to 0.10 in.) from the surface of the center section to serve as a pilot for the valve plate.

CAUTION

When installing the needle bearing, the printed (numbered) end of the bearing cage must face the press pin.

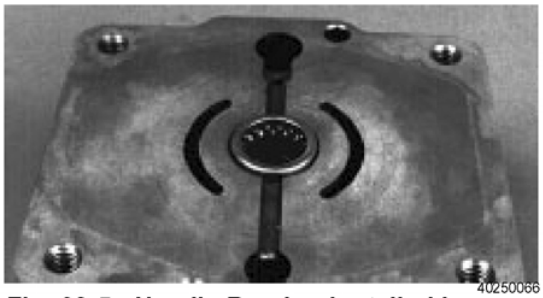


Fig. 62-5 - Needle Bearing Installed in Center Section (Tandem Pump)

Install the drive coupling into the center section. Install the second needle bearing into the center section, following the procedure outlined above.



Fig. 62-6 - Drive Coupling in place in Center Section for Installation of Second Needle Bearing (Tandem Pump)

Assembly Procedures for Tandem Pump

Clean and lightly oil parts prior to assembly of the pump. Be sure to torque all threaded parts to recommended torque levels.

CAUTION

Most parts have critical, high tolerance surfaces. Caution must be exercised to prevent damage to these surfaces during assembly. Protect exposed surfaces, openings, and ports from damage and foreign material.

Assemble the swashplate, swashplate bearings, drive shaft, and cylinder block of each pump section using the procedures outlined in the "Major Repair - Variable Displacement Pump" section of this manual.

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Major Repair - Tandem Pump (Continued)



Fig. 62-7 - Install Valve Plate Pins



Fig. 62-8 - Install Valve Plate

Install the valve plate locating pins into the center section.

Coat the back (steel side) of the valve plates with petroleum jelly to hold them in position, and install the valve plates onto the center section , with the bronze face visible. The notch on the valve plate must engage the locating pin. Be certain the correct valve plate is installed on the center section for each pump section. Refer to the appropriate Service Parts Manual for more information.

Since the tandem pump sections are mounted "back-to-back," each section will have a different valve plate installed. A "clockwise" (CW) rotation unit will have a "clockwise" (CW) valve plate installed in the front section, and a "counterclockwise" (CCW) valve plate installed in the rear section. A "counterclockwise" (CCW) rotation unit will have a "counterclockwise" (CCW) valve plate installed in the front section, and a "clockwise" (CW) valve plate installed in the rear section.



Fig. 62-9 - Pump Valve Plates

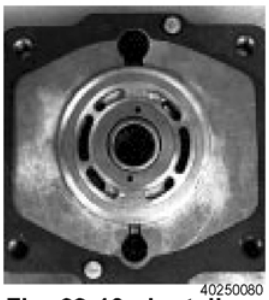


Fig. 62-10 - Install Center Section Gasket



Fig. 62-11 - Assemble Rear Pump Section to Center Section

Install the four (4) alignment pins in the center section. Install a new rear pump housing gasket.

Assemble the rear pump section onto the center section (with valve plate installed). Align the drive coupling splines while assembling.

NOTE: The charge pressure supply port and system ports "C" and "D" on the center section are located next to the rear pump section.

When the sections are properly assembled, the cylinder block spring will hold the center section away from the housing approximately 3 mm (1/8 in.).

Install the four (4) screws and washers that retain the rear housing to the center section and torque evenly to 61 to 73 Nm (45 to 54 lbsf•ft).

CAUTION

Be certain all parts are properly aligned Do not force the center section or housing into position.

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Major Repair - Tandem Pump (Continued)

Install a new front pump housing gasket, and assemble the front pump section onto the assembled center and rear section. Align the drive coupling splines while assembling.

When the sections are properly assembled, the cylinder block spring will hold the center section away from the housing approximately 3 mm (1/8 in.).

Install the four (4) screws and washers that retain the front housing to the center section and torque evenly to 61 to 73 Nm (45 to 54 lbsf•ft).

Rotate the shaft to assure correct assembly. When properly assembled, a maximum torque of 9.5 Nm (7 lbsf•ft) should be required to turn the shaft.

Assemble the following components as described in the “Minor Repair” section:

- Auxiliary Mounting Pad Cover
- Charge Relief Valve
- Charge Check / High Pressure Relief Valves



Fig. 62-12 - Front Pump Section Assembled to Center Section



Fig. 62-13 - Torque Housing Screws

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Notes

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Major Repair - Fixed Motor

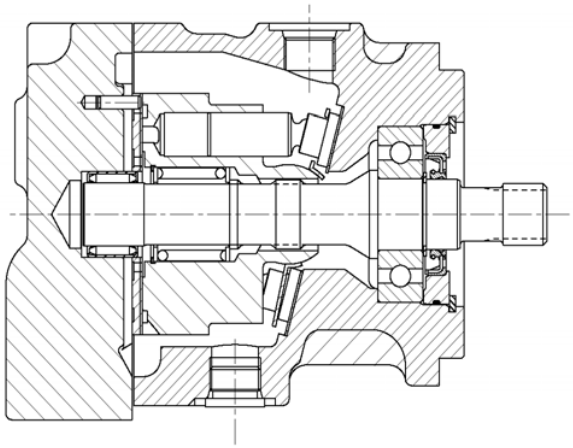
General

The following procedures are for the complete disassembly and reassembly (Major Repair) of the Series 40 - M25 Fixed Motor.

Cleanliness is a primary means of assuring satisfactory hydraulic pump life, on either new or repaired units. Cleaning parts by using a clean solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals. Protect all exposed sealing surfaces and open cavities from damage and foreign material.

During the assembly of the Series 40 - M25 fixed motor, all surfaces which have relative motion between two parts should be coated with a film of clean hydraulic oil. This will assure that these surfaces will be lubricated during start-up.

It is recommended that all O-rings and gaskets be replaced. Lightly lubricate all O-rings with clean petroleum jelly prior to assembly. All gasket sealing surfaces must be cleaned prior to installing new gaskets.



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Cross Section View of Series 40 - M25 Fixed Displacement Motor

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Major Repair - Fixed Motor (Continued)

Disassembly Procedures for Fixed Motor

Prior to performing Major Repairs, remove the external components as described in the Minor Repair section.

Place the motor on a work surface with the end cap up. Remove the four (4) screws (item B41) that retain the end cap (item E01) to the housing (item G01 or item G02).

Remove the end cap with the valve plate (item B52). Do not allow the valve plate to fall from the end cap. Remove the gasket (item B37) from the housing.

Carefully remove the valve plate from the end cap. It may be necessary to pry the valve plate off with a small screwdriver. Remove the alignment sleeves (item B40) from the end cap or housing.

CAUTION

Caution must be exercised to prevent damage to the valve plate and end cap surfaces.

Lay the motor on its side and remove the cylinder block assembly (item B22) from the housing.

Remove the slipper guide (item B36) and the piston assemblies (item B32) from the cylinder block.

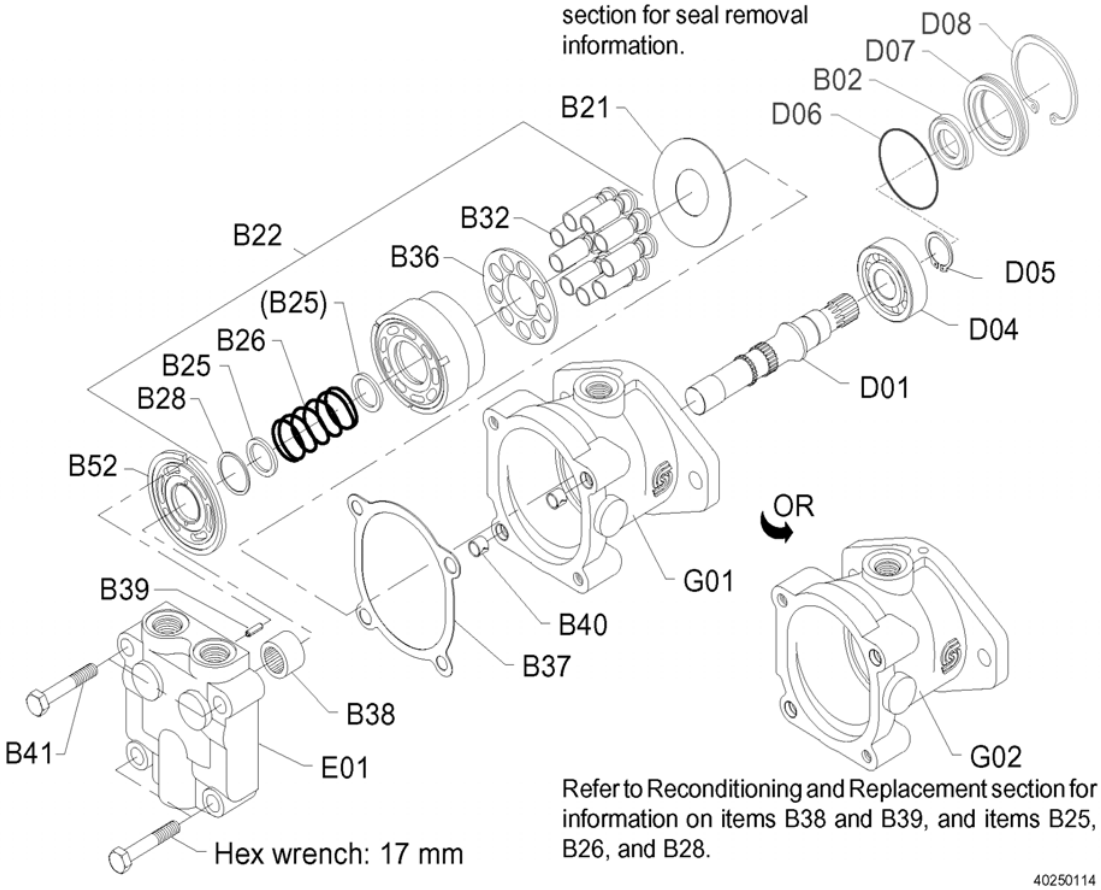
Using an O-ring pick or wire, remove the thrust plate (item B21) from the housing.

Remove the retaining ring (item D08) and remove the output shaft seal carrier (item D07) with the seal (item B02). Remove the O-ring (item D06) from the carrier. Press the old seal out of the carrier. Refer to the Minor Repair section for further information.

Slide the output shaft and bearing assembly out of the housing.

Remove the retaining ring (item D05) and press the output shaft (item D01) out of the bearing (item D04).

Refer to Minor Repair section for seal removal information.



Refer to Reconditioning and Replacement section for information on items B38 and B39, and items B25, B26, and B28.

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Major Repair - Fixed Motor (Continued)

Reconditioning and Replacement of Parts

Inspect all parts for damage, nicks, or unusual wear patterns. Replace all parts having unusual or excessive wear or discoloration.

Cracks are not allowed in any surface of the valve plate (item B52) or cylinder block. The running and sealing surfaces of the valve plate and cylinder block must be flat and free of nicks and burrs. Replace valve plates or cylinder blocks that show evidence of metal transfer, wear, or erosion on the running surface.

If scratches, which can be felt with a fingernail or pencil lead, are found on the bronze surface of the valve plate or the running surface of the cylinder block, polish or replace the parts.

Remove the valve plate locating spring pin (item B39) if necessary. Press a new valve plate pin into the end cap until it protrudes from the machined surface of the end cap as indicated.

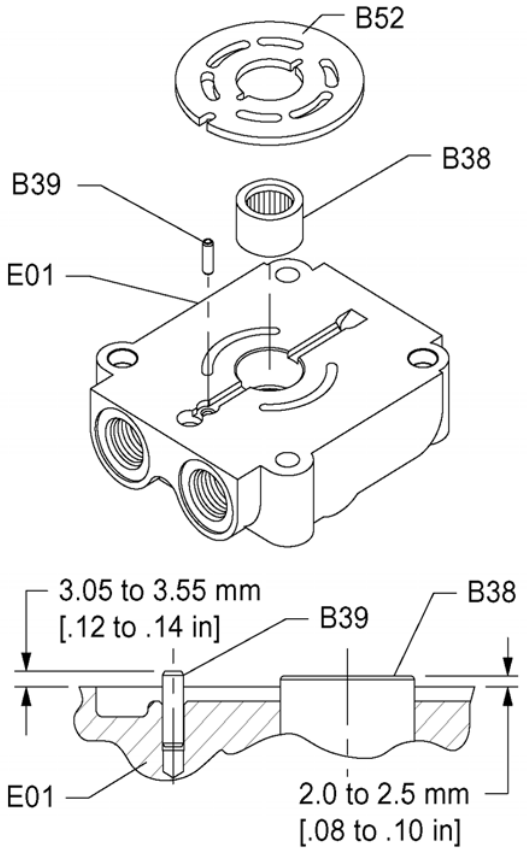
Inspect the needle bearing (item B38) in the end cap (item E01). If replacement is necessary, remove the shaft needle bearing using a suitable puller. Do not damage the valve plate surface of the end cap.

Press a new needle bearing into the end cap using a suitable press pin. When installed correctly, the bearing cage will protrude from the machined surface of the end cap as indicated to serve as a pilot for the valve plate.

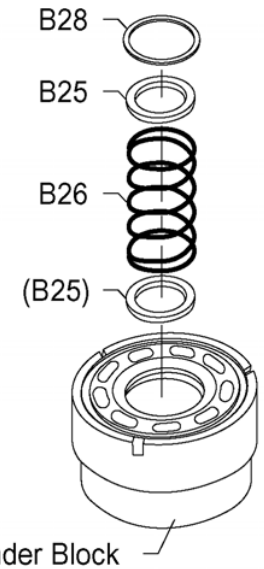
NOTE: When installing the needle bearing, the printed (numbered) end of the bearing cage should face the press pin.

Replace all piston assemblies if brass slippers are scored or excessively rounded at the edges.

Compress the cylinder block spring (item B26) and remove the spiral retaining ring (item B28), outer washer (item B25), spring, and inner washer. Reassemble in the reverse order.

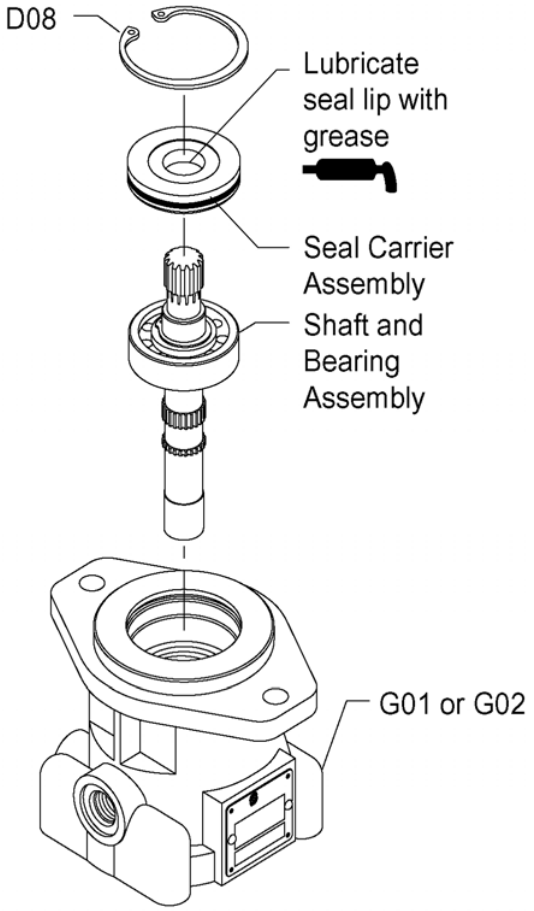


INSTALLED HEIGHT
OF ITEMS B38 & B39



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Major Repair - Fixed Motor (Continued)



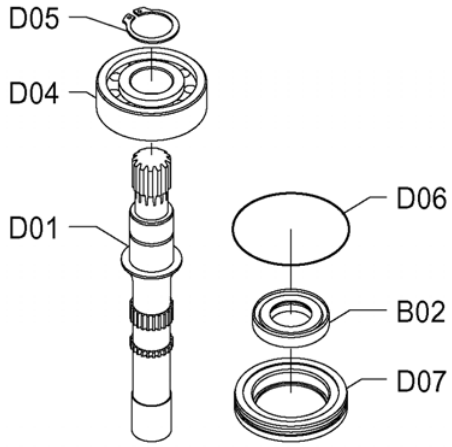
Assembly Procedures for Fixed Motor

Using caution to not damage the sealing surface, press the ball bearing (item D04) onto the output shaft (item D01). Install the bearing retaining ring (item D05) onto the shaft.

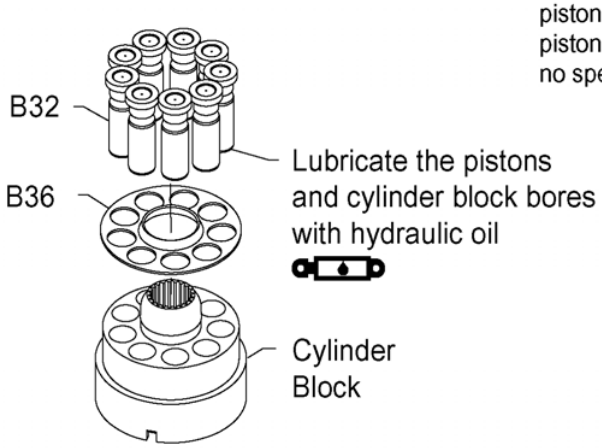
Install the output shaft and bearing into the housing (item G01 or item G02).

Install a new output shaft seal (item B02) into the seal carrier (item D07). Install a new O-ring (item D06) onto the seal carrier.

Install the seal carrier (with seal and O-ring) into the housing. PROTECT SEAL LIP FROM DAMAGE! Install the retaining ring (item D08). Refer to the Minor Repair section for further information.



Assemble the piston assemblies (item B32) into the slipper retainer (item B36). Lubricate the pistons and cylinder block bores. Install the assembled retainer and pistons onto the cylinder block by inserting the piston assemblies into the cylinder block bores. The pistons and bores are not selectively fitted, therefore no specific piston and bore orientation is required.



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Major Repair - Fixed Motor (Continued)

The thrust plate (item B21) is reversible. Coat one (1) side of the thrust plate with grease or petroleum jelly to retain it in the motor housing, and install into the housing.

Lay the motor housing on its side and install the assembled cylinder block kit into the housing.

Coat the back (steel side) of the valve plate (item B52) with petroleum jelly or grease to hold it in position, and install the valve plate onto the end cap (item E01), with the bronze face visible. The notch on the valve plate must engage the locating pin (item B39). The motor valve plate is a bi-directional valve plate.

Install the two (2) alignment sleeves (item B40), and install a new gasket (item B37) onto the housing .

Install the end cap (with valve plate installed) onto the housing.

When the end cap is properly installed, the cylinder block spring will hold the end cap away from the housing approximately 3 mm (1/8 in.).

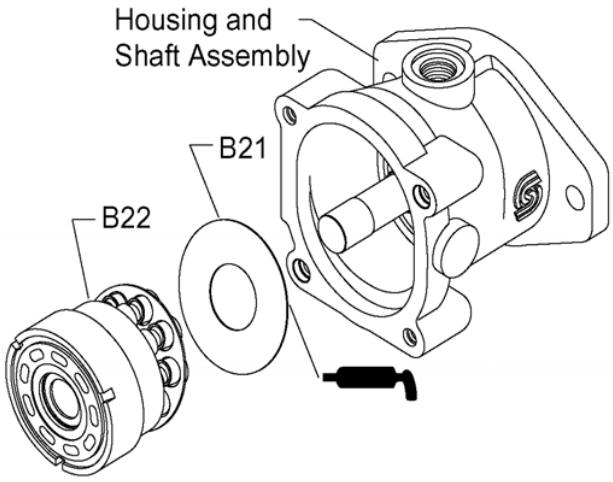
Install the four (4) screws (item B41) that retain the end cap to the housing and torque evenly.

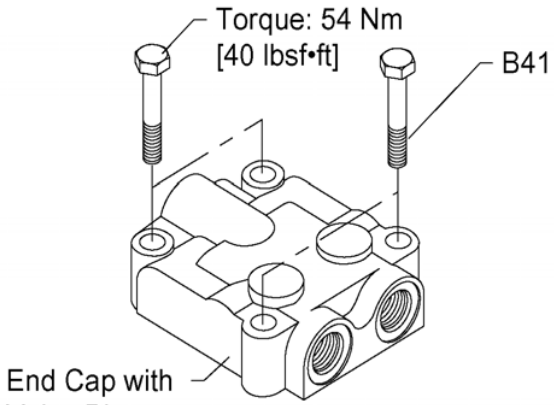
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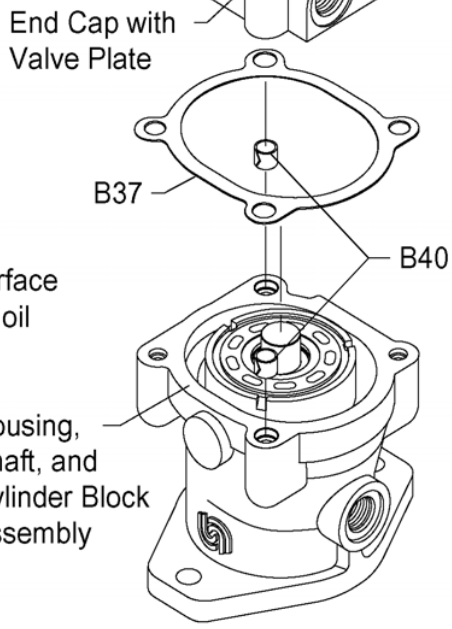
Be certain all parts are properly aligned. Do not force the end cap into position on the housing.

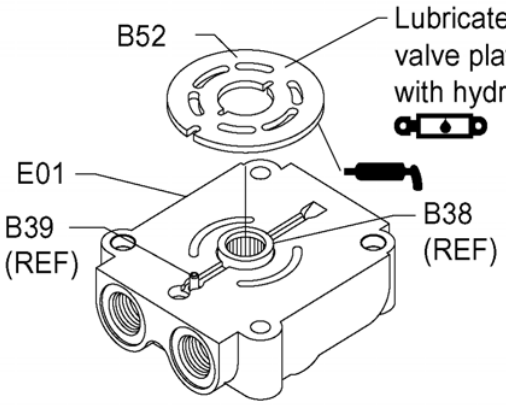
Rotate the shaft to assure correct assembly. When properly assembled, a maximum torque of 9.5 Nm (7 lbsf•ft) should be required to turn the shaft.

Assemble the external components as described in the Minor Repair section.









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Notes

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Major Repair - "U" Style Transmission

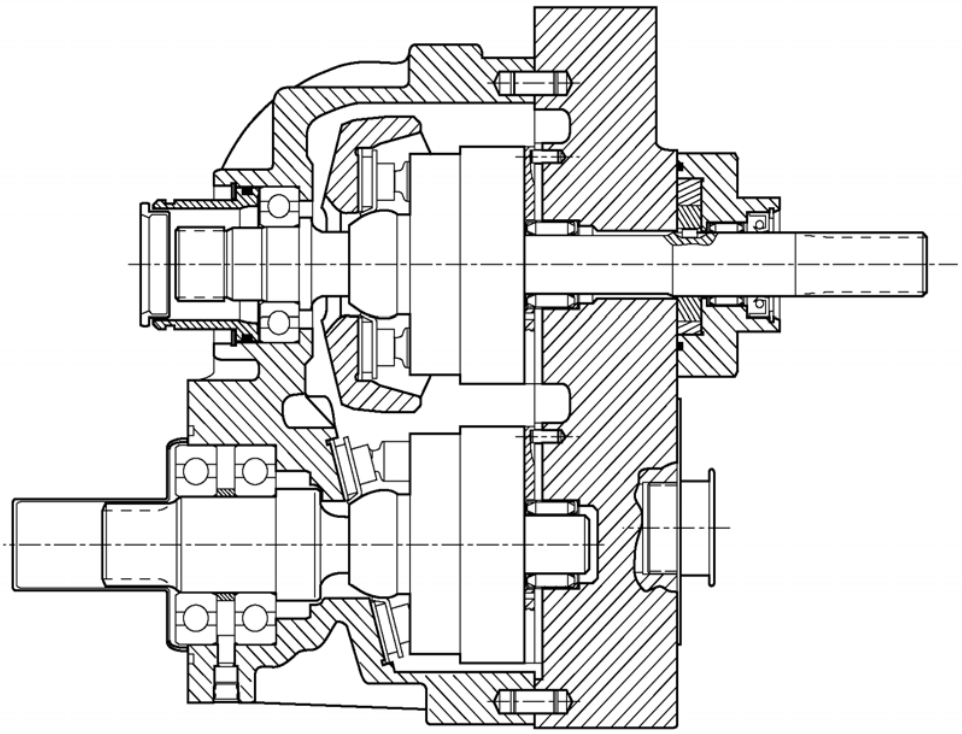
General

The procedures on the following pages are for the complete disassembly and reassembly (Major Repair) of the Series 40 - M25 "U" Style Transmission.

Cleanliness is a primary means of assuring satisfactory transmission life, on either new or repaired units. Cleaning parts by using a clean solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals. Protect all exposed sealing surfaces and open cavities from damage and foreign material.

During the assembly of the Series 40 - M25U transmission, all surfaces which have relative motion between two parts should be coated with a film of clean hydraulic oil. This will assure that these surfaces will be lubricated during start-up.

It is recommended that all gaskets and O-rings be replaced. Lightly lubricate all O-rings with clean petroleum jelly prior to assembly. All gasket sealing surfaces must be cleaned prior to installing new gaskets.



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Fig. 65-1 - Cross Section View of Series 40 - M25 "U" Style Transmission

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Major Repair - "U" Style Transmission (Continued)

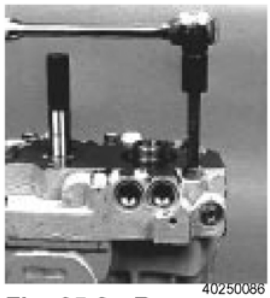


Fig. 65-2 - Remove Center Section Screws

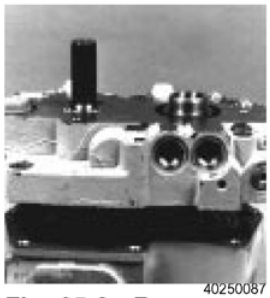


Fig. 65-2 - Remove Center Section and Valve Plates

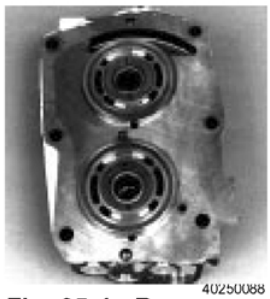


Fig. 65-4 - Remove Valve Plates from Center Section



Fig. 65-5 - Remove Valve Plate Pins



Fig. 65-6 - Remove Cylinder Blocks from Housing



Fig. 65-7 - Cylinder Block Kit Components

Disassembly Procedures for "U" Style Transmission

Prior to performing Major Repairs on the Series 40 - M25U transmission, remove the external components as described in the "Minor Repair" section of this manual. These include the following:

- Charge Check / High Pressure Relief Valves
- Charge Relief Valve
- Heat Exchanger Bypass Valve
- Filter Bypass Valve
- Filter Bypass Reverse Flow Check Valve
- Charge Pump

Remove the six (6) screws (using a 5/8" hex wrench and a 3/8" internal hex wrench) which retain the center section to the housing. Note the positions of the longer and shorter screws.

The cylinder block springs will separate the center section from the housing. Remove the center section from the housing.

CAUTION

The pump and motor cylinder blocks may stick to the valve plates and center section. Exercise caution to prevent damage to the sealing surfaces.

Remove the gasket and two (2) alignment pins from the housing.

Carefully remove the valve plates from the center section. It may be necessary to pry the valve plates off with a small screwdriver. Remove the valve plate pins from the center section.

CAUTION

Caution must be exercised to prevent damage to the valve plate and center section surfaces.

Lay the transmission on its side and remove the motor cylinder block kit from the housing. Remove the pump cylinder block kit from the pump shaft.

Remove the slipper guide and the piston assemblies from the cylinder block kits.

NOTE: The pump and motor cylinder block kits are identical. In order to avoid mixing wear patterns, do not mix parts between the pump and motor kits.

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Major Repair - "U" Style Transmission (Continued)

Using an O-ring pick or wire, remove the thrust plates from the swashplate and housing.

Using a 3/16" internal hex wrench, remove the pipe plug over the motor shaft bearing retaining pin.



Fig. 65-8 - Remove Thrust Plates



Fig. 65-9 - Remove Pipe Plug

Using a 4-40 (#4, 40 threads per inch) or 8-32 (#8, 32 threads per inch) machine screw, remove the motor shaft bearing retaining pin from the housing.

Remove the motor shaft assembly.

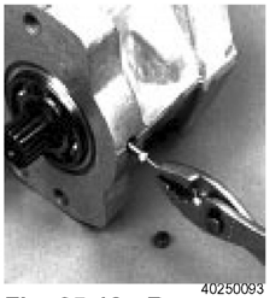


Fig. 65-10 - Remove Bearing Retaining Pin



Fig. 65-11 - Remove Motor Shaft Assembly

Press the motor shaft out of the bearings and spacer.



Fig. 65-12 - Components of Motor Shaft Assembly

Remove the spiral retaining ring and remove the PTO seal guide (with O-ring) from the housing.

Slide the pump shaft and bearing assembly from the housing. Press the shaft out of the bearing.



Fig. 65-13 - Remove PTO Seal Guide



Fig. 65-14 - Remove Pump Shaft and Bearing

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Major Repair - "U" Style Transmission (Continued)



Fig. 65-15 - Remove Trunnion Covers

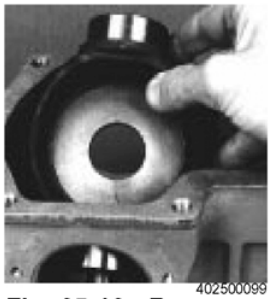


Fig. 65-16 - Remove Swashplate

With a 3/8" hex wrench, remove the tapping screws retaining the trunnion seal cover and trunnion cover to the housing. Mark the position of the covers for reassembly.

The trunnion seal cover assembly includes an O-ring, lip seal, and trunnion bearing on the control side. The trunnion cover assembly includes an O-ring and trunnion bearing on the side opposite the control. Remove these parts from the housing.

Tilt and remove the swashplate from the housing.

Reconditioning and Replacement of Parts

After disassembly all parts should be thoroughly cleaned in a suitable solvent. Replace all O-rings, gaskets, and seals.

Inspect all parts for damage, nicks, or unusual wear patterns. Replace all parts having unusual or excessive wear or discoloration.

Cracks are not allowed in any surface of the valve plates or cylinder blocks. The running and sealing surfaces of the valve plates and cylinder blocks must be flat and free of nicks and burrs. Replace valve plates or cylinder blocks that show evidence of metal transfer, wear, or erosion on the running surface.

If scratches, which can be felt with a fingernail or pencil lead, are found on the bronze surface of the valve plates or the running surface of the cylinder blocks, polish or replace the parts.

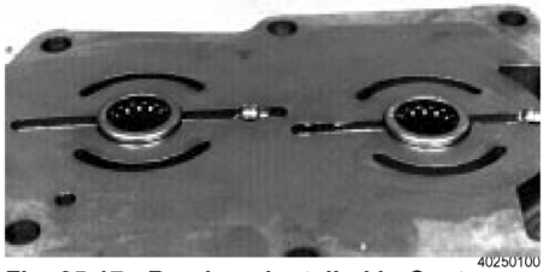


Fig. 65-17 - Bearings Installed in Center Section

Inspect the needle bearings in the center section. If replacement is necessary, remove the shaft needle bearings using a suitable puller. Do not damage the Press new needle bearings into the center section using a suitable press pin. When installed correctly, the bearing cage will protrude from 2.3 to 2.8 mm (0.09 to 0.11 in.) from the surface of the center section to serve as pilots for the valve plates.

CAUTION

When installing the needle bearing, the printed (numbered) end of the bearing cage must face the press pin.

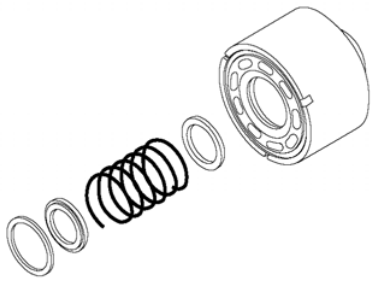


Fig. 65-18 - Cylinder Block Spring Components

Replace all piston assemblies if brass slippers are scored or excessively rounded at the edges

Compress the cylinder block spring and remove the spiral retaining ring, outer washer, spring, and inner washer. Reassemble in the reverse order.

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Major Repair - "U" Style Transmission (Continued)

Assembly Procedures for "U" Style Transmission

Clean and lightly oil parts prior to assembly of the motor. Be sure to torque all threaded parts to recommended torque levels.

CAUTION

Most parts have critical, high tolerance surfaces. Caution must be exercised to prevent damage to these surfaces during assembly. Protect exposed surfaces, openings, and ports from damage and foreign material.

Install the swashplate into the housing. Make sure the swashplate control shaft is located on the desired side of the housing (note the marks made during disassembly).

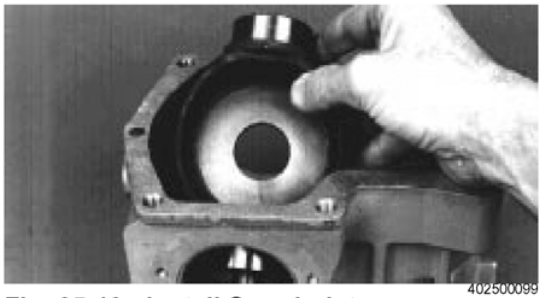


Fig. 65-19 - Install Swashplate

Install the trunnion cover (with O-ring and trunnion bearing) into the housing and over the swashplate trunnion.

NOTE: The trunnion bearings are pressed into the cover assemblies so the split in each bearing will be located closest to the center section.

Using an arbor press, press a new seal into the trunnion seal cover. The outer face of the seal should be pressed flush with the outer surface of the seal cover. Be careful not to damage the seal.

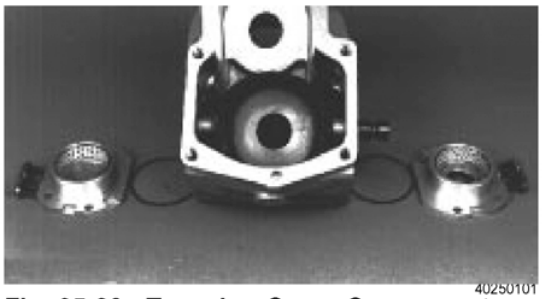


Fig. 65-20 - Trunnion Cover Components

Install the trunnion seal cover (with O-ring, seal, and trunnion bearing) into the housing and over the swashplate trunnion, as described in the "Minor Repair" section of the Service Manual. Wrap the end of the swashplate control shaft with thin plastic to prevent damage to the seal lip during installation.

Install the hex head tapping screws and torque to 8 to 12 Nm (6 to 9 lbsf•ft).



Fig. 65-21 - Install Trunnion Seal Cover



Fig. 65-22 - Torque Trunnion Cover Screws

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Major Repair - "U" Style Transmission (Continued)



Fig. 65-23 - Install Pump Shaft and Bearing



Fig. 65-24 - PTO Seal Guide Installed

Press the ball bearing onto the pump shaft. Install the pump shaft and bearing assembly into the housing.

Install the PTO seal guide and O-ring into the housing. Install the spiral retaining ring.

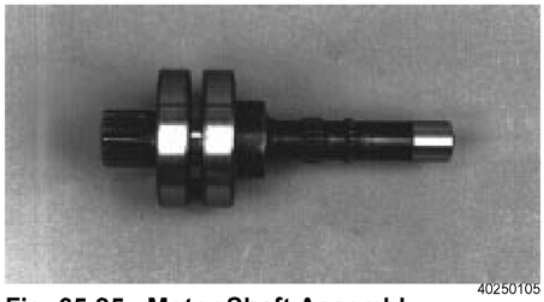


Fig. 65-25 - Motor Shaft Assembly

Press the inner bearing, spacer, and outer bearing onto the motor shaft



Fig. 65-26 - Install Motor Shaft Assembly

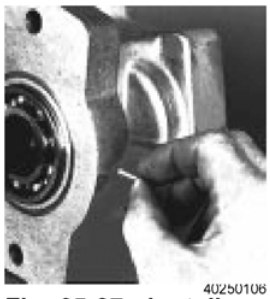


Fig. 65-27 - Install Bearing Retaining Pin

Install the motor shaft assembly into the housing.

Install the motor shaft bearing retaining pin into the housing.



Fig. 65-28 - Install Pipe Plug



Fig. 65-29 - Install Thrust Plates

Install the pipe plug over the motor shaft bearing retaining pin, and torque to 11 to 13 Nm (6 to 10 lbsf•ft).

Coat the thrust plates with petroleum jelly and install into the housing and swashplate. The thrust plates are reversible.

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Major Repair - "U" Style Transmission (Continued)

Assemble each cylinder block kit by installing the piston assemblies into the slipper guide. Lubricate the pistons and cylinder block bores. Install the assembled guide and pistons into the cylinder block by inserting the piston assemblies into the cylinder block bores. The pistons and bores are not selectively fitted, therefore no specific piston and bore orientation is required.

Lay the transmission housing on its side and install the cylinder block kits into the housing.

Place the transmission housing on a work surface with the center section opening up.

Install the valve plate locating pins into the center section.

Coat the back (steel side) of the valve plates with petroleum jelly to hold them in position and install the valve plates onto the center section, with their bronze faces visible. The notch on each valve plate must engage its locating pin.



Fig. 65-30 - Install Piston Assemblies into Cylinder Block



Fig. 65-31 - Install Cylinder Block Kits



Fig. 65-32 - Install Valve Plate Pins

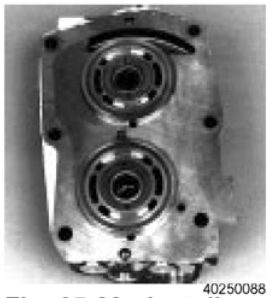


Fig. 65-33 - Install Pump and Motor Valve Plates

A transmission set up for "clockwise" (CW) pump rotation will have a "clockwise" (CW) pump valve plate installed. A "counterclockwise" (CCW) rotation unit will have a "counterclockwise" (CCW) pump valve plate installed. Be certain the proper valve plate is used for the transmission input rotation. Refer to the appropriate Service Parts Manual for more information.

NOTE: Since the pump cylinder block kit is located to the rear of the center section, the appearance of the valve plate will be similiar to that of the valve plate for the **rear** section of a tandem pump of the same rotation.

The motor valve plate is a bi-directional valve plate.



Fig. 65-34 - Pump Valve Plates



Fig. 65-35 - Motor Valve Plate

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Major Repair - "U" Style Transmission (Continued)

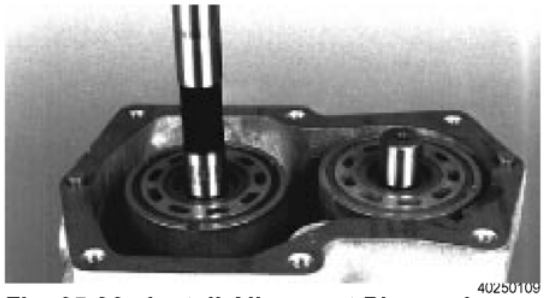


Fig. 65-36 - Install Alignment Pins and Center Section Gasket

Install the two (2) alignment pins, and install a new center section gasket onto the housing.

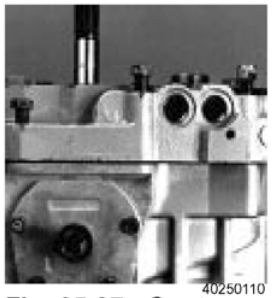


Fig. 65-37 - Center Section Installed

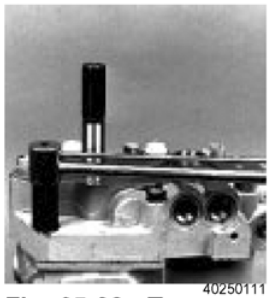


Fig. 65-38 - Torque Center Section Screws

Install the center section with valve plates onto the transmission housing.

CAUTION

Be certain all parts are properly aligned Do not force the center section into position on the housing.

When the center section is properly installed, the cylinder block springs will hold the end center section away from the housing approximately 3 mm (1/8 in.).

Install the six (6) screws that retain the center section to the housing and torque evenly to 45 to 55 Nm (33 to 41 lbsf•ft).

Rotate the pump and motor shafts to assure correct assembly. When properly assembled, a maximum torque of 4.7 Nm (3.5 lbsf•ft) should be required to turn either shaft.

Assemble the following components as described in the "Minor Repair" section of this manual:

- Charge Check / High Pressure Relief Valves
- Charge Relief Valve
- Heat Exchanger Bypass Valve
- Filter Bypass Valve
- Filter Bypass Reverse Flow Check Valve
- Charge Pump

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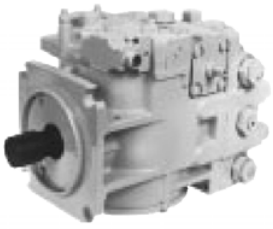
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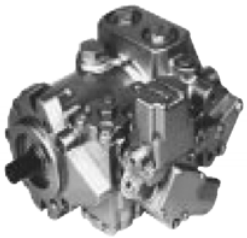
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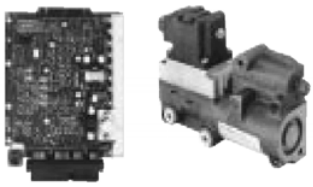
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7.5 Axle DANA 172

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DANA

maintenance and repair INSTRUCTION MANUAL

MANUALE D'ISTRUZIONE E RIPARAZIONE
WARTUNG UND REPARATURANLEITUNG
MANUAL DE MANUTENCION Y REPARACION
MANUAL ENTRETIEN ET REPARATION

DRIVE AXLE TYPE

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INTRODUZIONE

Il rendimento e la continuità degli organi meccanici dipendono oltre che da una costante e corretta manutenzione anche dal tempestivo intervento, nell'eventualità di guasti o anomalie.
Nel proporre questo manuale si è considerata l'ipotesi di una revisione generale del gruppo ma è il meccanico a valutare la necessità o meno di smontare i singoli componenti nel caso di riparazione.
Il manuale è una guida rapida e sicura che consente interventi precisi, tramite le fotografie ed i disegni prospettici che illustrano le varie fasi delle operazioni.
Di seguito sono riportate tutte quelle informazioni ed avvertenze necessarie al corretto disassemblaggio, alle relative verifiche ed all'assemblaggio dei singoli componenti.
Per la rimozione del ponte differenziale dal veicolo, è necessario consultare i manuali forniti a tal proposito dal costruttore del veicolo stesso. Nel descrivere le operazioni seguenti, si presuppone che il ponte sia già rimosso dal veicolo.

IMPORTANTE: In tutte le operazioni, è consigliabile usare attrezzature idonee quali cavalletti o banchi di sostegno, martelli in plastica o rame, leve appropriate, estrattori e chiavi specifiche, al fine di facilitare il lavoro salvaguardando nel contempo le superfici lavorate e la sicurezza degli operatori stessi.
Prima di procedere al disassemblaggio delle parti è opportuno effettuare una accurata pulizia del ponte, togliendo incrostazioni ed accumuli di grasso, quindi scaricare l'olio.

PREMESSA

Tutti gli organi meccanici smontati, devono essere accuratamente puliti con prodotti appropriati, quindi ripristinati o sostituiti nel caso presentino danni, usura, incrinature, grippaggi, ecc.
In particolare, verificare l'integrità di tutte quelle parti in movimento (cuscinetti, ingranaggi, coppia conica, alberi) e di tenuta (anelli OR, paraoli), soggette a maggiori sollecitazioni ed usura. È consigliabile, comunque, la sostituzione degli organi di tenuta ogni qualvolta si proceda alla revisione o riparazione dei componenti. Al momento del montaggio, gli anelli di tenuta devono essere lubrificati sui bordi di tenuta.
Nel caso della coppia conica, la sostituzione di uno dei suoi ingranaggi comporta anche la sostituzione dell'altro.
In fase di montaggio sono da rispettare scrupolosamente i giochi ed i precarichi prescritti.

MANUTENZIONE E RIPARAZIONE

Al fine di facilitare interventi sui gruppi ponti differenziali e cambi di velocità CLARK-HURTH Components, abbiamo ritenuto opportuno compilare queste istruzioni di manutenzione e riparazione.
I disegni delle attrezzature specifiche eventualmente necessarie per l'esecuzione di interventi di manutenzione e riparazione possono essere acquistati direttamente da noi: i ricambi possono essere ordinati tramite il costruttore della macchina o direttamente presso di noi.

EINFÜHRUNG

Leistung und Lebensdauer der Antriebselemente sind nicht nur von regelmässiger und ordnungsgemässer Wartung, sondern auch vom rechtzeitigen Eingreifen bei auftretenden Störungen oder Pannen abhängig.
Bei der Erstellung dieses Handbuches sind wir von einer vollständigen Überholung der Triebachse ausgegangen.
Es versteht sich, dass der Mechaniker selbst von Fall zu Fall den notwendigen Arbeitsgang wählt.
Dieses Handbuch ermöglicht während der Reparatur sicher und gezielt vorzugehen. Photos und Skizzen zeigen deutlich wie die Eingriffe vorzunehmen sind.
Nachstehend sind alle Informationen und Hinweise aufgeführt um den sachgemässen Aus- und Einbau der einzelnen Bestandteile sowie deren Überprüfung und eine korrekte Montage vornehmen zu können.
Für den Ausbau der Triebachse aus dem Fahrzeug müssen die entsprechenden Anweisungen des Fahrzeugsherstellers berücksichtigt werden. Wir gehen hier jedenfalls davon aus, daß sich die Triebachse bereits im ausgebauten, reparaturfähigen Zustand befindet.

WICHTIG: Bei allen Vorgängen ist es empfehlenswert geeignete Werkzeuge wie Stützen oder Werkbänke, Kunststoff- oder Kupferhammer, Abziehvorrichtungen und spezifische Schlüssel zu benützen um die Arbeit zu erleichtern und zu beschleunigen, sowie um bearbeitete Flächen zu schützen und, nicht zuletzt, zur Sicherheit des Monteurs.
Vor dem Ausbau die Triebachse gründlich reinigen, Verkrustungen und Fettanhäufungen entfernen, dann das Schmieröl ablassen.

VORAUSSETZUNG

Alle ausgebauten Antriebselemente müssen gründlich mit geeigneten Mitteln gereinigt, repariert bzw. ersetzt werden, wenn Beschädigungen wie Verschleißerscheinungen, Anrisse oder Freß-spuren festgestellt werden. Die Gleitelemente wie Lager, Nadelkäfige, Anlaufscheiben, die Zahnräder, das Kegel- u. Tellerradpaar, die Wellen, die Dichtelemente wie O-Ringe, die Wellendichtringe welche den Abnützungen besonders ausgesetzt sind, müssen ausführlichst überprüft werden.
Wir empfehlen die Dichtelemente bei jeder Reparatur oder Revision zu ersetzen.
Dichtringe sind vor der Montage einzufetten.
Kegel- und Tellerrad müssen gemeinsam ersetzt werden.
Beim Zusammenbau sind die vorgeschriebenen Werte für Spiele und Vorspannungen einzuhalten.

WARTUNG-UND REPARATUR

Um unseren Kunden die Reparatur von CLARK-HURTH Components Getrieben und- Triebachsen zu erleichtern, haben wir diese Wartungs-und Reparaturanleitung verfasst.
Die Zeichnungen der zur Reparatur erforderlichen, spezifischen Werkzeuge können über uns bezogen werden.
Ersatzteile können beim Hersteller des Fahrzeuges oder direkt bei uns bestellt werden.

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INTRODUCTION

Le rendement et la continuité du bon fonctionnement des organes mécaniques dépendent non seulement d'un entretien constant et correct mais aussi des interventions rapides, dans l'éventualité de pannes ou anomalies.
Ce manuel considere l'hypothèse d'une révision générale du groupe, mais le mécanicien doit évaluer la nécessité de démonter les différents composants dans le cas d'une réparation.
Le manuel est un guide rapide et fiable qui décrit des interventions précises, par l'intermédiaire de photographies et de dessins montrant les différentes phases des opérations.
Pour la dépose du pont différentiel du véhicule, il est nécessaire de consulter les manuels fournis à ce propos par le constructeur du véhicule.
Pour décrire les opérations suivantes, on supposera que le pont est déjà enlevé du véhicule.

IMPORTANT: Pour toutes les opérations il est conseillé d'utiliser l'outillage approprié tel que chevalets ou bancs de soutien, maillets en plastique ou en cuivre, leviers appropriés, extracteurs et clefs spéciales, afin de faciliter le travail, sauvegardant en même temps les surfaces usinées et la sécurite des opérateurs.
Avant de procéder au démontage des organes il est opportun de nettoyer soigneusement le pont, d'ôter les incrustations et les amas de graisse et de vider l'huile des carter.

PRELIMINAIRE

Tous les organes mécaniques démontés doivent être parfaitement nettoyés avec des produits appropriés, puis réparés ou remplacés s'il présentent des dommages, usures , criques, grippages, etc.
En particulier, vérifier l'intégrité de tous les organes en mouvement (roulements, engrenages, couples coniques, arbres), et d'étanchéité (O-Ring, joints) exposés aux plus grandes sollicitations et usures.
Il est conseillé de remplacer les organes d'étanchéité chaque fois que l'on procède à la révision ou à la réparation des composants.
Au moment du montage, les joints doîvent être lubrifiés sur les bords.
Dans le cas du couple conique, le remplacement de l'un de ces engrenages comporte aussi le remplacement de l'autre.
Au montage on doit respecter scrupuleusement les précharges et les jeux prescrits.

ENTRETIEN ET REPARATION

Pour faciliter les interventions sur les ponts différentiels et les boîtes de vitesses CLARK-HURTH Components, nous avons cru opportun d'établir ces instructions d'entretien et réparation.
Les dessins des outils spéciaux qui peuvent, éventuellement servir pour l'entretien ou la réparation, peuvent être achetés directement chez nous; les pièces de rechanges peuvent être commandées au constructeur de la machine ou directement chez nous.

INTRODUCTION

The efficiency and continued operation of mechanical units depends on constant and correct maintenance and also on efficient repair work should there be a break-down or malfunction.
The instructions in this manual have been made based on a complete overhaul of the unit. However the mechanic must decide whether or not it is necessary to dismantle the individual components when only partial repair work is needed.
The manual provides a quick and sure guide which, with the use of photographs and diagrams illustrating the various phases of the operations, allows accurate work to take place. Therefore all the information needed for correct disassembly, the relative checks and assembly of each individual component, has been written down.
In order to remove the differential unit from the vehicle, the manuals provided by the vehicle manufacturer should be consulted. In describing the following operations it is presumed that the unit has already been removed from the vehicle.

IMPORTANT: Throughout the phases of repair or maintenance work it is advisable to use proper equipment such as: trestles, or supporting benches, plastic or copper hammers, appropriate levers, extractors and specific spanners or wrenches. So that the work is facilitated and the working surfaces and the operators themselves are protected.
Before going on to disassemble the parts it is best to thoroughly clean the unit, removing any encrusted or accumulated greases and then drain the oil through the oil-draining plugs.

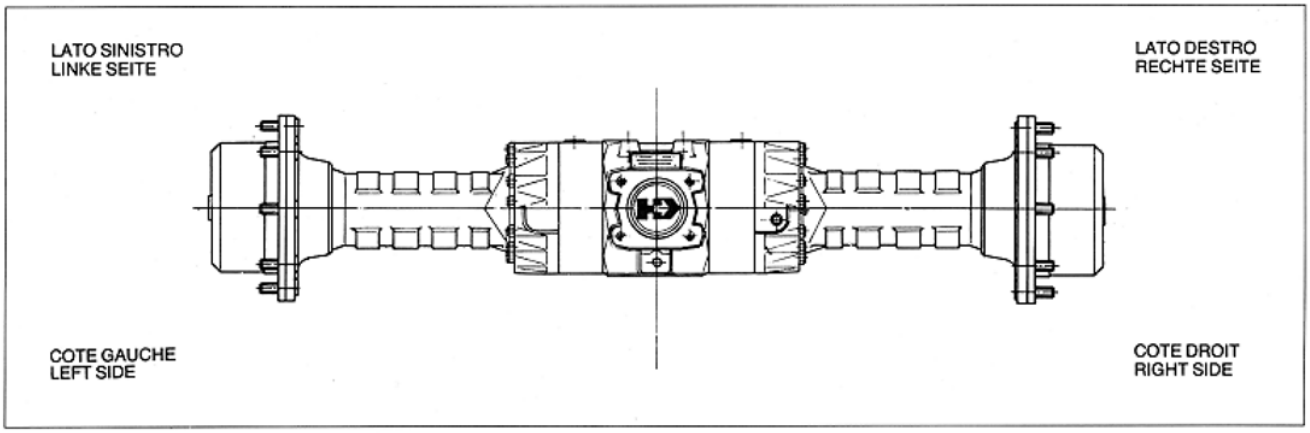
INTRODUCTORY STATEMENT

All the disassembled mechanical units should be thoroughly cleaned with appropriate products and then restored or replaced if damage, wear, craking or seizing have occurred. In particular, thoroughly check the state of all moving parts (bearings, gears, crown wheel and pinion, shafts) and sealing parts, (O-rings, oil shield) which are subject to major stress and wear. In any case it is advisable to replace the seals every time a component is overhauled or repaired. During assembly the sealing rings must be lubricated on the sealing edge. In the case of the crown wheel and pinion, replacement of one reguires the replacement of the other. During assembly the prescribed pre-loading and backlash of the parts must be maintained.

MAINTENANCE AND REPAIR

We have compiled these instructions for maintenance and repair in order to facilitate any such work on the CLARK-HURTH Components differential units and gear change units. Drawings necessary in order to carry out maintenance and repair work can be bought directly from us.
Spare parts can be ordered either through the manufacturer of the vehicle or directly from us.

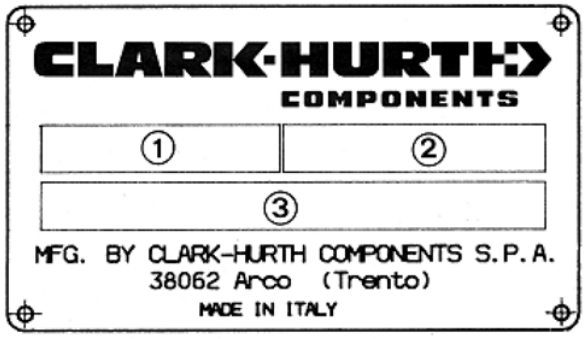
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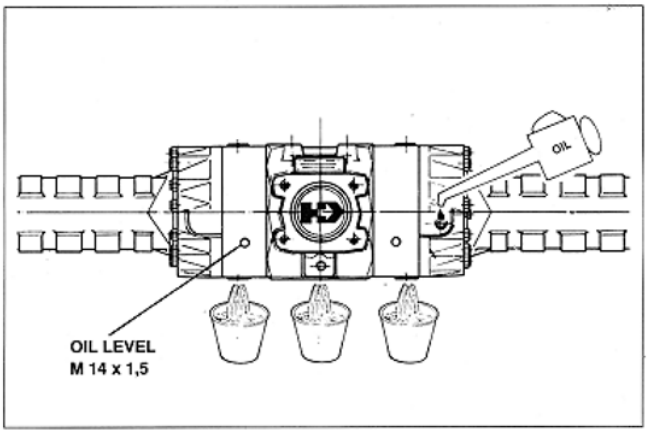


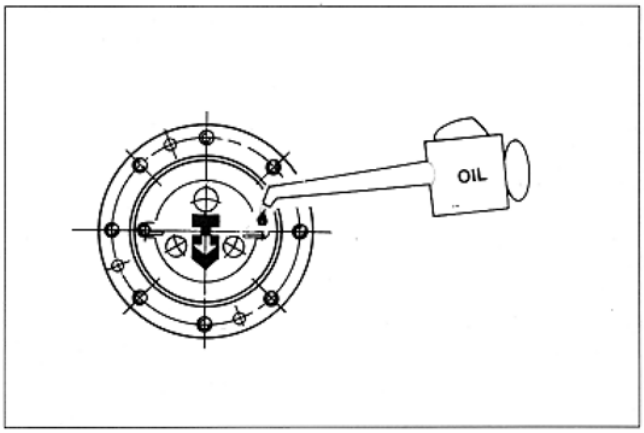
① Tipo e modello gruppo
Type und modell Antriebes
Type et modèle de ensemble
Type and model unit

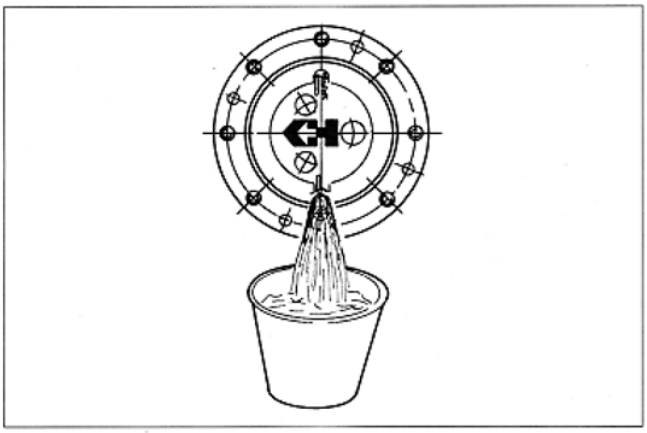
② Numero di matricola
Seriennummer
Numero de serie
Serial number

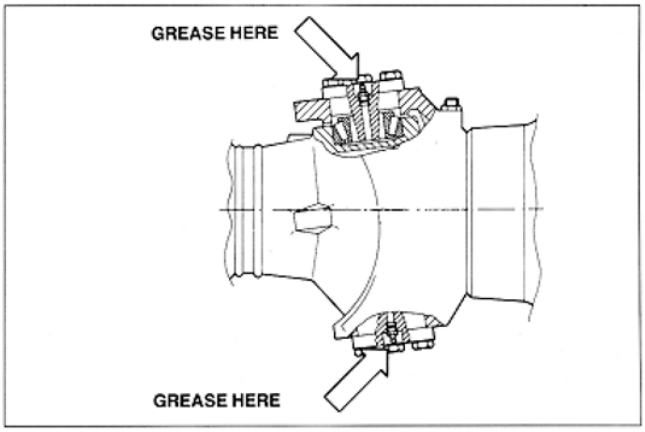
③ Lubrificante
Schmieroel
Lubrifiant
Lubricant









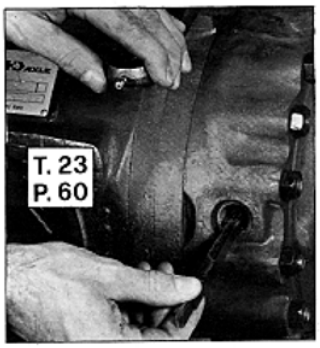


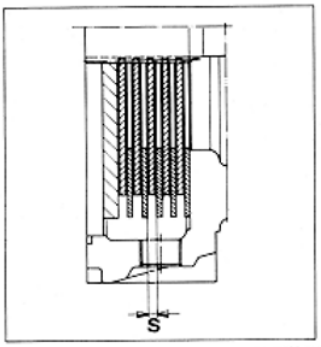
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OPERAZIONE *ARBEITSVORGANG* OPERATION *OPERATION*	PERIODICITÀ *ZEITABSTAND* PERIODICITE *PERIODICITY*	LUBRIFICANTI *SCHMIERSTOFFE* LUBRIFIANTS *LUBRICANT*
- Controllo livelli: differenziale riduzioni epicicloidali - *Ölstandkontrolle: im Differential* *in den Planetenabtrieben* - Contrôle niveaux: différentiel réducteurs épicycloidaux - *Check levels: differential* *planetary reduction*	mensile ogni 200 ore *monatlich* *alle 200 Std.* mensuel toutes les 200 heures *monthly* *every 200 hours*	SAE 85 W 90 API GL4 - MIL L-2105: Con additivi per freni a bagno d'olio. *Mit Zusätzen für im Ölbad laufende Lamellen benbremsen.* Avec additifs pour freins à bain d'huile. *With additives for oil immersed disc brakes.* SAE 85 W 90 API GL5 - MIL 2105-B: Per esecuzione con coppia conica ippoide e/o con differenziale autobloccante, con additivi per freni a bagno d'olio *Für Ausführung mit Hypoid Kegel-und Tellerradpaar und/oder mit Selbssperrdifferential; mit zusätzen für im Ölbad laufende Lamellen benbremsen* Pour execution avec couple conique hypoide et/ou avec différentiel glissement limité, avec additifs pour freins à bain d'huile *For execution with hypoid bevel gear set and/or with limited slip differential; With additives for oil immersed disc brakes* **Grasso:** Multiuso saponificato al litio. ***Fett:** Mehrzweckfett litiumverseift.* **Graisse:** Multi-utilisations saponnifieé au lithium. ***Grease:** Multipurpose lithium base.*
- Cambio olio: differenziale riduzioni epicicloidali differenziale autobloccante - *Ölwechsel: im Differential* *in den Planetenabtrieben* *im Selbstsperrdifferential* - Vidange huile: différentiel réducteurs épicycloidaux différentiel à glissement limité - *Oil change: differential* *planetary reduction* *limited slip differential* ** e in caso di primi cenni di rumorosità *und beim Auftreten von Geräeuschen ersetzen* et dans le cas de fonctionnement bryant *and in case of noise*	ogni 800 ore ⊛ ogni 1000 ore ogni 700 ore** *alle 800 Std.* *alle 1000 Std.* *alle 700 Std.*** toutes 800 heures toutes 1000 heures toutes 700 heures** *every 800 hours* *every 1000 hours* *every 700 hours***	
- Ingrassaggio: in condizioni normali in condizioni gravose - *Abschmieren: bei normalem Einsatz* *bei starkem Einsatz* - Graissage: en conditions normales en conditions sévères - *Greasing: under normal use* *under heavy duty use*	mensile settimanale *monatlich* *wöchentlich* mensuel hebdomadaire *montly* *weekly*	
- Registrazione freno negativo - *Einstellung der Federspeicherbremse* - Réglage du frein négatif - *Adjustment of the safety brake*	ogni 1000 ore ⊛ *alle 1000 Std.* toutes 1000 heures *every 1000 hours*	
- Registrazione freno di servizio - *Nachstellung der Betriebsbremse* - Réglage du frein de service - *Pedal brake adjustment*	ogni 500 ore *alle 500 Std.* toutes 500 heures *every 500 hours*	
- Serraggio dadi ruota - *Schrauben nachziehen* - Serrage des écrous de roue - *Screw/bolt tight ening*	ogni 200 ore *alle 200 Std.* toutes 200 heures *every 200 hours*	
- Circuito di comando freni: - *Brem sbetätigungsanlage:* - Circuit de commande frein: - *Service brake circuit:*		Usare esclusivamente olio minerale ATF Dexron II. Accertarsi che le guarnizioni del cilindro master siano adatte a questo olio. *Nur mineralisches Öl verwenden, z.B.: ATF Dexron II. Achtung: Dichtringe des Hauptbremszylinders müssen für dieses Öl geeignet sein.* Utiliser exclusivement huile minérale ATF Dexron II. Vérifier que les joints du maître-cylindre, soient compatibles avec cette huile. *Only for mineral oil use e.g. ATF Dexron II. Make sure that master cylinder seals are suitable for mineral oil.*

⊛ **Inizialmente dopo 100 ore di lavoro / *Erstmals nach 100 Betriebsstunden***
Initialement apres 100 heures de travail /*Initially at 100 operating hours*

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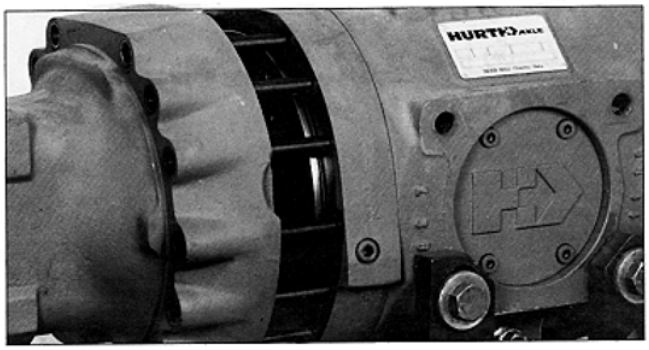


VERIFICA USURA E SOSTITUZIONE DISCHI FRENO:
UTILIZZO FINO AD UNO SPESSORE MINIMO DI S=4,5 mm.

VERSCHLEIß ÜBERPRÜFEN UND BREMSSCHEIBEN ERSETZEN:
GEBRAUCH BIS MINDESTSTÄRKE VON S=4,5 mm.

VERIFICATION D'USURE ET REMPLACEMENT DISQUES FREIN:
UTILISATION JUSQU'A UNE EPAISSEUR MIN DE S=4,5 mm.

WEAR CHECK AND REPLACEMENT OF BRAKE DISCS:
USE DISCS TILL MINIMUM THICKNESS OF S=4,5 mm.



ALLENTARE I DADI DI FISSAGGIO; RIMUOVERE IL BRACCIO ORIZZONTALMENTE.

BEFESTIGUNGSMUTTERN LÖSEN UND ACHSKÖRPER WAAGERECHT ABZIEHEN.

DESSERRER LES ECROUS DE FIXATION; DEPOSER LE BRAS CARTER HORIZONTALEMENT.

LOOSEN LOCK NUTS AND REMOVE THE AXLE HOUSING HORIZONTALLY.



RIMOZIONE DEI DISCHI FRENO.
NOTE: SE I DISCHI NON SONO DA SOSTITUIRE, RIMUOVERE L'INTERO PACCO SENZA CAMBIARE LA LORO POSIZIONE.
BREMSSCHEIBEN AUSBAUEN.
ACHTUNG: WENN DIE BREMS LAMELLEN NICHT ERSETZT WERDEN MÜSSEN, DAS VOLLSTÄNDIGE PAKET AUSBAUEN OHNE DIE REIHENFOLGE ZU ÄNDERN.
DEPOSE DES DISQUES FREIN.
NOTE: SI LES DISQUES SONT EN BON ETAT ENLEVER L'ENSEMBLE DES DISQUES EN GARDANT LEUR POSITION.
REMOVE BRAKE DISCS.
NOTE: IF THE BRAKE DISCS MUST NOT BEEN REPLACED, REMOVE THE COMPLETE PACK WITHOUT CHANGING THE POSITION OF THE DISCS.

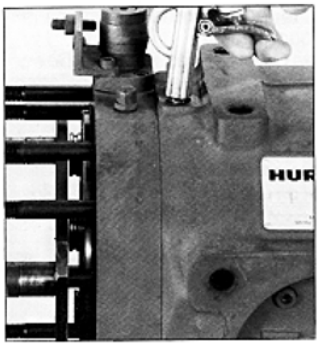


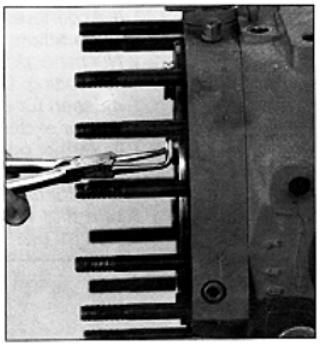
PER IL MONTAGGIO PROCEDERE IN SENSO INVERSO ALLINEANDO I FORI DI LUBRIFICAZIONE.

DER EINBAU ERFOLGT IN UMGEKEHRTER REIHENFOLGE, SCHMIERUNGSBOHRUNGEN ANREIHEN.

POUR LE MONTAGE PROCEDER EN SENS INVERSE ET ALIGNER LES TROUS DE LUBRIFICATION.

FOR ASSEMBLY PROCEED IN REVERSE ORDER, ALIGN LUBRICATION HOLES.





IMMETTENDO ARIA COMPRESSA ESPELLERE I PISTONCINI FRENO
OPERAZIONE DA ESEGUIRE SOLO SE NECESSARIO

MIT DRUCKLUFT DIE BETÄTIGUNGSKOLBEN DER BREMSE AUSZUSTOßEN.
DIESER VORGANG IST NUR DANN DURCHZUFÜHREN, WENN ER ERFORDERLICH IST.

INTRODUIRE DE L'AIR COMPRIMÉ POUR EXPULSER LES PISTONS DES FREINS.
OPÉRATION À EFFECTUER UNIQUEMENT EN CAS DE NÉCESSITÉ

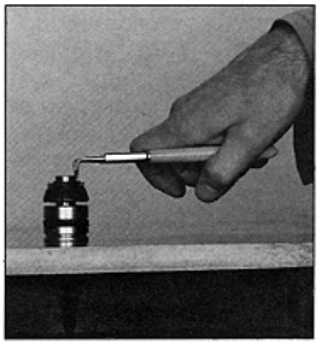
USE COMPRESSED AIR TO EJECT THE BRAKE PISTONS.
THIS OPERATION SHOULD ONLY BE CARRIED OUT IF NECESSARY.

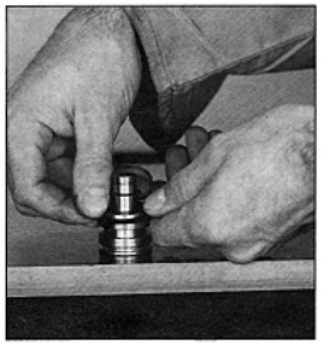
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SIMBOLI/*SYMBOLE*
SYMBOLS/*SYMBOLE*

	Smontaggio di sottogruppi *Zerlegen von Baugruppen* Demontage des sous-groupes *Disassembly of assembly groups*
	Montaggio di sottogruppi *Zusammenbauen von Baugruppen* Montage des sous-groupes *Reassemble to from assembly group*
	Smontaggio di particolari ingombranti *Abbauen - Ausbauen* Demontage des pieces encombrante *Remove obstruction parts*
	Montaggio di particolari ingombranti *Einbauen-Anbauen* Montage des pieces encombrantes *Reinstall-remount parts which had obstructed disassembly*
	Attenzione, indicazione importante *Achtung, wichtiger Hinweis* Attention, indication importante *Attention! Important notice*
	Controllare regolare p.e. coppie, misure, pressioni etc. *Prüfen - Einstellen z.B. Momente, Maße, Drucke u.s.cs.* Controler, regler p.e. couples, mesures, pressions ecc. *Check - adjust e.g. torque, dimensions, pressures etc.*
	T = Attrezzature speciali P = Pagina *T = Spezialwerkzeug P = Seite* T = Outils speciaux P = Page *T = Special tool P = Page*
	Rispettare direzione di montaggio *Einbaurichtung beachten* Respecter direction de montage *Note direction of installation*
	Controllare esaminare controllo visuale *Kontrollieren - Prüfen* Controler, examiner, controle visuel *Visual inspection*
	Eventualmente riutilizzabile (sostituire se necessario) *Bedingt wiederverwendbar* Eventuellement a utiliser a noveau (remplacer si nécessaire) *Possibly still serviceable, renew if necessary*
	Sostituire con ogni montaggio *Beim Zusammenbau immer erneuern* Remplacer avec chaque montage *Renew at each reassembly*
	Togliere - mettere la sicura *Entsichern - Sichern* Enlever - mettre la securite *Unlock - lock e.g. split pin, locking plate, etc.*
	Mettere la sicura, incollare (mastice liquido) *Sichern-Kleben (flüssige Dichtung)* Mettre la securite, coller (mastic liquide) *Lock - adhere (liquid sealant)*
	Evitare danni ai materiali, danni ai pezzi *Materialschaden verhüten* Eviter dommages au materiaux, dommages au pieces *Guard against material damage, damage to parts*
	Marchiare prima dello smontaggio (per il montaggio) *Vor dem Ausbau markieren (für den Zusammenbau)* Marquer avant le demontage (pour le montage) *Mark before disassembly, observe marks when reassembl.*
	Caricare - riempire (olio - lubrificante) *Einfüllen - Auffüllen - Nachfüllen (Öl-Schmiermittel)* Charger - remplir (huile - lubrifiant) *Filling - topping up - refilling e.g. oil, cooling water, etc.*
	Scaricare olio, lubrificante *Öl, bzw. SchmiermittelAblassen* Vidanger, lubrifiant *Drain off oil, lubricant*
	Tendere *Spannen* Tendre *Tighten - clamp e.g; tightening a clamping device*
	Inserire pressione nel circuito idraulico *Leitung unter Druck setzen* Inserer pression dans le circuit hydraulique *Apply pressure into hydraulic circuit*
	Pulire *Reinigen* Nettoyer *To clean*

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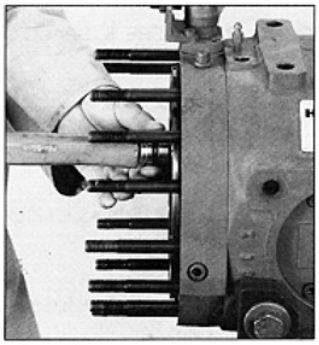


SMONTAGGIO PARTICOLARI DEI PISTONCINI.

AUSBAU VON EINZELTEILEN DER BREMSBETÄTIGUNGSKOLBEN.

DÉMONTAGE DES PIÈCES DU PISTON.

DISSASEMBLY OF PISTON PONTS.



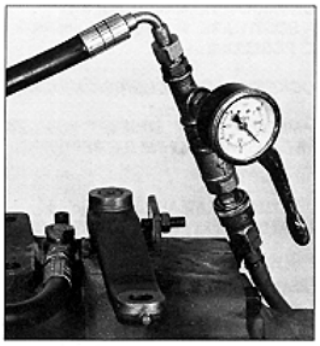


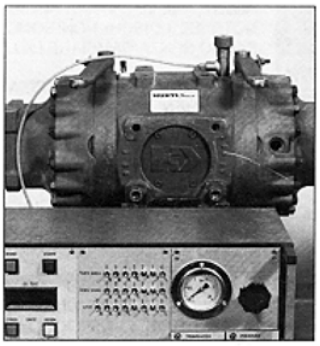
MONTAGGIO
ANCHE NEL CASO IN CUI I PISTONCINI FRENO NON SIANO STATI SMONTATI, SPINGERLI A FINE CORSA NELLA LORO SEDE.

EINBAU
AUCH WENN DIE BREMSBETÄTIGUNGSKOLBEN NICHT AUSGEBAUT WORDEN SIND, MUß MAN SIE BIS ZUM ANSCHLAG EINDRÜCKEN.

MONTAGE
MEME DANS LE CAS OÙ LES PISTONS DE FREIN N'ONT PAS ÉTÉ DÉMONTÉS, IL FAUT LES POUSSER À FOND DANS LEUR LOGEMENT.

ASSEMBLY
EVEN IF THE BRAKE PISTONS HAVE NOT BEEN REMOVED, SEAT THEM TO THE BORE BOTTON.



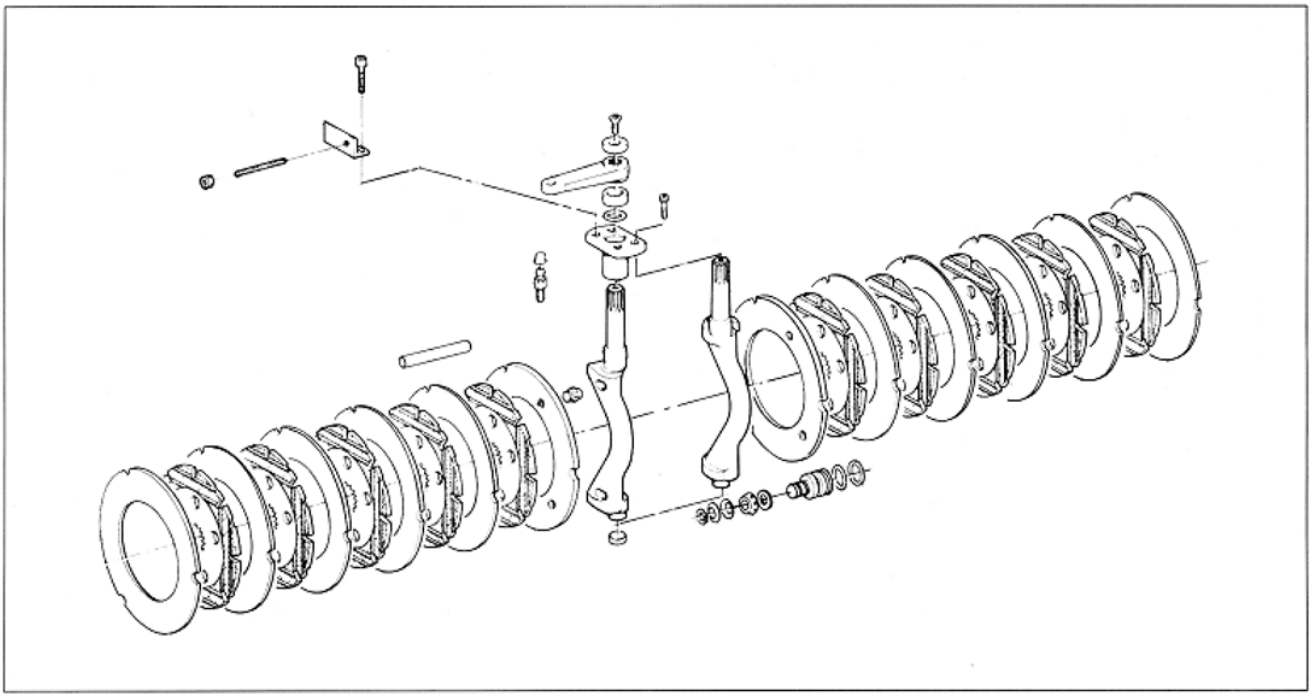


CONTROLLO TENUTA CON ARIA COMPRESSA A 0,5 - 1 bar PER UN TEMPO DI 10' PER PARTE.

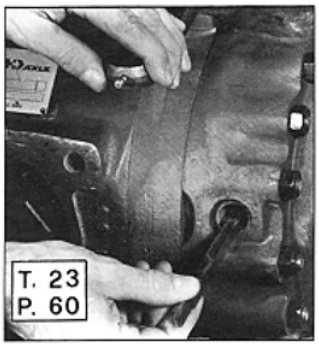
DICHTHEITSPRÜFUNG MIT 0,5 - 1 bar DRUCKLUFT FÜR 10 min. JE SEITE DURCHFÜHREN.

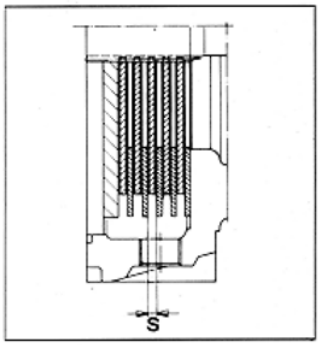
CONTROLER L'ETANCHEITE AVEC L'AIR COMPRIME A 0,5 - 1 bar PENDANT 10' DE CHAQUE COTE.

CHECK FOR LEAKAGE USING 0,51 bar COMPRESSED AIR FOR 10 min. PER SIDE.



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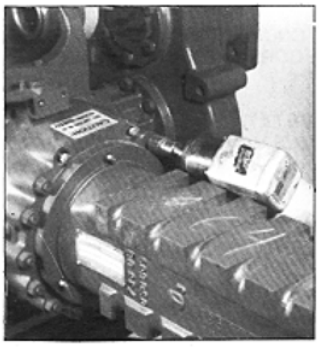


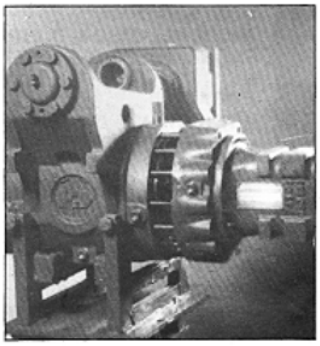
VERIFICA USURA DISCHI FRENO:
FRENARE L'ASSALE E VERIFICARE, ATTRAVERSO IL FORO CARICO OLIO, LO SPESSORE DEI DISCHI.
UTILIZZO FINO AD UNO SPESSORE MINIMO DI S=4,5 mm.

DIE ABNÜTZUNG DER UND BREMSSCHEIBEN ÜBERPRÜFEN:
DIE ACHSE BREMSEN UND DURCH DIE ÖLEINFÜLLÖFFNUNG DIE SCHEIBENSTÄRKE ÜBERPRÜFEN.
GEBRAUCH BIS MINDESTSTÄRKE VON S=4,5 mm.

VERIFICATION D'USURE DISQUES FREIN:
FREINER L'ESSIEU ET VÉRIFIER L'EPAISSEUR DES DISQUES, À TRAVERS LE TROU DE REMPLISSAGE.
UTILISATION JUSQU'A UNE EPAISSEUR MIN DE S=4,5 mm.

WEAR CHECK OF BRAKE DISCS:
BRAKE THE AXLE AND CHECK THE THICKNESS OF THE DISKS THROUGH THE OIL FILL HOLE.
USE DISCS TILL MINIMUM THICKNESS OF S=4,5 mm.



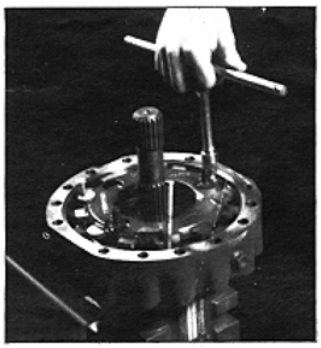


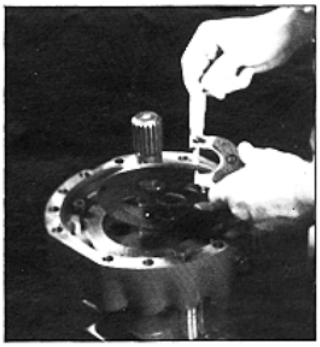
RIMOZIONE DISCHI FRENO
ALLENTARE I DADI DI FISSAGGIO; RIMUOVERE IL BRACCIO ORIZZONTALMENTE.

BREMSSCHEIBEN AUSBAUEN
BEFESTIGUNGSMUTTERN LÖSEN UND ACHSKÖRPER WAAGERECHT ABZIEHEN.

DEPOSE DES DISQUES FREIN
DESSERRER LES ECROUS DE FIXATION; DEPOSER LE BRAS CARTER HORIZONTALEMENT.

REMOVE BRAKE DISCS
LOOSEN LOCK NUTS AND REMOVE THE AXLE HOUSING HORIZONTALLY.



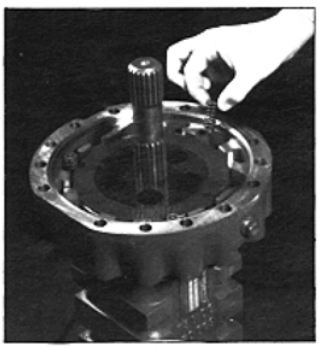


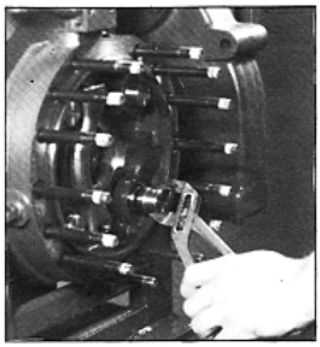
ALLENTARE LE 3 VITI DI REGISTRO: RIMUOVERE IL SPINGIDISCO.
NOTE: SE I DISCHI NON SONO DA SOSTITUIRE, RIMUOVERE L'INTERO PACCO SENZA CAMBIARE LA LORO POSIZIONE.

DIE 3 EINSTELLSCHRAUBEN LOCKERN: DEN SCHEIBENDRÜCKER ABNEHMEN.
ACHTUNG: WENN DIE BREMS LAMELLEN NICHT ERSETZT WERDEN MÜSSEN, DAS VOLLSTÄNDIGE PAKET AUSBAUEN OHNE DIE REIHENFOLGE ZU ÄNDERN.

DESSERRER LES 3 VIS DE RÉGLAGE: DÉPOSER LE PLATEAU DE PRESSION.
NOTE: SI LES DISQUES SONT EN BON ETAT ENLEVER L'ENSEMBLE DES DISQUES EN GARDANT LEUR POSITION.

LOOSEN THE 3 ADJUSTER SCREWS: REMOVE THE PRESSURE PLATE.
NOTE: IF THE BRAKE DISCS MUST NOT BEEN REPLACED, REMOVE THE COMPLETE PACK WITHOUT CHANGING THE POSITION OF THE DISCS.



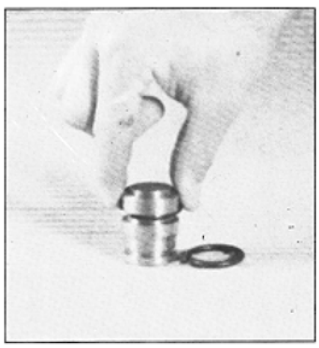


VERIFICARE L'EFFICENZA DELLE MOLLE. RIMUOVERE IL PISTONCINO FRENO.

DIE FUNKTIONSTÜCHTIGKEIT DER FEDERN ÜBERPRÜFEN DEN BREMSENSTEUERKOLBEN ABNEHMEN.

VÉRIFIER L'EFFICACITÉ DES RESSORTS. DÉPOSER LE PETIT PISTON DU FREIN.

CHECK THAT THE SPRINGS ARE EFFICIENT. REMOVE THE BRAKE PLUNGER.





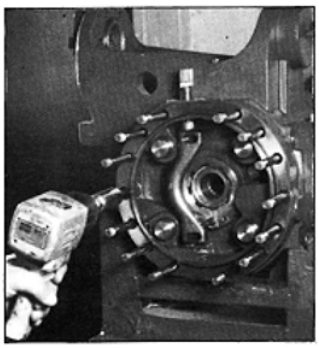
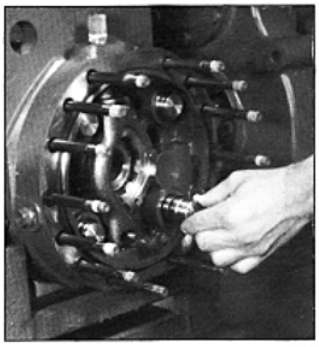
MONTAGGIO PISTONCINI FRENO
MONTARE L'ANELLO ANTIESTRUSIONE VERSO L'ESTERNO E POI L'ANELLO OR DI SEGUITO.

MONTAGE BREMSSTEUERKOLBEN
DEN RUTSCHFESTEN RING NACH AUßEN GERICHTET UND DANN DEN O-RING MONTIEREN.

MONTAGE PISTON FREIN
MONTER L'ANNEAU DE BLOCAGE VERS L'EXTÉRIEUR, PUIS LE CIRCLIP.

MOUNTING THE BRAKE PLUNGERS
MOUNT THE ANTIEXTRUSION RING ON THE OUTSIDE FOLLOWED BY THE O-RING.

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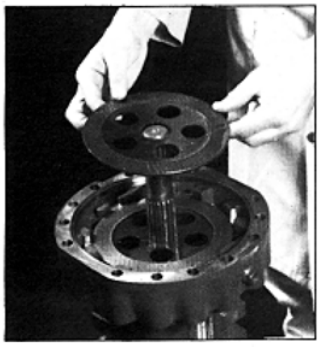
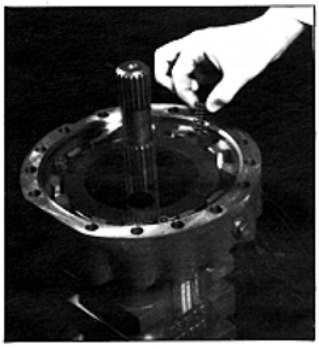



SERRARE I 2 PRIGIONIERI MOBILI LUBRIFICARE LE ZONE DI TENUTA PRIMA DI MONTARE I PISTONCINI.

DIE ZWEI BEWEGLICHEN STIFTSCHRAUBEN ANZIEHEN, VOR DER STEUERKOLBENMONTAGE DIE DICHTUNGSBEREICHE SCHMIEREN.

SERRER LES 2 GOUJONS MOBILES; LUBRIFIER LES ZONES D'ÉTANCHEITÉ AVANT DE MONTER LES PETITS PISTONS.

TIGHTEN THE 2 MOBILE STUD BOLTS. LUBRICATE THE RETENTION ZONES BEFORE MOUNTING THE PLUNGERS.

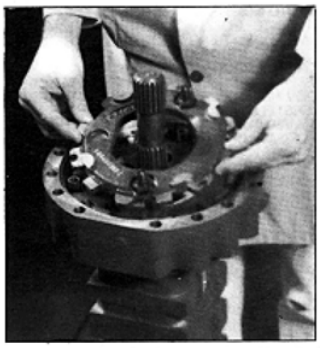
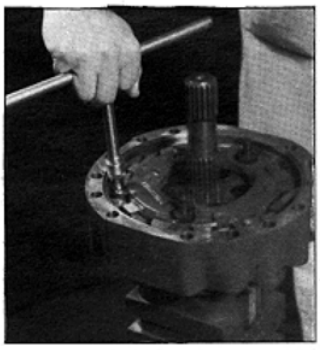



ASSEMBLAGGIO PACCO DISCHI FRENO
ALLINEARE I FORI DI PASSAGGIO D'OLIO DEI SINGOLI DISCHI.

ZUSAMMENSETZUNG BREMSSCHEIBENPAKET
DIE ÖLDURCHFLUßLÖCHER DER EINZELNEN SCHEIBEN AUSRICHTEN.

ASSEMBLAGE PAQUET DISQUES FREIN
ALIGNER LES TROUS DE PASSAGE D'HUILE DE CHAQUE DISQUE.

ASSEMBLING THE BRAKE DISK PACK
ALIGN THE OIL HOLES OF THE INDIVIDUAL DISKS.

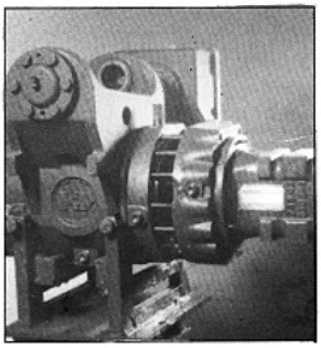
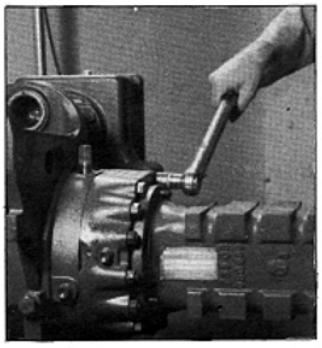



ASSEMBLARE IL SPINGIDISCO CON I PUNTALINI VERTICALI.
AVVITARE PARZIALMENTE LE 3 VITI DI REGISTRO.

DEN SCHEIBENDRÜCKER MIT DEN SENKRECHTEN AUFLAGESTIFTEN ZUSAMMENSETZEN.
DIE 3 EINSTELLSCHRAUBEN ETWAS ANZIEHEN.

ASSEMBLER LE PLATEAU AVEC LES ERGOTS VERTICAUX.
VISSER PARTIELLEMENT LES 3 VIS DE RÉGLAGE.

MOUNT THE PRESSURE PLATE WITH THE VERTICAL RODS.
PARTIALLY TIGHTEN THE 3 ADJUSTER SCREWS.

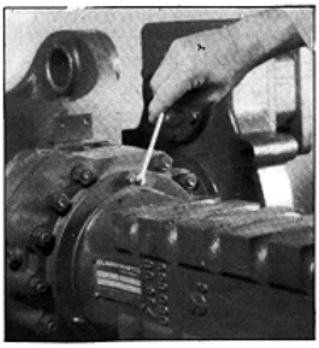
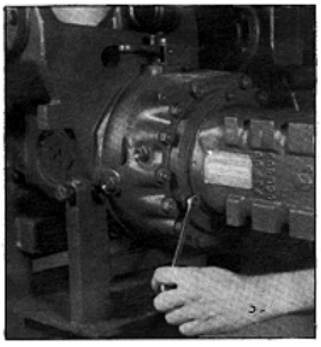



MONTARE CON LOCTITE 242
COPPIA DI SERRAGGIO VITI M12 8.8 = 86 Nm SUL PONTE DI FISSAGGIO CON STAFFA. COPPIA DI SERRAGGIO VITI M12 10.9 = 120 Nm SUL PONTE CON FISSAGGIO A PENDOLO.

MIT LOCTITE 242 MONTIEREN.
ANZUGSMOMENT SCHRAUBEN M12 8.8 = Nm AN DER BÜGELLBEFESTIGUNGSACHSE. ANZUGSMOMENT SCHRAUBEN M12 10.9 = 120 Nm AN MIT PENDELSBEFESTIGUNGSACHSE.

MONTER AVEC DE LA LOCTITE 242.
COUPLE DE SERRAGE VIS M12 8.8 = 86 Nm SUR LE PONT DE FIXATION AVEC BRIDE. COUPLE DE SERRAGE VIS M12 10.9 = 120 Nm SUR LE PONT AVEC FIXATION À PENDULE.

MOUNT WITH LOCTITE 242.
M12 8.8 BOLT DRIVING TORQUE = 86 Nm ON AXLE WITH BRACKET FIXING.
M12 10.9 BOLT DRIVING TORQUE = 120 Nm ON AXLE WITH PENDULUM FIXING.

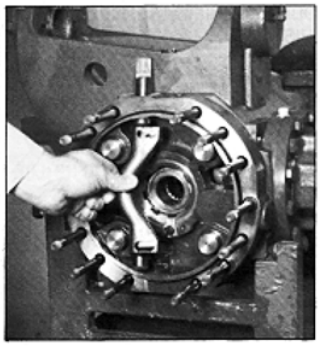
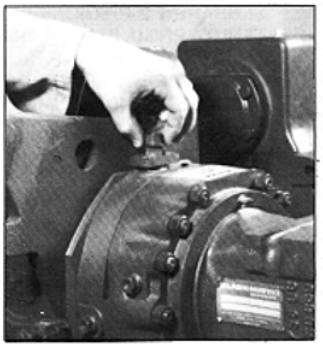
REGISTRAZIONE GIOCO DISCHI FRENO
RUOTARE GRADATAMENTE A FONDO (COPPIA DI SERRAGGIO ~ 50 Nm) IN SENSO ANTIORARIO LE 3 VITI DI REGISTRO, SUCCESSIVAMENTE RUOTARE DI 3/4 DI GIRO IN SENSO ORARIO PARI A 0,75 mm DI GIOCO FRA I DISCHI INFINE BLOCCARE CON IL CONTRODADO.

BREMSSCHEIBENSPIEL-EINSTELLUNG
DIE 3 EINSTELLSCHRAUBEN LANGSAM VOLLKOMMEN GEGEN UHRZEIGERSINN DREHEN (ANZIEHDREHMOMENT ~ 50 Nm); DANACH EINE 3/4 UMDREHUNG IM UHRZEIGERSINN GLEICH 0,75 mm SPIEL ZWISCHEN DEN SCHEIBEN MACHEN; ZULETZT MIT DER GEGENMUTTER SICHERN.

REGLAGE JEU DISQUES FREIN
TOURNER GRADUELLEMENT À FOND (COUPLE DE SERRAGE ~ 50 Nm) DANS LE SENS ANTIHORAIRE LES 3 VIS DE RÉGLAGE, ENSUITE TOURNER DE 3/4 DE TOUR DANS LE SENS HORAIRE ÉGAL À 0,75 mm DE JEU ENTRE LES DISQUES. BLOQUER AVEC LE CONTRE-ÉCROU.

BRAKE DISK PLAY ADJUSTMENT
GRADUALLY AND FULLY TURN (DRIVING TORQUE ~ 50 Nm) THE 3 ADJUSTER SCREWS IN AN ANTICLOCKWISE DIRECTION, THEN TURN THEM 3/4 OF A TURN IN A CLOCKWISE DIRECTION TO ACHIEVE A 0.75 mm PLAY BETWEEN THE DISKS. LASTLY, LOCK IN PLACE WITH THE CHECK NUT.

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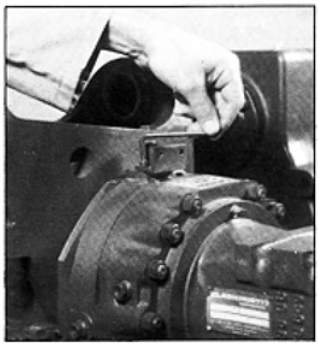
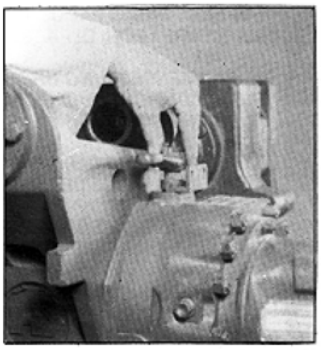



MONTAGGIO DELLA LEVA INTERNA.

MONTAGES DES INNEREN HEBELS.

MONTAGE DU LEVIER INTERNE.

MOUNTING THE INTERNAL LEVER.

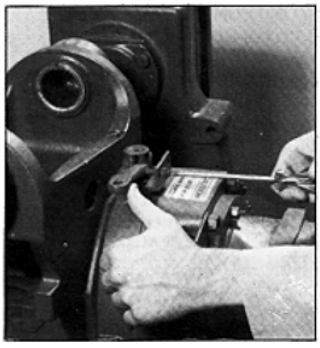
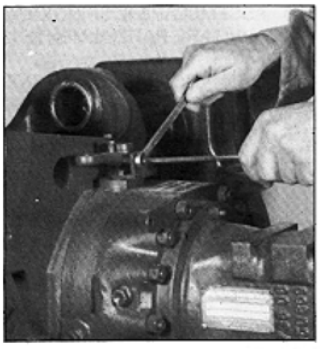



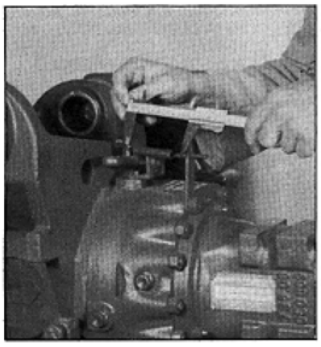
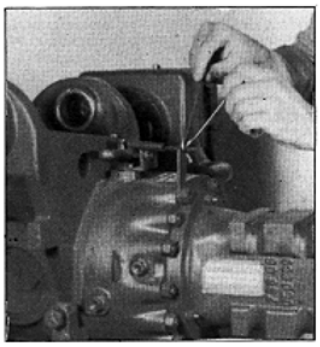
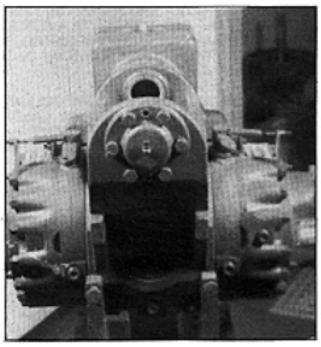
MONTARE LA BUSSOLA E LA PIASTRA DI FERMO USARE LOCTITE 573.
COPPIA DI SERRAGGIO VITI M6 = 10 Nm.
MONTARE LA LEVA IN MODO CHE IN POSIZIONE DI RILASCIO FORMI UN ANGOLO DI ~11° OPPOSTO AL SENSO DI TIRAGGIO.

DIE BUCHSE UN DIE SPERRPLATTE MONTIEREN, LOCTITE 573 VERWENDEN. ANZUGSMOMENT SCHRAUBEN M6 = 10 Nm.
DEN HEBEL SO MONTIEREN, DAß ER LOSGELASSEN EINEN WINKEL VON CIRCA 11° ENTGEGEN DER ZIEHRICHTUNG BILDET.

MONTER LA BAGUE ET LA BUTEÉ DE BLOCAGE; UTILISER DU LOCTITE 573.
COUPLE DE SERRAGE VIS M6 = 10 Nm.
MONTER LE LEVIER AFIN QUE DANS LA POSITION RELÂCHEÉ IL FORME UN ANGLE D'ENVIRON 11°, OPPOSÉ AU SENS DU TIRAGE.

MOUNT THE BUSH AND STOP PLATE USING LOCTITE 573. M6 BOLT DRIVING TORQUE = 10 Nm.
MOUNT THE LEVER SO THET IN THE RELASE POSITION, IT FORMS A= 11° ANGLE IN THE OPPOSITE DIRECTION TO THAT OF PULLING.

REGOLAZIONE DEL FRENO DI STAZIONAMENTO CON FERMI MECCANICI
I PONTI IN OGGETTO NON NECESSITANO, DURANTE LE OPERAZIONI DI PRIMO MONTAGGIO, DELLA REGOLAZIONE DEL GIOCO FRA I DISCHI FRENO E DELLE LEVE FRENO DI STAZIONAMENTO (OPERAZIONE GIA' ESEGUITA IN FABBRICA).

EINSTELLUNG DER FESTELLBREMSE MIT MECHANISCHEN SPERRUNGEN
BEI DER ERSTMONTAGE IST FÜR DIE BETREFFENDEN ACHSEN KEINE SPIELEINSTELLUNG ZWISCHEN DEN BREMSSCHEIBEN UND DEN HEBELN DER FESTELLBREMSE NÖTIG (DIESER VORGANG WURDE BEREITS IM HERSTELLWERK VORGENOMMEN).

REGLAGE DU FREIN DE STATIONNEMENT AVEC BUTEES MECANIQUES
LORS DU PREMIER MONTAGE, IL N'EST PAS NECESSAIRE DE RÉGLER LE JEU ENTRE LES DISQUES FREIN ET LES LEVIERS FREIN DE STATIONNEMENT DES PONTS (OPÉRATION DÉJA RÉALISÉE EN USINE).

ADJUSTTING THE PARKING BRAKE WITH MECHANICAL STOPS
THE PLAY BETWEEN THE BRAKE DISKS AND PARKING BRAKE LEVERS ON THESE AXLES WILL NOT NEED ADJUSTING DURING THE FIRST ASSEMBLY OPERATIONS (THIS WILL HAVE ALREADY BEEN CARRIED OUT IN THE FACTORY).

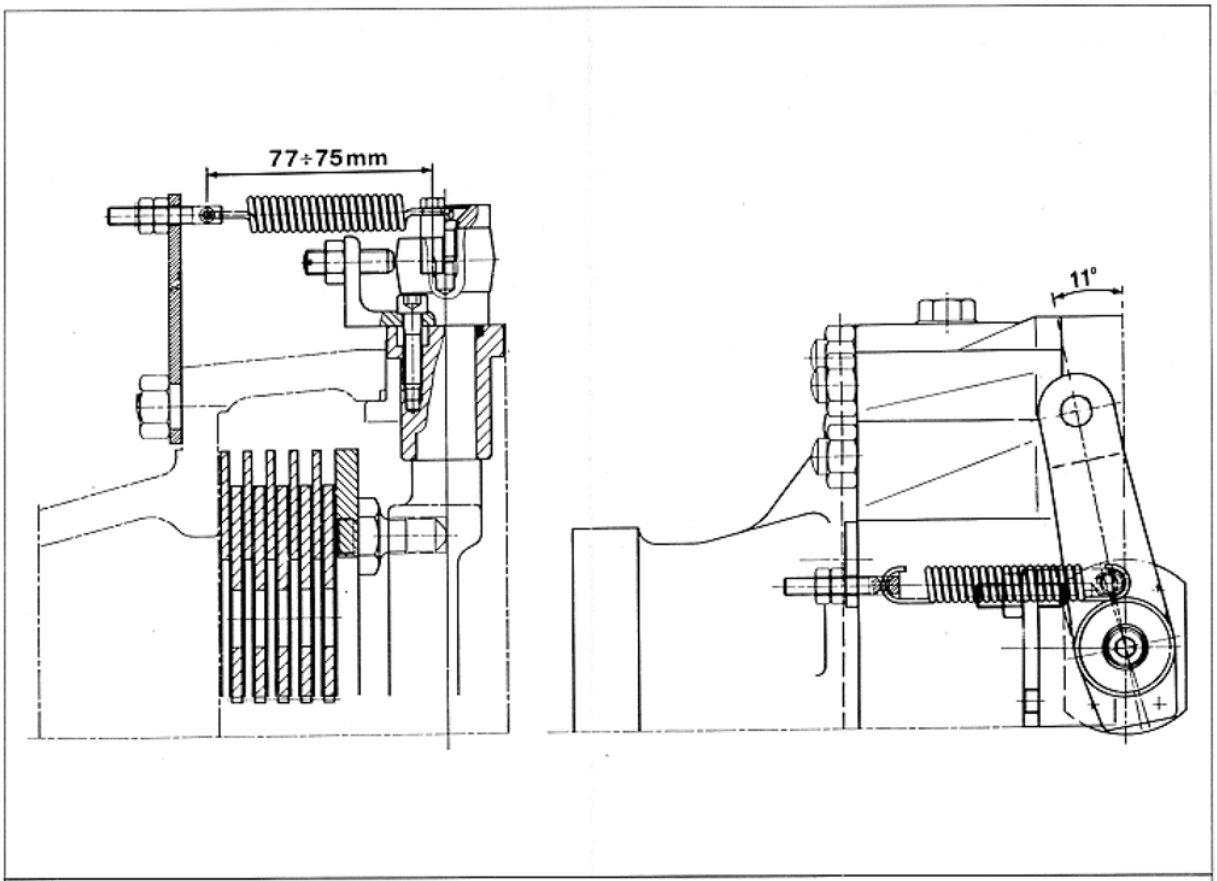
PROCEDURA DI REGOLAZIONE PER OPERAZIONI DI MANUTENZIONE
1° REGISTRAZIONE GIOCO DISCHI FRENO (FOTO 9-10 PAGINA 9).
2° LIBERARE ENTRAMBE LE LEVE DI RINVIO DAL CAVO DI COMANDO E DA EVENTUALI ULTERIORI AGGANCI.
3° APPLICARE SULLE LEVE UN CARICO DI ~8÷10 N SUFFICENTE A PORTARE LA LEVA IN APPOGGIO AL DISCO SPINTORE (SENZA DEFORMAZIONI DEI LIVERISMI E DELLE MOLLE INTERNE - FOTO 5).
4° IN QUESTA POSIZIONE PORTARE LE VITI DI REGISTRAZIONE DEI FERMI A **CONTATTO** CON LE LEVE E BLOCCARE CON IL CONTRODADO (FOTO 5-6).
5° POSIZIONARE LA PIASTRA (FOTO 7) ED AGGANCIARE LA MOLLA ESTERNA BLOCCANDOLA CON UN TIRAGGIO DI 75÷77 mm (FOTO 8)
6° RIAGGANCIARE I CAVI DI COMANDO DEL FRENO ALLE LEVE .
7° ASSICURARSI CHE IN FASE DI RILASCIO DEL FRENO LE LEVE RITORNINO ENTRAMBE IN APPOGGIO ALLE VITI DI FERMO.

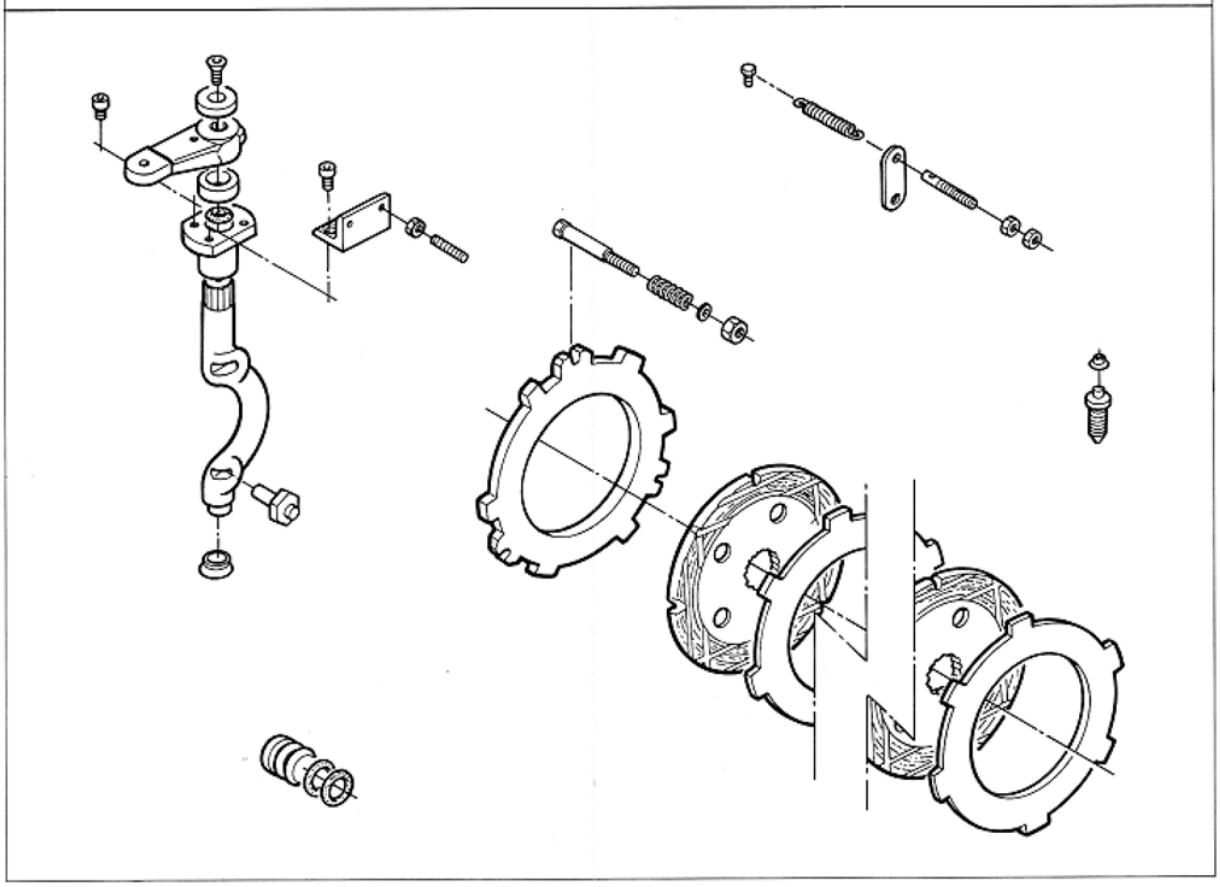
EINSTELLUNGEN BEI WARTUNGSARBEITEN
1° EINSTELLUNG BREMSSCHEIBENSPIEL (BILD 9-10 SEITE 9).
2° DAS STEUERKABEL UND EVENTUELLE WEITERE VERBINDUNGEN VON DEN BEIDEN STEUERKABEL LÖSEN.
3° EINE LAST VON CIRCA 8÷10 N AN DEN HEBELN ANBRINGEN, DIE AUSREICHT, DEN HEBEL AUF DER DRUCKSCHEIBE AUFLIEGEN ZU LASSEN (OHNE DAß SICH DIE HEBELWERKE UND INNENFEDERN VERFORMEN - BILD 5).
4° IN DIESER STELLUNG DIE EINSTELLSCHRAUBEN DER ANSCHLÄGE MIT DEN HEBELN IN BERÜHRUNG BRINGEN UND MIT DER GEGENMUTTER SICHERN (BILD 5-6).
5° DIE PLATTE POSITIONIEREN (BILD 7), DIE ÄUßERE FEDER EINHÄNGEN UND MIT EINER ZUGLÄNGE VON 75-77 mm BLOCKIEREN (BILD 8).
6° DIE BREMSSTEUERKABEL WIEDER AN DEN HABELN ANBRINGEN.
7° SICHERSTELLEN, DAß BEIM LÖSLASSEN DER BREMSE BEIDE HEBEL WIEDER AN DEN FESTSTELLSCHRAUBEN AUFLIEGEN.

PROCEDURE DE REGLAGE POUR LES OPERATIONS D'ENTRETIEN
1° RÉGLAGE JEU FREIN DISQUES FREIN (PHOTO 9-10 PAGE 9).
2° LIBÉRER LES DEUX LEVIERS DE RENVOI DU CÂBLE DE COMMANDE ET DE TOUTE FIXATION.
3° APPLIQUER SUR LES LEVIERS UN CHARGEMENT D'ENVIRON 8 À 10 N SUFFISANT À PORTER LE LEVIER EN APPUI SUR LE PLATEAU (SANS DÉFORMATIONS DES TRINGLERIES ET DES RESSORTS (PHOTO 5).
4° DANS CETTE POSITION, METTRE LES VIS DE RÉGLAGE DES BUTÉES EN CONTACT AVEC LES LEVIERS ET BLOQUER AVEC LE CONTRE-ÉCROU (PHOTO 5-6).
5° METTRE LA PLAQUE À SA PLACE (PHOTO 7) ET ACCROCHER LES RESSORTS EXTÉRIEURS EN LA BLOQUANT AVEC UN TIRAGE DE 75-77 mm (PHOTO 8).
6° REBRANCHER LES TRINGLERIES DE COMMANDE DI FREIN AUX LEVIERS.
7° S'ASSURER QUE DURANT LA PHASE DE RELÂCHEMENT DU FREIN LES LEVIERS REVIENNENT TOUTES DEUX S'APPUYER SUR LES VIS DE BUTÉE.

ADJUSTMENT PROCEDURE FOR MAINTENANCE OPERATIONS
1° BRAKE DISK PLAY ADJUSTMENT (PHOTOS 9-10 ON PAGE 9).
2° FREE BOTH TRANSMISSION LEVERS FROM THE CONTROL CABLE AND FROM ANY OTHER RESTRAINTS.
3° APPLY A ~ 8 ÷ 10 N LOAD TO THE LEVERS SO THAT THE LEVER ITSELF RESTS ON THE PRESSURE PLATE (WITHOUT DEFORMING THE LEVERS OR INTERNAL SPRINGS - PHOTO 5).
*4° HAVING SET TO THIS POSITION, ALLOW THE STOP ADJUSTER SCREWS TO **TOUCH** THE LEVERS AND LOCK IN PLACE WITH THE CHECK NUT (PHOTOS 5-6).*
5° POSITION THE PLATE (PHOTO 7) AND COUPLE THE EXTERNAL SPRING, LOCKING IT WITH A 75-77 mm PULL (PHOTO 8).
6° RE-CONNECT THE BRAKE CONTROL CABLES TO THE LEVERS.
7° CHECK THAT DURING THE BRAKE DISENGAGING PHASE, THE LEVERS BOTH RETURN TO THE POSITION IN WHICH THEY REST ON THE STOP SCREWS.

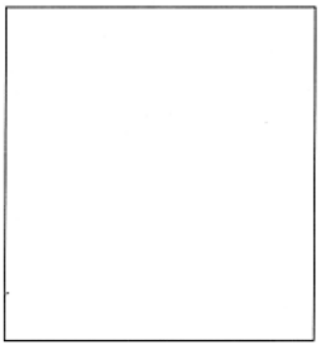
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FRENO NEGATIVO/*FEDERSPEICHERBREMSE*
FREIN NEGATIF/*SAFETY BRAKE*



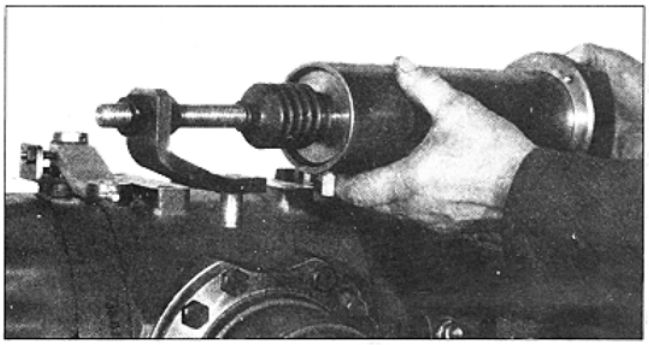


INSERIRE NEL CIRCUITO IDRAULICO UNA PRESSIONE DI 15-20 bar, SUCCESSIVAMENTE RIMUOVERE IL CILINDRO FRENO.

15-20 bar IN DEN BREMSKREISLAUF EINLASSEN UND DEN BREMSZYLINDER DANN HERAUSNEHMEN.

CONNECTER AU CIRCUIT HYDRAULIQUE UNE PRESSION DE 15-20 bars; ENSUITE DÉPOSER LE CYLINDRE DE FREIN.

PRESSURIZE THE HYDRAULIC CIRCUIT AT 15-20 bar, THEN REMOVE THE BRAKE CYLINDER.

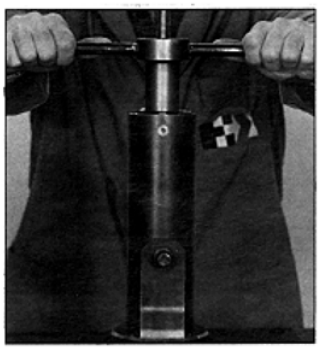


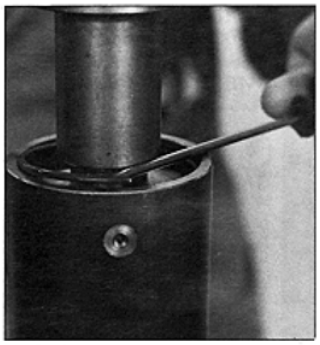
SMONTAGGIO CILINDRO FRENO
PER IL MONTAGGIO PROCEDERE IN SENSO INVERSO.

AUSBAU DES BREMSZYLINDERS
FÜR DEN EINBAU IN UMGEKEHRT ERVORGEHEN REIHENFOLGE.

DÉMONTAGE CYLINDRE DE FREIN
POUR LE MONTAGE, PROCÉDER EN SENS INVERSE.

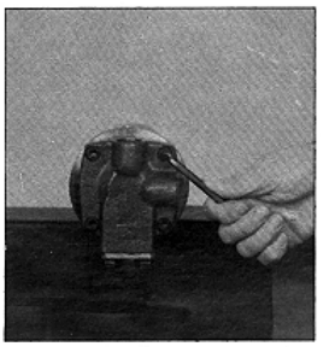
REMOVE THE BRAKE CYLINDER
PROCEED IN REVERSE ORDER WHEN ASSEMBLING.

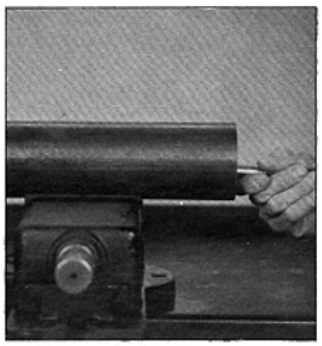




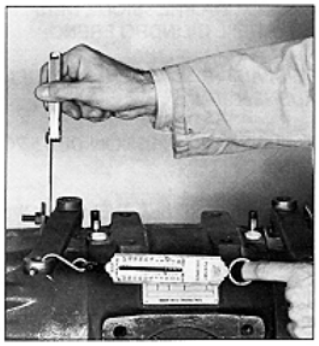


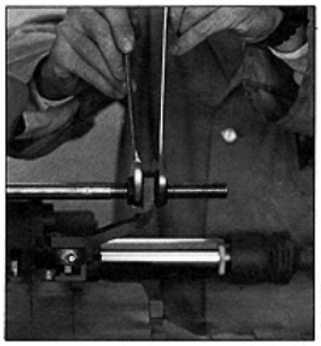






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Quantità molle per pistoncino *Q.ty of cup springs for piston*	N° Disegno Distanziale Ⓐ *Drawing no. of spacer Ⓐ*	Corsa pistoncino *Piston stroke* mm	G
2	738.07.030.02	0,7	1,75
3	738.07.030.01	1,0	2,5
4	738.07.030.03	1,3	3,25
5	738.07.030.04	1,6	4,0

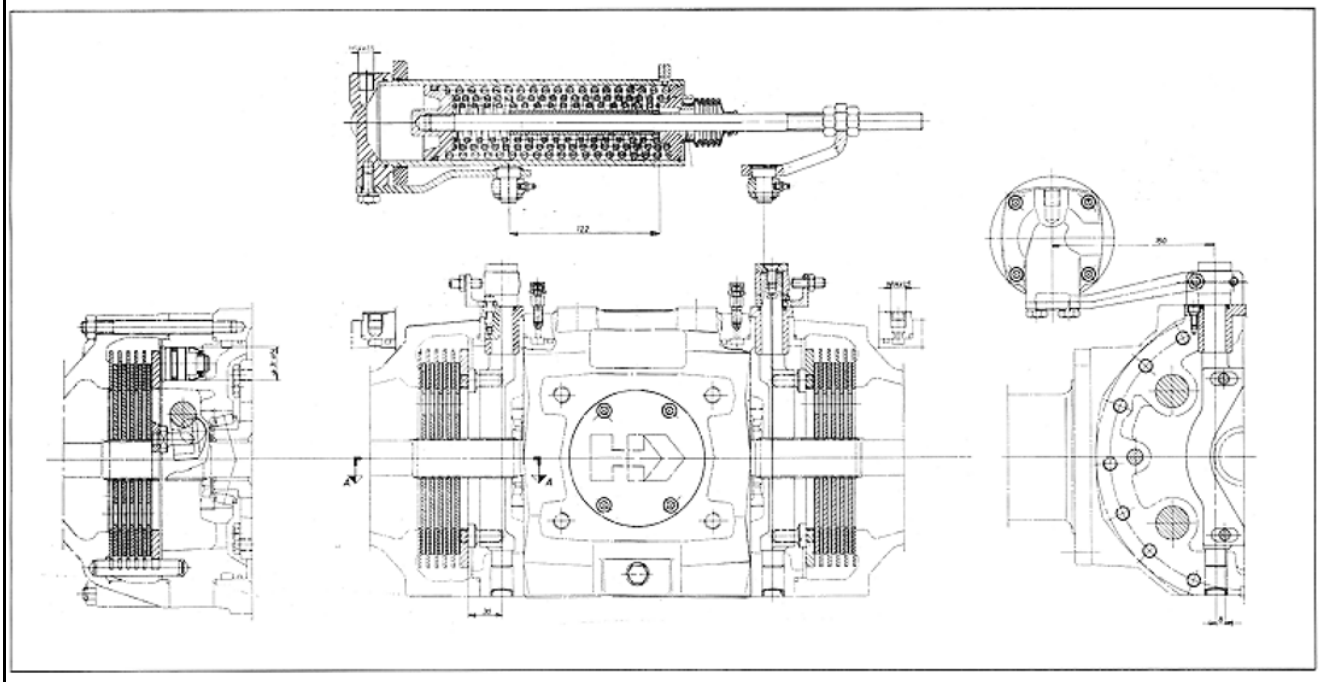
REGISTRAZIONE
APPLICARE ALLA LEVA UN CARICO DI C.A 10 kg.
REGISTRARE LA VITE FINO AD OTTENERE LA DISTANZA «G».
CON UN SPESSIMETRO SERRARE IL CONTRODADO.
ASSEMBLARE IL CILINDRO FRENO CON INSERITA UNA PRESSIONE DI 15-20 bar.
AGIRE SUL DADO E CONTRODADO FINO A CHE ENTRAMBE LE LEVE SIANO IN APPOGGIO O CON LEGGERO GIOCO SU FINE CORSA.

EINSTELLUNG
EINE LAST VON 10 kg AM HEBEL BEFESTIGEN UND DIE SCHRAUBE SO EINSTELLEN, DASS DER ABSTAND «G» ERHALTEN WIRD. MIT EINEM DICKENMESSER PRÜFEN UND DIE GEGENMUTTER ANZIEHEN.
DEN BREMSZYLINDER ZUSAMMENSETZEN, WOBEI EIN DRUCK VON 15-20 bar VORLIEGEN MUSS.
MUTTER UND GEGENMUTTER VERSTELLEN, BIS BEIDE HEBEL AUFLIEGEN ODER MIT GERINGFÜGIGEM SPIEL AM ENDE DES VERSTELLWEGS VORLIEGEN.

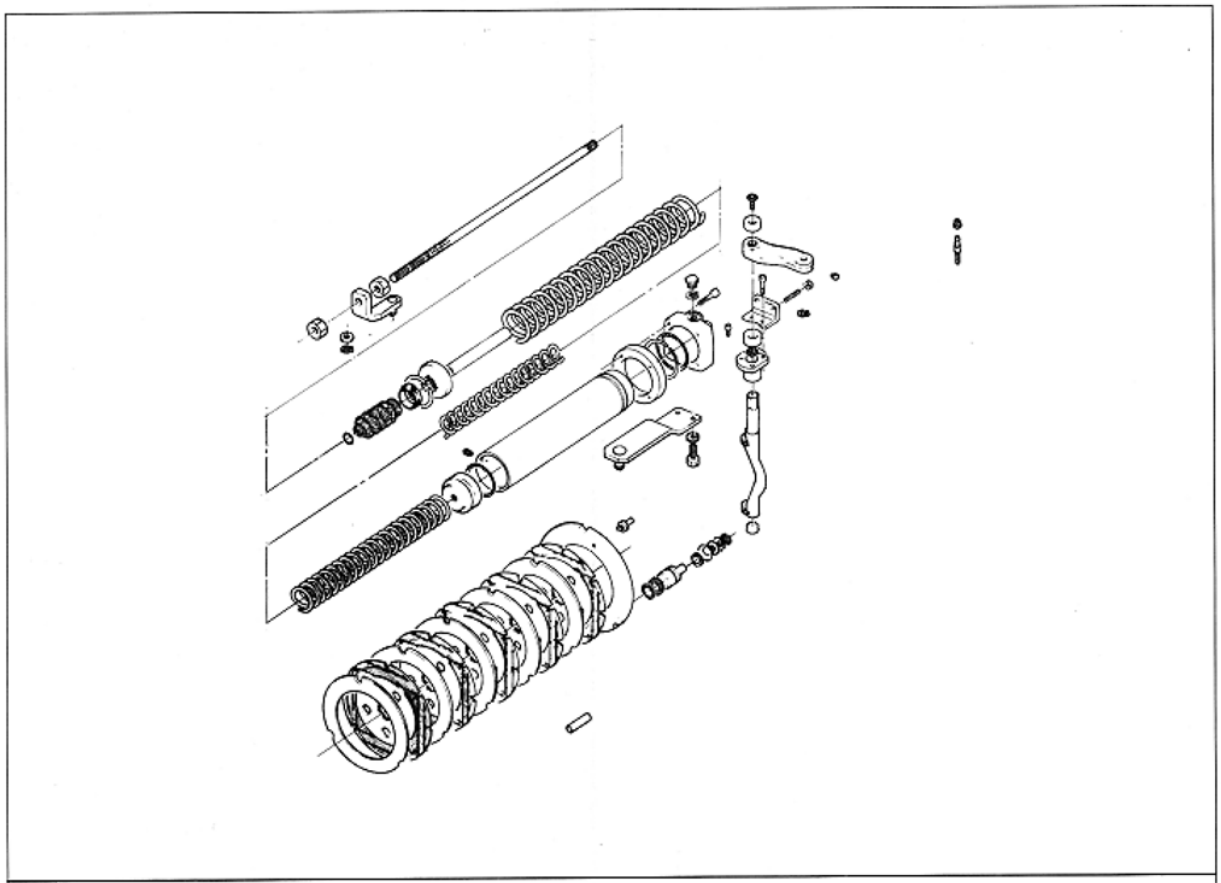
RÉGLAGE
APPLIQUER UNE CHARGE D'ENVIRON 10 kg AU LEVIER.
REGLER LA VIS JUSQU'A OBTENIR LA DISTANCE «G»; A L'AIDE D'UNE JAUGE D'EPAISSEUR SERRER LE CONTRE-ECROU.
ASSEMBLER LE CYLINDRE DE FREIN A UNE PRESSION DE 15-20 bars.
REGLER L'ECROU ET LE CONTRE-ECROU JUSQU'A CE QUE LES DEUX LEVIERS PUISSENT S'APPUYER OU GARGENT UN JEU MINIME SUR LE FIN DE COURSE.

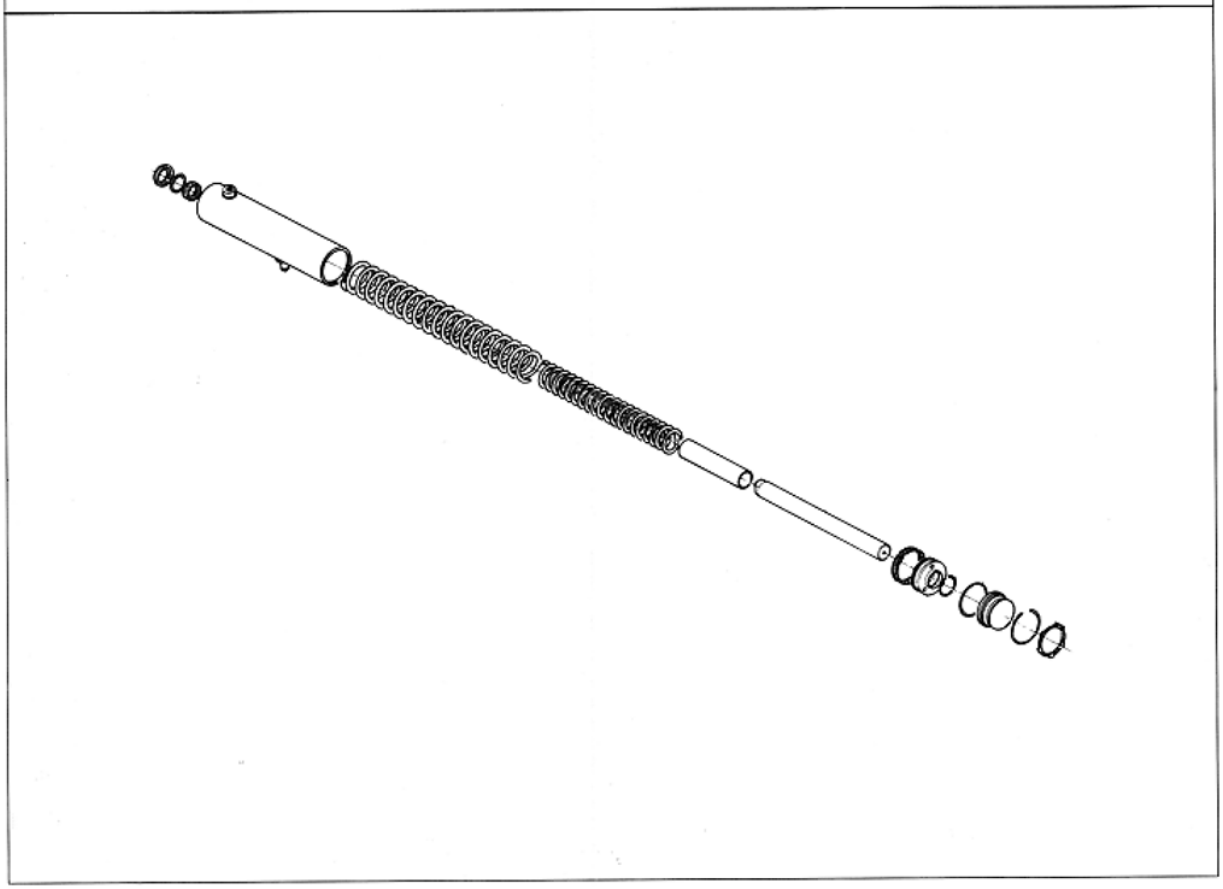
ADJUSTMENT
APPLY A LOAD OF APPROX. 10 kg TO THE LEVER.
ADJUST THE SCREW UNTIL DISTANCE «G» IS OBTAINED; TIGHTEN THE CHECK NUT USING A THICKNESS GAUGE.
MOUNT THE BRAKE CYLINDER AFTER HAVING ENAGED A PRESSURE OF 15-20 bar.
USE THE NUT AND CHECK NUT UNTIL BOTH LEVERS ARE RESTING WITH SLIGHT PLAY AT END OF TRAVEL.

(*)
TABELLA GIOCO IN FUNZIONE DEL N° DI MOLLE SUI PISTONCINI
TABELLE MIT LÜFTSPIELWERTEN IM ABHÄNGIGKEIT DER ANZAHL DER FEDERN AUF DEM BREMSBETÄTIGUNGS-KOLBEN.
TABLEAU DES JEUX EN FONCTION DU NOMBRE DE RESSORTS SUR LES PISTONS.
GAP CHART ACCORDING TO THE NUMBER OF SPRINGS ON THE PISTONS.



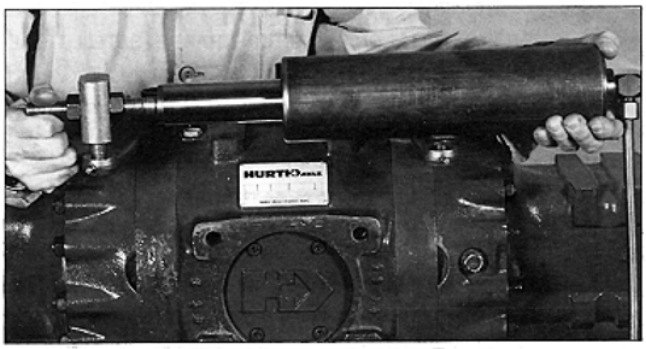
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FRENO NEGATIVO/*FEDERSPEICHERBREMSE*
FREIN NEGATIF/*SAFETY BRAKE*

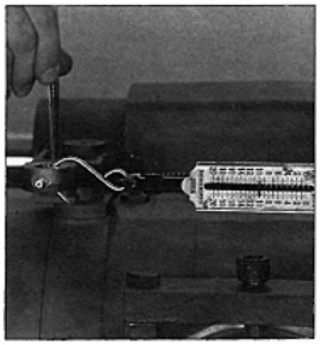


SMONTAGGIO
INSERIRE NEL CIRCUITO IDRAULICO UNA PRESSIONE DI * BAR

AUSBAU
*EINEN DRUCK VON * bar IN DEN BREMSKREISLAUF EINLASSEN.*

DÉMONTAGE
CONNECTER AU CIRCUIT UNE PRESSION DE * bars.

DISASSEMBLY
*ACTUATE THE HYDRAULIC CIRCUIT WITH * bar.*





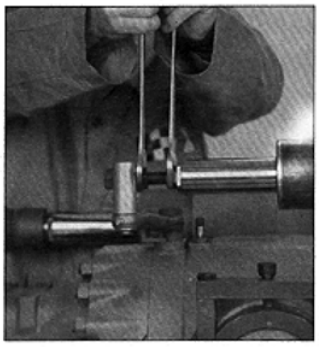
REGISTRAZIONE
VEDI REGISTRAZIONE E TABELLA PAG. 14.

EINSTELLUNG
S. EINSTELLUNGEN UND TABELLE MIT SPIELANGABE SEITE 14.

RÉGLAGE
VOIR LE RÉGLAGE ET TABLEAU DES JEUX PAGE 14.

ADJUSTMENT
SEE ADJUSTMENT AND PLAY CHART PAGE 14.





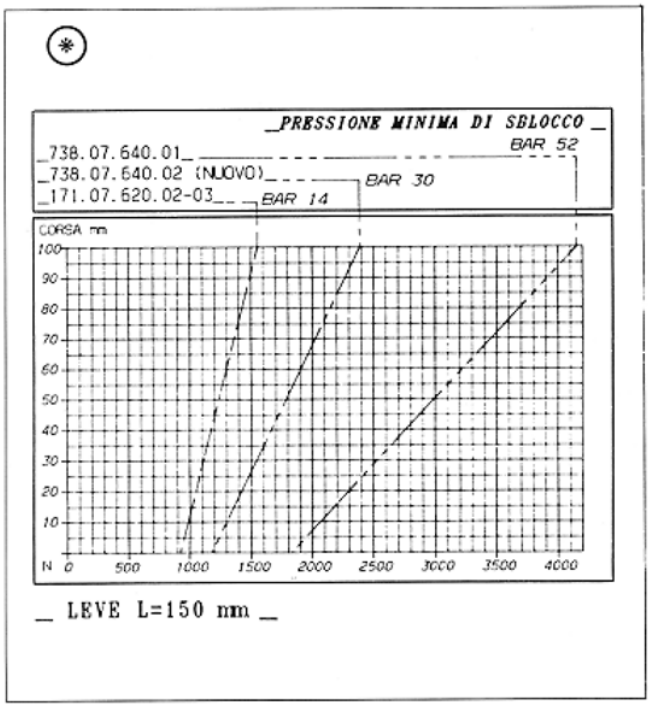
MONTARE IL CILINDRO FRENO CON INSERITA LA PRESSIONE E REGISTRARE LA VITE FINO A CHE LE DUE LEVE SIANO IN APPOGGIO SULLE VITI DI FINE CORSA.
QUINDI SERRARE IL CONTRO DADO CON LOCTITE 242.
DEN BREMSZYLINDER BEI ANGELEGTEM DRUCK MONTIEREN UND DIE SCHRAUBE SO EINSTELLEN, DAß DIE BEIDEN HEBEL AUF DIE ANSCHLAGSCHRAUBEN DRÜCKEN.
DANN DIE GEGENMUTTER MIT LOCTITE 242 ANZIENEN.
MONTER LE CYLINDRE DE FREIN, LA PRESSION ÉTANT ACTIVÉE, ET RÉGLER LA VIS JUSQU'À CE QUE LES DEUX LEVIERS REPOSENT SUR LES VIS DE FIN DE COURSE.
ENSUITE SERRER LE CONTRE-ÉCROU AVEC DE LA LOCTITE 242.
MOUNT THE BRAKE CYLINDER AFTER PRESSURIZING AND ADJUST THE SCREW SO THAT THE TWO LEVERS REST ON THE END OF TRAVEL SCREWS.
NOW TIGHTEN THE LOCK NUT USING LOCTITE 242.

PRESSIONE IN BASE AL TIPO DI CILINDRO E CURVA CARICHI MOLLE.

DRUCK JE NACH ZYLINDERAUSFÜHRUNG UND FEDERBELASTUNGSDIAGRAMM.

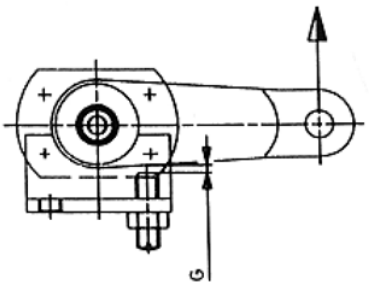
PRESSION SUR LA BASE DU TYPE DE CYLINDRE ET COURBE DE CHARGE DES RESSORTS.

PRESSURE ACCORDING TO THE TYPE OF CYLINDER AND SPRING LOAD CURVE.



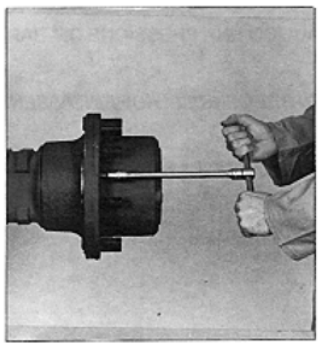
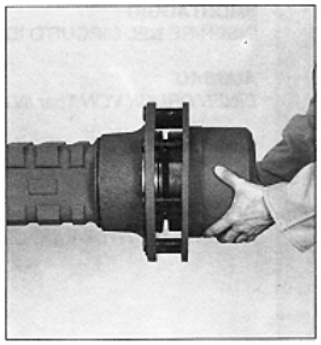
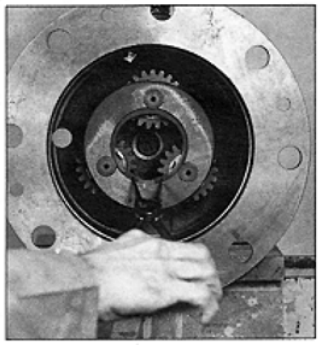
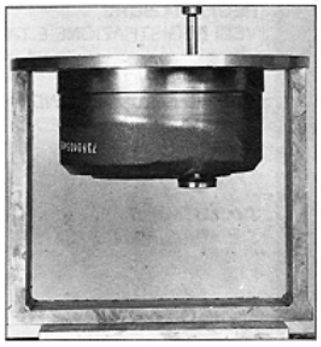
_ LEVE L=150 mm _

n° of springs on each. piston	clearance "G"
2	1,75 standard
3	2,5



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EPICICLOIDALE 4,25 - 5,25/*PLANETENTRIEB 4,25 - 5,25*
EPICYCLOIDAL 4,25 - 5,25/*PLANETARY 4,25 - 5,25*

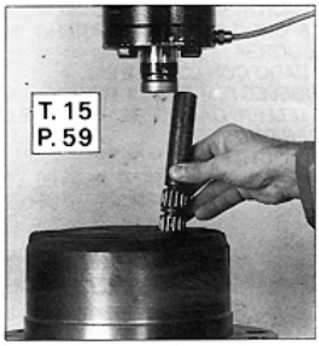





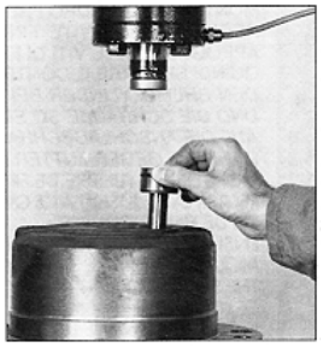
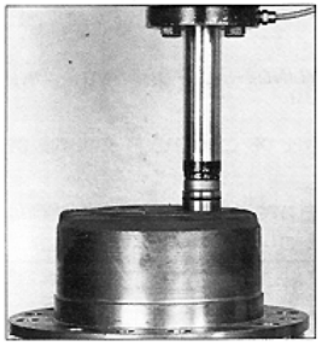
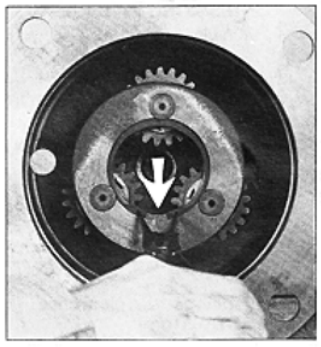
SMONTAGGIO SUPP. PORTA SATELLITE
TOGLIERE TUTTI 3 I PERNI PRIMA DI ESTRARRE I SATELLITI DAL FORO CENTRALE DEL COPERCHIO.

AUSBAU DES PLANETENTRÄGERS
ALLE 3 BOLZEN ENTFERNEN, BEVOR DIE PLANETENRÄDER AUS DER ZENTRALEN DECKELSEITE.

DÉMONTAGE SUPPORT PORTE-SATELLITES
DÉPOSER LES 3 AXES AVANT D'EXTRAIRE LES SATELLITES PAR LE TROU CENTRE DU COUVERCLE.

DISASSEMBLING THE PLANET SUPPORT
REMOVE ALL 3 PINS BEFORE REMOVING THE PLANETS FROM THE CENTRAL HOLE OF THE COVER.



MONTAGGIO
FARE ATTENZIONE ALLA CENTRATURA DELLA RONDELLA DI RASAMENTO

EINBAU
BEACHTEN, DAß DIE PAßSCHEIBEN ZENTRAL MONTIERT WERDEN.

MONTAGE
FAIRE ATTENTION AU CENTRAGE DE LA RONDELLE D'AJUSTEMENT.

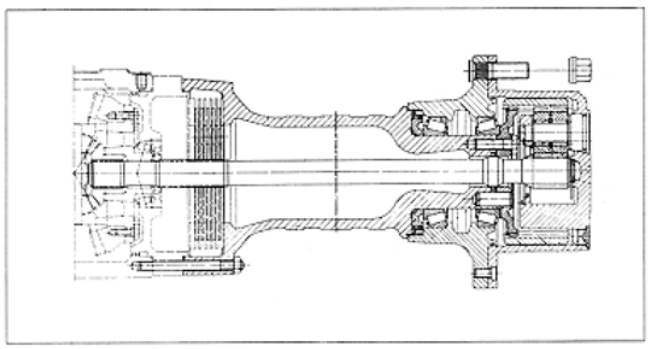
ASSEMBLY
TAKE CARE TO CENTER THE THRUST WASHER.

PER IL MONTAGGIO DEL SUPPORTO ESEGUIRE IN SENSO INVERSO.
CIANFRINARE DOPO IL MONTAGGIO DELL'ANELLO SEEGER COME INDICATO.

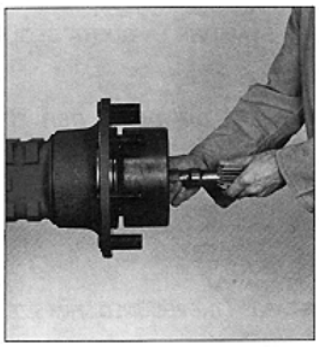
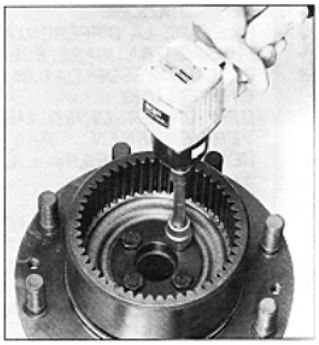
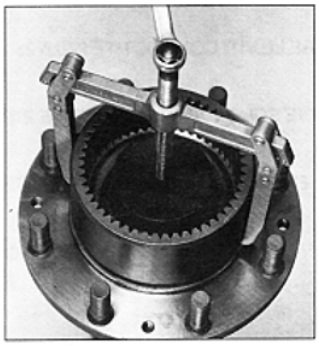
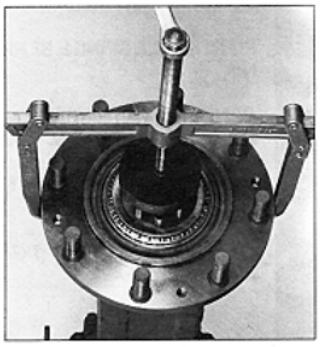
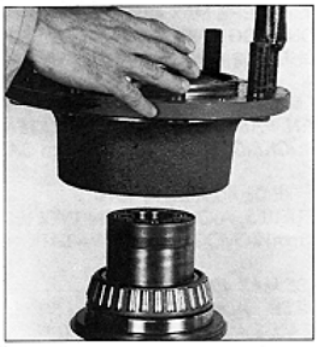
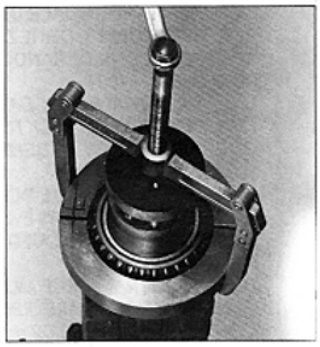
BEIM EINBAU DES PLANETENTRÄGERS IN UMGEKEHRT ER VORGEHEN REIHENFALGE.
NACH DER MONTAGE DEN SEEGERRING WIE GEZEIGT STEMMEN.

POUR LE MONTAGE DU SUPPORT, PROCÉDER EN SENS INVERSE.
CHANFREINER APRES LE MONTAGE DE L'ANNEAU SEEGER DE LA MANIERE INDIQUEE.

PROCEED IN REVERSE ORDER WHEN MOUNTING THE SUPPORT.
CHAMPFER AFTER HAVING MOUNTED THE CIRCLIP AS INDICATED.



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SMONTAGGIO
PRIMA DI SFILARE IL SEMIASSE BLOCCARE IL FRENO PER MANTENERE I DISCHI CENTRATI

AUSBAU
VOR DEM HERAUSZIEHEN DER ACHSWELLE DIE BREMSE BLOCKIEREN, UM DIE LAMELLEN ZUSAMMENGE DRÜCKT ZU HALTEN.

DÉMONTAGE
AVANT D'EXTRAIRE LE DEMI-ARBRE, BLOQUER LE FREIN POUR MAINTENIR LES DISQUES COMPACTES.

DISASSEMBLY
BEFORE REMOVING THE AXLE SHAFT, LOCK THE BRAKE TO KEEP THE DISKS IN PLACE.

USARE LE VITI ORIGINALI PARZIALMENTE AVVITATE ED UNA PIASTRA PER L'ESTRATTORE.

DIE TEILWEISE EINGESCHRAUBTEN ORIGINALSCHRAUBEN UND EINE PLATTE FÜR DEN ABZIEHER VERWENDEN.

UTILISER LES VIS PARTIELLEMENT VISSÉES ET UNE PLAQUE POUR L'EXTRACTEUR.

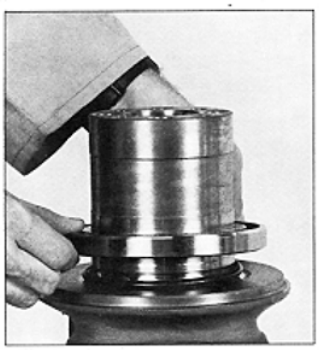
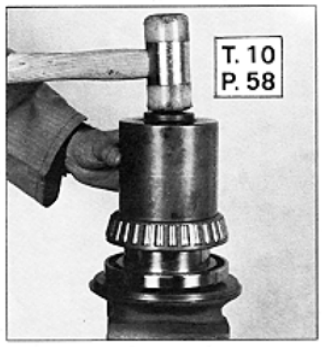
USE THE PARTLY TIGHTENED ORIGINAL SCREWS AND A PLATE FOR THE PULLER

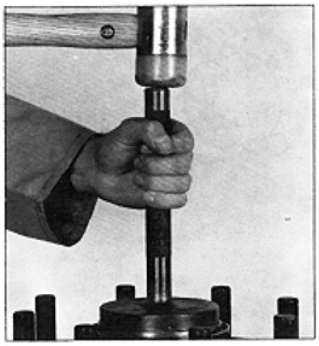
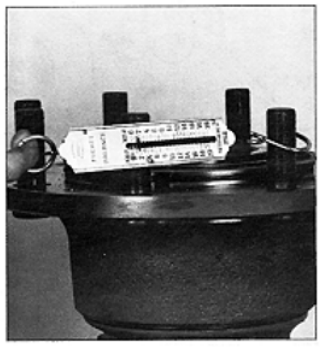
SE NECESSARIO TOGLIERE IL CUSCINETTO E DISTANZIALE CON ESTRATTORE.

FALLS ERFORDERLICH, DAS LAGER UND DAS DISTANZSTÜCK MIT ABZIEHER ENTFERNEN.

LES CAS ÉCHÉANT, DÉPOSER LE ROULEMENT ET L'ENTRETOISE À L'AIDE D'UN EXTRACTEUR.

REMOVE THE BEARING AND SPACER WITH A PULLER IF NECESSARY.

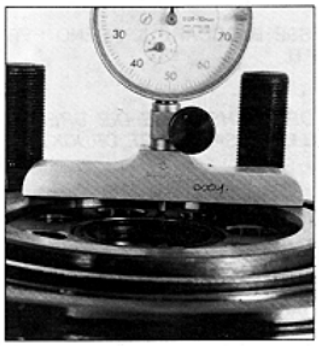
MONTAGGIO
CONTROLLARE LA COPPIA DI ROTAZIONE LASCIANDO UN LEGGERO GIOCO ASSIALE AL CUSCINETTO CONICO.
LA FORZA TANGENZIALE DEVE ESSERE DI 20÷30 N.

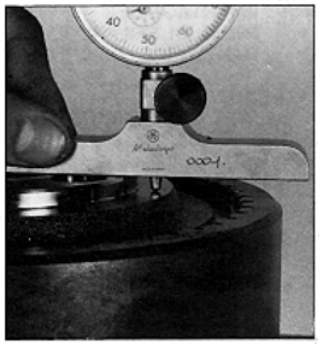
EINBAU
DAS DREHMOMENT PRÜFEN. DAZU EIN GERINGES AXIALSPIEL AM KEGELROLLENLAGER LASSEN.
MAX. TANGENTIALKRAFT 20÷30 N.

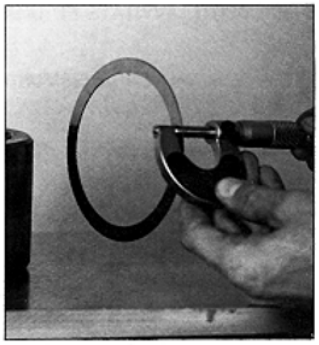
MONTAGE
CONTROLER LE COUPLE DE ROTATION EN LAISSANT UN PETIT JEU AXIAL AU ROULEMENT CONIQUE.
LA FORCE TANGENTIELLE DOIT ÉTRE DE 20 À 30 N.

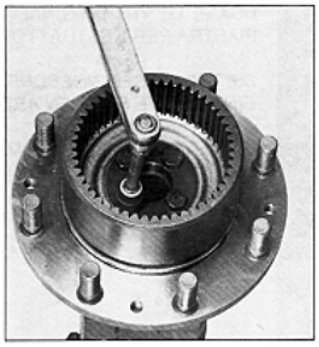
ASSEMBLY
CHECK THE ROTATION TORQUE, ALLOWING THE TAPER BEARING A SLIGHT END PLAY.
THE TANGENTIAL FORCE MUST BE 20-30 N.

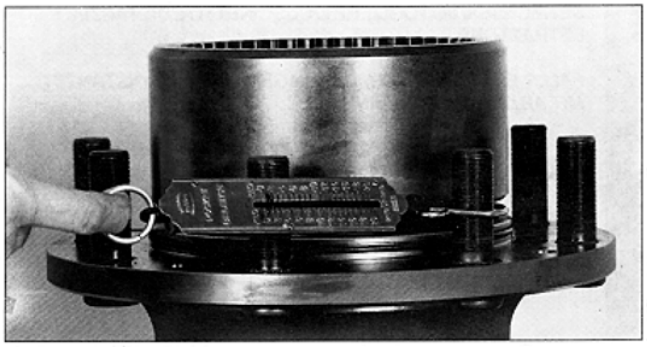
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REGISTRAZIONE
RILEVARE LA DIFFERENZA PER STABILIRE LA QUOTA DEGLI SPESSORI DA USARE: ESEMPIO 0.9 mm
PACCO SPESSORI DA 0,88 A 0,92 mm

EINSTELLUNG
DEN UNTERSCHIED MESSEN, UM DIE DICKE DER ZU VERWENDENEN PAß SCHEIBEN FESTZULEGEN, BEISPIELSWEISE 0,9 mm, ALSO EIN PAKET PASS SCHEIBEN VON 0,88 BIS 0,92 mm.

RÉGLAGE
MESURER LA DIFFÉRENCE POUR ÉTABLIR LA VALEUR DES CALES À UTILISER; EXEMPLE 0,9 mm
PAQUET CALES D'ÉPAISSEUR DE 0,88 À 0,92 mm.

ADJUSTMENT
MEASURE THE DIFFERENCE TO ESTABLISH THE REQUIRED SHIM SIZE, EG. 0,9 mm
SHIM PACK FROM 0,88 TO 0,92 mm.

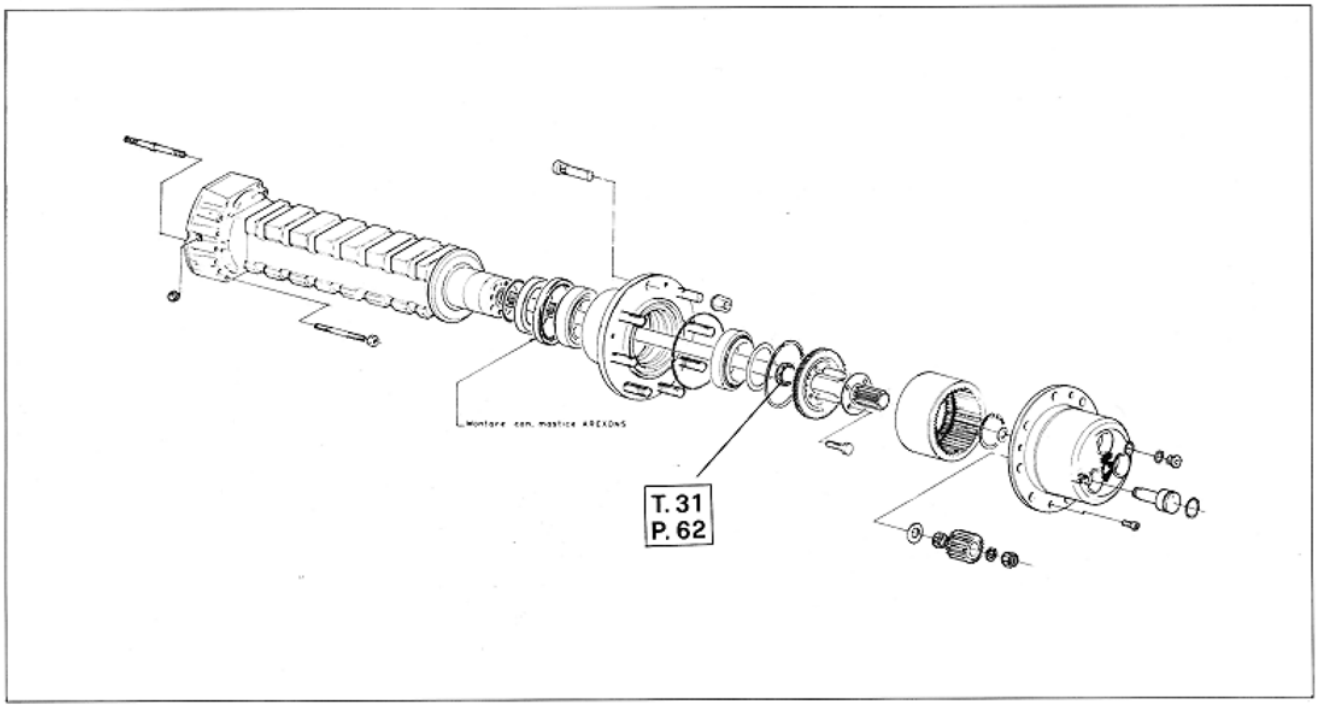
PIANTARE LA SPINE E SERRARE LE VITI CON LOCTITE 270 A 250 Nm.

DEN STIFT EINTREIBEN UND DIE SCHRAUBEN MIT LOCTITE 270 BIS 250 Nm ANZIEHEN.

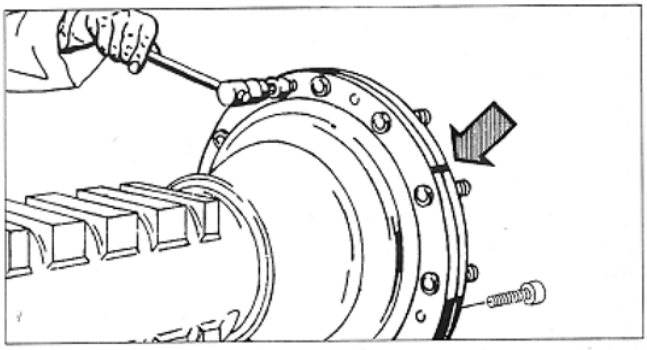
ENFONCER LES GOUPILLES ET SERRER LES VIS AVEC DE LA LOCTITE 270 À 250 Nm.

INSERT THE PIN AND TIGHTEN THE BOLTS TO 250 Nm USING LOCTITE 270.

LA FORZA TANGENZIALE DEVE ESSERE MAX 40÷50 N
PER EVENTUALI CORREZZIONI AGGIUNGERE O TOGLIERE SPESSORI CONSIDERANDO CHE 0,02 mm CAUSANO UNA VARIAZIONE DI ~10 N.
DIE TANGENTIALKRAFT DARF MAX. 40-50 N AUSMACHEN.
FÜR ETWAIGE KORREKTUREN PAßSCHEIBEN HINZUFÜGEN ODER ENTFERNEN. DABEI BERÜCKSICHTIGEN, DAß 0,02 mm CA. 10 N ENTSPRECHEN.
LA FORCE TANGENTIELLE DOIT ÊTRE DE 40 À 50 N MAXI.
POUR LES CORRECTIONS ÉVENTUELLES, AJOUTER OU ENLEVER LES ÉPAISSEURS, SACHANT QUE 0,02 mm PROVOQUENT UNE VARIATION D'ENVIRON 10 N.
THE TANGENTIAL FORCE MUST BE MAX 40÷50 N
IF CORRECTIONS ARE REQUIRED, ADD OR REMOVE SHIMS CONSIDERING THAT 0,02 mm CAUSE A VARIATION OF ~10 N.



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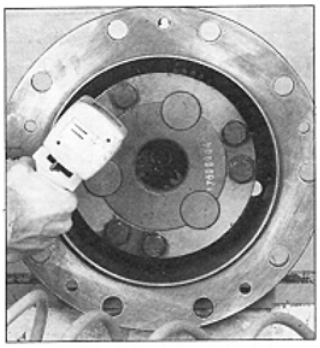


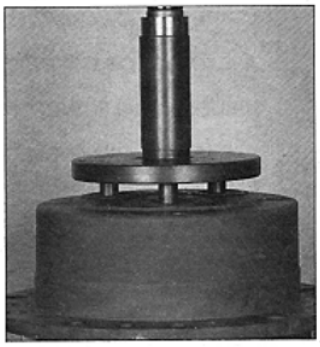
SMONTAGGIO

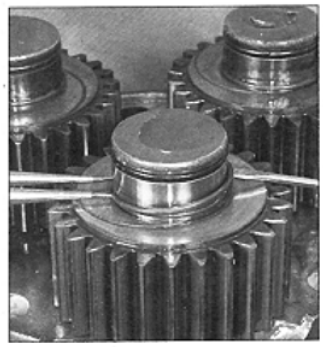
AUSBAU

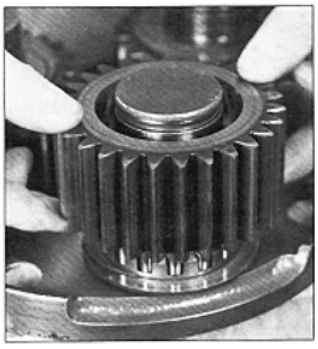
DÉMONTAGE

DISASSEMBLY







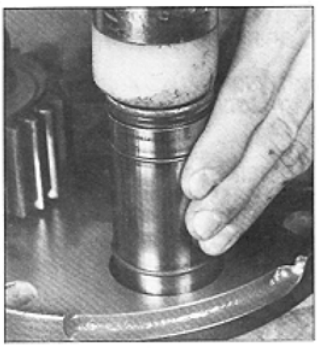


MONTAGGIO

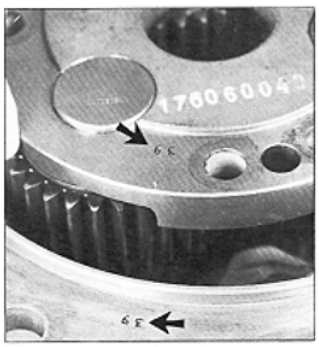
ZUSAMMENBAU

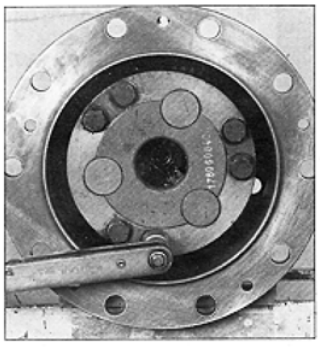
MONTAGE

ASSEMBLY









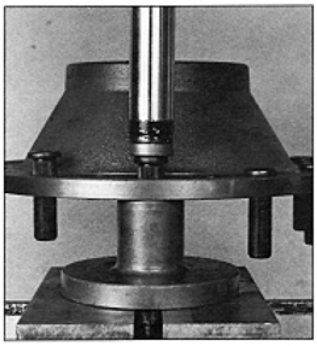
FARE ATTENZIONE AI NUMERI DI RIFERIMENTO.
SERRARE LE VITI CON «LOCTITE 270» A 315-320 Nm.

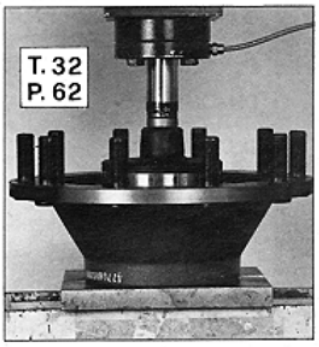
AUF DIE BEZUGSNUMMERN ACHTEN.
DIE SCHRAUBEN MIT «LOCTITE 270» BEI 315-320 Nm.

FAIRE ATTENTION AUX RÉFÉRENCES.
SERRER LES VIS AVEC DU «LOCTITE 270» A315-320 Nm.

CHECK THE REFERENCE NUMBERS.
TORQUE THE SCREWS AT 315-320 Nm.

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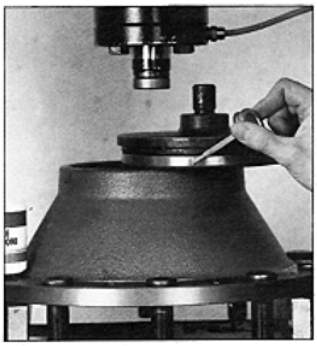


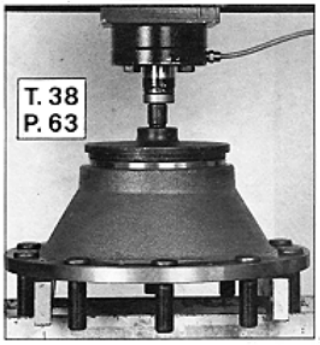
SMONTAGGIO
VEDI LE OPERAZIONI DI PAG. 17.
MONTAGGIO

AUSBAU
VGL. DIE BESCHREIBUNG AUF SEITE 17.
ZUSAMMENBAU

DÉMONTAGE
VOIR LES OPÉRATIONS PAGE 17.
MONTAGE

DISASSEMBLY
FOLLOW THE OPERATIONS ON PAGE 17.
ASSEMBLY





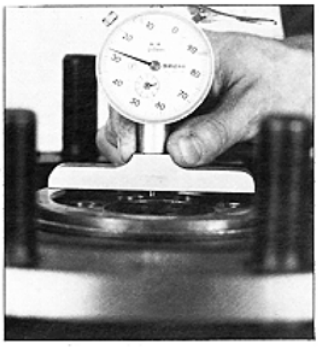
USARE MASTICE AREXON.

AREXON-KLEBEMASSE BENUTZEN.

UTILISER DU MASTIC AREXON.

USE AREXON ADHESIVE. (LIQUID GASKET MATERIAL)





REGISTRAZIONE
VEDI LE OPERAZIONI DI PAG. 17.

EINSTELLUNG
S. DIE BESCHREIBUNG AUF SEITE 17.

RÉGLAGE
VOIR LES OPÉRATIONS PAGE 17.

ADJUSTMENT
FOLLOW THE OPERATION ON PAGE 17.



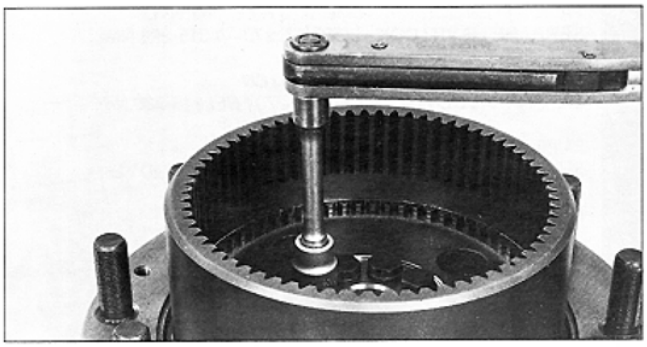


USARE LOCTITE 242 SUL FILETTO E GRASSO SU DIAMETRO SPINA PER EVITARE POSSIBILI GRIPPAGGI.

GEWINDE MIT LOCTITE 242 BESTREICHEN UND AUF DEN PASS STIFTDURCHMESSER FETT AUFTRAGEN, DAMIT EIN ETWAIGES FESTFRESSEN VERMIEDEN WIRD.

UTILISER DE LA LOCTITE 242 SUR LE FILETAGE ET DE LA GRAISSE SUR LE DIAMÈTRE DE LA FUSEÉ POUR ÉVITER LES GRIPPAGES.

USE LOCTITE 242 ON THE THREAD AND GREASE AROUND THE PIN DIAMETER TO PREVENT LOCK UP.



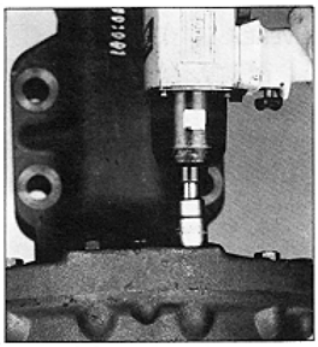
SERRARE CON CHIAVE DINAMOMETRICA A 315÷320 Nm.

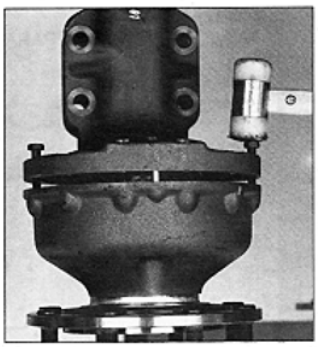
MIT EINEM DREHMOMENTENSCHLÜSSEL BIS AUF 315÷320 Nm ANZIEHEN.

SERRER AVEC UNE CLÉ DYNAMOMETRIQUE À 315÷320 Nm.

TORQUE TO 315÷320 Nm WITH A TORQUE WRENCH.

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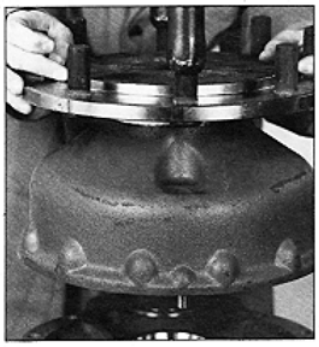


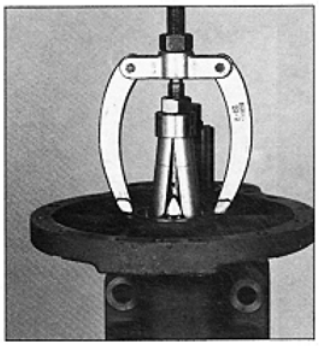
SMONTAGGIO
USARE DUE VITI PARZIALMENTE AVVITATE COME ESTRATTORE.

AUSBAU
ZWEI TEILWEISE EINGEDREHTE SCHRAUBEN BEIM ABZIEHEN BENÜTZEN.

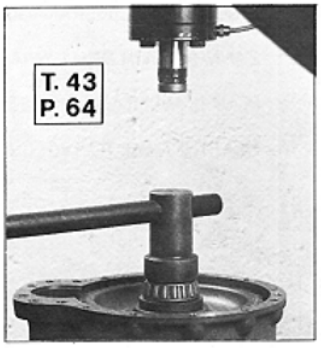
DÉMONTAGE
EN GUISE D'EXTRACTEUR UTILISER DEUX VIS PARTIELLEMENT VISSEES.

DISASSEMBLY
USE TWO PARTIALLY TIGHTENED SCREWS AS A PULLER.







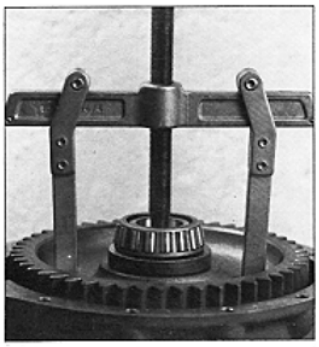


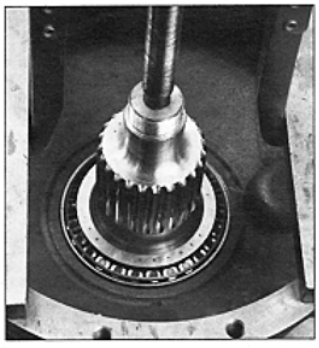
ALLENTARE LA GHIERA QUINDI SMONTARE L'INGRANAGGIO DAL MOZZO.

NUTMUTTER LOCKERN UND DAS ZAHNRAD VON DER NABE ABMONTIEREN.

DESSERRER LA BAGUE PUIS DÉMONTER L'ENGRENAGE DU MOYEU.

LOCK THE RING NUT THEN REMOVE THE HUB GEAR.



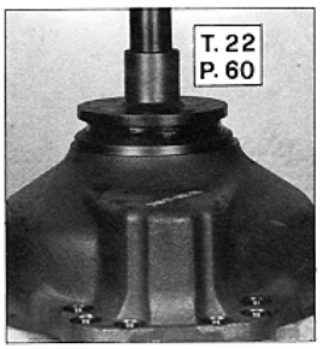


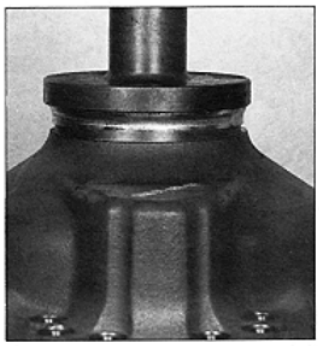
SMONTAGGIO MOZZO DAL COPERCHIO.
SOSTITUIRE L'ANELLO DI TENUTA.

NABE VOM DECKEL ABMONTIEREN.
DEN DICHTUNGSRING ERSETZEN.

DÉMONTER LE MOYEU DU COUVERCLE.
REMPLACER LA BAGUE D'ÉTANCHÉITÉ.

DISASSEMBLY THE HUB COVER.
REPLACE THE RETAINING RING.





MONTAGGIO
ANELLO DI TENUTA A PARAPOLVERE.

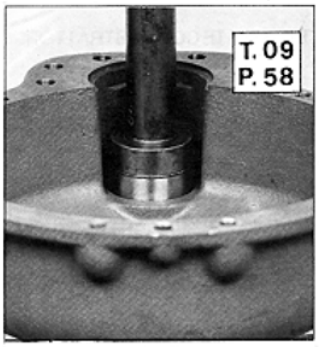
EINBAU
STAUBABSTREIFRING.

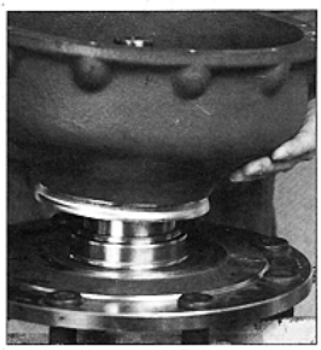
MONTAGE
BAGUE D'ÉTANCHÉITÉ À PARE-POUSSIÈRE.

ASSEMBLY
DUST EXCLUDER

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RIDUZIONE A PORTALE 141/*PORTALGETRIEBE 141*
REDUCTION A PONT 141/*FINAL DRIVE 141*





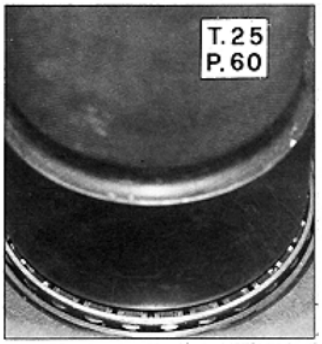
MONTAGGIO
ANELLO DI TENUTA A PARAPOLVERE.

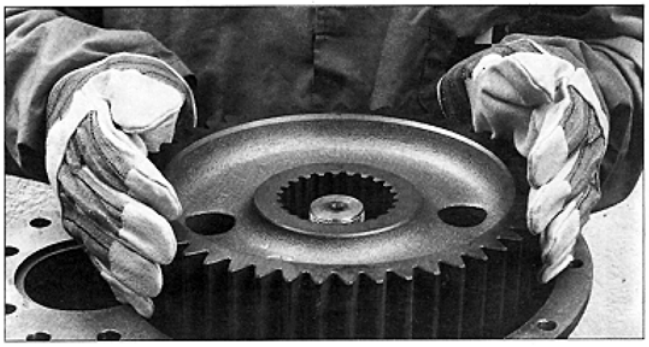
EINBAU
STAUBABSTREIFRING.

MONTAGE
BAGUE D'ÉTANCHÉITÉ À PARE-POUSSIÈRE.

ASSEMBLY
DUST EXCLUDER





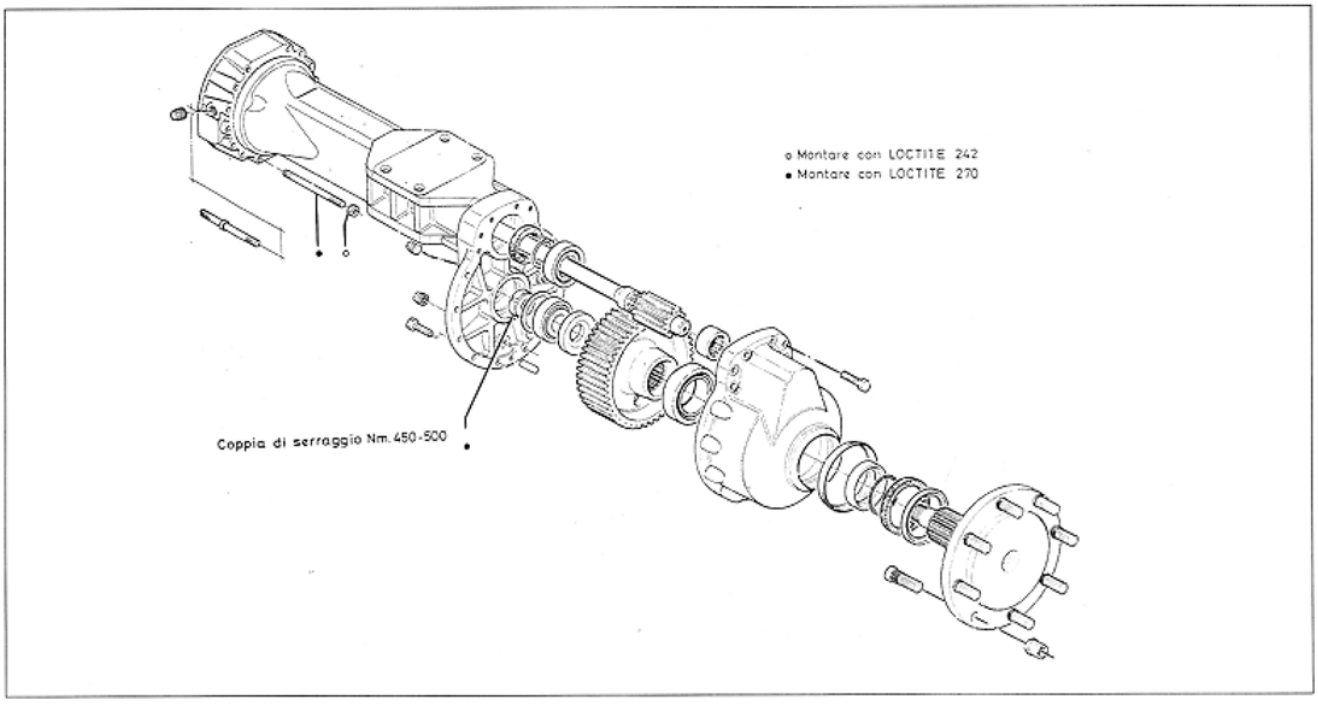


RISCALDARE L'INGRANAGGIO A 140°C PER IL MONTAGGIO.

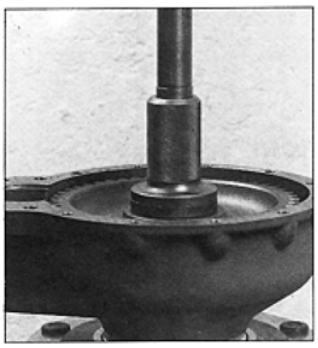
ZAHNRAD VOR DEM EINBAU AUF 140° C ERWÄRMEN.

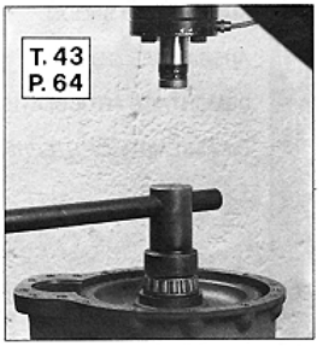
POUR LE MONTAGE CHAUFFER L'ENGRENAGE À 140° C.

HEAT THE GEAR TO 140° C FOR ASSEMBLY.



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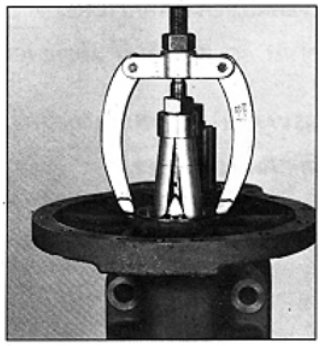


SERRARE LA GHIERA A 450÷500 Nm CON LOCTITE 270.

DIE NUTMUTTER MIT LOCTITE 270 UND 450÷500 Nm ANZIEHEN.

SERRER LA BAGUE À 450÷500 Nm AVEC DE LA LOCTITE 270.

TIGHTEN THE RING NUT AT 450÷500 Nm USING LOCTITE 270.





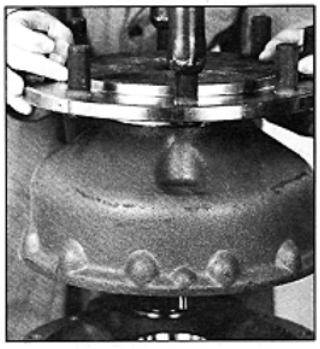
ASSEMBLAGGIO E REGISTRAZIONE
PREASSEMBLAGGIO CON GLI STESSI SPESSORI RISCONTRATI NELLO SMONTAGGIO O 0,80 mm DI SPESSORI.

ZUSAMMENBAU UND EINSTELLUNG
VORMONTAGE MIT DEN GLEICHEN PAßSCHEIBEN, DIE BEIM AUSBAU ANGEFALLEN SIND, ODER PAßSCHEIBEN VON 0,80 mm.

ASSEMBLAGE ET RÉGLAGE
PRÈASSEMBLER AVEC LES MEMES CALES DU DÉMONTAGE OU À 0,80 mm.

ASSEMBLY AND ADJUSTMENT
PREASSEMBLY WITH THE SAME SHIMS AS THOSE REMOVED DURING DISASSEMBLY, OR WITH 0,08 mm SHIMS.



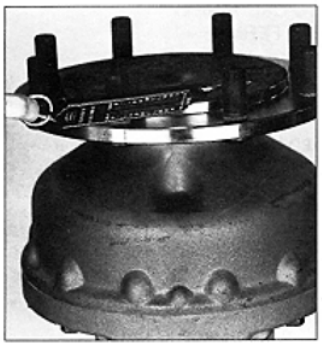


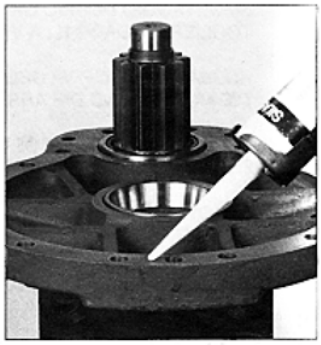
VERIFICARE LA COPIA DI ROTAZIONE APPLICATA TANGENZIALMENTE ALLE COLONNETTE CHE DEVE ESSERE MAX DI 60 N TOTALE (CON ANELLO DI TENUTA).
PER CORREZIONI AGGIUNGERE O TOGLIERE SPESSORI CONSIDERANDO CHE UNA VARIAZIONE DI 0.05 mm, PROVOCA UNA VARIAZIONE DI ~20 N.

DAS DREHMOMENT PRÜFEN, DAS TANGENTIAL AUF DIE RAD BOLZEN EINWIRKT. ES DARF MAXIMAL INSGESAMT 60 N BETRAGEN (MIT DICHTUNGSRING).
FÜR KORREKTUREN PAßRINGE HINZUFÜGEN ODER HERAUSNEHMEN, WOBEI ZU BERUCKSICHTIGEN IST, DAß 0,05 mm CA. 20 N ENTSPRICHT.

VÉRIFIER LE COUPLE DE ROTATION APPLIQUÉ TANGENTIELLEMENT AUX GOUJONS QUI DOIT ETRE DE 60 N MAXI (AVEC BAGUE D'ÉTANCHÉITÉ).
POUR LES CORRECTIONS AJOUTER OU ENLEVER LES CALES EN CONSIDÉRANT QU'UNE VARIATION DE 0,05 mm PROVOQUE UNE VARIATION D'ENVIRON 20 N.

CHECK THE ROTATION TORQUE APPLIED TANGENTIALLY TO THE WHEEL STUDS, WHICH MUST BE MAX 60 N (WITH RING).
TO CORRECT, ADD OR REMOVE SHIMS CONSIDERING THAT A 0,05 mm VARIATION CAUSE A VARIATION OF ~ 20 N.



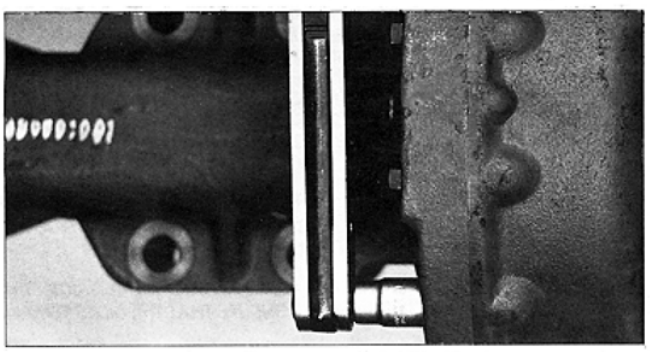


MONTARE DEFINITIVAMENTE CON SILICONE DOWCORNING TIPO Q3-7091.
SERRARE LE VITI CON CHIAVE DINAMOMETRICA A120÷123 Nm.

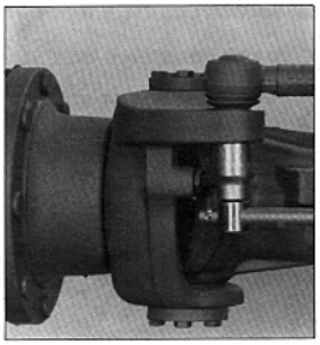
MIT SILIKON DOWCORNING TYP Q3-7091 ENDGÜLTIG MONTIEREN.
DIE SCHRAUBEN MIT EINEM DREHMOMENTENSCHLÜSSEL ANZIEHEN 120÷123 Nm.

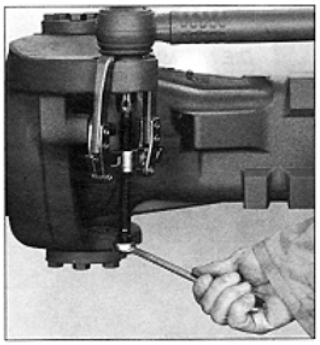
MONTER DÉFINITIVEMENT AVEC DU SILICONE DOWCORNING TYPE Q3-7091.
SERRER LES VIS AVEC UNE CLÉ DYNAMOMÉTRIQUE 120÷123 Nm.

ASSEMBLY USING ONLY DOWCORNING SILICONE TYPE Q3-7091.
TIGHTEN THE SCREWS WITH A TORQUE WRENCH 120÷123 Nm.



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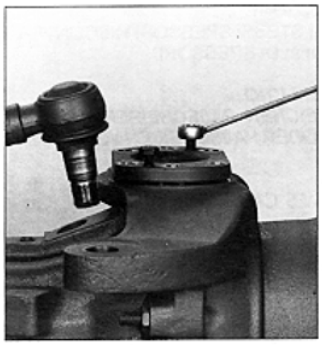


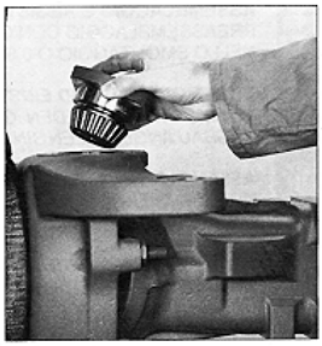
SMONTAGGIO SNODO.

AUSBAU DES GELENKES.

DEMONTAGE ARTICULATION.

DISASSEMBLY OF STEERING JOINT.



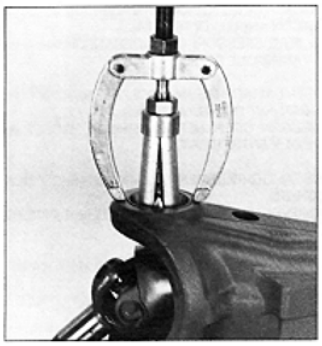


USARE I FORI FILETTATI NEL PERNO PER ESTRATTORE.

DIE GEWINDEBOHRUNGEN IM BOLZEN ZUM ABZIEHEN BENUTZEN.

UTILISER LES TROUS FILETÉS DANS L'AXE EN TANT QU' EXTRACTEUR.

USE THE THREADED HOLES IN THE PIN AS A PULLER.





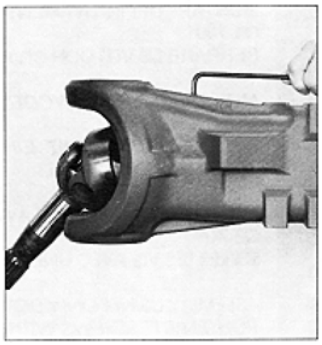
VERIFICARE CHE LE SEDI DELLE RALLE DEI CUSCINETTI A RULLI CONICI NON ABBIANO SUBITO DEFORMAZIONI.

PRÜFEN, DAß DIE LAUFFLÄCHEN DER KEGELROLLENLAGER NICHT VERFORMT SIND.

VÉRIFIER QUE LES LOGEMENTS DE LA CAGE DES ROULEMENTS À ROULEAUX CONIQUES NE SONT PAS DÉFORMÉS.

CHECK THE BEARING RACES FOR POSSIBLE DAMAGE.



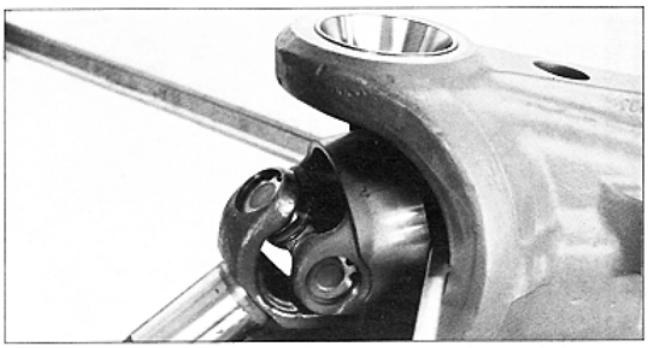


SMONTAGGIO DOPPIO GIUNTO CARDANICO.
TOGLIERE IL DADO E LA VITE DI FERMO.

AUSBAU DER DOPPELGELENKWELLE.
DIE MUTTER UND DIE ARRETIERSCHRAUBE ENTFERNEN.

DÉMONTAGE DU JOINT DE CARDAN DOUBLE.
ENLEVER L'ÉCROU ET LA VIS DE BLOCAGE.

REMOVE THE DOUBLE CARDAN JOINT.
REMOVE THE NUT AND THE STOP SCREW.



PRIMA DI SFILARE IL DOPPIO GIUNTO CARDANICO INSERIRE IL BLOCCO DIFFERENZIALE E BLOCCARE IL FRENO PER GARANTIRE CHE I DISCHI RIMANGANO IN POSIZIONE.

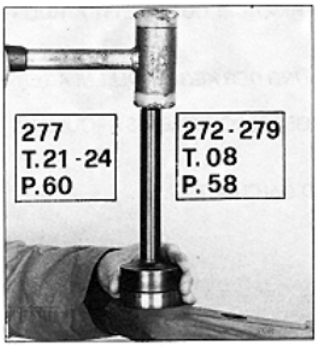
VOR DEM HERAUSZIEHEN DER DOPPELGELENKWELLE DIE DIFFERENTIALSPERRE EINSCHALTEN UND DIE BREMSE BLOCKIEREN, DAMIT DIE BREMSLAMELLEN NICHT VERRUTSCHEN.

AVANT D'EXTRAIRE LE JOINT DE CARDAN DOUBLE, INTRODUIRE LE BLOCAGE DU DIFFÉRENTIEL ET BLOQUER LE FREIN POUR QUE LES DISQUES RESTENT EN POSITION.

BEFORE REMOVING THE DOUBLE CARDAN JOINT LOCK THE DIFFERENTIAL AND THE BRAKE TO ENSURE THAT THE DISKS REMAIN IN POSITION.

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MONTAGGIO SNODO 272-277-279/*MONTAGE DES GELENKES 272-277-279*
MONTAGE ARTICULATION 272-277-279/*ASSEMBLING ARTICULATION 272-277-279*





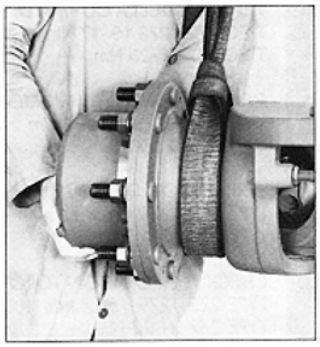
PIANTAGGIO RALLA ESTERNA CUSCINETTO A RULLI CONICI.
INSERIMENTO DOPPIO GIUNTO CARDANICO.

EINSETZEN DER ÄUßEREN LAGERSCHALE DES KEGELROLLENLAGERS.
EINBAU DER DOPPELGELENKWELLE.

MONTAGE FORCÉ DE LA CAGE EXTERIEURE DU ROULEMENT À ROULEAUX CONIQUES.
INTRODUCTION DU JOINT DE CARDAN DOUBLE.

INSERT THE EXTERNAL BEARING RACE OF THE TAPER ROLLER BEARING.
INSERT THE DOUBLE CARDAN JOINT.



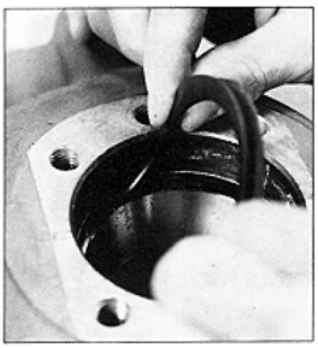


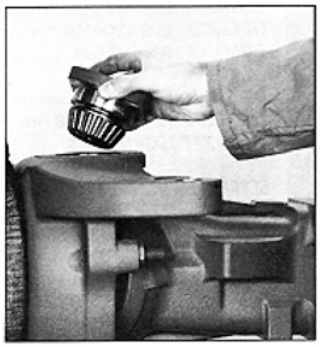
SERRARE IL CONTRODADO CON CHIAVE DINAMOMETRICA A 86 Nm.

DIE GEGENMUTTER MIT EINEM DREHMOMENTENSCHLÜSSEL MIT 86 Nm ANZIEHEN.

SERRER LE CONTRE-ÉCROU AVEC UNE CLÉ DYNAMOMÉTRIQUE A 86 Nm.

TIGHTEN THE LOCK NUT AT 86 Nm USING A TORQUE WRENCH.





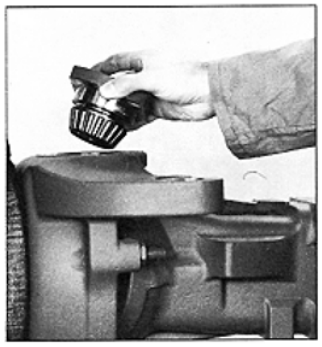
MONTAGGIO ANELLO ACLA RING NEL TIPO 272 - 279.

MONTAGE DES ACLA RING ES IM TYP 272 - 279.

MONTAGE DE L'ANNEAU ACLARING DANS LES PONTS 272 - 279.

ASSEMBLY OF ACLA RING TYPE 272 - 279.



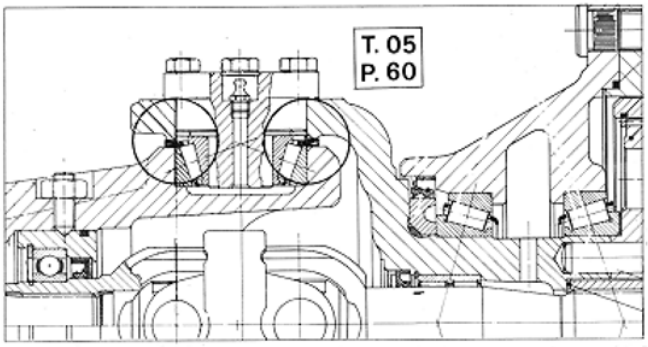


MONTAGGIO ANELLO NEL TIPO 277.

MONTAGE VON RING IM TYP 277.

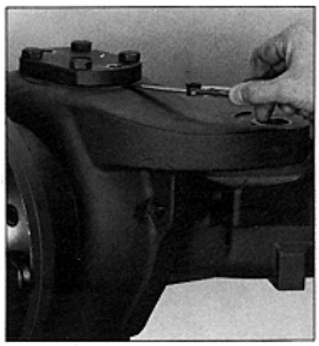
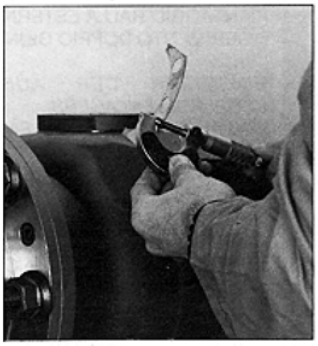
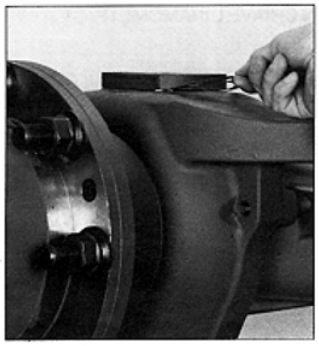
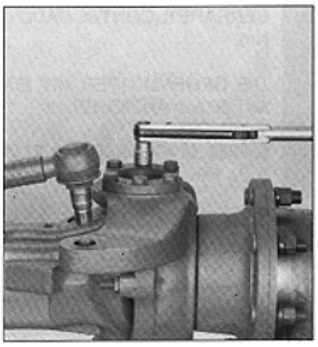
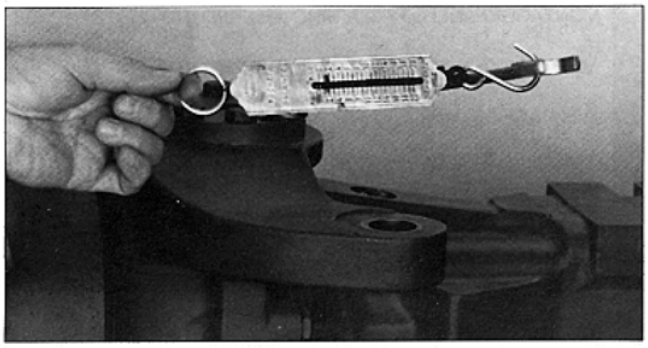
MONTAGE ANNEAU DANS LES PONTS 277.

ASSEMBLY OF RING TYPE 277.



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SNODO 272-277-279/*GELENK 272-277-279*
ARTICULATION 272-277-279/*ARTICULATION 272-277-279*

DETERMINAZIONE DEL PRECARICO DEI CUSCINETTI A RULLI CONICI.

FESTLEGUNG DER VORSPANNUNG DER KEGELROLLENLAGER.

DÉTERMINATION DE LA PRÉCHARGE DES ROULEMENTS À ROULEAUX CONIQUES.

TAPER ROLLER BEARING PRELOAD CALCULATION.

VERIFICA DELLA COPPIA DI ROTAZIONE
TIPO 272 - 279 15÷17 Nm
TIPO 277 21÷23 Nm.

PRÜFUNG DES DREHMOMENTES
TYPE 272 - 279 15 ÷ 17 Nm
TYPE 277 21÷23 Nm.

VÉRIFICATION DU COUPLE DE ROTATION
TYPE 272 - 279 15 À 17 Nm
TYPE 277 21 À 23 Nm.

CHECK THE ROTATION TORQUE
TYPE 272 - 279 15-17 Nm
TYPE 277 21-23 Nm.

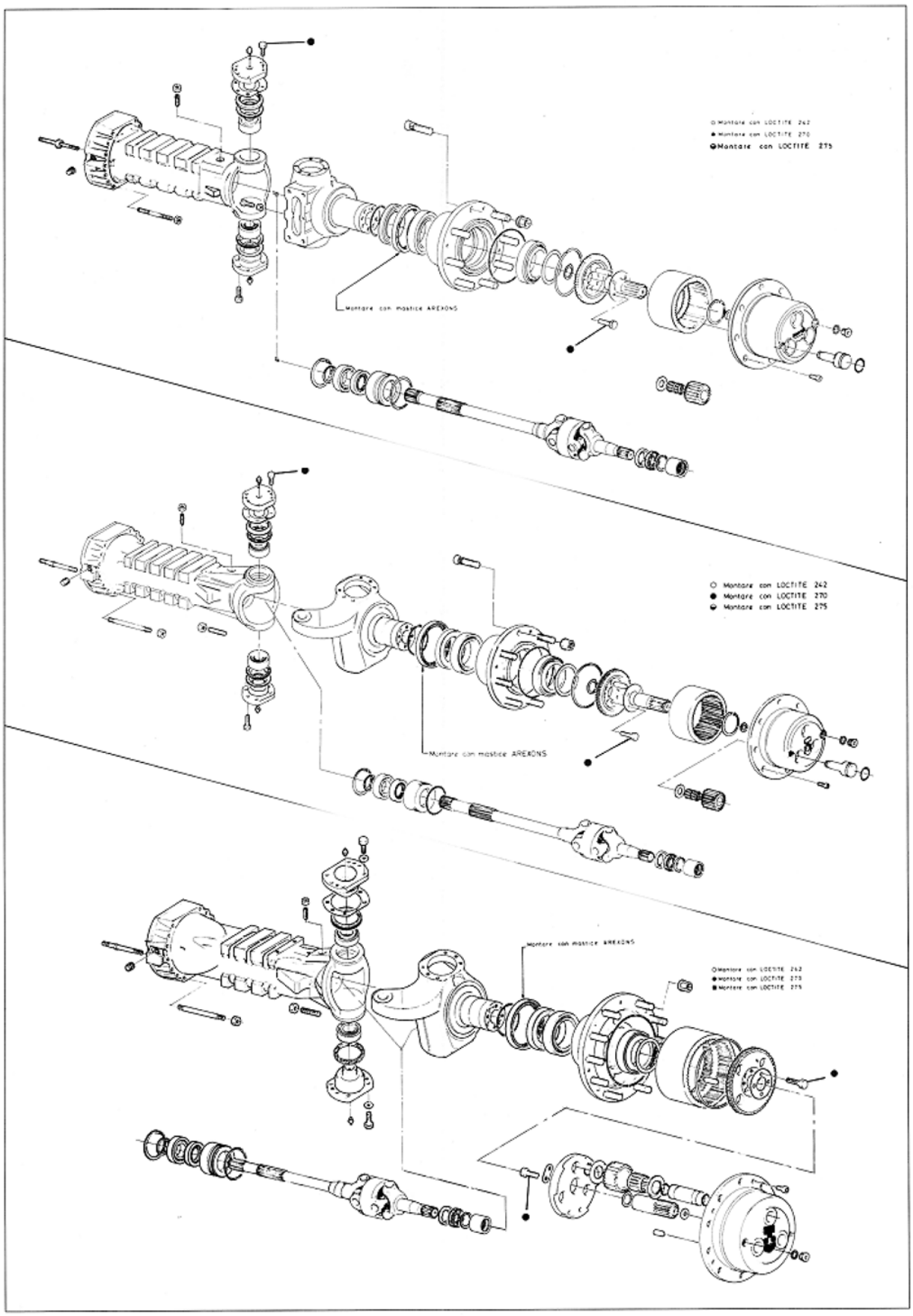
SERRARE LE VITI CON CHIAVE DINAMOMETRICA
TIPO 272 - 279 120÷123 Nm
TIPO 277 190÷193 Nm.

DIE SCHRAUBEN MIT DEM DREHMOMENTENSCHLÜSSEL ANZIEHEN
TYPE 272 - 279 120÷123 Nm
TYPE 277 190÷193 Nm.

SERRER LES VIS A L'AIDE D'UNE CLÉ DYNAMOMETRIQUE
TYPE 272 - 279 120 À 123 Nm
TYPE 277 190 À 193 Nm.

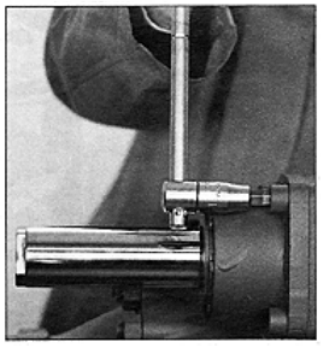
TIGHTEN THE SCREWS WITH A TORQUE WRENCH
TYPE 272 - 279 120-123 Nm
TYPE 277 190-193 Nm.

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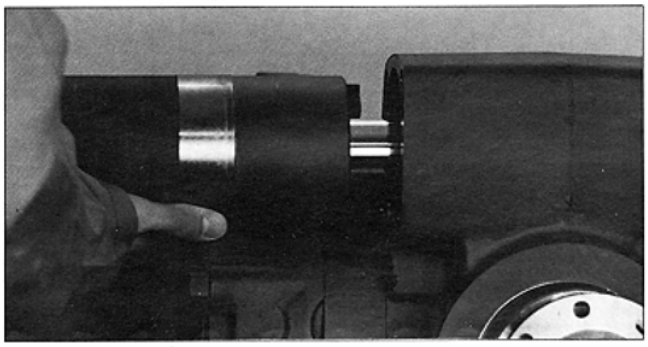


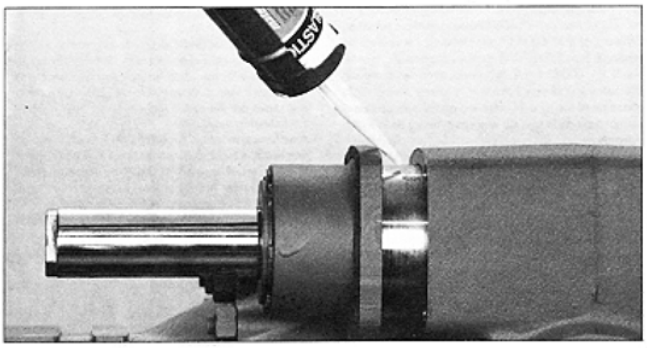
SMONTAGGIO CILINDRO STERZO DAL PONTE.

DEN LENKZYLINDER VON DER ACHSE AUSBAUEN.

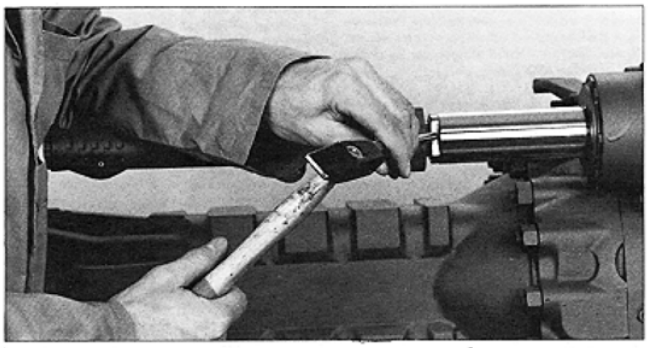
DÉMONTAGE DU CYLINDRE DE DIRECTION DU PONT.

REMOVING THE STEERING CYLINDER FROM THE AXLE.





MONTAGGIO
ESEGUIRE LE OPERAZIONI DESCRITTE SOPRA IN SENSO INVERSO.
USARE SILICONE.
EINBAU
DEN OBEN BESCHRIEBENEN VORGANG IN UMGEKEHRTER REIHENFOLGE DURCHFÜHREN SILIKON VERWENDEN
MONTAGE
EXÉCUTER LES OPÉRATIONS DÉCRITES CI-DESSUS EN SENS INVERSE.
UTILISER DU SILICONE.
ASSEMBLY
CARRY OUT THE ABOVE OPERATIONS IN REVERSE ORDER.
USE SILICONE.

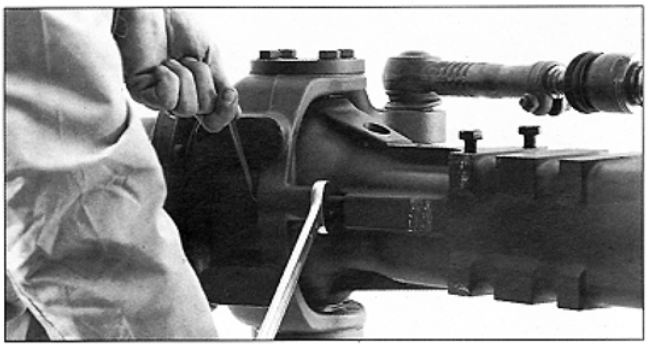


CIANFRINARE.

ANSTAUCHEN.

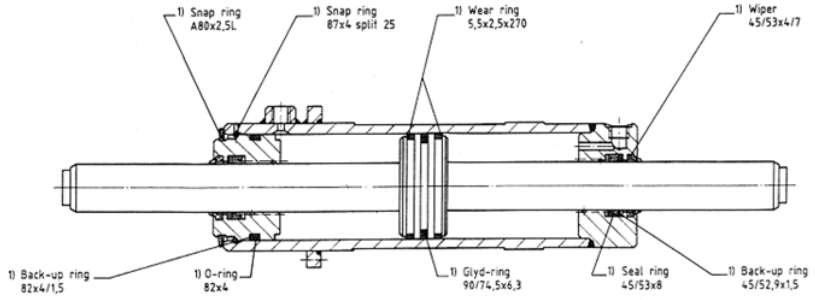
CHANFREINER.

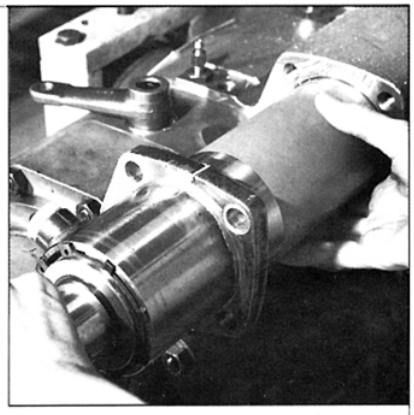
CAULK.



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CILINDRO STERZO/*LENKZYLINDER*
VÉRIN DE DIRECTION/*STEERING CYLINDER*





ISTRUZIONI PER L'USO DEGLI ATTREZZI DI MANUTENZIONE DEL CILINDRO DIS. 279.24.620.01

Le guarnizioni tenuta stelo 45x53x8; anello antiestrusione 45x52,9x1,5; o-ring 82x4, possono essere montate senza l'ausilio di alcuna attrezzatura.

Per montare la guarnizione tenuta pistone 90x74,5x6,3 procedere nel modo seguente.

Infilare l'attrezzo n° 400437 lungo l'asta dello stelo e farlo calzare sul pistone. La guarnizione tenuta pistone 90x74,5x6,3 è composta da due parti: un OR in gomma nitrilica e un pattino di tenuta.

Fare scorrere l'anello OR in gomma nitrilica sul tratto conico dell'attrezzo n° 400437 fino a farlo entrare nella propria sede. Procedere nello stesso modo con il pattino di tenuta. A questo punto la guarnizione tenuta pistone 30x74x6,3 è montata nella propria sede ma risulta dilatata rispetto alla sua forma originale e deve essere ricalibrata con l'attrezzo n° 400436 nel modo seguente.

Rimuovere l'attrezzo n° 400437, montare le due fascie guida 5,5x2,5x270 nelle proprie sedi, montare sul pistone l'attrezzo n° 400436 con il smusso di invito rivolto in avanti e lasciarlo montato sul pistone per 10-15 minuti dopo di che si può procedere al montaggio dello stelo sul corpo cilindro nel seguente modo.

Dopo aver montato le guarnizioni anello anti-estrusione 45x52,9x1,5; guarnizione tenuta stelo 45x53x8 e raschiatore 45/53x4,7 infilare l'attrezzo n° 400438 all'estremità dello stelo dopo averlo cosparso di un leggero strato di grasso sulle zone di contatto fra stelo e attrezzo stesso, per favorire l'adesione fra i due corpi.

Infilare il complesso stelo + attrezzo n° 400438 + attrezzo n° 400436 nel corpo cilindro. Il particolare n° 400436 viene espulso col primo movimento di scorrimento dello stelo nel corpo cilindro.

Lo stelo deve essere montato in modo tale che il pistone esca dal particolare n° 400436 dal lato opposto a quello dello smusso d'invito.

Sfilare ora il cono di montaggio n° 400438 dall'estremità stelo e infilarlo con le stesse modalità nell'estremità opposta. Dopo aver montato tutte le guarnizioni sulla testata infilare la stessa sullo stelo, farla scorrere all'interno del corpo cilindro, rimuovere l'attrezzo n° 400438 e applicare i seeger 87x4 e seeger A80x2,5L.

NOTA

Tutte le sedi delle guarnizioni devono essere ben pulite prima del montaggio e lubrificate con un leggero strato di olio.

Il montaggio delle guarnizioni è facilitato se le stesse vengono preriscaldate ad una temperatura di40-60 gradi mediante immersione in olio caldo o esposizione ad una lampada a raggi infrarossi.

ANLEITUNG ZUR BENUTZUNG DER WERKZEUGE ZUR WARTUNG DES ZYLINDERS ZEICHNUNG 279.24.620.01

Die Kolbenstangen dichtungen 45x53x8, der Sicherungsring 45x52,9x1,5 und der O-Ring 82x4 können allesamt ohne Zuhilfenahme von Werkzeugen montiert werden:

Zur Montage der Kolbendichtung 90x74,5x6,3 folgendermaßen vorgehen.

Das Werkzeug Nr. 400437 in Längsrichtung in die Kolbenstange einstecken, bis es ganz in den Kolben einrastet. Die Kolbendichtung 90x74,5x6,3 besteht aus zwei Teilen: ein O-Ring aus Nitrilgummi und ein Abdichtungsgleitschuh.

Den O-Ring aus Nitrilgummi auf dem kegelförmigen Abschnitt des Werkzeugs Nr. 400437 gleiten lassen, bis er in seinen Sitz eintritt. Mit dem Abdichtungsgleitschuh gleichermaßen vorgehen. Nun ist die Kolbendichtung 30x74x6,3 in ihrem Sitz angebracht, aber sie ist im Bezug zu ihrer ursprünglichen Form ausgedehnt und muß daher mit Werkzeug Nr. 400436 wie folgt bearbeitet werden, um ihre Form wiederzuerlangen.

Das Werkzeug Nr. 400437 entfernen und die beiden Führungsbänder 5,5x2,5x270 in ihren Sitz montieren.

Das Werkzeug Nr. 400436 mit der Aschrägung nach vorne zeigend auf den Kolben montieren und 10-15 Minuten lang auf dem Kolben sitzen lassen. Danach kann Kolbenstangen folgendermaßen auf den Zylinderkörper montiert werden die Kolbenstange

Nachdem die Dichtungsringe 45x52,9x1,5, die Kolbenstangen dichtung 45x53x8 und der Ölabstreifer 45/53x4,7 montiert worden sind, das Werkzeug Nr. 400438 auf die Kolbenstangen stecken, nachdem man die Stelle, wo Kolbenstange und Werkzeug sich berühren, leicht ein gefettet worden sind, damit die Teile besser zusammenhaften.

Die Gruppe Kolbenstange + Werkzeug Nr. 400438 + Werkzeug Nr. 400436 in den Zylinderkörper einführen. Das Teil Nr. 400436 wird mit der ersten Gleitbewegung der Kolbenstange im Zylinder ausgestoßen.

Die Kolbenstange muß derartig montiert werden, daß der Kolben aus dem Teil Nr. 400436 auf der Seite austritt, die der Abschrägung entgegengesetzt ist.

Nun den Montagekonus Nr. 400438 aus der Kolbenstange herausziehen und nach den gleichen Modalitäten in das andere Ende einführen. Nachdem alle Dichtungen auf den Zylinderkopf montiert worden sind, diesen auf die Kolbenstangestecken und die Kolbenstange im Zylinder auf- und abgleiten lassen. Das Werkzeug Nr. 400438 entfernen und die Seegerringe 87x4 und A80x2,5L einsetzen.

ANMERKUNGEN

Die Dichtungssitze müssen vor dem Einbau der Dichtungen gründlich gesäubert und mit einer dünnen Ölschicht geschmiert werden.

Die Montage der Dichtungen kann dadurch erleichtert werden, indem man die Dichtungen durch Tauchen in 40-60° C warmes Öl oder unter einem Infrarotstrahler geschmeidig macht.

MODE D'EMPLOI DES OUTILS DE MAINTENANCE DU CYLINDRE PLAN N° 279.24.620.01

Les joints d'étanchéité de la tige 45x53x8; anneau antiextrusion 45x52,9x5; O-ring 82x4, peuvent être montés sans aucun outil.

Pour monter le joint d'étanchéité du piston 90x74,5x6,3 procéder de la manière suivante:

Enfiler l'outil n° 400437 le long de la tige et le faire buter contre le piston. Le joint d'étanchéité du piston 90x74,5x6,3 est composé de deux parties: un OR en caoutchouc au nitrile et un segment racleur.

Faire coulisser l'anneau OR sur la partie conique de l'outil n° 400437 jusqu'à ce qu'il rentre dans son logement.

Procéder de la même manière avec le segment racleur. Le joint d'étanchéité du piston 30x74x6,3 est en place, mais dilaté par rapport à sa forme d'origine et doit être recalibré avec l'outil n° 400436 de la manière suivante.

Enlever l'outil n° 400437, monter les deux colliers de guidage 5,5x2,5x270 dans leurs logements, monter l'outil n° 400436 sur le piston avec le chanfrein d'amorce tourné vers l'avant et le laisser monté sur le piston pendant 10 à 15 minutes; après quoi procéder au montage de la tige sur le corps cylindre de la façon suivante.

Monter les joints: anneau anti-extrusion 45x53x8 et racleur 45/53x4,7, enfiler l'outil n° 400438 à l'extrémité de la tige après l'avoir enduit de graisse sur les zones de contact entre tige et outil, pour favoriser l'adhérence entre les deux corps.

Enfiler l'ensemble tige-outillage n° 400438 + outil n° 400436 dans le corps cylindre. L'outil 400436 est expulsé avec le premier mouvement de coulissement du cylindre dans le corps.

La tige doit être montée de manière à ce que l'outil n° 400436 sorte du côté opposé au chanfrein d'amorce.

Ensuite oter le cône de montage n° 400438 et l'enfiler suivant les même modalités dans l'extrémité opposée.

Après avoir monté tous les joints sur la tête, l'enfiler sur la tige et la faire coulisser à l'intérieur du corps cylindre.

Déposer l'outil n° 400438 et appliquer les circlips 87x1 et circlips A80x2,5L.

NOTA

Tous les logements des joints doivent être propres avant montage et lubrifiés avec une mince couche d'huile.

Le montage des joints est facilité par leur préchauffage à une température de 40-60° degrés par immersion dans de l'huile chaude ou exposition à une lampe à rayons infrarouges.

HOW TO USE THE CYLINDER SERVICING TOOLS DRWG 279.24.620.01

45x53x8 piston rod seals, 45x52,9x1,5 anti-extrusion ring, 82x4 O-Ring can be mounted without the aid of tools.

Proceed in the following way to mount the 90x74,5x6,3 piston seal:

Insert tool N° 400437 along the piston rod and allow it to fit on the piston. The 90x74,5x6,3 piston seal consists of two parts: an O-Ring in nitrile rubber and a retention pad.

Allow the nitrile rubber O-Ring to slide along the tapered part of tool N° 400437 until it fits into its housing.

Proceed in the same way with the retention pad. The 30x74x6,3 piston seal will now be mounted in its housing, but its original shape will have expanded. It must be recalibrated with tool N° 400436 in the following way:

Remove tool N° 400437, mount the two 5,5x2,5x270 guide rings in their seats. Mount tool N° 400436 on the piston with the chamfer pointing forwards and leave it mounted on the piston for 10-15 minutes. After this, assemble the piston rod on the cylinder body in the following way.

After having mounted the 45x52,9x1,5 anti-extrusion ring seals, 45x53x8 piston rod seal and 45/53x4,7 scraper, insert tool N° 400438 on the end of the piston rod after having spread it with a light film of grease on the contact area between the piston rod and the tool itself. This will improve the adhesion a between the two parts.

Insert the piston rod + tool N° 400438 N° 400436 into the cylinder body. Part. N° 400436 will be pushed out immeditely after the piston rod slides in the cylinder.

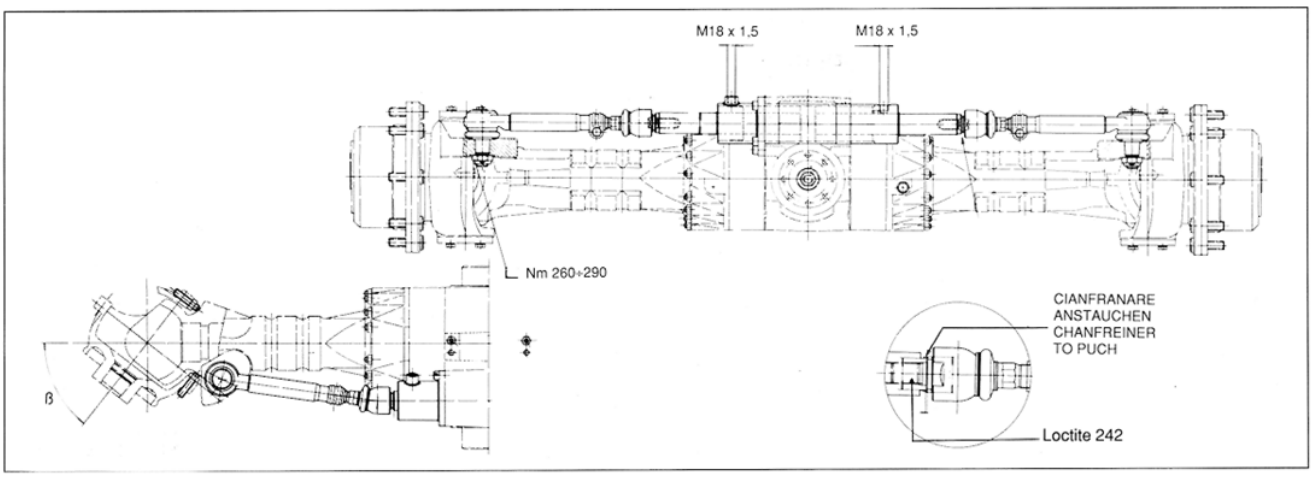
The piston rod must be mounted so that the piston comes out from part N° 400436 on the side opposite the chamfer.

Now remove assembly cone N° 400438 from the piston rod and and insert it into the opposite end in the same way. After having mounted all the seals on to the head, fit this on to the piston rod, allow it to slide inside the cylinder, remove tool N° 400438 and apply thecirclips 87x4 and A80x2,5L .

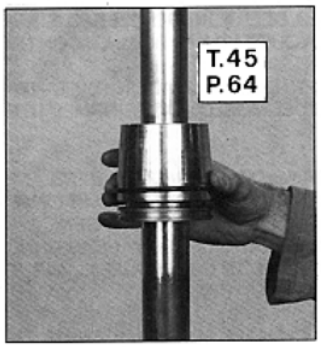
NOTE

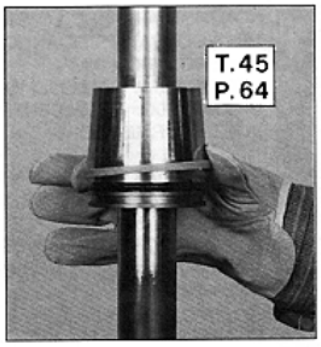
All the seal seats must be thoroughly cleaned before assembly and lubricated with a light film of oil.

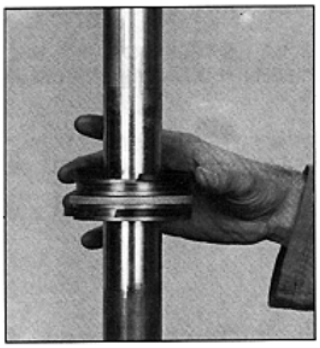
Seal assembly will be facilitated if the seals are preheated to a temperature of 40-60 colsius degrees by immersing them in oil or exposing them to an infrared lamp.

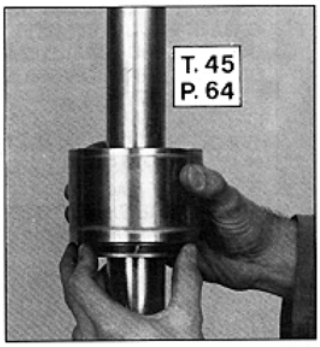


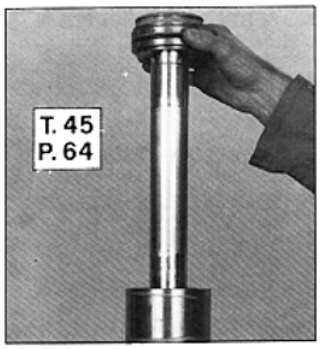
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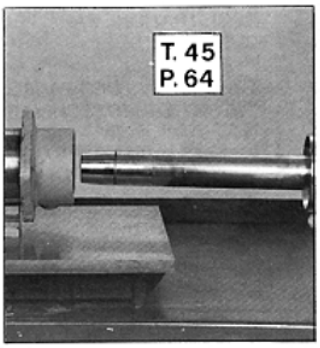


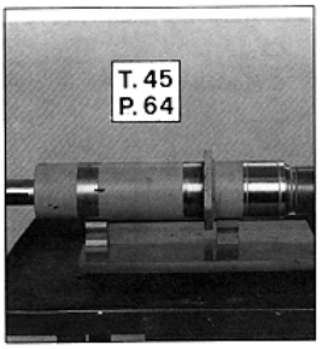




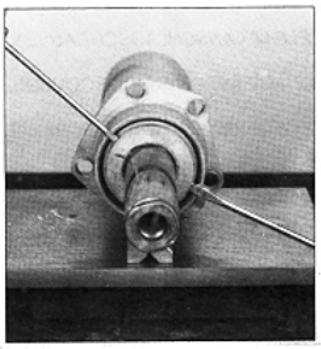


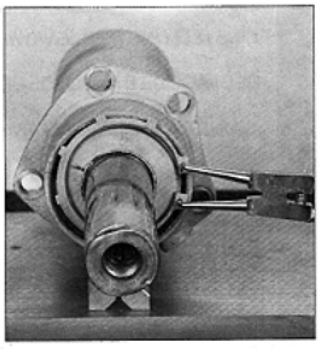












SOSTITUZIONE DEGLI ANELLI DI TENUTA
PER LO SMONTAGGIO ESEGUIRE IN SENSO INVERSO LE OPERAZIONI DI MONTAGGIO SENZA USARE GLI ATTREZZI SPECIALI.

DICHTUNGSRINGE ERSETZEN
DEN AUSBAU AUSFÜHREN IN UMGEKEHRTER REIHENFOLGE, OHNE VERWENDUNG DER SONDERWERKZEUGE.

REMPLACEMENT DES BAGUES D'ÉTANCHÉITÉ
POUR LE DÉMONTAGE EXÉCUTER EN SENS INVERSE LES OPÉRATIONS DE MONTAGE SANS UTILISER LES OUTILS SPECIAUX.

REPLACING THE LIP SEALS
TO REMOVE, CARRY OUT THE ASSEMBLY OPERATIONS IN REVERSE ORDER WITHOUT USING SPECIAL TOOLS.

RISCALDARE GLI ANELLI CON OLIO A ~80÷90°C.
VEDI PAG. 28.

DIE RINGE IN CA. 80÷90° WARMEN ÖL ERWÄRMEN SEITE 28.

RÉCHAUFFER LES ANNEAUX AVEC DE L'HUILE À ENVIRON 80÷90° C
VOIR PAGE 28.

HEAT THE SEALS IN OIL TO ~ 80÷90° C SEE PAGE 28.

ASSEMBLARE IL CILINDRO DOPO AVERE SOSTITUITO TUTTI GLI ANELLI DI TENUTA.

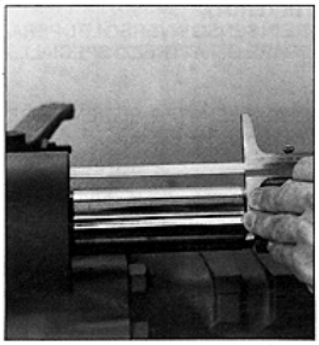
DEN ZYLINDER ZUSAMMENSETZEN NACHDEM ALLE DICHTUNGSRINGE ERSETZT WORDEN SIND.

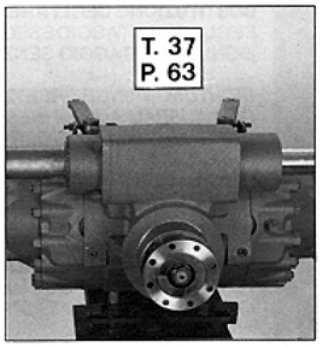
ASSEMBLER LE CYLINDRE APRÈS AVOIR REMPLACÉ TOUTES LES BAGUES D'ÉTANCHÉITÉ.

ASSEMBLE THE CYLINDER AFTER HAVING CHANGED ALL THE LIP SEALS.

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CILINDRO DI STERZO/*LENKZYLINDER*
CYLINDRE DE DIRECTION/*STEERING CYLINDER*



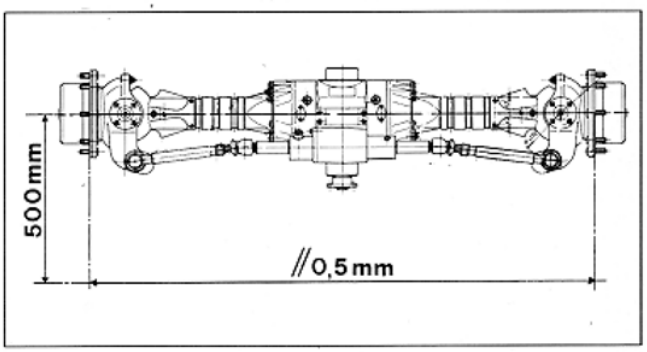


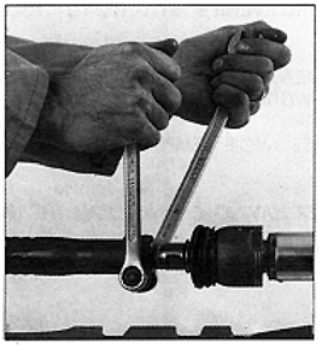
CONTROLLARE CHE LO STELO DEL CILINDRO STERZO SIA A METÀ CORSA VERIFICANDO LA QUOTA DA AMBO I LATI CON UN CALIBRO O CON DIMA.
VERIFICA DI PARALLELISMO TRA I DUE MOZZI AD UNA DISTANZA DI CIRCA 500 mm DAL CENTRO DEL MOZZO (ANTERIORMENTE E POSTERIORMENTE).

PRÜFEN, DAß DIE KOLBENSTANGE DES LENKZYLINDERS AUF HALBER HÖHE STEHT, UM DANN AUF BEIDEN SEITEN MIT EINER LEHRE ODER EINER SCHABLONE DEN WERT ZU MESSEN.
PARALLELITÄT ZWISCHEN DEN BEIDEN RADNABEN AUF ABSTAND VON CA 500 mm VON DER NABENMITTE ÜBERPRÜFEN (VORNE UND HINTEN).

CONTROLER QUE LA TIGE DU CYLINDRE SOIT À MI-COURSE EN VÉRIFIANT LA COTE DES DEUX COTÉS AVEC UN CALIBRE OU LE GABARIT PRÉVU À CET EFFET.
CONTROLE DU PARALLELISME ENTRE LES DEUX MOYEUX A UNE DISTANCE D'ENVIRON 500 mm DU CENTRE DU MOYEU (ANTERIEUR ET POSTERIEUR).

CHECK THAT THE STEERING CYLINDER PISTON ROD IS AT HALF TRAVEL BY MEASURING FROM BOTH SIDES WITH A GAUGE OR EQUIVALENT TEMPLATE.
CHECK PARALLELISM BETWEEN BOTH WHEEL HUBS AT APPROX. 500 mm FROM THE HUB CENTRE (FRONT AND REAR)







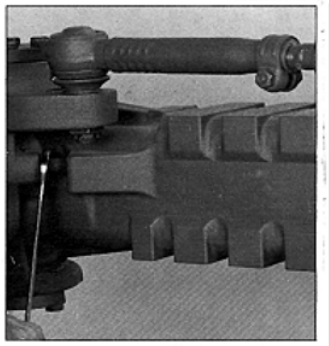
REGISTRAZIONE PARALLELISMO SERRAGGIO FASCETTE DI SICUREZZA.

EINSTELLUNG DER PARALLELITÄT DER BEFESTIGUNG DURCH DIE SICHERHEITSSCHELLEN.

REGLAGE DU PARALLÉLISME DU SERRAGE DES COLLIERS DE SÉCURITÉ.

ADJUSTING THE PARALLELISM TIGHTENINGS OF SAFETY CLAMPS.



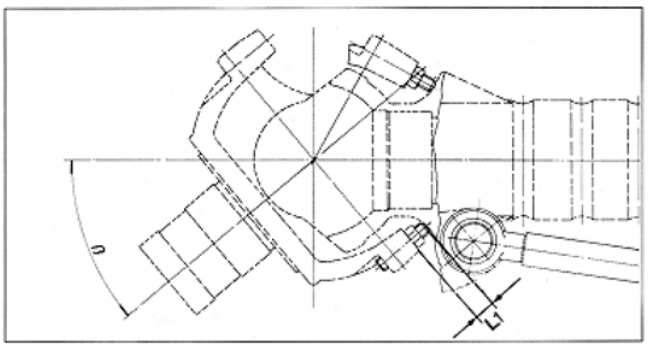


REGISTRAZIONE DELL'ANGOLO DI STERZATURA CON APPOSITA DIMA.

EINSTELLUNG DES LENKEINSCHLAGWINKELS MIT EINER SPEZIALSCHABLONE.

RÉGLAGE DE L'ANGLE DE BRAQUAGE AVEC UN OUTIL SPÉCIAL.

ADJUSTING THE STEERING ANGLE WITH THE RELATIVE TEMPLATE.



REGISTRAZIONE DELL'ANGOLO DI STERZO CON VITI FINE CORSA.

EINSTELLUNG DES LENKWINKELS MIT ANSCHLAGSCHRAUBEN.

RÉGLAGE DE L'ANGLE DE BRAQUAGE AVEC VIS FINDE COURSE.

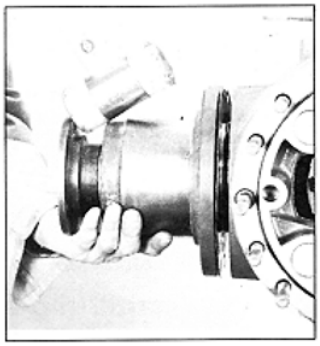
ADJUST THE STEERING ANGLE WITH END OF TRAVEL SCREWS.

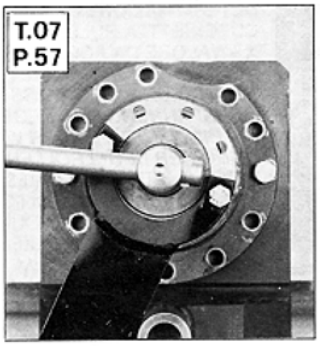
272	279
L1	ß°
22 mm	40°
17 mm	50°

277	
L1	ß°
18 mm	50°
22 mm	40°
32 mm	36°
46 mm	30°

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SUPPORTAZIONE PIGNONE CONICO/*KEGELRITZELLAGERUNG*
SUPPORT DU PIGNON CONIQUE/*BEVEL PINION SUPPORT*



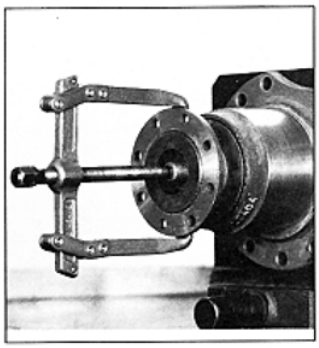


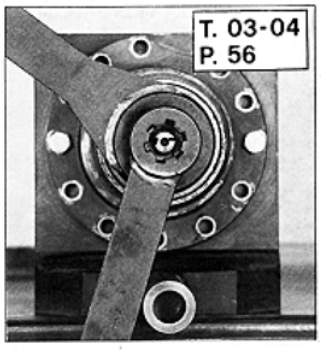
SMONTAGGIO SUPPORTAZIONE CONICA.

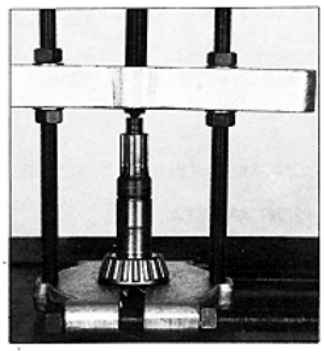
AUSBAU DER KEGELRITZELLAGERUNG.

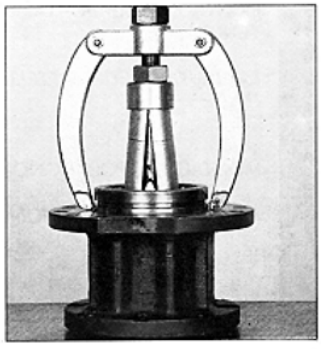
DEMONTAGE SUPPORT COUPLE CONIQUE.

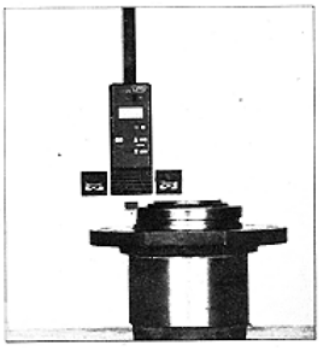
REMOVAL OF BEVEL PINION SUPPORT.

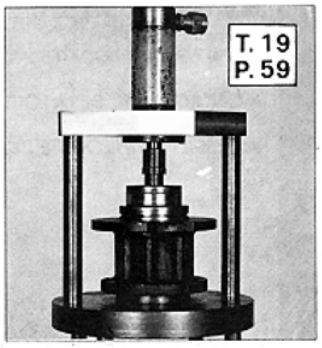










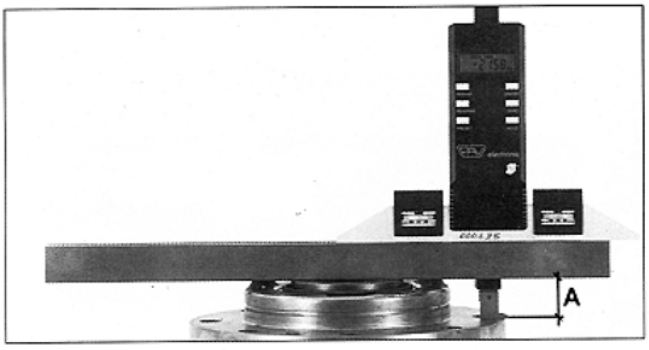


MONTAGGIO RALLE ESTERNE.
CUSCINETTI A RULLI CONICI.
VERIFICA QUOTA «A» DEL COPERCHIO.

MONTAGE DER ÄUSSEREN LAGERSCHALE.
KEGELROLLENLAGER.
PRÜFUNG VON WERT «A» DES DECKELS.

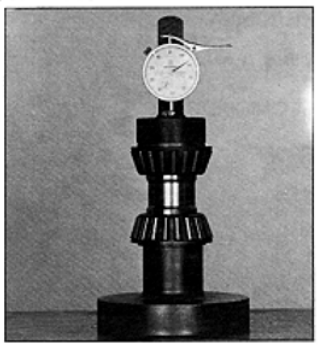
MONTAGE DES CAGES EXTÉRIEURES.
ROULEMENTS À ROULEAUX CONIQUES.
VÉRIFICATION DE LA COTE «A» DU COUVERCLE.

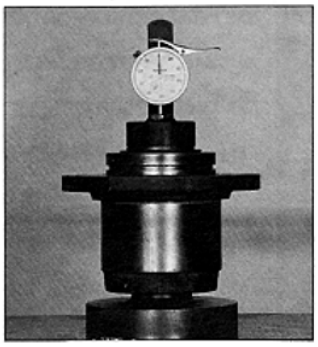
ASSEMBLE THE EXTERNAL RACES.
TAPER ROLLER BEARINGS.
CHECK COVER MEASUREMENT «A».



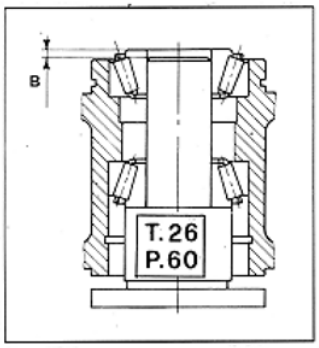
https://truckmanualshub.com/

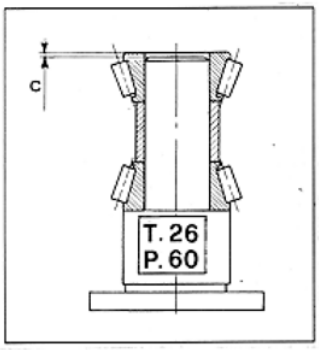
SUPPORTAZIONE PIGNONE CONICO/*KEGELRITZELLAGERUNG*
SUPPORT DU PIGNON CONIQUE/*BEVEL PINION SUPPORT*





DETERMINAZIONE DEGLI SPESSORI S1 PER IL PRECARICO DEI CUSCINETTI A RULLI CONICI S1 = B - C + X
X = VALORE DA AGGIUNGERE PER OTTENERE IL PRECARICO CORRETTO DEI CUSCINETTI A RULLI CONICI.
ERMITTLUNG DES PASS-SCHEIBENPAKETES S1 FÜR DIE VORSPANNUNG DER KEGELROLLENLAGER S1 = B - C + X
X = HINZUZUFÜGENDER WERT UM DIE KORREKTE VORSPANNUNG DER KEGELROLLENLAGER ZU ERREICHEN.
DETERMINATION DES CALES S1 POUR LA PRECHARGE DES ROULEMENTS A ROULEAUX CONIQUES S1 = B - C + X
X = VALEUR A AJOUTER POUR OBTENIR LA PRECHARGE CORRECTE DES ROULEMENTS A ROULEAUX CONIQUES.
DETERMINATION OF SHIM PACK S1 FOR THE PRELOAD OF THE TAPER ROLLER BEARINGS S1 = B - C + X
X = VALUE TO ADD IN ORDER TO OBTAIN THE CORRECT PRELOAD OF THE TAPER ROLLER BEARINGS.



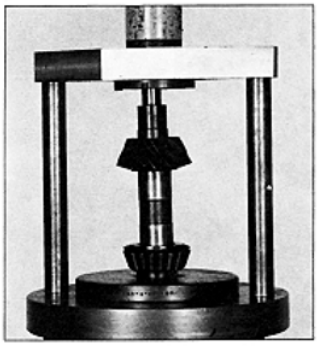


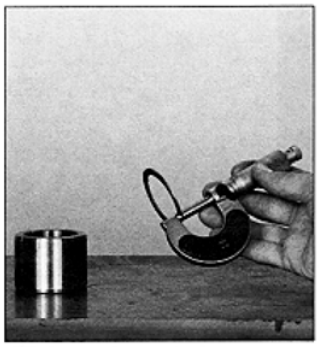
VALORE X VEDI PAG. 34.

WERT X= SEITE 34.

VALEUR X= VOIR PAGE 34.

VALUE X= SEE PAGE 34.



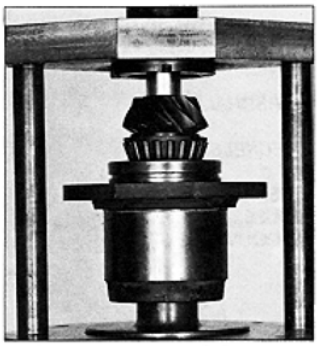


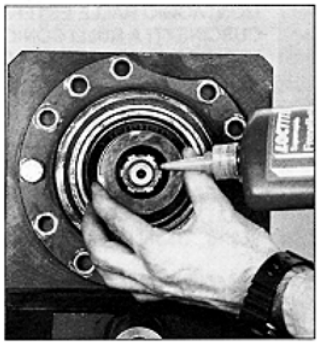
MONTAGGIO SUPPORTAZIONE PIGNONE CONICO E ANELLO DI TENUTA.

EINBAU DER KEGELRITZELLAGERUNG UND DES WELLENDICHTRINGES.

MONTAGE SUPPORT PIGNON CONIQUE ET JOINT D'ETANCHEITE.

ASSEMBLY OF BEVEL PINION SUPPORT AND SEAL.



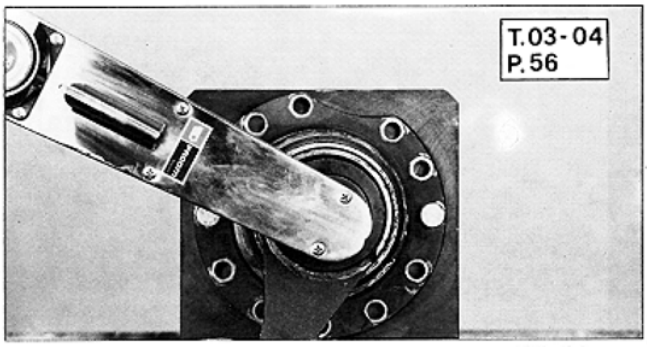


MONTAGGIO CON LOCTITE 242.

MONTAGE MIT LOCTITE 242.

MONTAGE AVEC DE LA LOCTITE 242.

ASSEMBLY WITH LOCTITE 242.



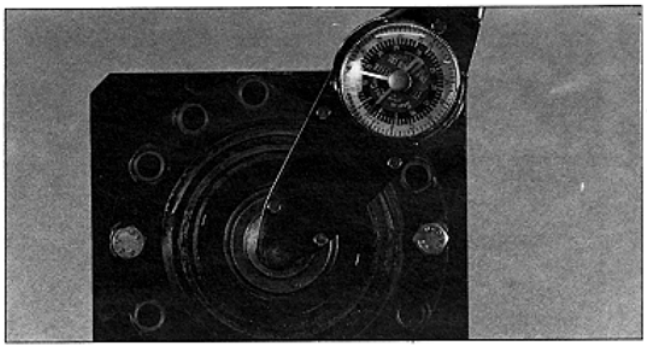
SERRAGGIO GHIERA CON CHIAVE DINAMOMETRICA VEDI PAGINA 34.

ANZIEHEN DER NUTMUTTER MIT DREHMOMENTENSCHLÜSSEL, VLG. LOSÜNG SEITE 34.

SERRAGE DE LA BAGUE AU MOYEN D'UNE CLÉ DYNAMOMETRIQUE; VOIR SOLUTION PAGE 34.

TIGHTEN THE RING NUT WITH A TORQUE WRENCH; SEE SOLUTION ON PAGE 34.

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VERIFICA DELLA COPPIA DI ROTAZIONE.

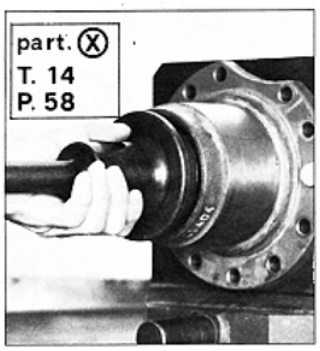
PRÜFUNG DES DREHMOMENTES.

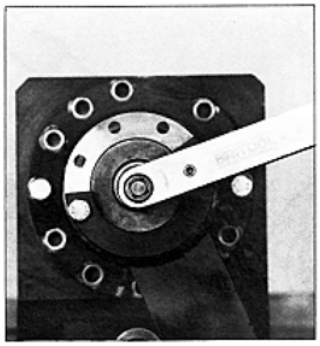
VÉRIFICATION DU COUPLE DE ROTATION.

CHECKING THE ROTATION TORQUE.

SOLUZIONE,LÖSUNG, SOLUTION, SOLUTION:

A 150÷200 Ncm
B 150÷200 Ncm
C 120÷170 Ncm
D 120÷170 Ncm





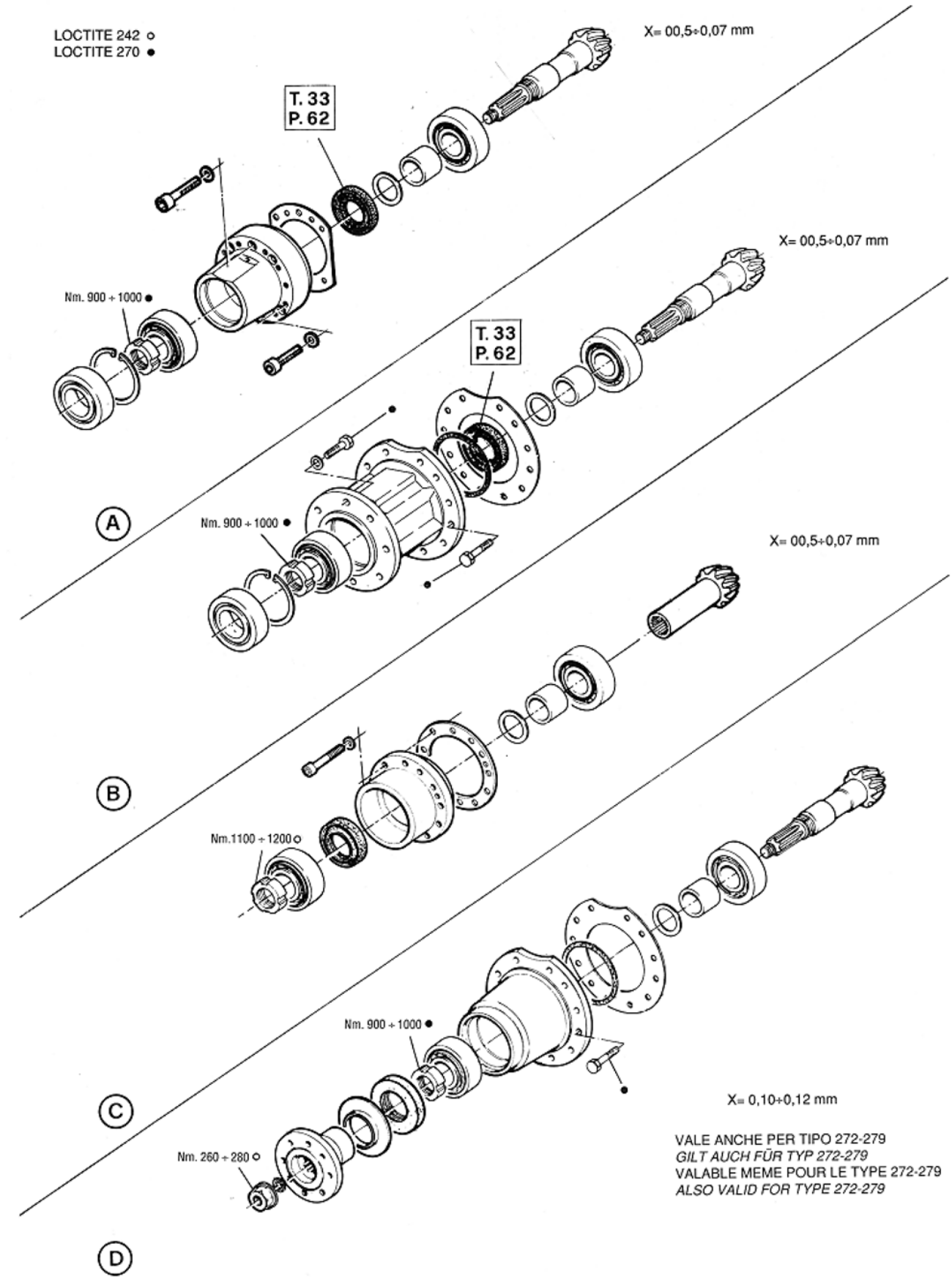
MONTAGGIO ANELLO DI TENUTA E SERRAGGIO DADO FLANGIA CON CHIAVE DINAMOMETRICA.

MONTAGE DES DICHTUNGSRINGES UND ANZIEHEN DER FLANSCHMUTTER MIT DREHMOMENTENSCHLÜSSEL.

MONTAGE DE BAGUE D'ÉTANCHÉITÉ ET SERRAGE ÉCROU DE FLASQUE AVEC CLÉ DYNAMOMETRIQUE.

ASSEMBLY OF THE LIP SEAL AND TIGHTENING OF FLANGE NUT WITH A TORQUE WRENCH.

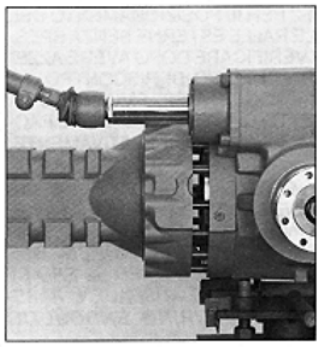
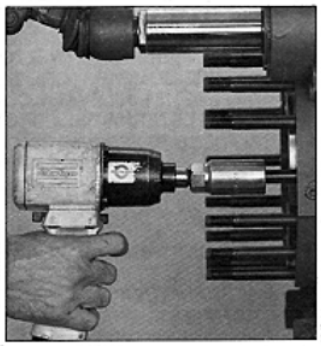
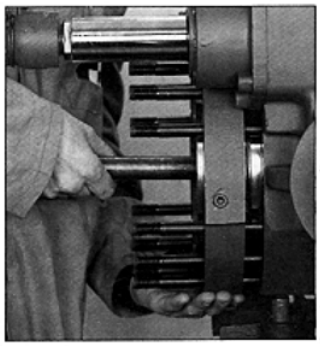
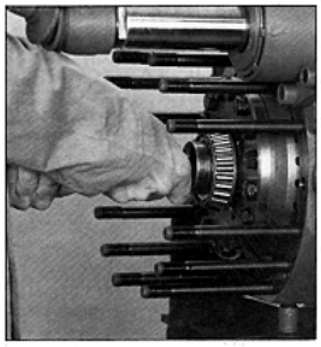
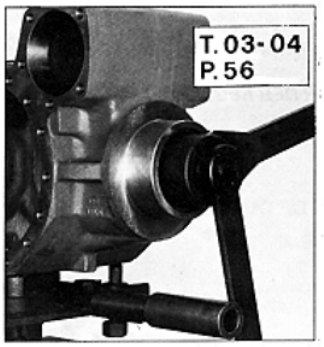
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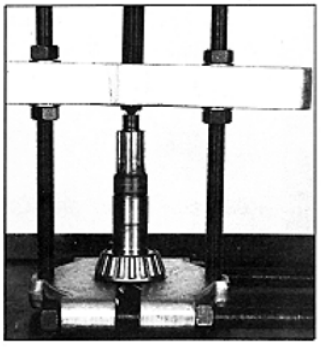


VALE ANCHE PER TIPO 272-279
GILT AUCH FÜR TYP 272-279
VALABLE MEME POUR LE TYPE 272-279
ALSO VALID FOR TYPE 272-279

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SUPPORTAZIONE PIGNONE CONICO 277-279/*KEGELRITZELLAGERUNG 277-279*
SUPPORT DU PIGNON CONIQUE 277-279/*BEVEL PINION SUPPORT 277-279*



SMONTAGGIO:
FARE ATTENZIONE A NON DANNEGGIARE LE ZONE DI TENUTA DEGLI ANELLI «OR» DURANTE L'ESTRAZIONE DEL DIFFERENZIALE DALLA SCATOLA CENTRALE.

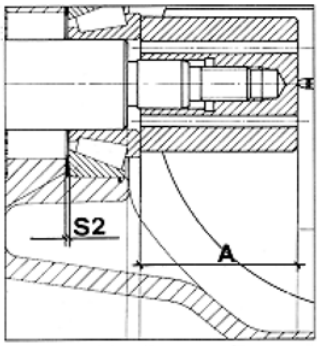
AUSBAU:
DARAUF ACHTEN, DASS DR DICHTUNGSBEREICH DER «O-RINGE» NICHT BESCHÄDIGT WIRD, WÄHREND MAN DAS DIFFERENTIAL AUS DEM ZENTRALEN GEHÄUSE ZIEHT.

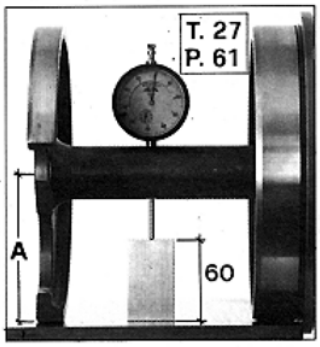
DÉMONTAGE:
FAITES ATTENTION A NE PAS ENDOMMAGER LES ZONES D'ETANCHEITE DES ANNEAUX «OR» PENDANT L'EXTRATION DU DIFFERENTIEL DE LA BOITE CENTRALE.

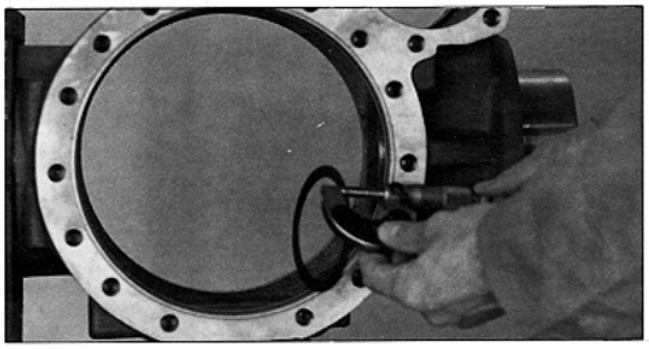
DISASSEMBLY:
TAKE CARE TO PREVENT DAMAGE TO THE RETENTION AREAS OF THE «OR» RINGS WHEN REMOVING THE DIFFERENTIAL GEAR FROM THE CENTRAL BOX.

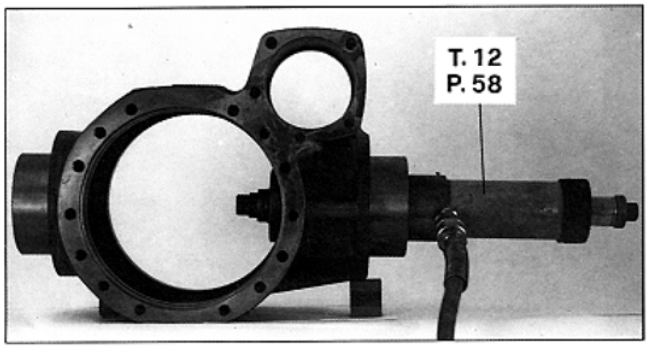
https://truckmanualshub.com/

SUPPORTAZIONE PIGNONE CONICO/*KEGELRITZELLAGERUNG*
SUPPORT DU PIGNON CONIQUE/*BEVEL PINION SUPPORT*









DETERMINAZIONE SPESSORI S2 PER IL POSIZIONAMENTO DEL PIGNONE CONICO. MONTARE LE RALLE ESTERNE SENZA SPESSORI. INSERIRE L'ATTREZZO E VERIFICARE DOPO AVERE AZZERATO IL COMPARATORE SU DI UN PIANO DI RISCONTRO. LA DIFFERENZA RILEVATA CORRISPONDE A S2. SMONTARE LA RALLA ESTERNA DEL CUSCINETTO CONICO, INSERIRE IL PACCO DEGLI SPESSORI E RIMONTARE LA RALLA DEFINITIVAMENTE.

ERMITTLUNG DES PASS-SCHEIBENPAKETES S2 FUER DIE EINSTELLUNG DER KEGELRITZELLAGERUNG. AUSSENRINGE OHNE PASS-SCHEIBEN EINSETZEN. NACHDEM DAS MESSINSTRUMENT AUF NULL EINGESTELLT WURDE, DAS WERKZEUG EINSETZEN UND MESSEN. DAS MASS S2 ERGIBT SICH AUS DER DIFFERENZ. AUSSENRING AUSBAUEN, PASSSCHEIBEN EINSETZEN UND AUSSENRING ENDGÜLTIG EINBAUEN.

DETERMINATION S2 POUR LE POSITIONNEMENT DU PIGNON CONIQUE. MONTER LES CAGE EXTERNE SANS CALES. INSERER L'OUTIL ET VERIFIER APRES AVOIR MIS A ZERO LE COMPARATEUR SUR UN MARBRE DE CONTROLE. LA DIFFERENCE RELEVEE CORRESPOND A S2. DEMONTER LA CAGE EXTERNE DU ROULEMENT CONIQUE, INSERER LE PAQUET DES CALES ET REMONTER LA CAGE DEFINITIVEMENTE.

DETERMINATION OF SHIM PACK S2 FOR ADJUSTEMENT OF BEVEL PINION POSITION. ASSEMBLING OF OUTER RACES WITHOUT SHIMS. INSERT TOOL AND VERIFY AFTER HAVING SET TO ZERO THE GAUGE ON A SURFACE PLATE. THE DIFFERENCE IS S2. REMOVE OUTER RACE OF TAPER ROLLER BEARING, INSERT SHIMS AND REASSEMBLE THE OUTER RACE DEFINITIVELY.

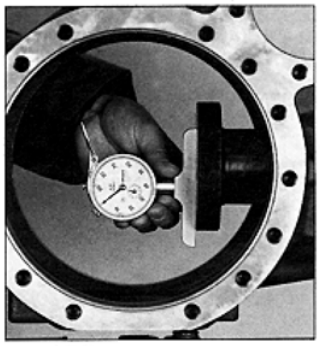
MONTAGGIO RALLE ESTERNE CUSCINETTI A RULLI CONICI.

MONTAGE DER AUSSENRINGE DER KEGELROLLENLAGER.

MONTAGE BAGUE EXTERNE ROULEMENTS A ROULEAUX CONIQUES.

ASSEMBLY OF OUTER RACES OF TAPER ROLLER BEARINGS.

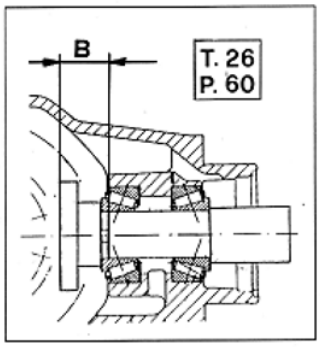
https://truckmanualshub.com/

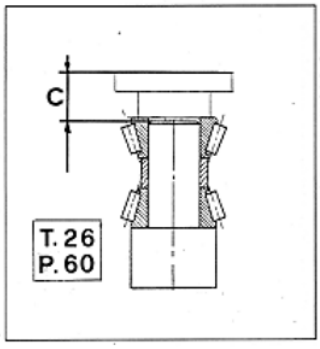




DETERMINAZIONE DEGLI SPESSORI S1 PER IL PRECARICO DEI CUSCINETTI A RULLI CONICI:
S1 = B - C + X
X = VALORE DA AGGIUNGERE PER OTTENERE IL PRECARICO CORRETTO DEI CUSCINETTI A RULLI CONICI (VEDI ESPLOSO A PAG. 34 SOLUZIONE D).

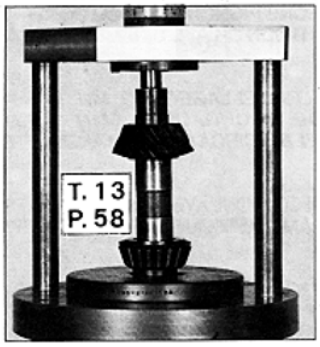
ERMITTLUNG DES PASSSCHEIBENPAKETES S1 FÜR DIE VORSPANNUNG DER KEGELROLLENLAGER:
S1 = B - C + X
X = HINZUZUFÜGENDER WERT UM DIE KORREKTE VORSPANNUNG DER KEGELROLLENLAGER ZU ERREICHEN (SIEHE EXPLOSIONSDARSTELLUNG AUF SEITE 34 LÖSUNG D).





DETERMINATION DES CALES S1 POUR LA PRECHARGE DES ROULEMENTS A ROULEAUX CONIQUES:
S1 = B - C + X
X= VALEUR A AJOUTER POUR OBTENIR LA PRECHARGE CORRECTE DES ROULEMENTS A ROULEAUX CONIQUES (VOIR ECLATE A LA PAGE 34 SOLUTION D).

DETERMINATION OF SHIM PACK S1 FOR THE PRELOAD OF TAPER ROLLER BEARINGS:
S1 = B - C + X
X = VALUE TO ADD IN ORDER TO OBTAIN THE CORRECT PRELOAD OF THE TAPER ROLLER BEARINGS (SEE EXPLODED VIEW DRAWING ON PAGE 34 SOLUTION D).



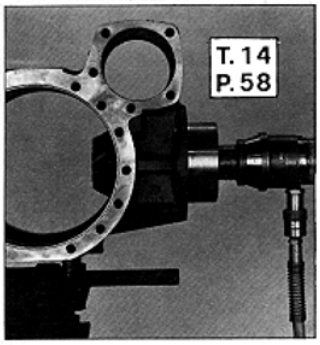


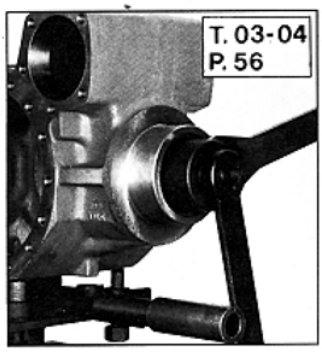
MONTAGGIO SUPPORTAZIONE PIGNONE CONICO E SERRAGGIO DADO FLANGIA (VEDI ESPLOSO A PAG. 34 SOLUZIONE D).

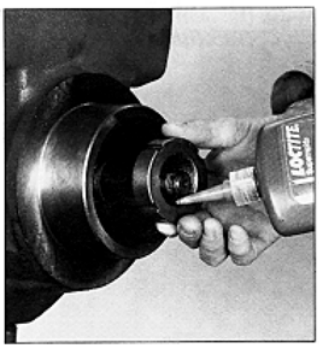
EINBAU DER KEGELRITZELLAGERUNG UND ANZIEHEN DER FLANSCHMUTTER (SIEHE EXPLOSIONSDARSTELLUNG AUF SEITE 34 LÖSUNG D).

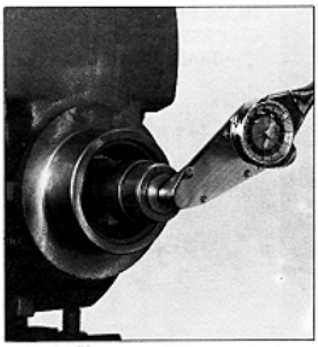
MONTAGE SUPPORTATION PIGNON CONIQUE ET SERRAGE DE ECROU DE LA BRIDE (VOIR ECLATE A LA PAGE 34 SOLUTION D).

ASSEMBLY OF BEVEL PINION SUPPORT AND TIGHTENINS OF FLANGE NUT *(SEE EXPLODED VIEW DRAWING ON PAGE 34 SOLUTION D).*









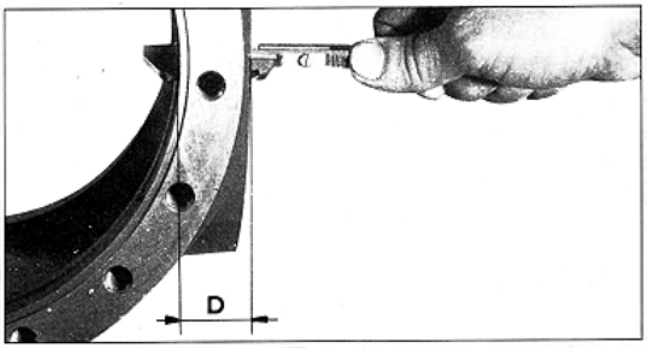
PER VERIFICA COPPIA DI ROTAZIONE (VEDI A PAG. 33 SOLUZIONE D).

FÜR ÜBERPRÜFUNG DES DREHMOMENTES (SIEHE AUF SEITE 33 LÖSUNG D).

POUR CONTROLE COUPLE DE ROTATION VOIR A LA PAGE 33 SOLUTION D).

FOR CHECKING OF TORQUE (SEE ON PAGE 33 SOLUTION D).

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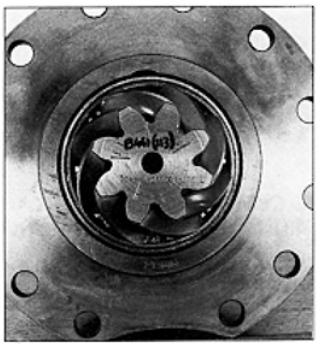


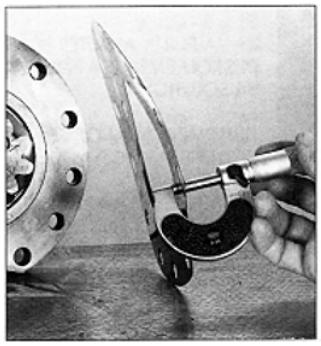
DETERMINAZIONE DEGLI SPESSORI S2 PER IL POSIZIONAMENTO DEL PIGNONE CONICO: S2 = (I + A) - (D + r) (VEDI SCHEMA PAGINA 40).

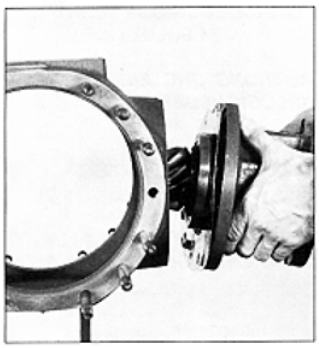
ERMITTLUNG DES PASSSCHEIBENPAKETES S2 FÜR DIE EINSTELLUNG DER KEGELRITZELLAGERUNG S2 = (I + A) - (D + r)(LÖSUNG SCHEMA SEITE 40).

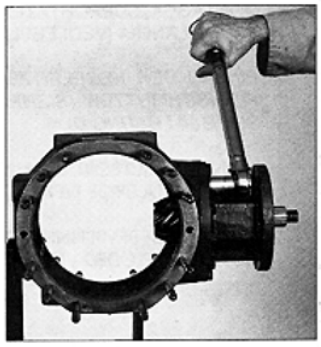
DETERMINATION DES CALES S2 POUR LE POSITIONNEMENT DU PIGNON CONIQUE:
S2 = (I + A) - (D + r) (VOIR SCHEMA PAGE 40).

DETERMINATION OF SHIM PACK S2 FOR ADJUSTEMENT OF BEVEL PINION POSITION: S2 = (I + A) - (D + r) (SEE SCHEMA PAGE 40).







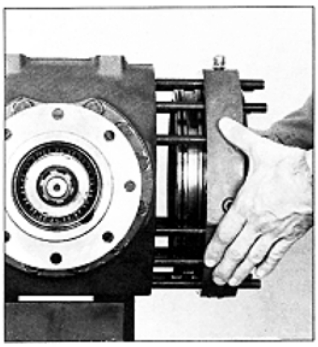


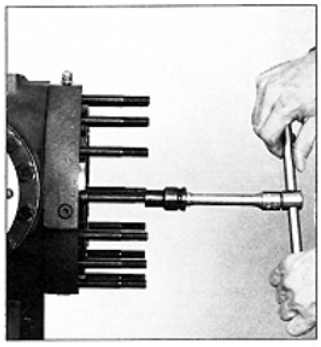
ASSEMBLAGGIO SUPPORTAZIONE PIGNONE CONICO CON SPESSORI S2. SERRARE LE VITI CON CHIAVE DINAMOMETRICA A 86÷89 Nm CON LOCTITE 270.

ZUSAMMENBAU DER KEGELRITZELLAGERUNG MIT PASSSCHEIBEN-PAKET S2. DIE SCHRAUBEN MIT DEM DREHMOMENTENSCHLÜSSEEL BEI CIRCA 86÷89 Nm ANZIEHEN. «LOCTITE 270» VERWENDEN.

ASSEMBLAGE SUPPORT PIGNON CONIQUE AVEC CALES S2. SERRES LES VIS A L'AIDE D'UNE CLÉ DYNAMOMETRIQUE A ENVIRON 86÷89 Nm AVEC DU «LOCTITE 270».

ASSEMBLY OF BEVEL PINION SUPPORT WITH SHIM PACK S2. TIGHTEN THE SCREWS BY ABOUT 86÷89 WITH A TORQUE WRENCH AND USING «LOCTITE 270».



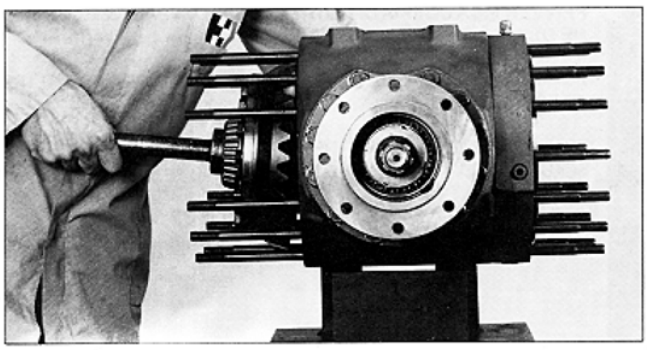


ASSEMBLAGGIO CORPO CENTRALE.
NOTA: FARE ATTENZIONE A NON DANNEGGIARE LE ZONE DI TENUTA DEGLI ANELLI OR DURANTE L'INSERIMENTO DEL DIFFERENZIALE NELLA SCATOLA CENTRALE.

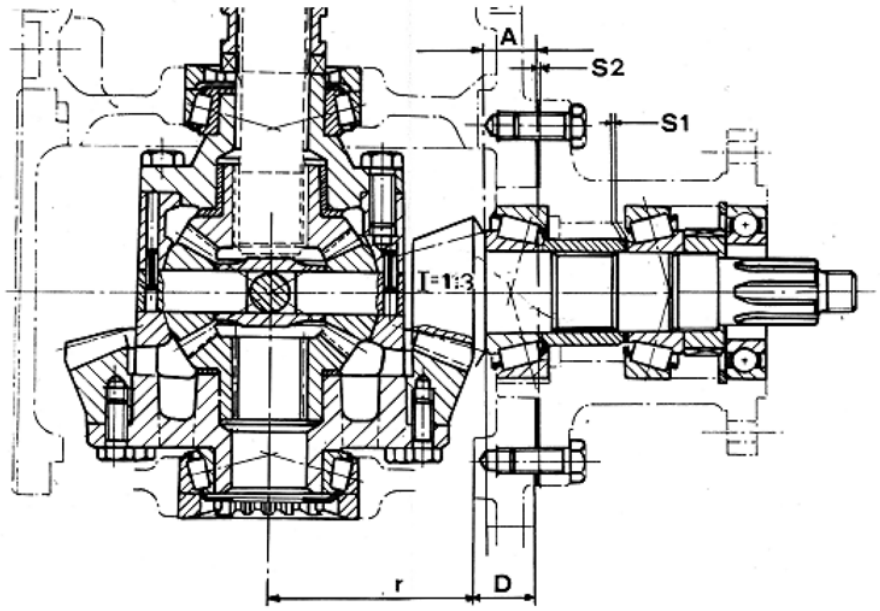
ZUSAMMENBAU DES ACHSMITTENGEHÄUSES.
ACHTUNG: DICHTFLÄCHEN DER O-RINGE BEIM EINBAU DES DIFFERENTIALS IN DAS ACHSMITTENGEHÄUSE NICHT BESCHÄDIGEN.

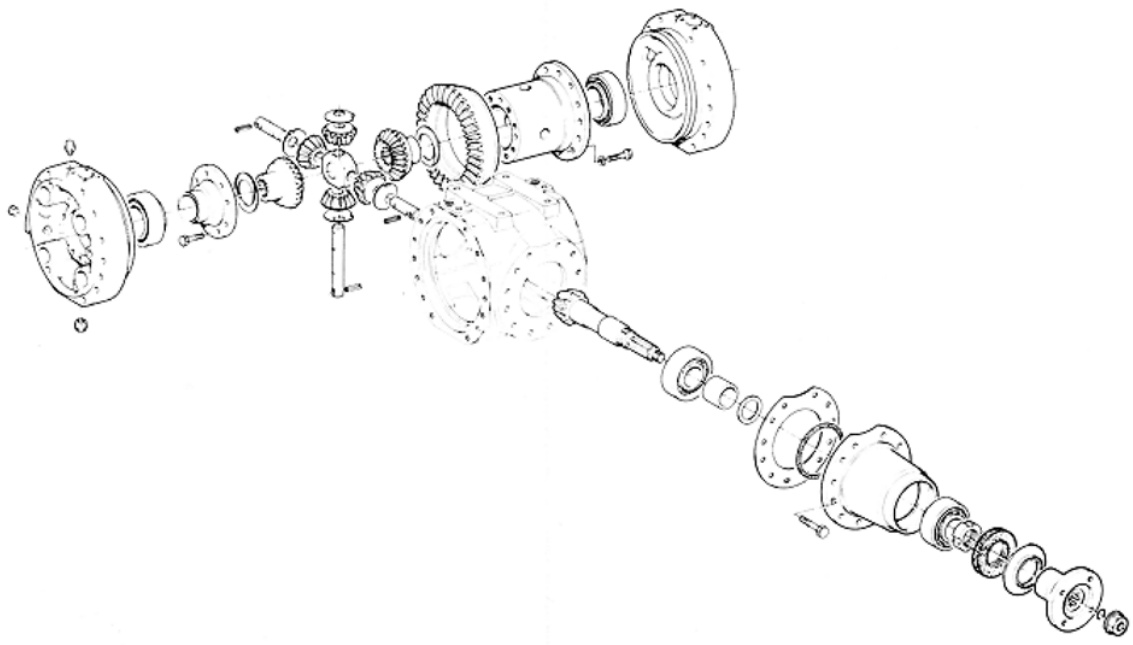
ASSEMBLAGE CORPS CENTRAL.
NOTE: FAIRE ATTENTION DE NE PAS ENDOMAGER LES ZONES D'ETANCHEITE DES JOINTS O-RING PENDANT LE MONTAGE DU DIFFERENTIEL DANS LE CARTER CENTRAL.

ASSEMBLING CENTRAL AXLE HOUSING.
NOTE: BE CAREFUL NOT TO DAMAGE THE TIGHT SURFACES OF THE O-RINGS WHILE INSERTING THE DIFFERENTIAL CASE INTO THE CENTRAL AXLE HOUSING.

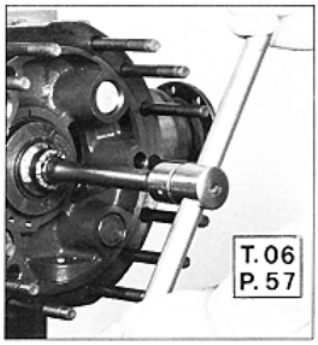


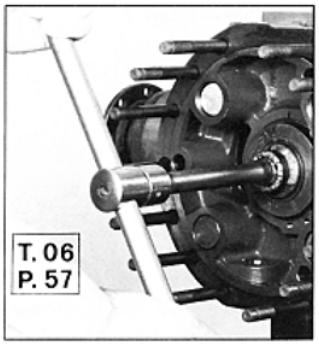
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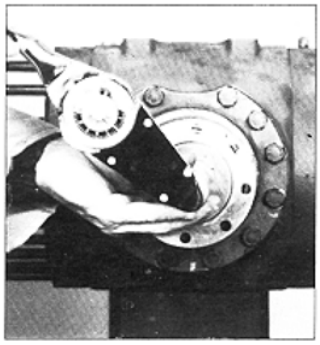




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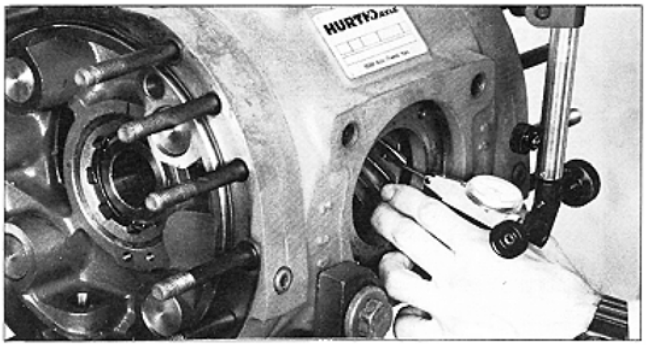


AVVITARE LE GHIERE FINO AD OTTENERE UN GIOCO DI CIRCA 0,15-0,18 mm TRA I DENTI DELLA COPPIA CONICA. NON PRECARICARE I CUSCINETTI DEL DIFFERENZIALE.
RILEVARE LA COPPIA DI ROTAZIONE DEL PIGNONE E DEL DIFFERENZIALE. SERRARE LA GHIERA SUL LATO OPPOSTO DELLA CORONA CONICA FINO AD AUMENTARE LA COPPIA SUL PIGNONE DI 35-45 Ncm.

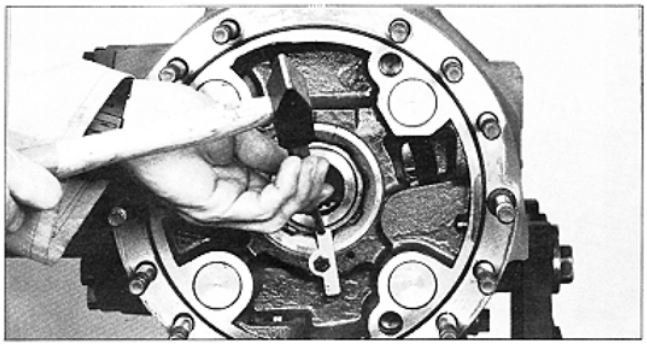
MUTTERN ANZIEHEN BIS FLANKENSPIEL ZWISCHEN DEN ZÄHNEN VON KEGEL- UND TELLERRADPAAR CA. 0,15÷0,18 mm BETRAEGT. LAGER NICHT VORSPANNEN.
AM KEGELRITZEL DAS DREHMOMENT DER RITZEL- UND DIFFERENTIALLAGERUNG MESSEN. DIE AM TELLERRAD GEGENÜBERLIEGENDE MUTTER ANZIEHEN BIS EIN 35-45 Ncm HÖHERES MOMENT AM KEGELRITZEL GEMESSEN WIRD.

VISSER LES ECROUS JUSQU'A OBTENIR UN JEU DE 0,15-0,18 ENTRE LES DENTS DU COUPLE CONIQUE SANS PRECHARGER LES ROULEMENTS DU DIFFERENTIEL. RELEVER LE COUPLE DE ROTATION DU PIGNON ET DU DIFFERENTIEL ET SERRER L'ECROU DU COTE OPPOSE DE LA COURONNE JUSQU'A OBTENTION DU COUPLE DU PIGNON DE 35-45 Ncm.

SCREW IN THE ADJUSTING NUTS TO OBTAIN APPROX. 0,15-0,18 mm BACKLASH BETWEEN THE TEETH OF THE BEVEL GEAR SET, WITHOUT PRELOADING THE TAPER ROLLER BEARINGS.
CHECK THE ROTATING TORQUE OF PINION AND DIFFERENTIAL. TIGHTEN NUT ON OPPOSITE SITE TO THE CROWN WHEEL TO OBTAIN A 35-45 Ncm HIGHER ROTATING TORQUE ON THE PINION.



TRACCIARE UN RIFERIMENTO SU ENTRAMBE LE GHIERE. PER LA CORREZIONE DEL GIOCO TRA I DENTI DELLA COPPIA CONICA AGIRE ESCLUSIVAMENTE SULLE GHIERE. ALLENTARE QUELLA SUL LATO CORONA CONICA E STRINGERE QUELLA OPPOSTA DELLA STESSA ENTITÀ SE IL GIOCO È SCARSO, VICEVERSA SE È TROPPO.
BEIDE MUTTERN KENNZEICHNEN. ZUR KORREKTUR DES FLANKENSPIELS DES KEGEL- UND TELLERRADES AUSSCHLIESSLICH DIE BEIDEN MUTTERN VERSTELLEN. BEI ZU KLEINEM SPIEL MUTTER AUF DER TELLERRADSEITE LÖSEN UND DIE GEGENÜBERLIEGENDE ENTSPRECHEND NACHSTELLEN. BEI ZU GROSSEM SPIEL IN UMGEKEHRTER WEISE VERFAHREN.
TRACER UN TRAIT DE REPERE SUR LES DEUX ECROUS. POUR LA CORRECTION DU JEU ENTRE LES DENTS DU COUPLE CONIQUE AGIR EXCLUSIVEMENT SUR LES ECROUS, SERRER OU DESSERRER D'EGALE MESURE POUR NE PAS MODIFIER LA PRECHARGE.
MARK BOTH RING NUTS. TO ADJUST THE BACKLASH MOVE RING NUTS ONLY. LOOSEN THE ONE ON BEVEL CROWN WHEEL SIDE AND TIGHTEN THE OPPOSITE ONE FOR THE EQUAL MEASURE IF THE BACKLASH IS TOO LOW; VICEVERSA IF THE BACKLASH IS TOO HIGH.



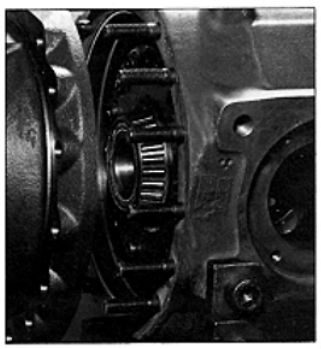
MONTARE LE PIASTRE DI SICUREZZA NELLA POSIZIONE PIÙ IDONEA E CIANFRINARE.

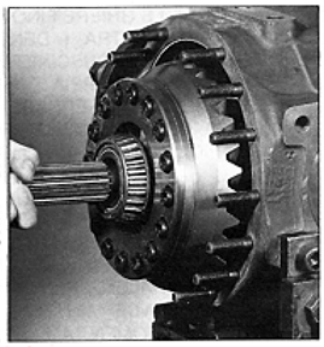
SICHERUNGSBLECHE IN DER GEEIGNETESTEN POSITION ANBRINGEN UND ANSTAUCHEN.

MONTER LES PLAQUETTES DE SECURITE DANS LA POSITION LA PLUS ADAPTEE ET CHANFREINER.

MOUNT LOCKING TABS IN THE BEST POSITION AND PUNCH IN PLACE.

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SMONTAGGIO.

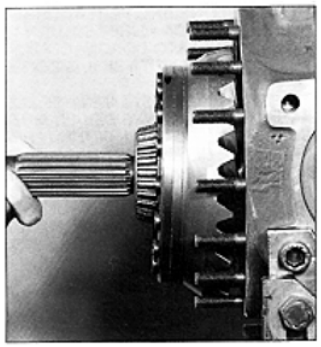
AUSBAU.

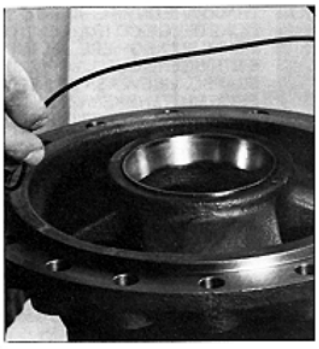
DÉMONTAGE.

DISASSEMBLY.



MONTAGGIO E REGISTRAZIONE
INSERIRE UNA QUOTA INIZIALE DI SPESSORI DI
0,8 mm LATO CORONA CONICA - 0,85 mm LATO OPPOSTO.
EINBAU UND EINSTELLUNG
MIT DEM EINLEGEN VON PASSCHEIBEN VON
0,8 mm AUF DER SEITE DES TELLERRADES UND VON - 0,85 mm AUF DER GEGENSEITE BEGINNEN.
MONTAGE ET RÉGLAGE
PLACER INITIALEMENT
0,8 mm D'ÉPAISSEUR DU COTÉ DE LA COURONNE, ET 0,85 mm DU COTÉ OPPOSÉ.
ASSEMBLY AND ADJUSTMENT
INSERT AN INITIAL SHIM THICKNESS OF
0,8 mm ON THE CROWN WHEEL SIDE AND 0,85 mm ON THE OPPOSITE SIDE.



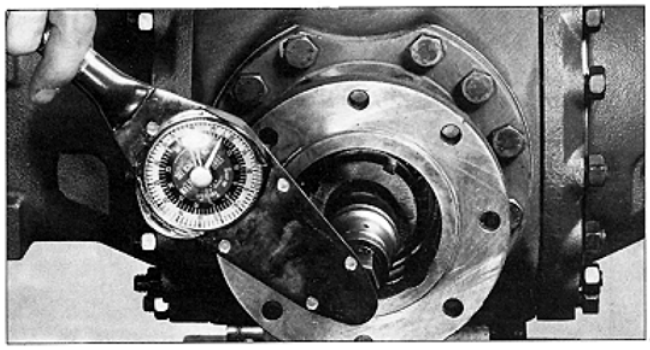


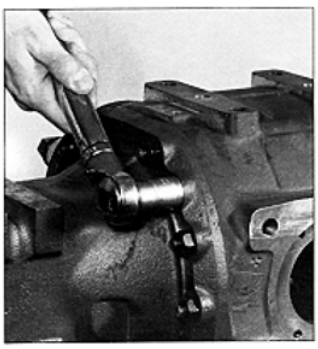
ASSEMBLARE IL DIFFERENZIALE CON I BRACCI LASCIANDO DAL LATO CORONA I DADI LENTI E UN LEGGERO GIOCO QUINDI VERIFICARE LA COPPIA DI ROTAZIONE DEL PIGNONE CONICO.

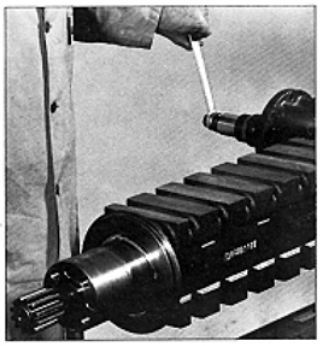
ACHSMITTENGEHÄUSE UND ACHSKÖRPER ZUSAMENBAUEN UND AUF DER SEITE DES TELLERRADES DIE SECHSKANTMUTTERN NUR LEICHT ANZIEHEN UND EIN GERING ES SPIEL LASSEN. DANN DAS DREHMOMENT DES KEGEL RITZELS PRÜFEN.

ASSEMBLER LE DIFFÉRENTIEL AVEC LES BRAS, EN LAISSANT LES DENTS DESSERRÉES, COTÉ COURONNE, ET UN PEU DE JEU. PUIS VÉRIFIER LE COUPLE DE ROTATION DU PIGNON CONIQUE.

MOUNT HTE DIFFERENTIAL WITH THE LATERAL AXLE HOUSINGS, LEAVING THE BEVEL GEAR SIDE NUTS LOOSE. CHECK ROTATIONAL TORQUE OF BEVEL PINION.

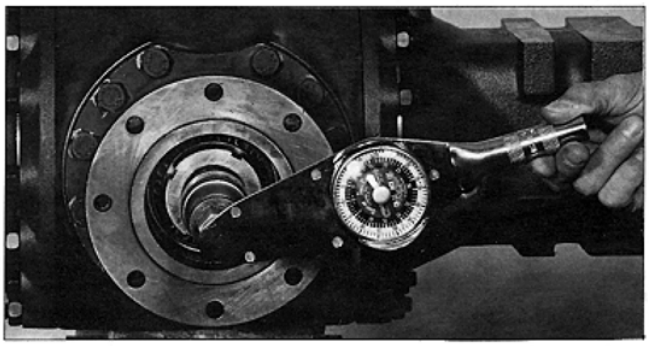




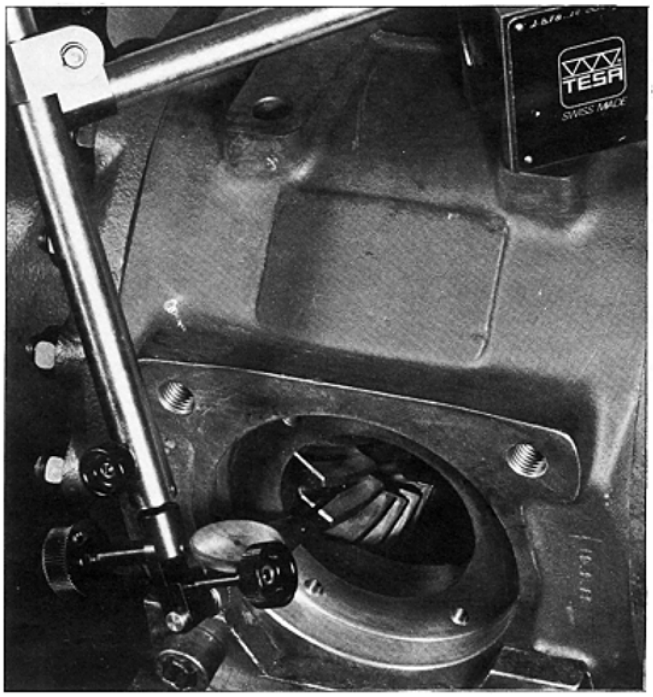


SERRARE TUTTI I DADI DEI BRACCI .
ASSESTARE I CUSCINETTI A RULLI CONICI DEL DIFFERENZIALE MEDIANTE DEI SEMIASSI E CONTEMPORANEAMENTE FARE RUOTARE IL PIGNONE.
ALLE SECHSKANTMUTTERN DER BEIDEN ACHSKÖRPER ANSIEHEN. DIE KEGELROLLENLAGER DES DIFFERENTIALS EINSTELLEN, INDEM MAN VON BEIDEN SEITEN MIT DEN ACHSWELLEN DARAUFSCHLÄGT UND GLEICHZEITIG DAS KEGELRITZEL IN DREHUNG BRINGT.
SERRER TOUS LES ÉCROUS DES BRAS.
AJUSTER LES ROULEMENTS À ROULEAUX CONIQUES DU DIFFÉRENTIEL EN TAPANT DES DEUX COTÉS À L'AIDE DES ESSIEUX, TOUT EN FAISANT TOURNER LE PIGNON.
TIGHTEN ALL NUTS OF THE LATERAL AXLE HOUSING.
SEAT THE TAPER ROLLER BEARINGS OF THE DIFFERENTIAL BY TAPPING ON BOTH SIDES BON THE AXLE SHAFTS WHILE TURNING THE PINION.

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VERIFICARE LA COPPIA DI ROTAZIONE DEL PIGNONE CHE DEVE ESSERE AUMENTATA DI 35÷45 Ncm.
PER EVENTUALI CORREZIONI TOGLIERE O AGGIUNGERE SPESSORI PER RISPETTIVAMENTE ABBASSARE O AUMENTARE LA COPPIA DI ROTAZIONE.
DAS DREHMOMENT DES KEGELRITZELS PRÜFEN, WELCHES UM 35÷45 Ncm HøOHER LIEGEN MUß.
GGF. PASSCHEIBEN HINZUFÜGEN ODER ENTFERNEN, UM DAS DREHMOMENT ZU ERHÖHEN ODER ZU SENKEN.
VÉRIFIER LE COUPLE DE ROTATION DU PIGNON QUI DOIT ETRE AUGMENTE DE 35÷45 Ncm.
POUR LES CORRECTIONS ENLEVER OU AJOUTER DES CALES POUR DIMINUER OU AUGMENTER LE COUPLE DE ROTATION.
CHECK THE ROTATION TORQUE OF THE PINION WHICH MUST BE INCREASED BY 35÷45 Ncm.
IF CORRECTIONS ARE REQUIRED, REMOVE OR ADD SHIMS TO RESPECTIVELY DECREASE OR INCREASE THE ROTATION TORQUE.

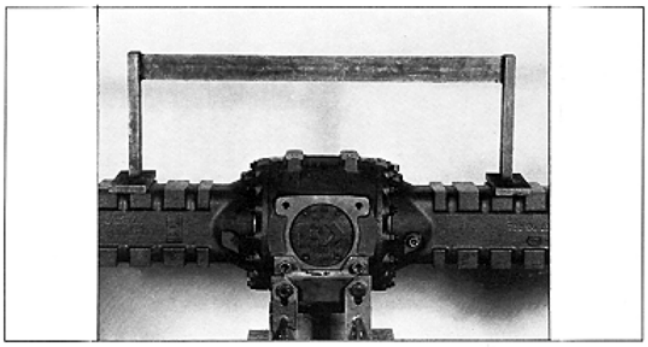


VERIFICA DEL GIOCO TRA I DENTI DELLA COPPIA CONICA.
GIOCO = 0,18÷0,25 mm.
PER EVENTUALI CORREZIONI SPOSTARE DA UN LATO ALL'ALTRO GLI SPESSORI FINO AD OTTENERE IL GIOCO CORRETTO.
ES: TROPPO GIOCO: TOGLIERE DAL LATO OPPOSTO DELLA CORONA CONICA DEGLI SPESSORI E INSERIRLI DAL LATO CORONA CONICA.

ERMITTLUNG DES ZAHNFLANKENSPIELES, SPIEL = 0,18 ÷ 0,25 mm.
LIEGT DAS ZAHNFLANKENSPIEL NICHT INNERHALB DER ZULÄSSIGEN TOLERANZ, SO IST DURCH AUSTAUSCH VON PASSCHEIBEN EINE KORREKTUR VORZUNEHMEN.

VÉRIFICATION DU JEU ENTRE LES DENTS DU COUPLE CONIQUE JEU = 0,18 À 0,25 mm.
POUR LES CORRECTIONS DÉPLACER LES CALES D'UN COTÉ À L'AUTRE JUSQU'À RETROUVER LE JEU CORRECT.EX.: TROP DE JEU; METTRE LES CALES, ENLEVÉES COTÉ OPPOSÉ, DU COTÉ DE LA COURONNE.

CHECK THE BACKLASH BETWEEN THE TEETH OF THE BEVEL GEAR PAIR GAP = 0,18 ÷ 0,25 mm.
IF CORRECTIONS ARE REQUIRED, MOVE THE SHIMS FROM ONE SIDE TO THE OTHER UNTIL THE CORRECT PLAY IS OBTAINED. EG.: EXCESSIVE PLAY: REMOVE THE SHIMS FROM THE SIDE OPPOSITE THE RING BEVEL GEAR AND INSERT THEM ON THE RING BEVEL GEAR SIDE.



VERIFICA DI PLANARITÀ DEI BRACCI A FINE MONTAGGIO.

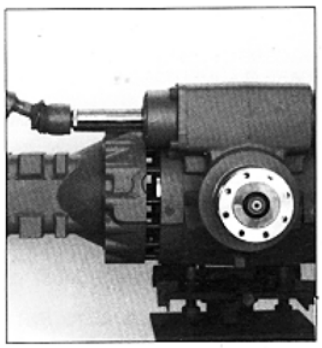
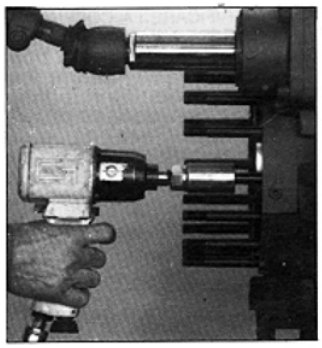
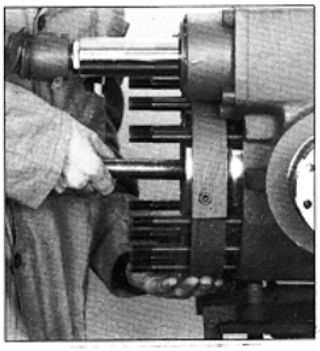
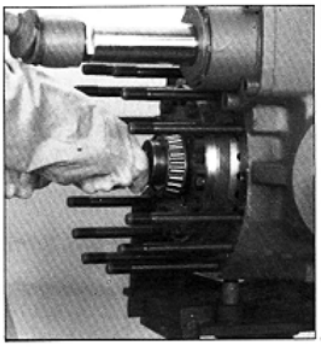
NACH VOLLENDETER MONTAGE DIE EBENHEIT DER ACHSKÖRPER PRÜFEN.

A LA FIN DU MONTAGE VÉRIFIER LA PLANÉITÉ DES BRAS.

CHECK LATERAL AXLE HOUSING LEVELNESS AFTER ASSEMBLE.

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SMONTAGGIO DIFFERENZIALE/*AUSBAU DES DIFFERENTIALS*
DEMONTAGE DIFFERENTIEL/*DISASSEMBY OF DIFFERENTIAL*

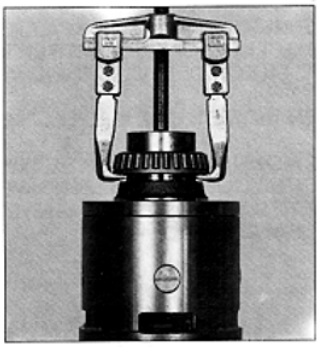





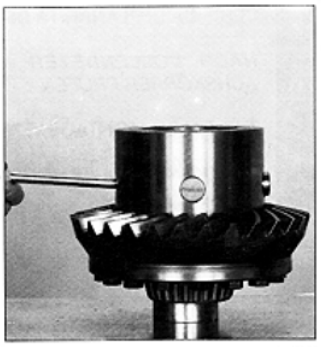
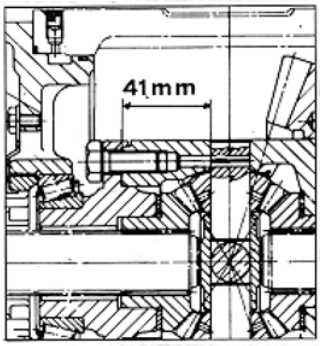
SMONTAGGIO DIFFERENZIALE DALL'ASSALE.

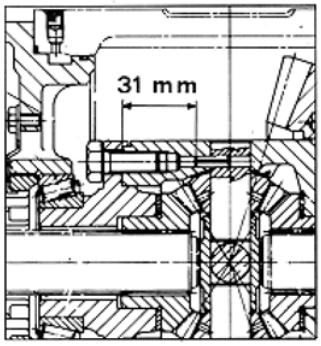
AUSBAU DES DIFFERENTIALS AUS DER ACHSE.

DEMONTAGE DIFFERENTIEL DU PONT.

REMOVAL OF THE DIFFERENTIAL FROM THE AXLE.





NOTE: SOSTITUIRE LE VITI DI FISSAGGIO DELLA CORONA CONICA OGNI VOLTA CHE SI DEVONO SMONTARE.

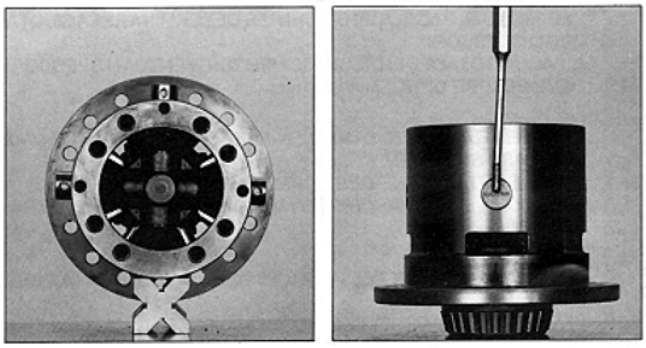
ACHTUNG: BEFESTIGUNGSSCHRAUBEN DES TELLERRADES VOR JEDEM EINBAU ERNEUERN.

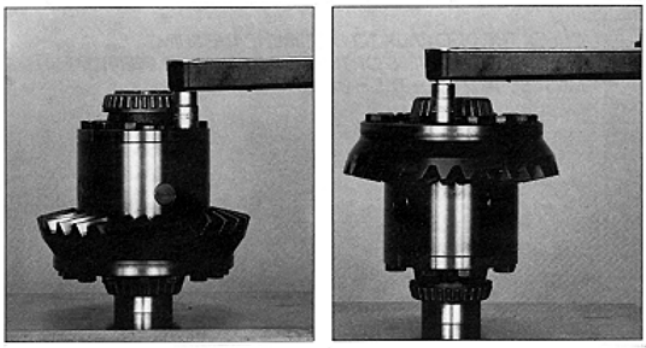
NOTE: REMPLACER LES VIS DE FIXATION DE LA COURONNE CHAQUE FOIS QUE L'ON DOIT LES DEMONTER.

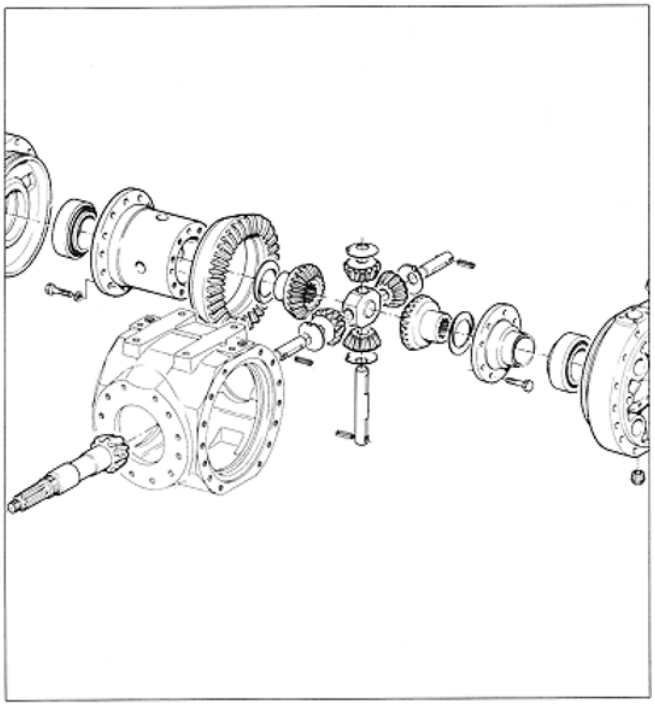
NOTE: REPLACE THE FITTING BOLTS OF THE CROWN WHEEL EVERY TIME THAT THEY HAVE TO BE REMOVED.

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MONTAGGIO DIFFERENZIALE/E*INBAU DES DIFFERENTIALS*
MONTAGE DIFFERENTIEL/ ASSEMBLY OF THE DIFFERENTIAL







INSERIRE LE SPINE ELASTICHE FINO A METÀ DEL PERNO.

DIE SPANNHÜLSEN BIS ZUR BOLZENMITTE EINFÜHREN

INTRODUIRE LES GOUPILLES ÉLASTIQUE JUSQU'À MI-AXE.

INSERT THE SPRING PINS HALF WAY UP THE PIN.

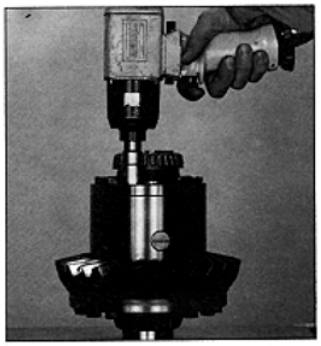
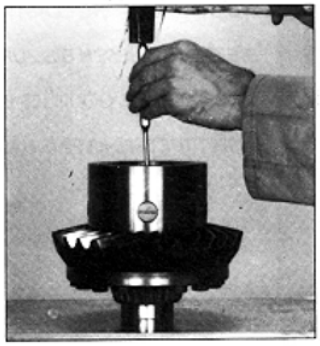
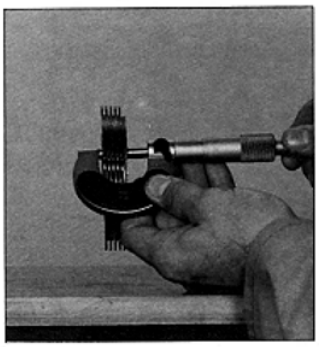
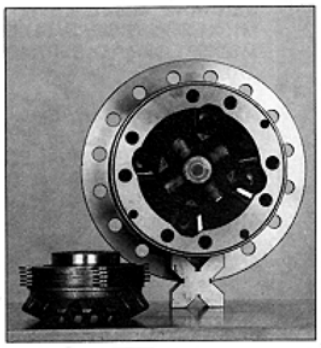
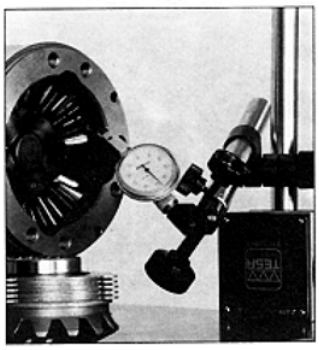
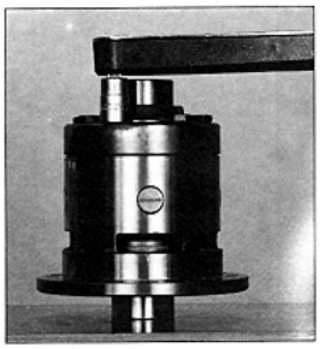
SERRARE TUTTE LE VITI CON CHIAVE DINAMOMETRICA.
M10X1,25X25 COPPIA DI SERRAGGIO Nm73.
M12X30 COPPIA DI SERRAGGIO Nm 89. MONTARE CON LOCTITE 270.

ALLE SCHRAUBEN M10x1,25x25 MIT EINEM DREHMOMENTENSCHLÜSSEL MIT DREHMOMENT VON 73 Nm ANZIEHEN. DIE SCHRAUBEN M12x30 BEI EINEM DREHMOMENT VON 89 Nm.ANZIEHEN UND MIT LOCTITE 270 SICHERN.

SERRER TOUTES LES VIS AVEC UNE CLÉ DYNAMOMÉTRIQUE M10x1,25x25, COUPLE DE SERRAGE 73 Nm, M12x30 COUPLE DE SERRAGE 89 Nm. MONTER AVEC DE LA LOCTITE 270.

TORQUE ALL BOLTS M10x1,25x25 WITH A TORQUE WRENCH CLAMPING TORQUE 73 Nm.
M12x30 BOLTS CLAMPING TORQUE 89 Nm. USE LOCTITE 270.

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VERIFICA DEL PACCO DEI DISCHI PER DETERMINARE LA QUOTA DEGLI SPESSORI.
IL PACCO TOTALE DEI DISCHI COMPRESI EVENTUALI SPESSORI DEVE ESSERE DI 16,2 mm ± 0,1mm.

ÜBERPRÜFUNG DES LAMELLEN PAKETES ZUR ERMITTLUNG DER PASS-SCHEIBEN.
DIE GESAMTSTAERKE DES SCHEIBENPAKETES MIT EVENTUELLEN PASS-SCHEIBEN MUß 16,2 mm± 0,1 mm BETRAGEN.

CONTROLE DU PAQUET DES DISQUES POUR DETERMINER LA COTE DES CALES.
L'ENSEMBLE DU PAQUET DES DISQUES AVEC LES CALES DOIT ETRE DE 16,2 ± 0,1 mm.

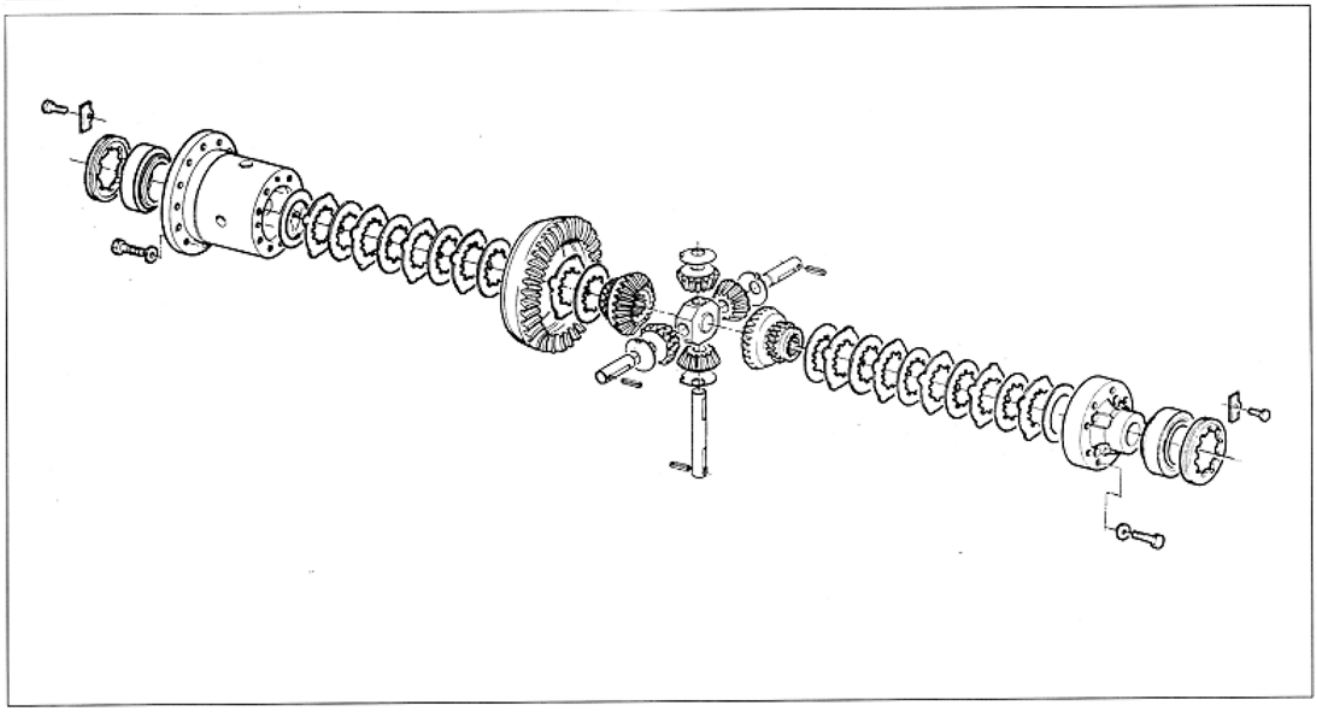
CHECK THE DISC PACK TO DETERMINE THE SHIMS.
THE TOTAL THICKNESS OF THE DISC PACK WITH EVENTUAL SHIMS MUST BE 16,2 mm ± 0,1 mm.

SERRARE LE VITI CON CHIAVE DINAMOMETRICA.
M10X40-10 K COPPIA DI SERRAGGIO Nm 69÷72 MONTARE CON LOCTITE 242.

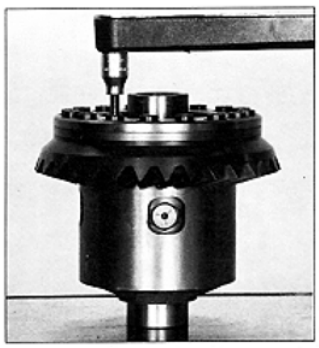
DIE SCHRAUBEN M10x40-10 K MIT EINEM DREHMOMENTENSCHLÜSSEL MIT EINEM.
DREHMOMENT VON 69-72 Nm ANZIEHEN UND MIT LOCTITE 242 SICHERN.

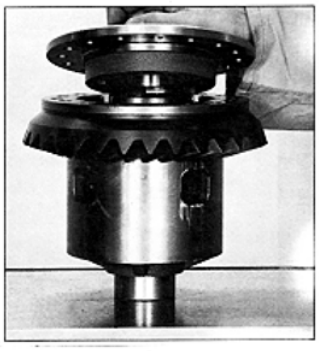
SERRER LES VIS AVEC UNE CLÉ DYNAMOMÉTRIQUE.
M10x40-10 K COUPLE DE SERRAGE 69 À 72 Nm; MONTER AVEC DE LA LOCTITE 242.

TORQUE THE BOLTS WITH A TORQUE WRENCH.
M10x40-10 K TIGHTENING TORQUE 69÷72 Nm USE LOCTITE 242.



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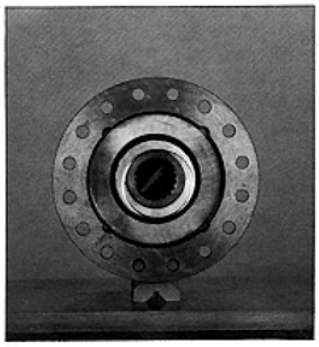


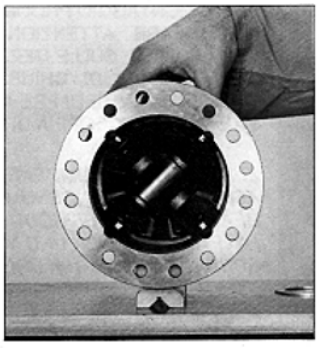
SMONTAGGIO

AUSBAU

DEMONTAGE

DISASSEMBLY



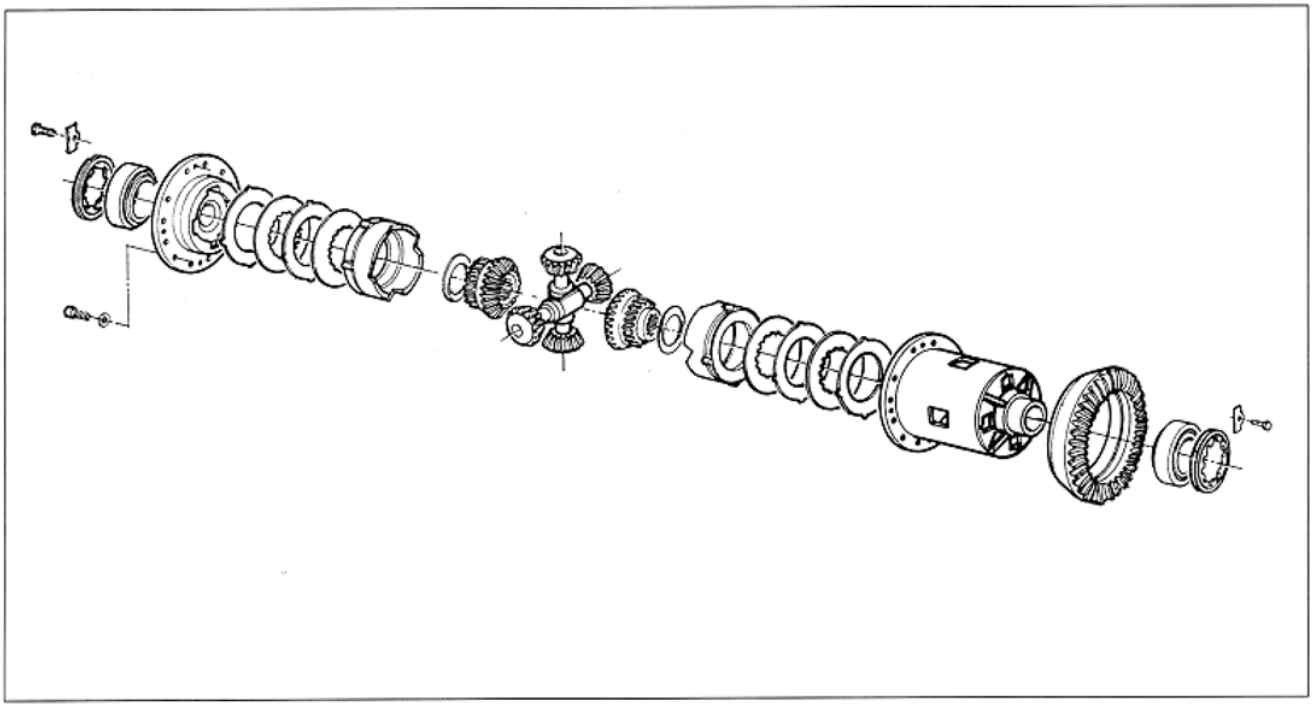


PER IL MONTAGGIO ESEGUIRE LE OPERAZIONI IN SENSO INVERSO.
CONTROLLARE CHE I DISCHI NON SIANO DEFORMATI.

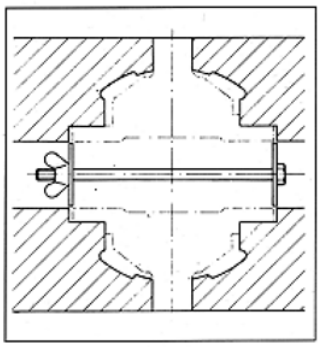
ZUR MONTAGE DIE VORGÄNGE IN UMGEKEHRTER REIHENFOLGE DURCHFÜHREN.
PRÜFEN, DAß DIE LAMELLEN NICHT VERFORMT SIND.

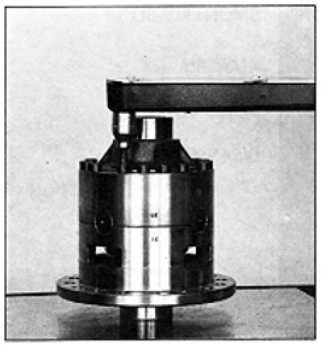
POUR LE MONTAGE EXÉCUTER LES OPÉRATIONS EN SENS INVERSE.
CONTROLER QUE LES DISQUES NE SOIENT PAS ORDER DÉFORMES.

CARRY OUT THE OPERATIONS IN REVERSE TO ASSEMBLE.
CHECK THAT THE DISKS ARE NOT DEFORMED.



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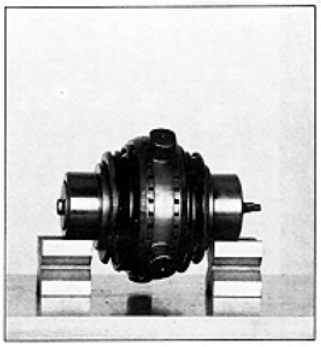
SMONTAGGIO

AUSBAU

DEMONTAGE

DISASSEMBLY



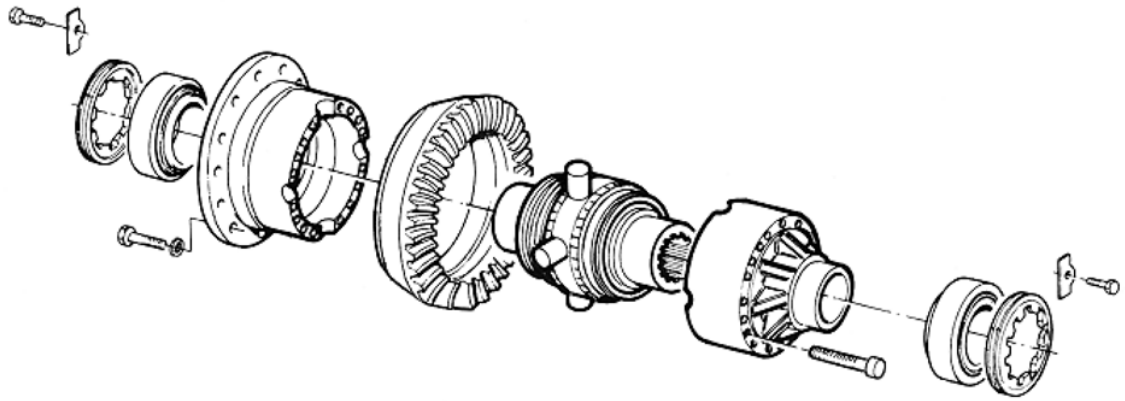


PER IL MONTAGGIO PROCEDERE IN SENSO INVERSO.
NOTE: FARE ATTENZIONE AI NUMERI DI ACCOPPIAMENTO STAMPIGLIATI SULLE MEZZE SCATOLE DIFFERENZIALE. SERRARE LE VITI DI CHIUSURA DELLE MEZZE SCATOLE E TOGLIERE LA VITE DI PRE-ASSEMBLAGGIO.
VITE M8X65-10K COPPIA DI SERRAGGIO Nm 35÷37.

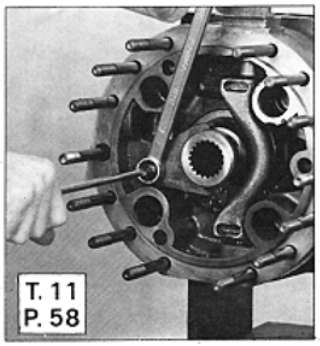
ZUR MONTAGE IN UMGEKEHRTER REIHENFOLGE VORGEHEN. ACHTUNG: PAARUNGSNUMMERN AUF DEN GEHÄUSEHÄLFTEN BEACHTEN. BEFESTIGUNGSSCHRAUBEN DER GEHAEUSEHÄLFTEN ANZIEHEN UND MONTIERSCHRAUBE ENTFERNEN. SCHRAUBE M8X65-10K DREHMOMENT Nm 35÷37.

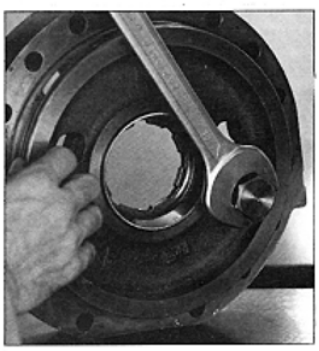
POUR LE MONTAGE PROCÉDER EN SENS INVERSE
NOTE: FAIRE ATTENTION AUX NUMEROS D'APPARIEMENT MARQUES SUR LES DEMI-CARTERS DIFFERENTIEL. ENLEVER LA VIS DE PRE-ASSEMBLAGE APRES A VOIR SERRE LES VIS DE FERMETURE DES DEMI-CARTERS.
VIS M8X65-10K COUPLE DE SERRAGE Nm 35-37.

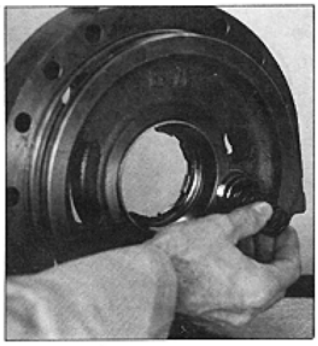
PROCEED IN REVERSE ORDER FOR ASSEMBLY.
NOTE: OBSERVE PAIRING NUMBER ON CASE HALVES. TIGHTEN THE FIXING BOLTS OF THE CASES AND REMOVE MOUNTING BOLT.
BOLT M8X65-10K TORQUE Nm 35-37.

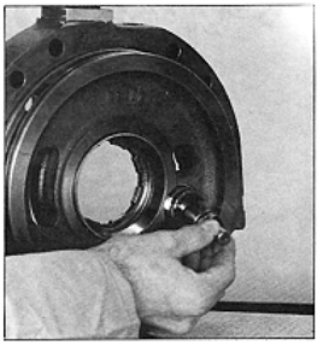


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SMONTAGGIO

AUSBAU

DEMONTAGE

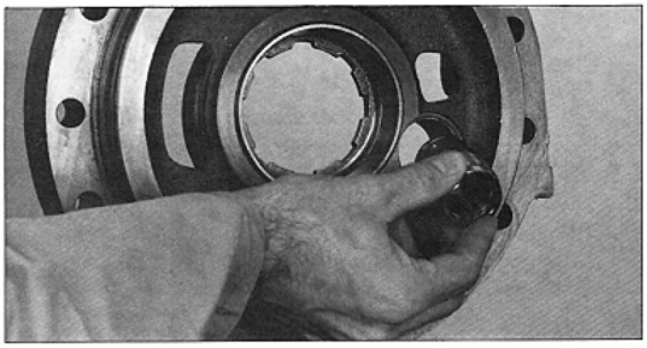
DISASSEMBLY

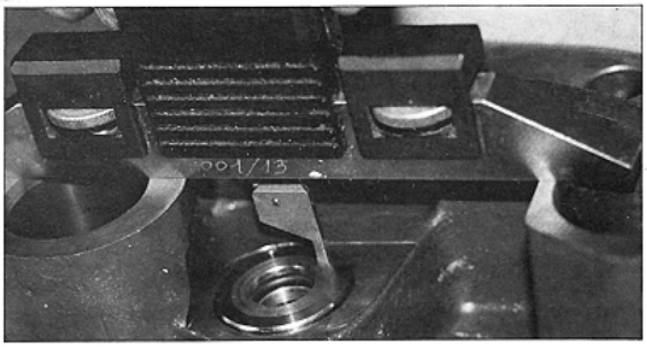
PER IL MONTAGGIO PROCEDERE IN SENSO INVERSO.

ZUR MONTAGE IN UMGEKEHRTER REIHENFOLGE VORGEHEN.

POUR LE MONTAGE PROCÉDER EN SENS INVERSE.

PROCEED IN REVERSE ORDER FOR ASSEMBLY.





MONTAGGIO E VERIFICA POSIZIONAMENTO CILINDRETTO BLOCCO.

EINBAU UND ÜBERPRÜFUNG DER LAGE DES BETÄTIGUNGSZYLINDERS.

MONTAGE ET CONTROLE DU POSITIONNEMENT CYLINDRE DE BLOCAGE.

ASSEMBLY AND CHECK POSITION OF CYLINDER.



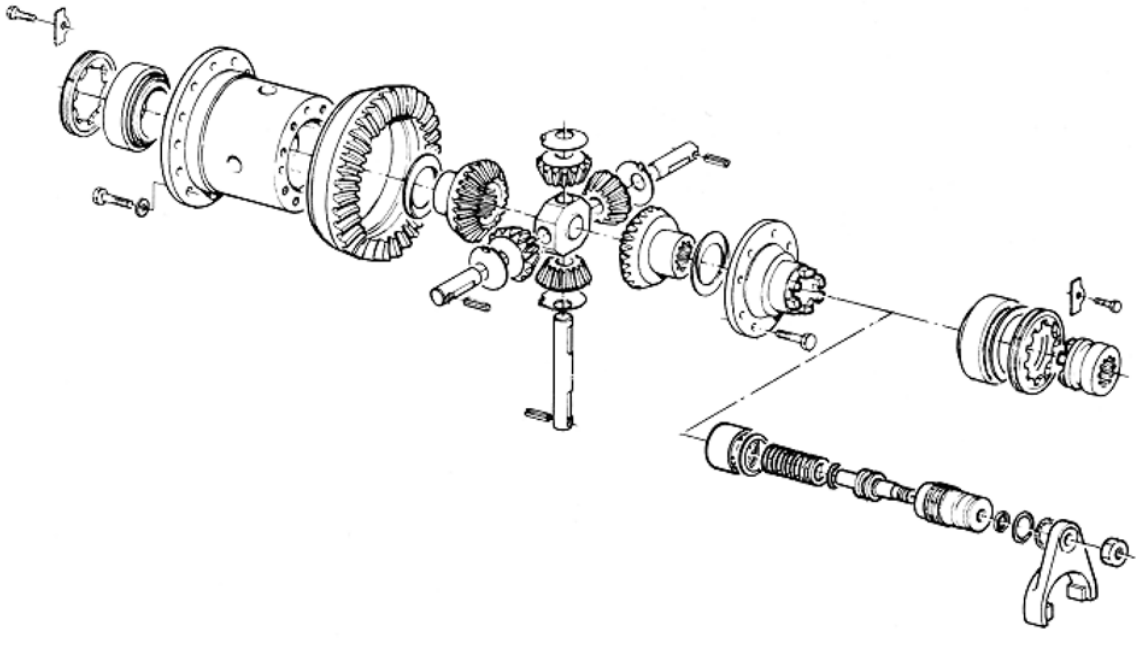
MONTAGGIO E VERIFICA
POSIZIONAMENTO CILINDRETTO BLOCCO.

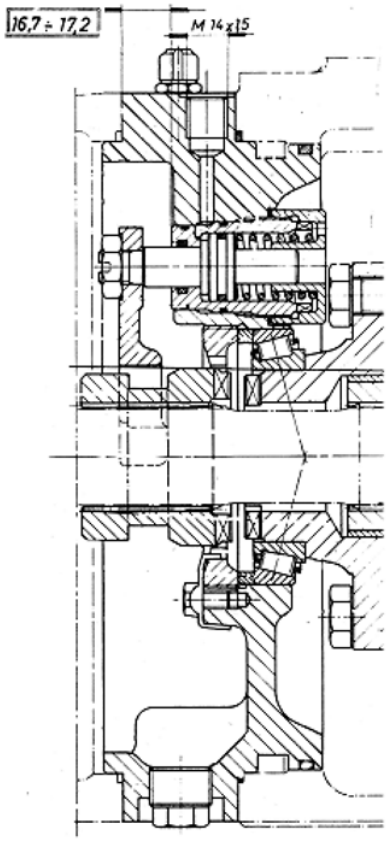
MONTAGE UND PRÜFUNG
POSITIONIERUNG DES BETÄTIGUNGSZYLINDERS.

MONTAGE ET VÉRIFICATION
POSITIONNEMENT DU PETIT CYLINDRE DE BLOCAGE.

ASSEMBLY AND INSPECTION
POSITIONING THE CYLINDER.

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TABELLE DI CONVERSIONE/*UMRECHNUNGSTABELLEN*
TABLEAUX DE CONVERSION/*CONVERSION TABLES*

1 Atm ≅ 1 bar ≅ 10^5 Pa ≅ 14.4 Psi
Pa

	N	da N	KN	Kg	Lbs
1N	1	0,1	0,001	0,102	0,225
1 da N	10	1	0,01	1,02	2,25
1 KN	1000	100	1	102	225
1 Kg	9,81	0,981	0,00981	1	2,205
1 Lbs	4,44	0,444	0,00444	0,4536	1

	Nm	da Nm	KNm	Kgm	Lb-in
1Nm	1	0,1	0,001	0,102	8,854
1 da Nm	10	1	0,01	1,02	88,54
1 KNm	1000	100	1	102	8854
1 Kgm	9,81	0,981	0,00981	1	86,8
1 Lb-in	0,1129	0,01129	0,0001129	0,01152	1
1 Kg cm	0,0981	0,00981	0,0000981	0,01	0,868

COPPIE DI SERRAGGIO/*ANZIEHDREHMOMENTE*
COUPLES DE SERRAGE/*TIGHTENING TORQUES*

TIPO VITE *GEWINDE* TYPE DE VIS *SIZE OF BOLT*	8G/8.8	10K/10.9	12K/12.9
M 4	2,9	4,1	-
M 6	10,0	14,0	-
M 8	25,0	35,0	-
M 10	49,0	69,0	-
M 10x1,25	52,0	73,0	88,0
M 12	86,0	120,0	-
M 14	135,0	190,0	-
M 14x1,5	150,0	210,0	250,0
M 16	210,0	295,0	-
M 18x1,5	325,0	460,0	550,0
A 22	550		

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RICERCA GUASTI/*FEHLERSUCHE*
RECHERCHE DES PANNES/*TROUBLE SHOOTING*

PROBLEMA/*PROBLEM* **PROBLEME/*PROBLEM***	**CAUSE/*URSACHE*** **CAUSE/*CAUSE***	**RIMEDI/*ABHILFE*** **REMEDE/*CORRECTION***
Frenatura insufficiente *Ungenëgende Bremswirkung* Freinage insuffisant *Insufficient braking*	1. Incorretta registrazione *1. Fehlerhafte Einstellung* 1. Mauvais reglage *1. Incorrect adjustment*	Ispezionare lo spessore dei dischi freno (vedi pag.8) e, se i dischi freno possono essere riutilizzati, registrarli come da istruzioni del manuale del veicolo. *Bremsscheibenstärke überprüfen, siehe Seite 8;* *koennen die Bremscheiben noch verwendet werden, Spiel neu einstellen gemäß Anweisungen im Handbuch des Fahrzeuges.* Inspecter l'épaisseur des disques frein (voir page 8) et, si les disques frein sont en bon etat, regler selon les instructions du manuel du vehicule. *Inspect disc thickness (see page 8) and if discs are usable readjust brakes to the specifications in the vehicle's manual.*
	2. Dischi freno usurati *2. Bremsscheiben verschlissen* 2. Disques frein usés *2. Brake discs worn out*	Ispezionare lo spessore dei dischi freno (vedi pag.8) e, se necessario, sostituirli. *Bremsscheibenstärke überprüfen, siehe Seite 8 und falls erforderlich ersetzen.* Inspecter l'épaisseur des disques frein (voir page8) et si nécessaire remplacer les disques. *Inspect disc thickness (see page 8) and replace if necessary.*
	3. Fluido non idoneo nel circuito *3. Ungeeignete Fluessigkeit in der Bremsanlage* 3. Fluide inadéquat dans le circuit *3. Incorrect brake fluid*	Sostituire tutti gli anelli di tenuta del ponte e del cilindro master che sono venuti a contatto con il fluido non idoneo nonchè i tubi flessibili. Se il fluido non idoneo è entrato nel ponte e si è mescolato con il lubrificante tutti gli anelli di tenuta ed o-rings devono essere sostituiti. *Alle Dichtringe und Gummischläuche die mit der falschen Flüssigkeit in Kontakt gekommen sind, in der Achse und im Hauptbremszylinder ersetzen.* *Sollte diese Flüssigkeit auch in die Achse gelaugt sein, sind auch sämtliche O-Ringe und Dichtringe der Achse zu ersetzen.* Substituer tous les joints d'étancheité du pont et du maître-cylindre qui ont ete en contact avec ce fluide mais aussi les tubes flexibles. Si le fluide incorrect est entré dans le pont et s'est melange avec le lubrifiant tous les joints d'étanchéité et o-ring doivent être changés. *Replace all seals in axle and master cylinder that have made contact with the incorrect fluid and all brake hoses.* *If incorrect fluid leaked into axle oil, seals and o-rings in axle must be replaced.*
	4. Perdita del fluido dal circuito freno *4. Verlust von Bremsflüssigkeit* 4. Fluidé dans le circuit de freinage *4. Loss of brake fluid*	Ispezionare e riparare tutte le perdite del circuito esterno o del cilindro master. Se la causa è dovuta al fluido non idoneo vedi rimedio n. 3. Se la perdita è verso l'esterno del ponte sostituire gli o-rings tra la scatola centrale ed i coperchi intermedi. Se la perdita è verso l'interno del ponte sostituire gli o-rings sopra menzionati e quelli dei pistoncini freno. *Äussere Bremsanlage und Hauptbremszylinder auf Ölverluste prüfen.* *Sollte der Verlust auf ungeeignete Bremsfluessigkeit zurückzuführen sein, siehe Abhilfe N. 3.* *Sollte der Verlust nach aussen sein, die O-Ringe zwischen dem Achsmittengehäuse und den Zwischengehäuse ersetzen.* *Sollte der Verlust nach innen sein, oben genannte O-Ringe und jene der Bremskolben ersetzen.* Inspecter et réparer toutes les fuites du circuit externe ou du maître-cylindre. Si la cause est dûe à l'utilisation d'un fluide non indique voir remède N. 3. Si la fuite est vers l'exterieur du pont, substituer les o-rings entre le carter central et les carters intermediaires. Si la fuite est vers l'interieur du pont substituer les o-rings mentionnés ci-dessus et ceux des pistons frein.

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PROBLEMA/*PROBLEM* PROBLEME/*PROBLEM*	CAUSE/*URSACHE* CAUSE/*CAUSE*	RIMEDI/*ABHILFE* REMEDE/*CORRECTION*
	4. Loss of brake fluid	*Inspect for and repair any leaks in outside circuit or master cylinder.* *If caused by incorrect brake fluid see correction n. 3.* *If leak is to the outside replace the o-rings between the center and intermediate housings.* *If leak is to the inside replace above o-rings and brake piston o-rings.*
	5. Surriscaldamento del ponte con vaporizzazione del fluido (i freni ritornano quando il ponte si raffredda). *5. Verdunstung der Bremsflussigkeit wegen Überhitzung. (Im abgekühlten Zustand ist die Bremswirkung wieder hergestellt).* 5. Surchauffe du pont avec vaporisation du fluide (les freins fonctionnent à nouveau quand le fluide se refroidit). *5. Overheated axle causing brake fluid to vaporize (brake return when axle cools).*	Vedi problema: Surriscaldamento. *Siehe Problem: Überhitzung.* Voir probleme: Surchauffe. *See "overheating" problem.*
Pedale del freno non risponde *Leichtes Bremspedal* Pedale du frein ne repond pas *Soft brake pedal*	6. Aria nel circuito freno *6. Luft in der Bremsanlage* 6.. Air dans le circuit *6. Air in brake circuit*	Spurgare il circuito freno come da istruzioni di spurgo del manuale del veicolo. *Bremsen entlüften gemäß Anweisungen im Handbuch des Failrzeuges.* Purger le circuit de frein selon "instructions de purge" du manuel du véhicule. *Bleed brakes as described in the vehicle's service manual.*
Freno negativo inefficiente *Federspeicherbremse ohne Funktion* Inefficacite du frein negatif *Ineffective safety brake*	8. Registrazione incorretta *8. Fehlerhafte Einstellung des Bremsscheibenspieles* 8. Mauvais reglage *8. Incorrect adjustment*	Vedi rimedio N. 1. *Siehe Abhilfe N. 1.* Voir remède N. 1. *See correction N. 1.*
	9. Dischi freno usurati *9. Bremslamellen verschlissen* 9. Usure disques frein *9. Brake disc worn out*	Vedi rimedio N. 2. *Siehe Abhilfe N. 2.* Voir remède N. 2. *See correction N. 2.*
Surriscaldamento *Überhitzung* Surchauffe *Overheating*	10. Livello olio non corretto *10. Niedriger Ölspiegel-Falscher Ölstand* 10. Niveau d'huile pas incorrect *10. Oil level wrong*	Scaricare, sciaquare e riempire d'olio fino a livello. *Öl ablassen, reinigen und richtigen Ölstand wieder herstellen.* Vidanger, rincer et refaire le niveau d'huile. *Drain, flush and refill oil to proper level.*
	11. Poco gioco tra i dischi freno *11. Zu wenig Spiel zwischen den Bremslamellen* 11. Peu de jeu entre les disques frein *11. Too small of a brake gap.*	Registrare il freno come istruzioni da manuale del veicolo. *Spiel gemäß Anweisungen im Handbuch des Fahrzeuges herstellen.* Regler le frein selon les instructions du manuel du véhicule. *Réadjust brakes to the specifications in the vehicle's service manual.*
	12. Freno di parcheggio in trazione *12. Feststellbremse zieht* 12. Frein de parc mal réglé *12. Park brake dragging*	Sbloccare il freno ripristinando il gioco corretto. *Bremsen lösen und richtiges Lamellenspiel einstellen.* Débloquer le frein et régler le jeu. *Unlock the brake and adjust the correct gap.*

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PROBLEMA/*PROBLEM* PROBLEME/*PROBLEM*	CAUSE/*URSACHE* CAUSE/*CAUSE*	RIMEDI/*ABHILFE* REMEDE/*CORRECTION*
	13. Fluido non idoneo nel circuito *13. Ungeeignete Flüssigkeit in der Bremsanlage* 13. Fluide incorrect dans le circuit *13. Incorrect brake fluid in system*	Vedi rimedio N. 3 *Siehe Abhilfe N. 3* Voir remède N. 3 *See correction N. 3*
	14. Non c'è corsa a vuoto sul cilindro master *14. Kein Leerweg am Bremspedal* 14. Pas de garde sur la pedale du maître-cylindre *14. No free-pedal at master cylinder*	Registrare il pedale del freno come istruzioni da manuale del veicolo. *Bremspedal gemäß Anweisungen im Handbuch des Fahrzeuges einstellen.* Régler la pedale du frein selon les instrucions du manuel du véhicule *Readjust brake pedal as described in the vehicle's service manual*
	15. Restringimento sul circuito del freno *15. Verengung in der Bremsanlage* 15. Reglage sur circuit du frein *15. Restriction in brake lines*	Ispezionare e riparare i condotti ammaccati o piegati. *Anlage überprüfen und verbeulte oder geknickte Leitungen ersetzen.* Inspecter et réparer les conduites endommagees. *Inspect for and repalce damage lines.*
	16. Restringimento sul condotto di ritorno del sistema servo. *16. Verengung in der Rückflussleitung des Servobremssystems* 16. Etranglement sur la conduite de retour du servo-frein *16. Restriction in return line of brake Servo system*	Ispezionare e riparare il condotto ammaccato o piegato. Ispezionare e sostituire tutti i filtri e raccordi sul circuito o qualsiasi altro ostacolo nel condotto di ritorno. *Anlage überprüfen und verbeulte oder geknickte Leitungen ersetzen.* *Alle Filter und Abzweigungen in der Anlage überprüfen, sämtliche Hindernisse für den freien Durchfluß entfernen.* Inspecter et réparer la conduite endommagée. Inspecter et changer tous les filtres, raccords en "T" ou autre obstacle sur le circuit de retour. *Inspect for and replace damaged return line.* *Inspect for and remove any filter, tee'd in line or any other source of back pressure from the return line.*
	17. Lubrificante non idoneo *17. Ungeeignetes Schmieroel* 17. Lubrifiant incorrect *17. Incorrect lubricant*	Sostituire gli anelli di tenuta del circuito freno e della pompa freno. *Die Abdichtungsringe des Bremskreislaufs der Bremspumpe ersetzen.* Replacer les anneaux d'étanchéité du circuit et de la pompe de frein. *Change the retaining rings of the brake circuit and brake pump.*
Il blocco differenziale non funziona *Differentialsperre ohne Wirkung* Mauvais fonctionnement du blocage du différentiel *Diff-lock inoperative*	18. Se è manuale: comando scollegato o registrato male *18. Bei mechanisch betätigter Sperre, loser oder schlecht eingestellter Hebel* 18. Si manuel: commande déconnectée ou mal réglée *18. If manual, loose or misadjusted linkage*	Ispezionare, riparare e registrare il comando indicato nel manuale del veicolo. *Hebel überprüfen und gemaß Anweisungen im Handbuch des Fahrzeuges einstellen.* Inspecter, réparer et régler la commande selon le manuel du véhicule. *Inspect and correct linkage and readjust as indicated in vehicle's service manual.*
	19. Se è a comando idraulico: problemi nel circuito elettrico del veicolo *19. Bei hydraulisch betätigter Sperre, Probleme in der hydraulischen oder elektrischen Anlage des Fahrzeuges* 19. Si commande hydraulique: problème dans le circuit électrique dans le véhicule *19. If hydraulic, problems in the hydraulic or electrical circuits of the vehicle.*	Fare riferimento alle istruzioni nel manuale del veicolo Siehe Anweisungen im Handbuch des Fahrzeuges. Voir instructions dans manuel du véhicule *Refer to the service manual for the vehicle.*

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PROBLEMA/*PROBLEM* PROBLEME/*PROBLEM*	CAUSE/*URSACHE* CAUSE/*CAUSE*	RIMEDI/*ABHILFE* REMEDE/*CORRECTION*
	20. Se è a comando idraulico: problemi nell'-attuatore (caratterizzati da perdite del fluido idraulico o da aumento del livello d'olio nel ponte). *20. Bei hydraulisch betätigter Sperre, Ölverlust im Betätigungszylinder (erkentlich durch Verlust von hydr. Fluessigkeit oder Anstieg des Oelniveaus in der Achse)* 20. Si commande hydraulique: problèmes dans le vérin (caracterisés par des fuites de fluide hydraulique ou augmentation du niveau d'huile dans le pont) *20. If hydraulic: problems in actuating cylinder (noteable through loss of hydr. oil or increase of the oillevel in axle).*	Ispezionare e riparare il cilindro come da istruzioni a pagina 47. *Überprüfen und gemäß Anweisungen auf Seite 47 reparieren.* Inspecter et reparer le cylindre selon les instructions a page 47. *Rebuilt cylinder as described on page 47.*
	21. Se differenziale autobloccante, dischi usurati. *21. Wenn mit Selbstsperrdifferential, Scheiben verschlissen* 21. Si avec différentiel à glissement limité, usure sur les disques. *21. If with lim. slip differential, worn discs.*	Sostituire i dischi come descritto a pag. 44-45. *Scheiben ersetzen gemäß Anweisungen auf Seite 44-45.* Remplacer les disques selon description page 44-45. *Replace discs as described on page 44-45.*
Olio fuoriesce dallo sfiato *Ölaustritt aus dem Entlüfter* Huile sort du reniflard *Oil coming out of breather*	22. Perdita di fluido idraulico dal sistema frenante *22. Verlust von hydr. Flüssigkeit der Bremsanlage* 22. Fuite de fluide hydraulique du systeme de freinage *22. Leak in internal brake system*	Vedi rimedi N. 2 e 3. *Siehe Abhilfe N. 2 und 3.* Voir remède N. 2 et 3 *See corrections N. 2 & 3*
	23. Perdita d'olio idraulico dal circuito del blocco differenziale *23. Verlust von Hydr. Flüssigkeit der hydr. Anlage der Differentialsperre* 23. Fuite d'huile hydraulique du circuit de blocage du différentiel *23. Leak in diff-lock actuating cylinder.*	Vedi rimedio N. 20 *Siehe Abhilfe N. 20* Voir remède N. 20 *See corrections N. 20*
Il NoSpin è rumoroso viaggiando sul rettilineo *NoSpin macht Geräusche bei Geracheausfahrt* Le No-Spin fait du bruit en roulant en ligne droite *NoSpin indexing noise when driving straight*	24. Pressione disuguale nei pneumatici sui due lati *24. Ungleichmässiger Reifendruck links und rechts* 24. Pressions différentes dans les pneumatiques sur les deux cotes du véhicule *24. Unequal tire pressure left anal right*	Gonfiare i pneumatici alla pressione raccomandata nel manuale o comunque fino ad ottenere un raggio statico uguale. *Reifen vorschriftsgemäß auf pumpen bis ein gleichgroßer statischer Halbmesser erreicht wird.* Gonfler les pneumatiques selon la pression Recommandée dans le manuel ou jusq'à obtenir le même rayon sous charge *Inflate tires to the recommended pressure in the service manual, or until the rolling radius is equal.*
	25. Pneumatico di disegno, marca o costruttore diversi sui due lati *25. Unterschiedliche Reifen, -größen -marken, links und rechts* 25. Pneumatiques de sculptures ou de constructeurs differents sur les deux côtes du vehicule *25. Different style, size or brand of tires between left and right hand side.*	Cambiare pneumatici o rendere i raggi statici dei pneumatici eguali. Variare la pressione dei pneumatici nei campi di tolleranza prescritti dai costruttori dei pneumatici stessi, fino ad ottenere un raggio statico uguale. *Reifen ersetzen sodaß ein gleich-großer Statischer Halbmesser erreicht wird.* *Reifendruck im Bereich der Vorschriften ändern bis ein gleichgroßer Halbmesser erreicht wird.* Changer les pneumatiques ou rendre les rayons sans charge des pneumatiques égaux. Modifier la pression des pneumatiques dans les tolérances prescrites par les constructeurs de ces memes pneumatiques, jusq'à obtenir un rayon sous charge identique. *Change tires to make the rolling radius equal.* *Vary the tire pressure within the specifications until the rolling radius is equal.*

Attenzione: con il NoSpin possono verificarsi avarie da fatica sul lato con il pneumatico più grande.
Achtung: Mit NoSpin können auf der Seite mit dem grösseren Reifenradius Ermüdungsschäden auftreten.
Attention: Avec le NoSpin, des ruptures de fatigue peuvent se produire du côté des pneumatiques les plus grands.
Caution: With NoSpin, fatigue damage can occur on the side with the larger tire.

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PROBLEMA/*PROBLEM* PROBLEME/*PROBLEM*	CAUSE/*URSACHE* CAUSE/*CAUSE*	RIMEDI/*ABHILFE* REMEDE/*CORRECTION*
Rumorosità uguale sia in tiro che in rilascio *Geräusch im Zug und im Schub gleich stark* Bruit en traction ou en retenue *Noise during coast and under power the same*	26. Cuscinetti dei mozzi danneggiati *26. Lager der Radnaben beschädigt* 26. Roulements des moyeux endommagés *26. Wheel bearings damaged*	Sostituire i particolari in avaria come descritto a pagina 17. *Beschädigte Teile gemäß Anweisungen auf Seite 17 ersetzen.* Remplacer les pièces endommagées selon description page 17. *Replace and adjust as described on page 17.*
Rumorosità più elevata in tiro piuttosto che in rilascio *Geraeusch staerker im Zug als im Schub* Bruit plus éleve en traction qu'en retenue *Noise under power greater than during coast*	27. Livello olio basso *27. Niedriger Ölstand* 27. Niveau d'huile insuffisant *27. Low oil level*	Rabboccare olio fino a livello. *Schmieröl nachfüllen bis richtiger Ölstand wieder hergestellt ist.* Refaire le niveau d'huile *Refill oil to proper level*
	28. Olio non idoneo *28. Ungeeignetes Schmieröl* 28. Huile incorrect *28. Incorrect lubricant*	Vedi rimedio N. 17 *Siehe Abhilfe N. 17.* Voir remède N.17 *See correction N. 17.*
	29. Coppia conica usurata *29. Kegel- und Tellerrad verschlissen* 29. Usure du couple conique *29. Ring and pinion worn*	Ispezionare attraverso il coperchio posteriore. Sostituire la coppia conica come descritto da pag.31 a 39. *Durch die heckseitige Bohrung überprüfen. Kegel- und Tellerrad gemäß Anweisungen von Seite 31 bis 39 ersetzen.* Inspectioner au travers du couvercle posterieur. Remplacer le couple conique comme décrit de la page 31 à la page 39. *Inspect through rear cover. Replace and adjust as described from page 31 to 39.*
	30. Cuscinetti della coppia conica usurati *30. Kegelrollenlager des Kegel- und Tellerradpaares verschlissen* 30. Usure des roulements du couple conique *30. Worn ring and pinion bearings*	Sostituire i particolari in avaria come descritto da pagina 31 a 39. *Beschädigte Teile gemäß Anweisungen von Seite 31 bis 39 ersetzen.* Remplacer les pièces endommagées comme décrit de la page 31 à la page 39. *Replace and adjust as described from page 31 to 39.*
	31. Planetari o cuscinetti dell'epicicloidale usurati *31. Planetenräder oder Lager der Planetenabtriebe verschlissen* 31. Usure des planétaires ou roulement de l'épicycloïdale *31. Worn planetary gears or bearings*	Sostituire i particolari in avaria come descritto a pagina 16. *Beschädigte Teile gemäß Anweisungen auf Seite 16 ersetzen.* Remplacer les pièces endommagées selon description page 16. *Replace as described on page 16.*
Rumorosità più elevata in rilascio piuttosto che in tiro *Geräusch stärker im Schub als im Zug* Bruit plus eleve en retenue qu'en traction *Noise during coast greater than under power*	32. Ghiera pignone allentata *32. Wellenmutter des Kegelritzels lose* 32. Ecrou du pignon dévissé *32. Loose pinion nut*	Ispezionare la coppia conica ed i rispettivi cuscinetti, se non fossero danneggiati serrare la ghiera come descritto a pagina 32 - 33. *Kegel- und Tellerrad und Lager überprüfen. Sollten diese nicht beschädigt sein, Wellenmutter anziehen gemäß Anweisungen auf Seite 32 - 33.* Inspecter le couple conique et les roulements et si rien n'est endommagé, resserrer l'ecrou selon description page 32 - 33. *Inspect ring, pinion and pinion bearings. If undamaged, retighten nut as described on page 32 - 33.*
	33. Solo un cuscinetto del pignone è danneggiato *33. Nur eines der Lager des Kegelritzels ist beschädigt* 33. Seulement un roulement du pignon est endommage	Vedi rimedio N. 30 *Siehe Abhilfe N. 30* Voir remède N.30 *See correction N. 30*

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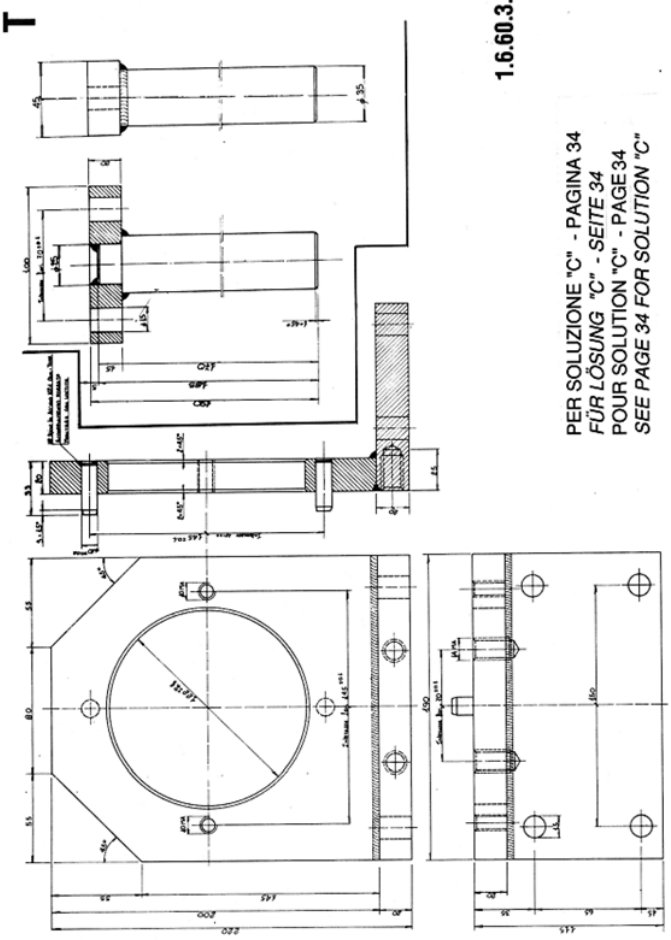
PROBLEMA/*PROBLEM* PROBLEME/*PROBLEM*	CAUSE/*URSACHE* CAUSE/*CAUSE*	RIMEDI/*ABHILFE* REMEDE/*CORRECTION*
Rumore sotto sterzo (senza NoSpin) *Geräusch während der Kurvenfahrt (ohne NoSpin)* Bruit en braquage (sans NoSpin) *Noise during turn (without NoSpin)*	34. Satelliti e/o planetari del differenziale danneggiati *34. Ausgleich kegelräder und/oder -wellenräder verschlissen* 34. Satellites et/ou planétaires du différentiel endommagés 34. Worn spider and/or side gears	Sostituire i particolari danneggiati come descritto a pagina 42. *Beschädigte Teile gemäß Anweisungen auf Seite 42 ersetzen.* Remplacer les pièces endommagées selon description page 42. Replace as described on page 42.
Un rumore tipo "Stick slip" si manifesta durante l'inversione di marcia *"Stick slip" -Geräusch bei Änderung der Fahrtrichtung* Un bruit type "Stick slip" se manifeste pendant l'inversion *A "Stick slip" noise when going from forward to reverse*	35. Giunto cardanico danneggiato *35. Kardanwelle beschädigt* 35. Joint cardan endommagé 35. Worn or damaged cardanshaft	Ispezionare e sostituire il giunto come indicato nel manuale del veicolo *Überprüfen und Kardanwelle gemäß Anweisungen im Handbuch des Fahrzeuges ersetzen.* Inspecter et remplacer le joint cardan selon les indications du manuel du véhicule *Inspect and replace as described in vehicle's service manual*
	36. Ruota allentata *36. Rad lose* 36. Roue dévissée 36. Loose wheel	Ispezionare eventuali danni al disco ed alle colonnette del mozzo ruota, se necessario sostituire i particolari danneggiati e serrare i dadi alla coppia prescritta a pagina. *Eventuelle Schäden an der Felge und an den Radbolzen überprüfen. Falls erforderlich beschädigte Teile ersetzen und Radmuttern gemäß auf Seite vorgeschriebenem Drehmoment anziehen.* Inspecter les éventuels dommages au disque et aux goujons du moyeu de roue. Si nécessaire remplacer les pieces endommagees et serrer les écrous au couple prescrit. *Inspect for wheel and wheel stud damage. Replace if needed and retorque lugnuts.*
	37. Giunto dell'articolazione di sterzo danneggiato *37. Kugelgelenk beschädigt* 37. Joint d'articulation de braquage endommagé *37. Worn or damaged ball joint at steering knuckle*	Ispezionare e sostituire i particolari danneggiati come descritto da pagina 24 a 27. *Überprüfen und beschädigte Teile gemäß Anweisungen von Seite 24 bis 27 ersetzen.* Inspecter et remplacer les pièces endommagées comme décrit de la page 24 à la page 27. *Inspect and repalce as described from page 24 to 27.*
	38. Satelliti liberi nella scatola differenziale *38. Ausgleich kegelräder im Differential lose* 38. Satellites libres dans le carter central *38. Spider pins loose in diff-carrier*	Ispezionare attraverso il coperchio posteriore, sostituire i particolari danneggiati come descritto a pagina 42. *Durch die heckseitige Bohrung überprüfen. Beschädigte Teile gemäß Anweisungen auf Seite 42 ersetzen.* Inspecter au travers du couvercle posterieur. Remplacer les pièces endommagées selon description page 42. *Inspect through rear cover. Replace as described on page 42.*
	39. Rondelle di rasamento del differenziale usurate *39. Anlaufscheiben im Differential verschlissen* 39. Usure des rondelles du différentiel *39. Damaged or missing spider and/or side gear washers*	Vedi rimedio N. 34. *Siehe Abhilfe N. 34.* Voir remède N. 34 . *See correction N. 34.*

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T 02

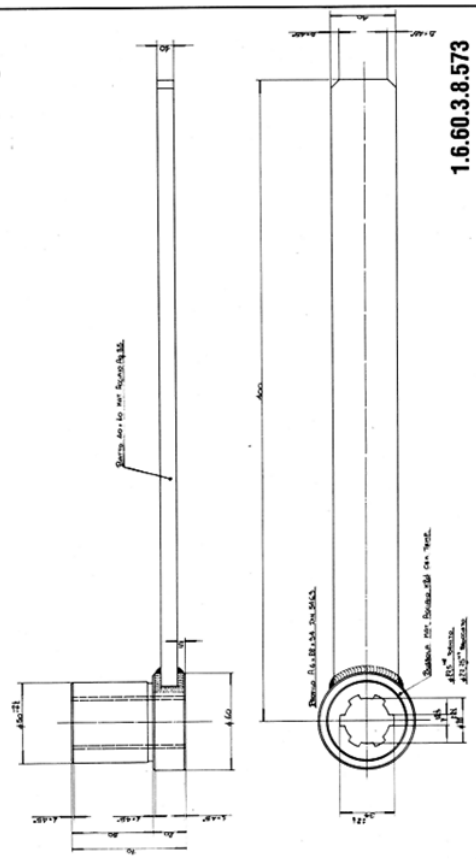
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PER SOLUZIONE "C" - PAGINA 34
FÜR LÖSUNG "C" - SEITE 34
POUR SOLUTION "C" - PAGE 34
SEE PAGE 34 FOR SOLUTION "C"



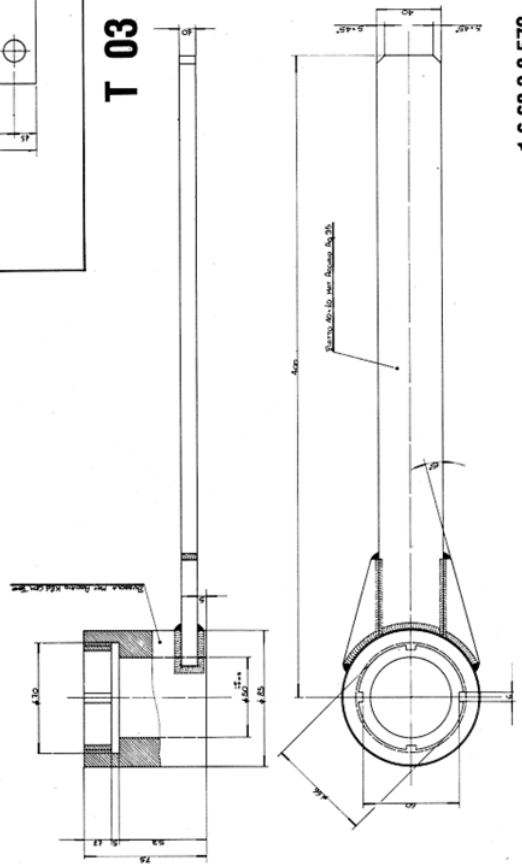
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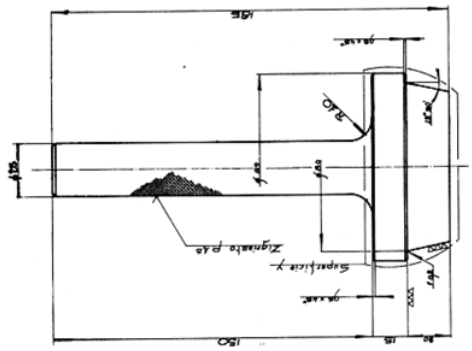
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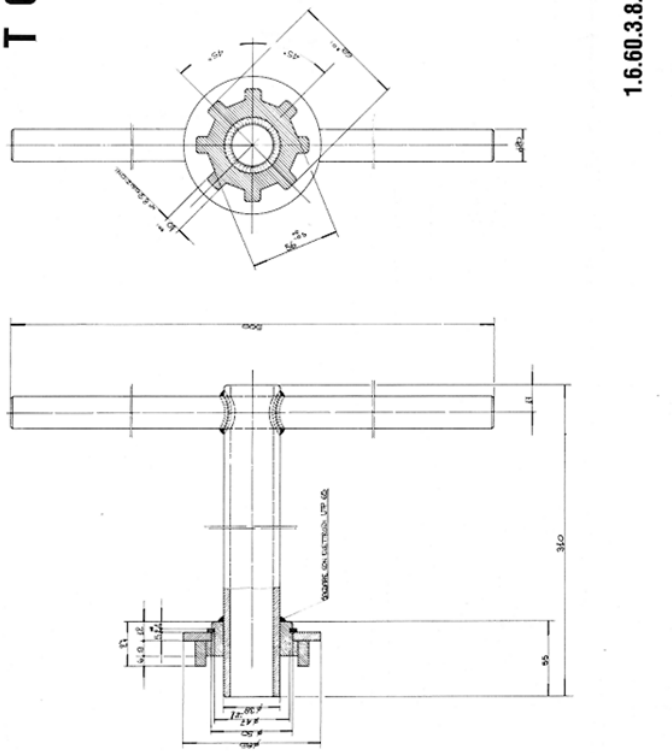
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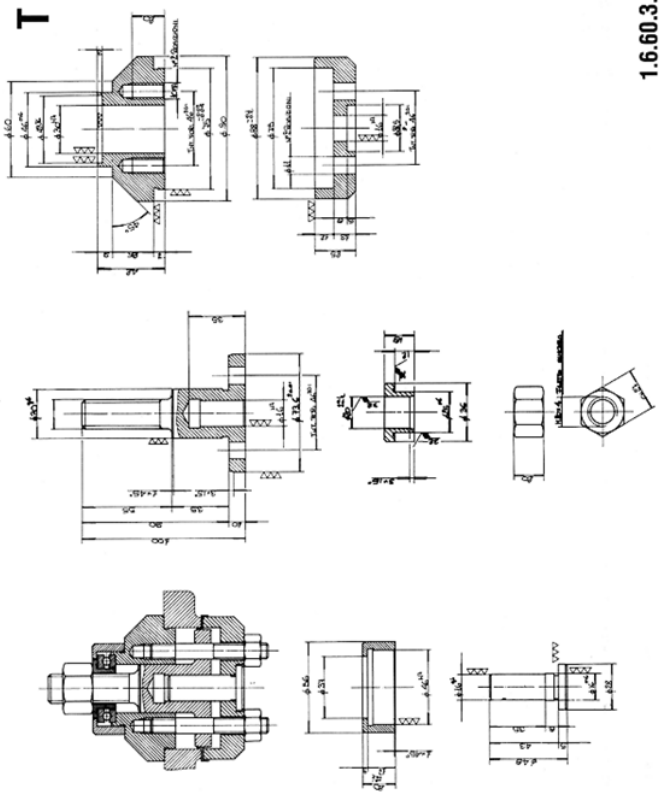
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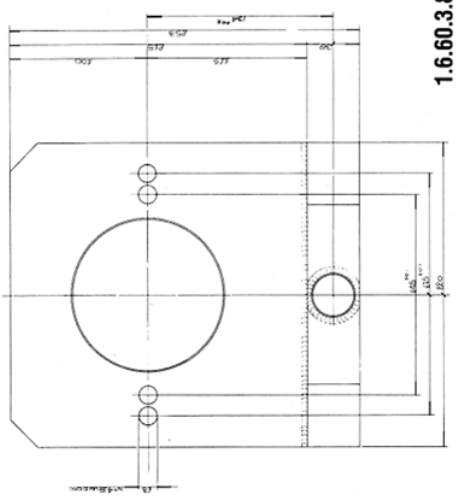
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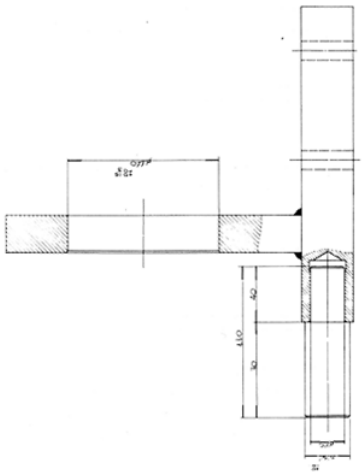


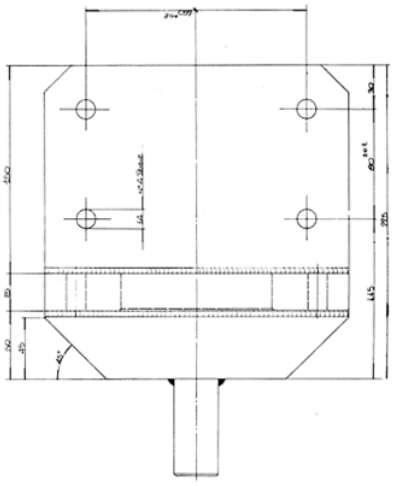
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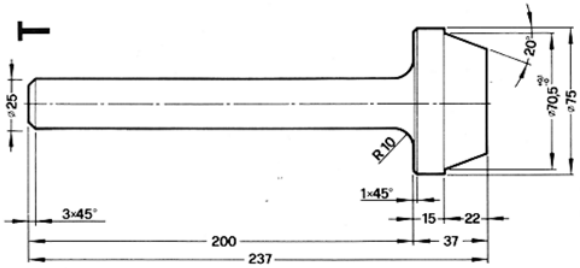
PER SOLUZIONE "A-B-D" - PAGINA 34
FÜR LÖSUNG "A-B-D" - SEITE 34
POUR SOLUTION "A-B-D" - PAGE 34
SEE PAGE 34 FOR SOLUTION "A-B-D"



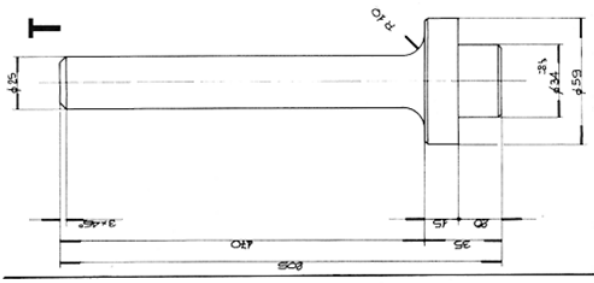


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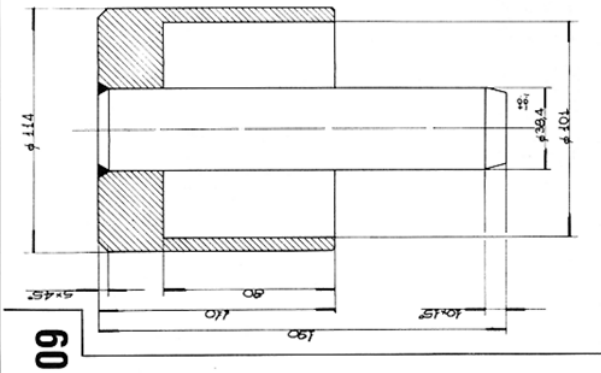
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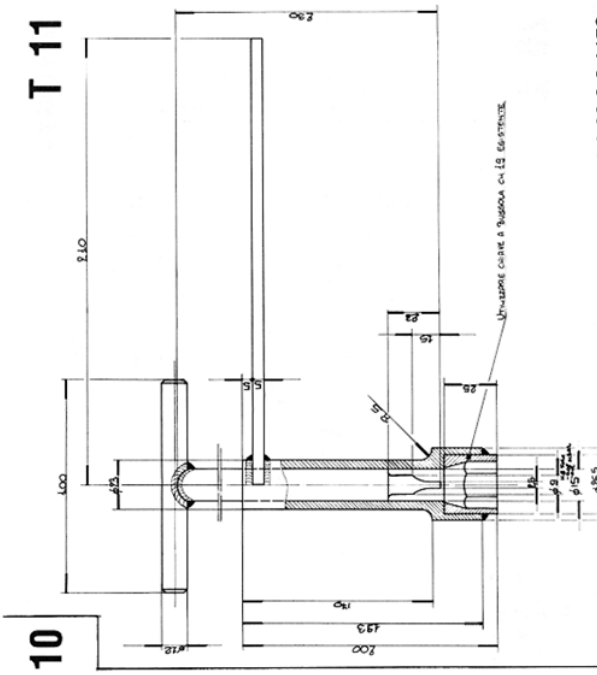
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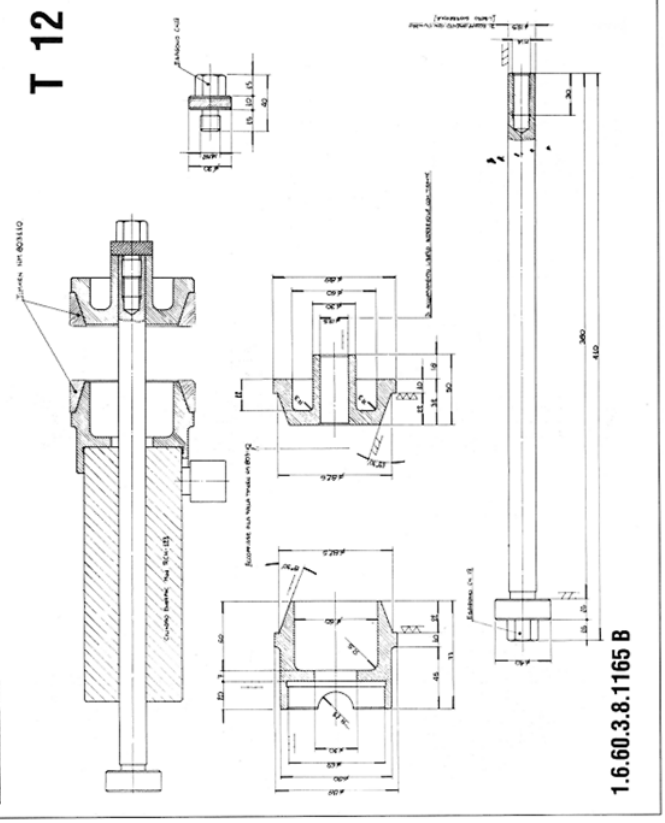
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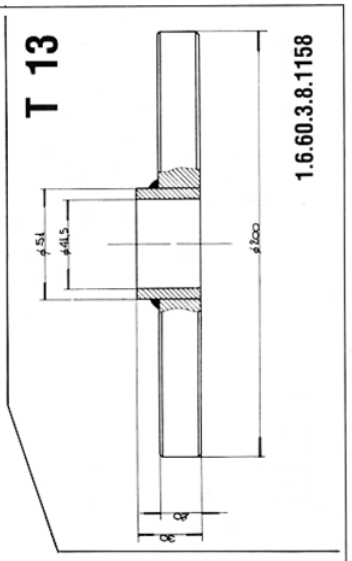
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T 12 — 1.6.60.3.8.1165 B



T 13 — 1.6.60.3.8.1158

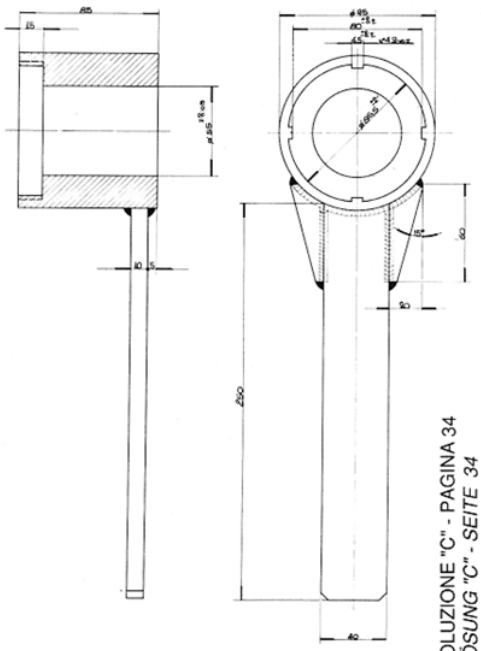


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T 16

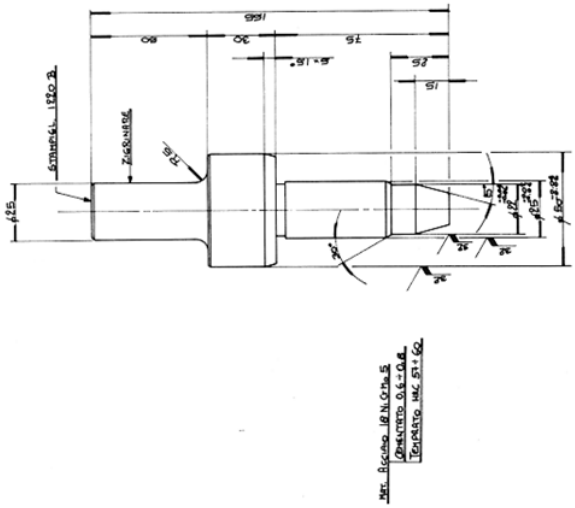
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PER SOLUZIONE "C" - PAGINA 34
FÜR LÖSUNG "C" - SEITE 34
POUR SOLUTION "C" - PAGE 34
SEE PAGE 34 FOR SOLUTION "C"

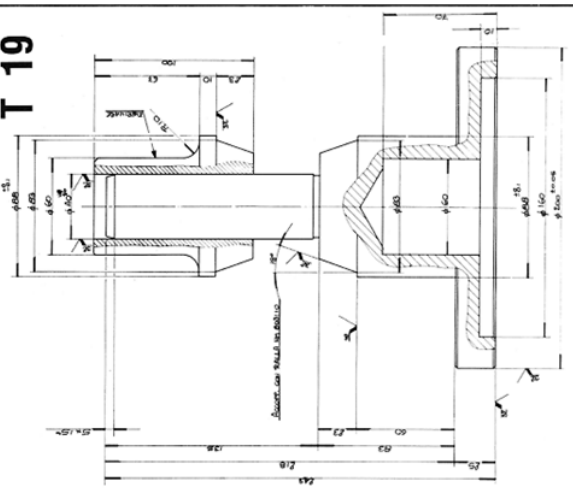
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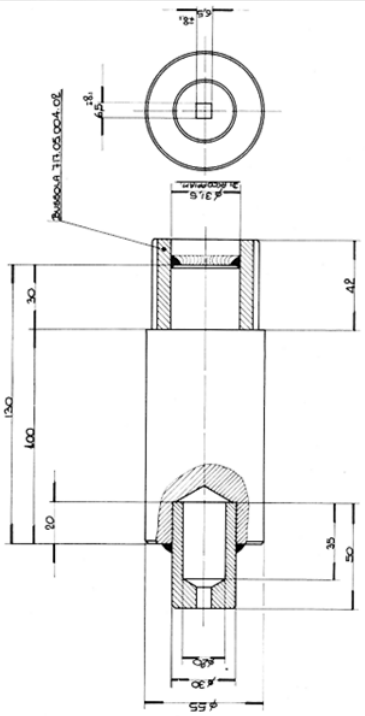
T 19

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T 18

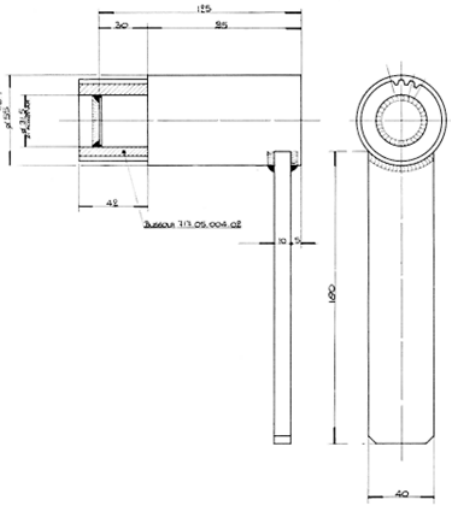
1.6.60.3.8.1259 C



PER SOLUZIONE "C" - PAGINA 34
FÜR LÖSUNG "C" - SEITE 34
POUR SOLUTION "C" - PAGE 34
SEE PAGE 34 FOR SOLUTION "C"

T 17

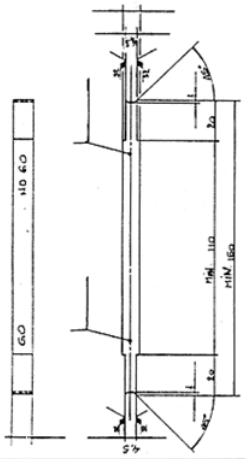
1.6.60.3.8.1259 B



PER SOLUZIONE "C" - PAGINA 34
FÜR LÖSUNG "C" - SEITE 34
POUR SOLUTION "C" - PAGE 34
SEE PAGE 34 FOR SOLUTION "C"

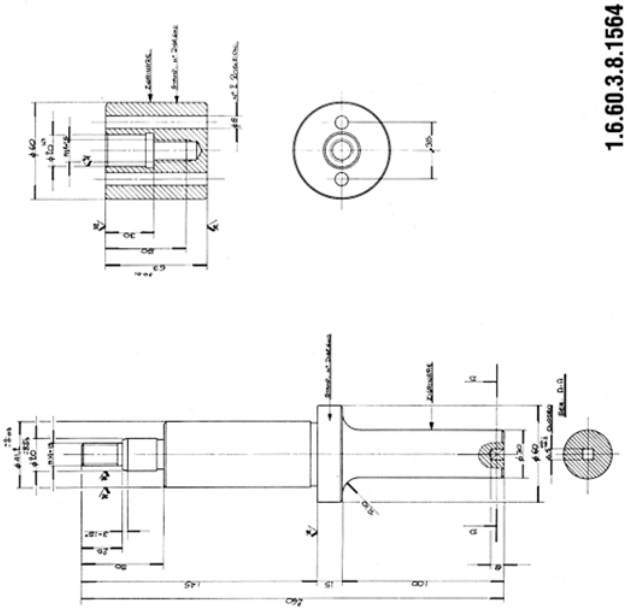
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T 23



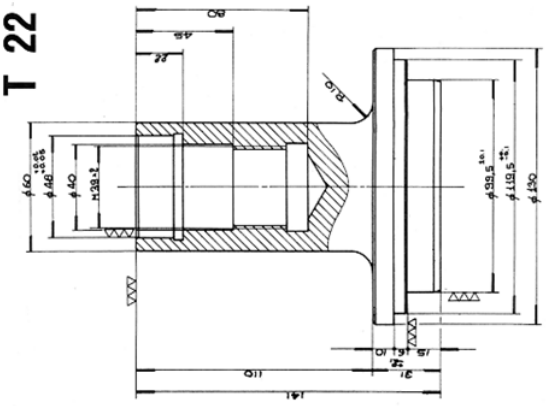
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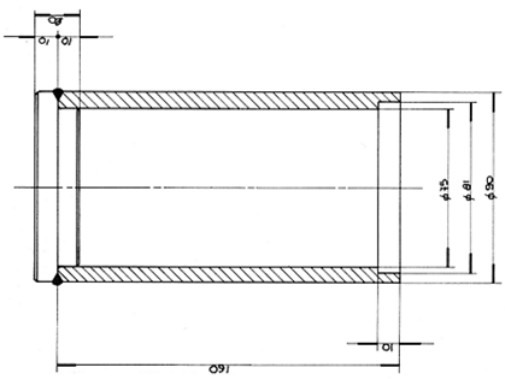
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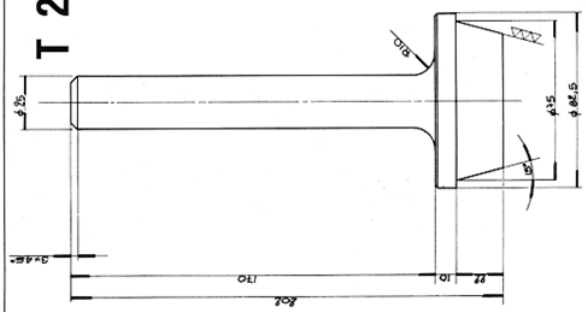
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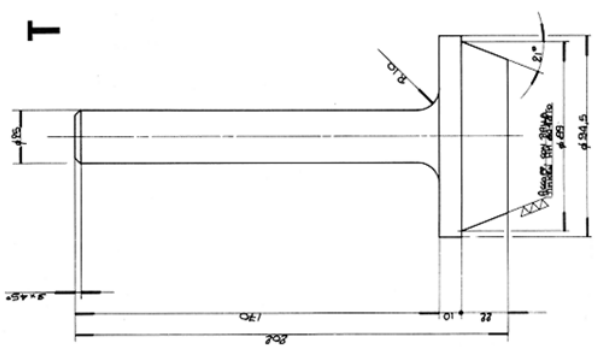
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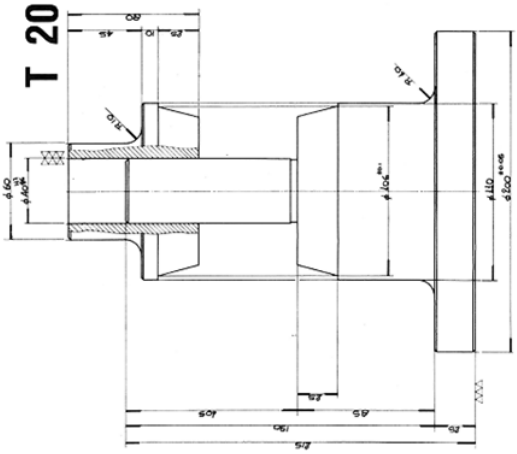
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T 20

1.6.60.3.8.1285

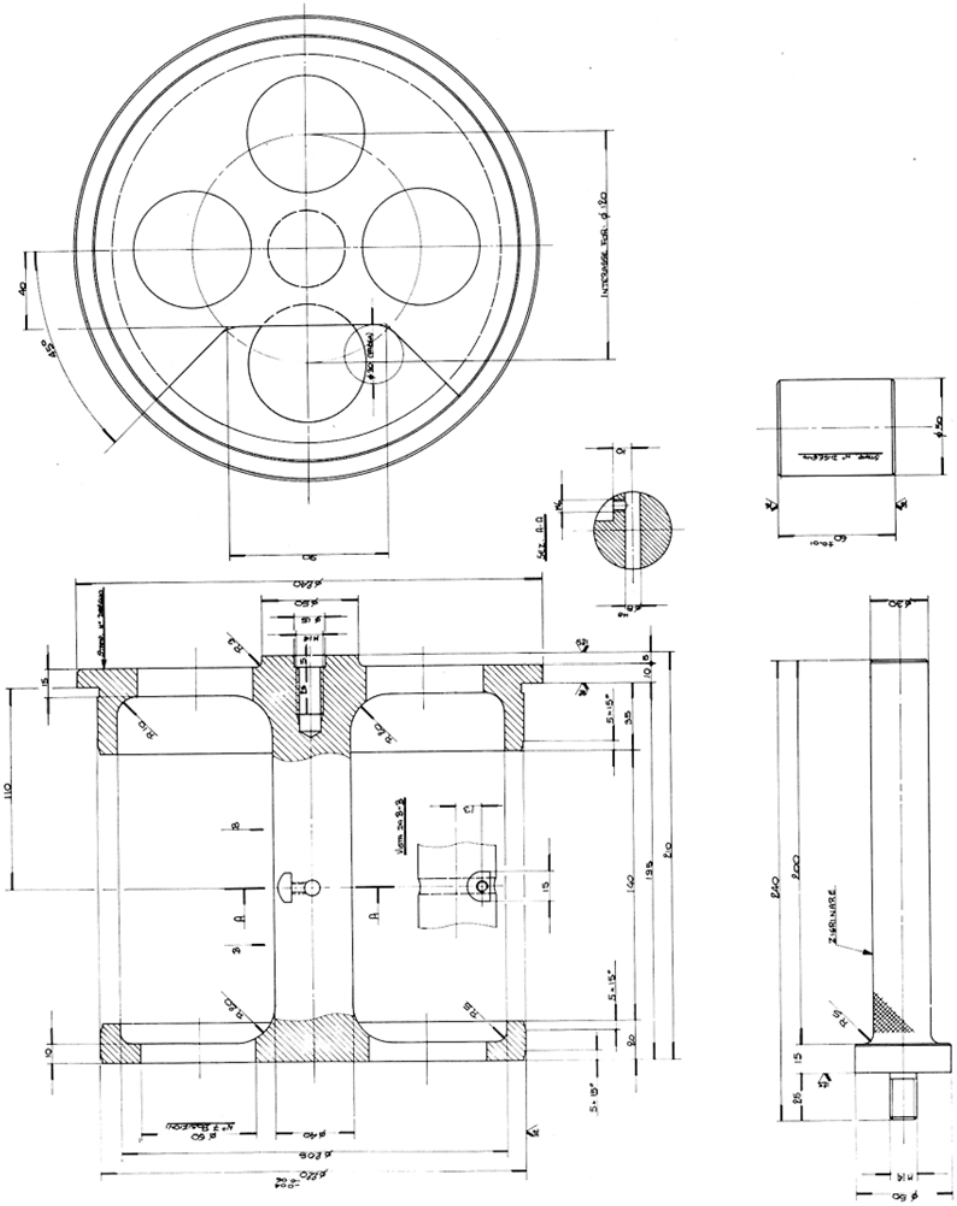


PER SOLUZIONE "C" - PAGINA 34
FÜR LÖSUNG "C" - SEITE 34
POUR SOLUTION "C" - PAGE 34
SEE PAGE 34 FOR SOLU "C"

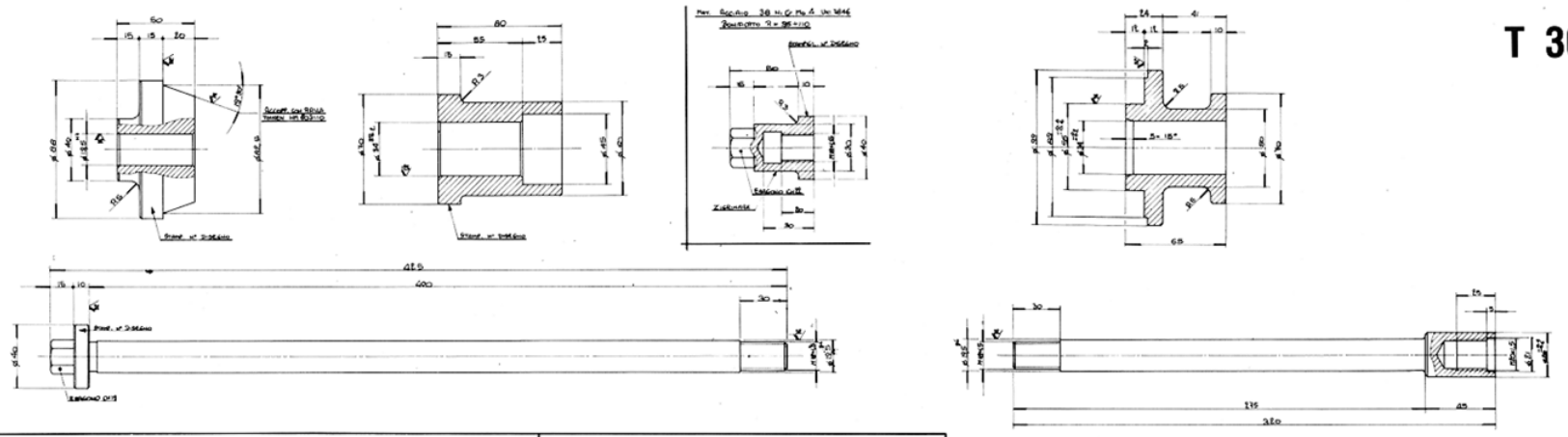
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T 27

1.6.60.3.8.1564 B

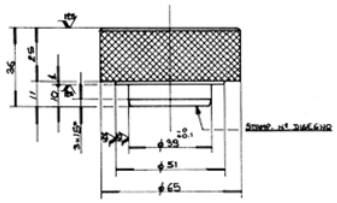


T 30



1.6.60.3.8.1565

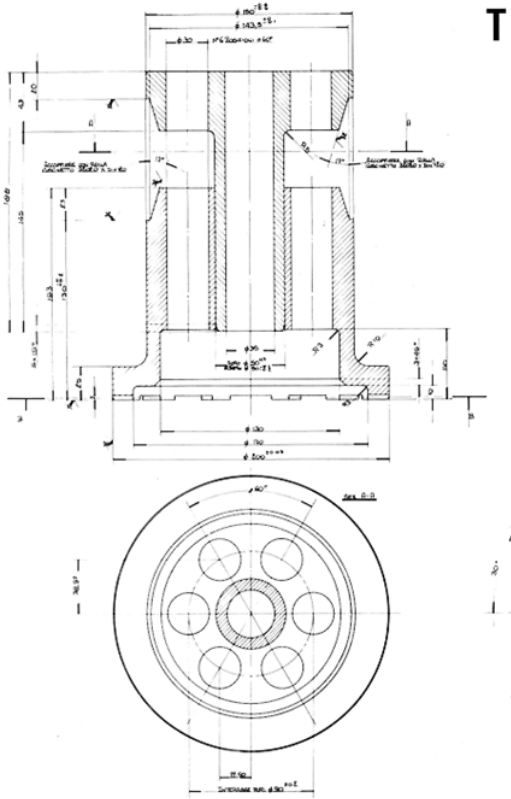
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DRAWING - PAG./*SEITE* 18

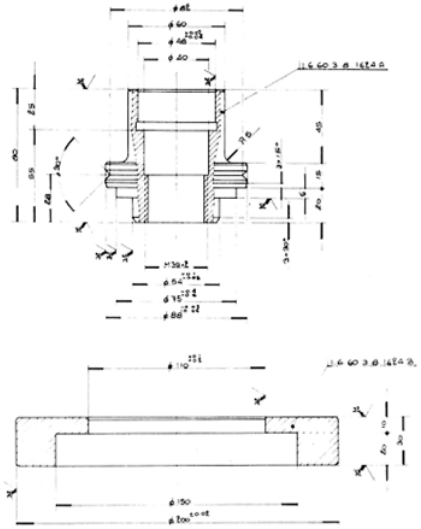
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T 32



1.6.60.3.8.1612

T 33



DRAWING
PER SOLUZIONE "A-B" - PAGINA 34
FÜR LÖSUNG "A-B" - SEITE 34
POUR SOLUTION "A-B" - PAGE 34
SEE PAGE 34 FOR SOLUTION "A-B"

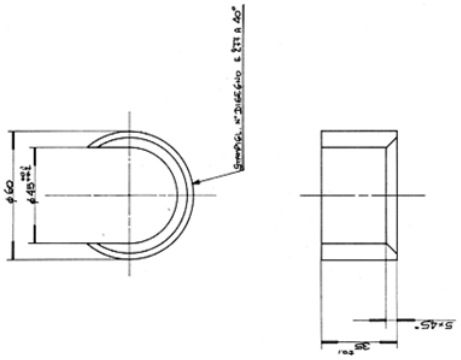
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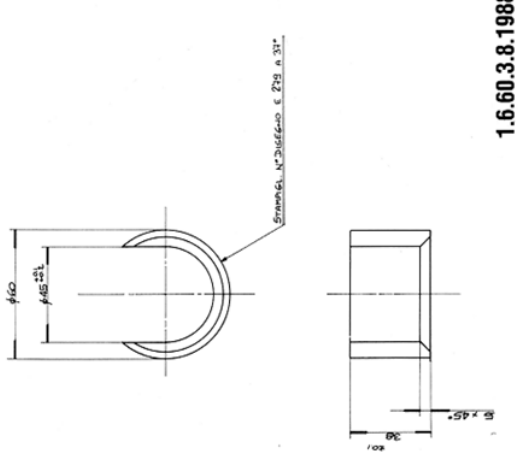
T 39

1.6.60.3.8.1985



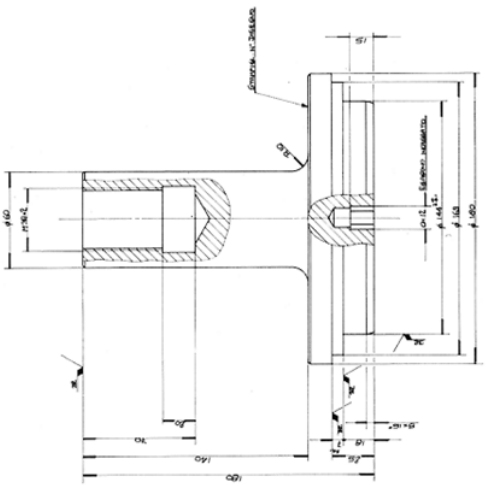
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1.6.60.3.8.1988



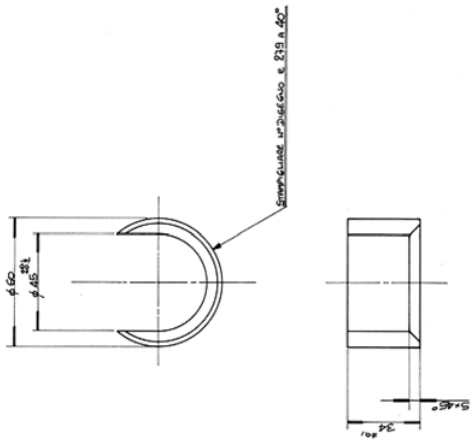
T 38

1.6.60.3.8.1982



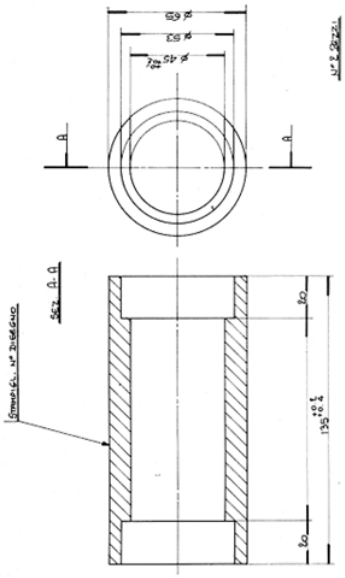
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1.6.60.3.8.1987



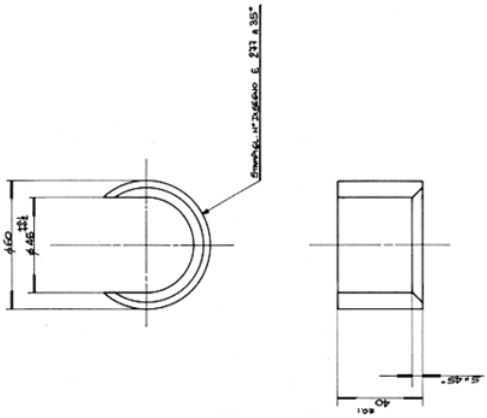
T 37

1.6.60.3.8.1875



T 40

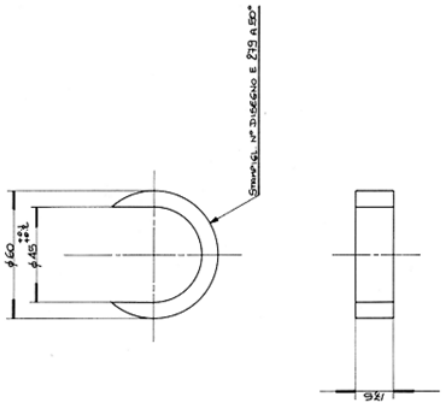
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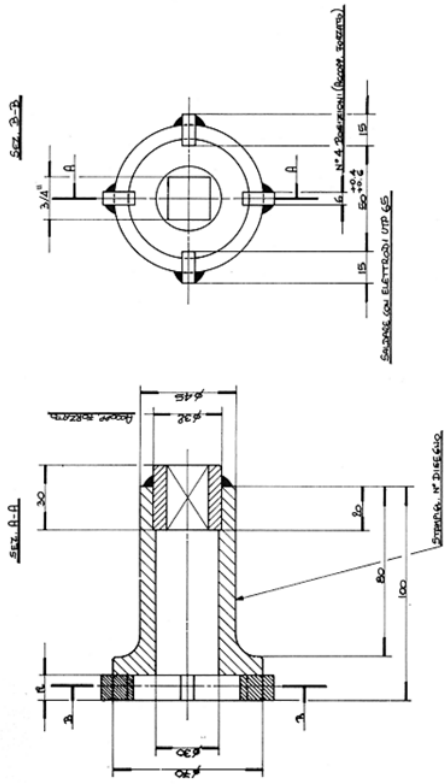
T 44

1.6.60.3.8.1998



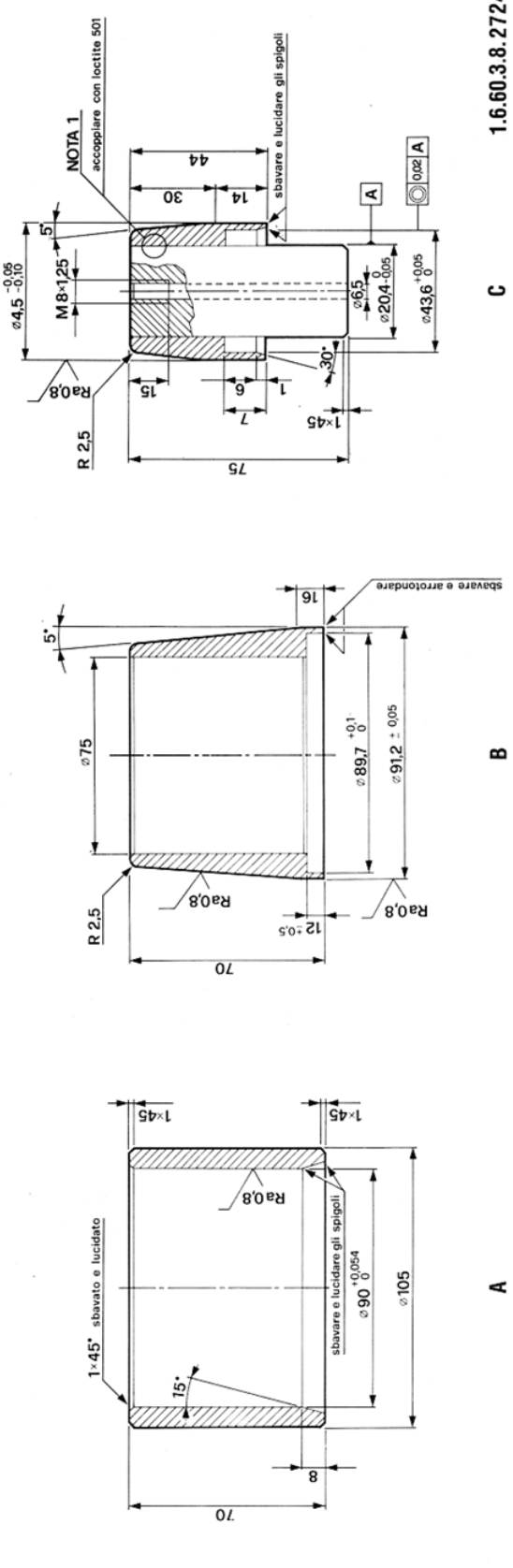
T 43

1.6.60.3.8.1989



T 45

1.6.60.3.8.2724



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NOTE

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SPICER OFF-HIGHWAY AXLE DIVISION

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N. IDENT. IVA IT 01638270221
COD. FISC. 09338680151
R.E.A. N. 165755 - TN 019505
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8.1 Electrics

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Standardverkabelung: standard wireing:	dicke Linien thick lines	Platinenverdrahtung: connection on printed circuit board:	dünne Linien thin lines

Inhaltsverzeichnis: BW 145–3/C820..C825C
table of contents: BW 145–3/C820..C825C

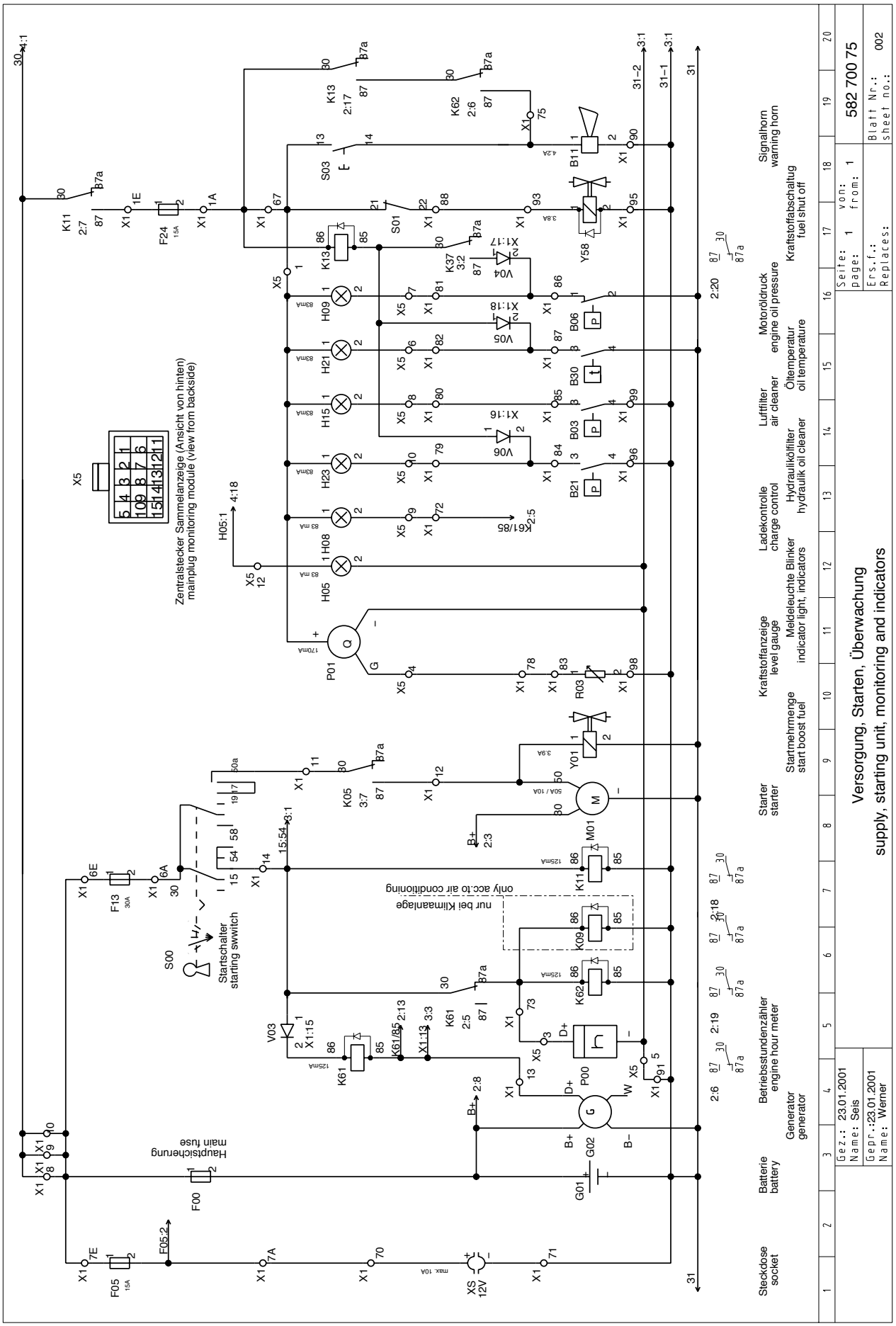
Blatt Nr.: sheet no.:	Zeichnungsnummer drawing – no.	Funktionsgruppe	function unit
001	582 700 75	Stromlaufplan	Circuit Diagram
002	582 700 75	Versorgung, Starten, Überwachung	supply, starting unit, monitoring and indicators
003	582 700 75	Bremse, Vibr., Rückfahrwarneinr., Fahrstufen	brake, vibration, back up alarm, speed ranges
004	582 700 75	Option Zusatzbeleuchtung, StvZO	option head lights, StvZO illumination
005	582 700 75	ZA Rundumkennleuchte, Kabine	Options rotary beacon, cabin
101	582 700 75	Bauteilliste	component listing
201	582 700 75	Schaltkastenübersicht BW 145–3	overview e–box BW 145–3

1	2	3	4	5	6	7	8	9	10

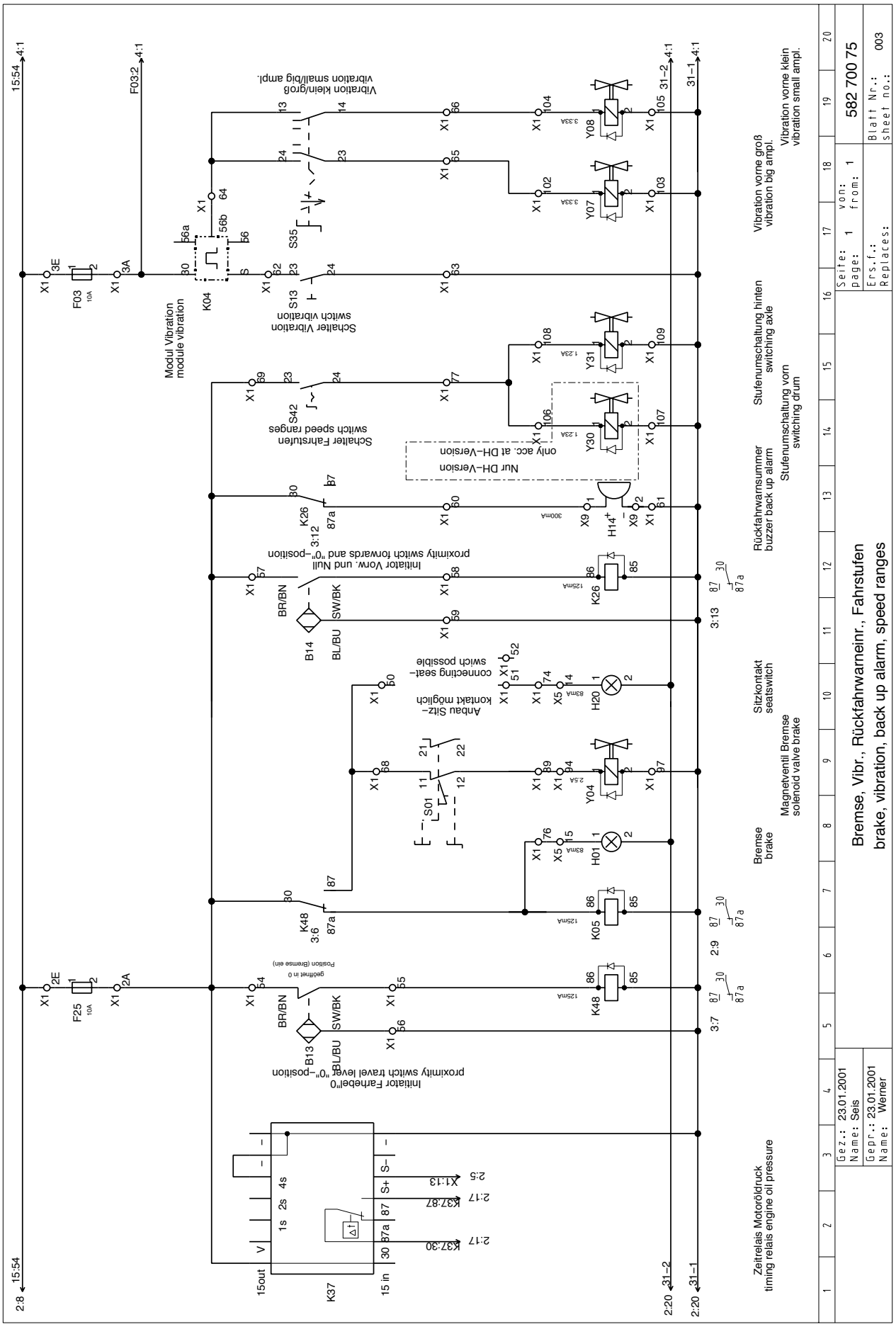
	Gez.: 23.01.2001 Name: Seis	Stromlaufplan circuit diagram	Seite: page: 001 von: from: 001	582 700 75
	Gepr.: 23.01.2001 Name: Werner		Ers.f.: Replaces:	Blatt Nr.: sheet no.: 001

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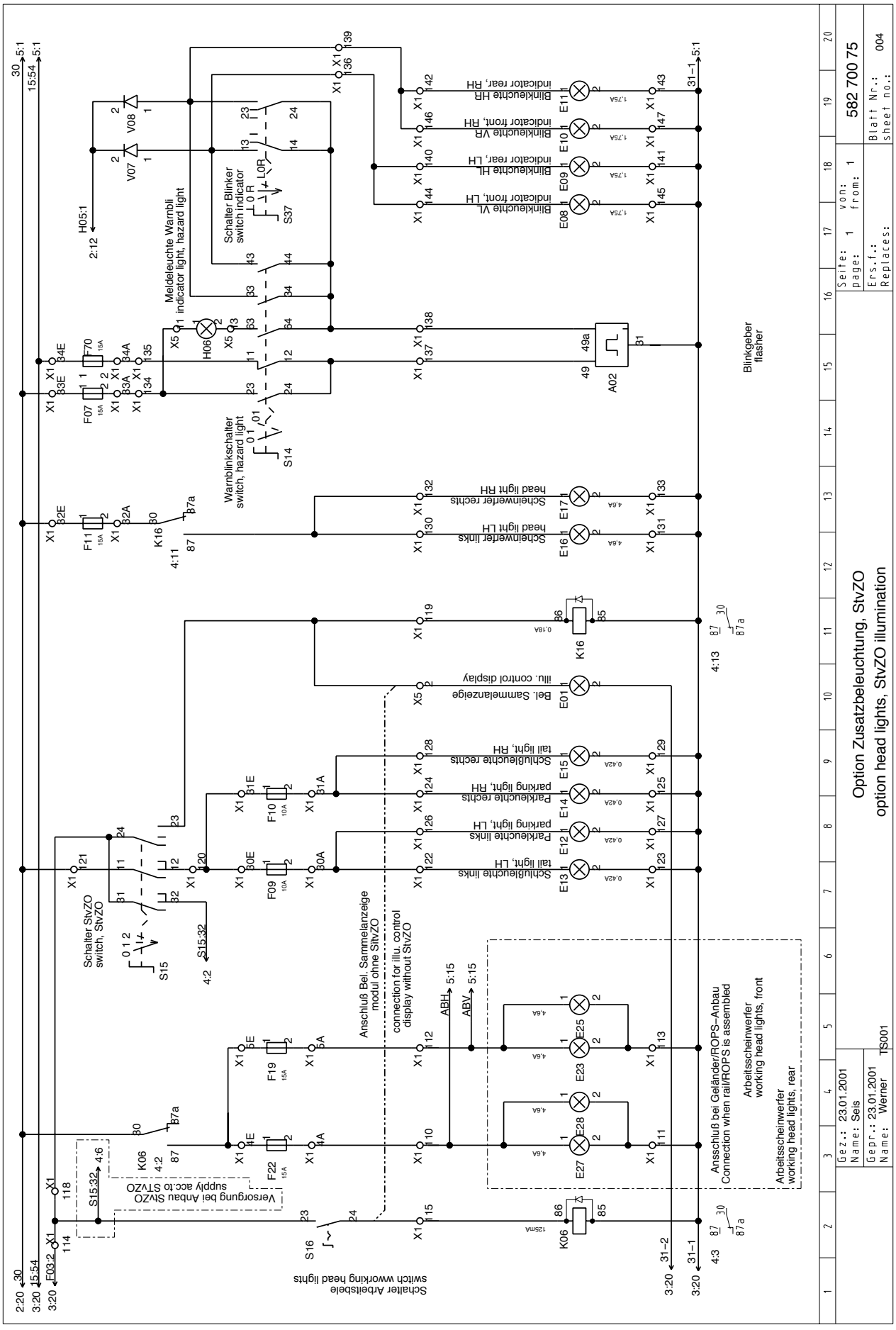
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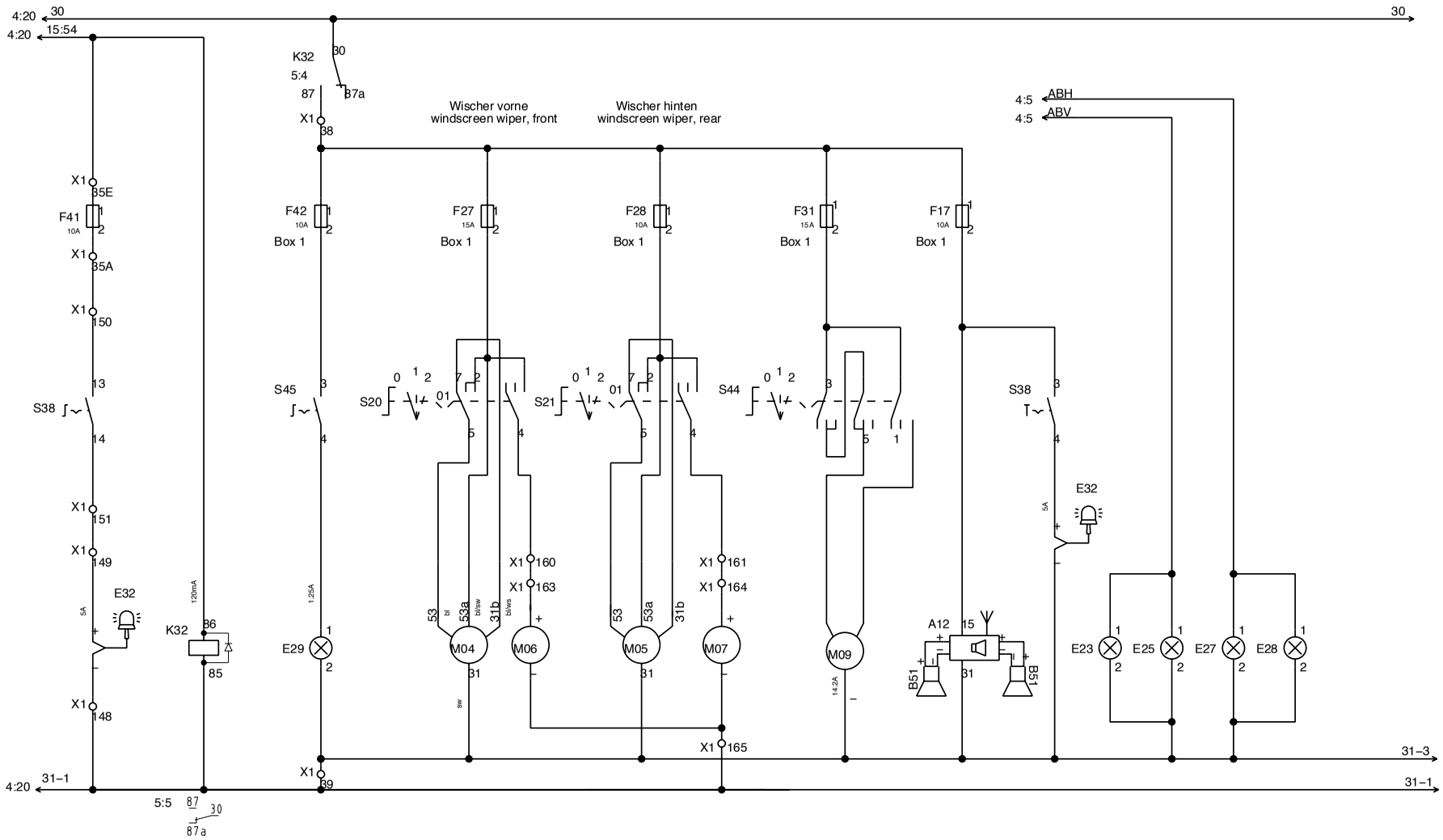
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

	Gez.: 23.01.2001 Name: Seis	ZA Rundumkennleuchte, Kabine Options rotary beacon, cabin		Seite: 1 von: 1 page: from:	582 700 75	
	Gepr.: 23.01.2001 Name: Werner TS001			Ers.f.: Replaces:	Blatt Nr.: 005 sheet no.:	

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Gez.: 23.01.2001
Name: Seis
Gepr.: 23.01.2001
Name: Werner

Bauteilliste
component listing

Seite: page: 1 von: from: 3
Ers.f.: Replaces:

Blatt Nr.: sheet no.: 582 700 75 101

Name	Bl.	Pf.	Benennung	title	TYP
A02	004	15	Blinkrelais	Indicator relay	
A12	005	14	Radio	Radio	
B03	002	14	Unterdruckschalter Luftfilter	Vacuum switch, air cleaner	
B06	002	16	Druckschalter Motoroel	Pressure switch, engine oil	
B11	002	18	Signalhorn	Warning horn	MAX.5A
B13	003	6	Naeherungsinitiator Fahrhebel links	Proximity switch, travel lever, lh.	
B14	003	12	Naeherungsinitiator Fahrhebel rechts	Proximity switch, travel lever, rh.	
B21	002	14	Differenzdruckschalter Hydr.–Oelfilter	Pressure diff. switch, hydr. oil filter	
B30	002	15	Temperaturschalter Motoroel	Temperature switch, engine oil	
B51	005	13	Lautsprecher Radio	Speaker radio	
B51	005	14	Lautsprecher Radio	Speaker radio	
E01	004	10	Beleuchtung Tankanzeige	Illumination, level gauge	
E08	004	17	Blinkleuchte vorne links	Indicator, front, lh.	MAX. 1,75A
E09	004	18	Blinkleuchte hinten links	Indicator, rear, lh.	MAX. 1,75A
E10	004	19	Blinkleuchte vorne rechts	Indicator, front, rh.	MAX. 1,75A
E11	004	19	Blinkleuchte hinten rechts	Indicator, rear, rh.	MAX. 1,75A
E12	004	8	Parkleuchte links	Parking light, lh.	MAX. 0,42A
E13	004	7	Schlussleuchte links	Tail light, lh.	MAX. 0,42A
E14	004	9	Parkleuchte rechts	Parking light, rh.	MAX. 0,42A
E15	004	9	Schlussleuchte rechts	Tail light, rh.	MAX. 0,42A
E16	004	12	Scheinwerfer links	Head light, lh.	MAX. 4,6A
E17	004	13	Scheinwerfer rechts	Head light, rh.	MAX. 4,6A
E23	004	5	Arbeitsscheinwerfer vorne links	Working head light, front, lh.	MAX 4,6A
E23	005	16	Arbeitsscheinwerfer vorne links	Working head light, front, lh.	MAX 4,6A
E25	004	5	Arbeitsscheinwerfer vorne rechts	Working head light, front, rh.	MAX 4,6A
E25	005	16	Arbeitsscheinwerfer vorne rechts	Working head light, front, rh.	MAX 4,6A
E27	004	3	Arbeitsscheinwerfer hinten links	Working head light, rear, lh.	MAX 4,6A
E27	005	17	Arbeitsscheinwerfer hinten links	Working head light, rear, lh.	MAX 4,6A
E28	004	4	Arbeitsscheinwerfer hinten rechts	Working head light, rear, rh.	MAX 4,6A
E28	005	18	Arbeitsscheinwerfer hinten rechts	Working head light, rear, rh.	MAX 4,6A
E29	005	5	Innenleuchte Kabine	Inside light, cabin	
E32	005	2	Kennleuchte	Warning light	MAX. 5A
E32	005	15	Kennleuchte	Warning light	MAX. 5A
F00	002	3	Hauptsicherung Batterie	Fuse, main, battery	
F03	003	16	Sicherung Vibration	Fuse, vibration	10A
F05	002	1	Sicherung Steckdose	Fuse, socket	15A
F07	004	15	Sicherung Warnblinker	Fuse, hazard light	15A
F09	004	7	Sicherung Park– u. Schlussl. links	Fuse, parking and tail light, lh.	10A
F10	004	9	Sicherung Park– u. Schlussl. rechts	Fuse, parking and tail light, rh.	10A
F11	004	13	Sicherung Scheinwerfer links	Fuse, head light, lh.	15A
F13	002	7	Sicherung Startschalter	Fuse, starter switch	30A
F17	005	14	Sicherung Radio	Fuse, radio	10A
F19	004	5	Sicherung Arbeitsscheinw. vorne li.	Fuse, working head light, front, lh.	15A
F22	004	3	Sicherung Arbeitsscheinwerfer hinten	Fuse, working head lights, rear	15A
F24	002	17	Sicherung Ueberwachungsmodul	Fuse, monitoring module	15A
F25	003	6	Sicherung Magnetv. Fahren u. Bremse	Fuse, sol. valve, travel and brake	10A
F27	005	7	Sicherung Wischer u. Wascher vorne	Fuse, windscr. wiper and washer, fr.	15A
F28	005	10	Sicherung Wischer u. Wascher hinten	Fuse, windscr. wiper and washer, re.	10A
F31	005	12	Sicherung Kabinenluefter	Fuse, cabin ventilator	15A
F41	005	2	Sicherung Rundumkennleuchte	Fuse, rotary beacon	10A
F42	005	5	Sicherung Kabineninnenleuchte	Fuse, inside light cab	10A
F70	004	15	Sicherung Blinker	Fuse, indicators	15A
G01	002	3	Batterie	Battery	
G02	002	3	Generator	Generator	
H01	003	8	Meldeleuchte Bremse	Indicator light, brake	
H05	002	12	Meldeleuchte Blinker	Indicator light, indicators	
H06	004	16	Meldeleuchte Warnblinker	Indicator light, hazard light	
H08	002	13	Meldeleuchte Ladekontrolle	Indicator light, charge control	
H09	002	16	Meldeleuchte Oeldruck Motor	Indicator light, engine oil pressure	
H14	003	13	Warnsummer Rueckwaertsfahrt	Back–up alarm buzzer	MAX. 0,12A
H15	002	14	Meldeleuchte Motorluftfilter	Indicator light, engine air filter	
H20	003	10	Meldeleuchte Sitzkontaktschalter	Indicator light, drivers seat contact	
H21	002	15	Meldeleuchte Oeltemperatur	Indicator light, oil temperature	
H23	002	14	Meldeleuchte Hydraulikoelfilter	Indicator light, hydr.oil filter	
K04	003	16	Schrittrelais Vibration	Toggle relay, vibration	
K05	003	7	Relais Startstrom	Relay, starting current	BOSCHW
K06	004	2	Relais Scheinwerfer hinten	Relay, head lights, rear	BOSCHW
K09	002	6	Relais Klimageraet	Relay, air conditioning	BOSCHW
K11	002	7	Relais Klemme 30 auf 15	Relay, terminal 30 to 15	BOSCHW
K13	002	17	Relais Signalhorn	Relay, warning horn	BOSCHW
K16	004	11	Relais Scheinwerfer vorne	Relay, head lights, front	BOSCHW
K26	003	12	Relais Rueckfahrwarneinrichtung	Relay, back up alarm	BOSCHW
K32	005	4	Relais Kabine	Relay, cabin	BOSCHW
K37	003	1	Zeitrelais	Timing relay	BOSCHW
K48	003	6	Relais Fahrhebel 0–Stellung	Relay, travel lever 0–position	BOSCHW
K61	002	5	Relais Ladekontrolle	Relay, charge control	BOSCHW
K62	002	6	Relais D+	Relay, D+	BOSCHW
M01	002	8	Starter	Starter	2,3 KW
M04	005	7	Scheibenwischermotor vorne	Windscreen wiper motor, front	7,9A
M05	005	9	Scheibenwischermotor hinten	Windscreen wiper motor, rear	7,9A
M06	005	8	Scheibenwaschermotor vorne	Windscreen washer motor, front	2,5A
M07	005	10	Scheibenwaschermotor hinten	Windscreen washer motor, rear	2,5A
M09	005	12	Kabinenluefter	Cabin ventilator	
P00	002	5	Betriebsstundenzaehler	Operating hour meter	
P01	002	11	Tankanzeige	Level gauge	
R03	002	10	Geber Tankanzeige	Sender, level gauge	
S00	002	7	Startschalter	Starter switch	
S01	003	9	Schalter NOT AUS	Switch, emergency off	
S03	002	18	Taster Signalhorn	Push button, warning horn	

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Name	Bl.	Pf.	Benennung	title	TYP
S13	003	16	Vibrationsschalter Fahrhebel rechts	Switch, vibration, travel lever, rh.	
S14	004	15	Warnblinkschalter	Switch, hazard light	
S15	004	7	Beleuchtungsschalter StVZO	Switch, lighting StVZO	
S16	004	2	Schalter Arbeitsbeleuchtung vorne	Switch, working head lights, front	
S20	005	7	Schalter Scheibenwischer vorne	Switch, windscreen wiper, front	
S21	005	9	Schalter Scheibenwischer hinten	Switch, windscreen wiper, rear	
S35	003	18	Vibrationsschalter klein/gross	Switch, vibration low/high	
S37	004	18	Schalter Blinker	Switch, indicator	
S38	005	2	Schalter Kennleuchte	Switch, warning light	MAX. 5A
S38	005	15	Schalter Kennleuchte	Switch, warning light	
S42	003	15	Stufenumschalter schnell–langsam	Speed range selector, fast–slow	
S44	005	12	Schalter Kabinenluefter	Switch, cabin ventilator	
S45	005	5	Kabineninnenleuchte	Switch, cabin inside light	
V03	002	5	Diode	Diode	4UF004
V04	002	17	Diode	Diode	4UF004
V05	002	16	Diode	Diode	4UF004
V06	002	14	Diode	Diode	4UF004
V07	004	18	Diode	Diode	FE5B
V08	004	19	Diode	Diode	FE5B
X1:8	002	3	WAGO,E–Kasten	WAGO,E–BOX	
X1:9	002	3	WAGO,E–Kasten	WAGO,E–BOX	
X1:10	002	3	WAGO,E–Kasten	WAGO,E–BOX	
X1:11	002	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:12	002	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:13	002	4	WAGO,E–Kasten	WAGO,E–BOX	
X1:14	002	7	WAGO,E–Kasten	WAGO,E–BOX	
X1:1A	002	17	WAGO,E–Kasten	WAGO,E–BOX	
X1:1E	002	17	WAGO,E–Kasten	WAGO,E–BOX	
X1:2A	003	6	WAGO,E–Kasten	WAGO,E–BOX	
X1:2E	003	6	WAGO,E–Kasten	WAGO,E–BOX	
X1:38	005	5	WAGO,E–Kasten	WAGO,E–BOX	
X1:39	005	5	WAGO,E–Kasten	WAGO,E–BOX	
X1:3A	003	16	WAGO,E–Kasten	WAGO,E–BOX	
X1:3E	003	16	WAGO,E–Kasten	WAGO,E–BOX	
X1:4A	004	3	WAGO,E–Kasten	WAGO,E–BOX	
X1:4E	004	3	WAGO,E–Kasten	WAGO,E–BOX	
X1:50	003	10	WAGO,E–Kasten	WAGO,E–BOX	
X1:51	003	10	WAGO,E–Kasten	WAGO,E–BOX	
X1:52	003	11	WAGO,E–Kasten	WAGO,E–BOX	
X1:54	003	6	WAGO,E–Kasten	WAGO,E–BOX	
X1:55	003	6	WAGO,E–Kasten	WAGO,E–BOX	
X1:56	003	5	WAGO,E–Kasten	WAGO,E–BOX	
X1:57	003	12	WAGO,E–Kasten	WAGO,E–BOX	
X1:58	003	12	WAGO,E–Kasten	WAGO,E–BOX	
X1:59	003	11	WAGO,E–Kasten	WAGO,E–BOX	
X1:5A	004	5	WAGO,E–Kasten	WAGO,E–BOX	
X1:5E	004	5	WAGO,E–Kasten	WAGO,E–BOX	
X1:60	003	13	WAGO,E–Kasten	WAGO,E–BOX	
X1:61	003	13	WAGO,E–Kasten	WAGO,E–BOX	
X1:62	003	16	WAGO,E–Kasten	WAGO,E–BOX	
X1:63	003	16	WAGO,E–Kasten	WAGO,E–BOX	
X1:64	003	17	WAGO,E–Kasten	WAGO,E–BOX	
X1:65	003	18	WAGO,E–Kasten	WAGO,E–BOX	
X1:66	003	19	WAGO,E–Kasten	WAGO,E–BOX	
X1:67	002	17	WAGO,E–Kasten	WAGO,E–BOX	
X1:68	003	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:69	003	15	WAGO,E–Kasten	WAGO,E–BOX	
X1:6A	002	7	WAGO,E–Kasten	WAGO,E–BOX	
X1:6E	002	7	WAGO,E–Kasten	WAGO,E–BOX	
X1:70	002	1	WAGO,E–Kasten	WAGO,E–BOX	
X1:71	002	1	WAGO,E–Kasten	WAGO,E–BOX	
X1:72	002	13	WAGO,E–Kasten	WAGO,E–BOX	
X1:73	002	5	WAGO,E–Kasten	WAGO,E–BOX	
X1:74	003	10	WAGO,E–Kasten	WAGO,E–BOX	
X1:75	002	19	WAGO,E–Kasten	WAGO,E–BOX	
X1:76	003	8	WAGO,E–Kasten	WAGO,E–BOX	
X1:77	003	15	WAGO,E–Kasten	WAGO,E–BOX	
X1:78	002	10	WAGO,E–Kasten	WAGO,E–BOX	
X1:79	002	14	WAGO,E–Kasten	WAGO,E–BOX	
X1:7A	002	1	WAGO,E–Kasten	WAGO,E–BOX	
X1:7E	002	1	WAGO,E–Kasten	WAGO,E–BOX	
X1:80	002	14	WAGO,E–Kasten	WAGO,E–BOX	
X1:81	002	16	WAGO,E–Kasten	WAGO,E–BOX	
X1:82	002	15	WAGO,E–Kasten	WAGO,E–BOX	
X1:83	002	10	WAGO,E–Kasten	WAGO,E–BOX	
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X1:91	002	4	WAGO,E–Kasten	WAGO,E–BOX	
X1:93	002	17	WAGO,E–Kasten	WAGO,E–BOX	
X1:94	003	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:95	002	17	WAGO,E–Kasten	WAGO,E–BOX	
X1:96	002	14	WAGO,E–Kasten	WAGO,E–BOX	
X1:97	003	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:98	002	10	WAGO,E–Kasten	WAGO,E–BOX	
X1:99	002	14	WAGO,E–Kasten	WAGO,E–BOX	
X1:102	003	18	WAGO,E–Kasten	WAGO,E–BOX	
X1:103	003	18	WAGO,E–Kasten	WAGO,E–BOX	
X1:104	003	19	WAGO,E–Kasten	WAGO,E–BOX	
X1:105	003	19	WAGO,E–Kasten	WAGO,E–BOX	
X1:106	003	14	WAGO,E–Kasten	WAGO,E–BOX	
X1:107	003	14	WAGO,E–Kasten	WAGO,E–BOX	
X1:108	003	15	WAGO,E–Kasten	WAGO,E–BOX	

Gez.: 23.01.2001
Name: Seis
Gepr.: 23.01.2001
Name: Werner

Bauteilliste
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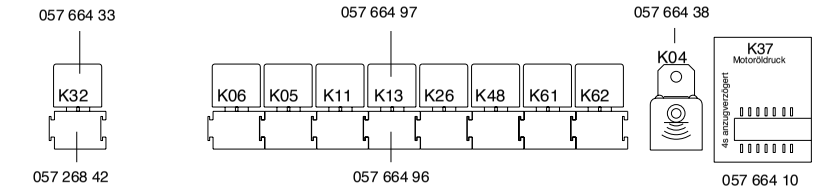
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X1:110	004	3	WAGO,E–Kasten	WAGO,E–BOX	
X1:111	004	3	WAGO,E–Kasten	WAGO,E–BOX	
X1:112	004	5	WAGO,E–Kasten	WAGO,E–BOX	
X1:113	004	5	WAGO,E–Kasten	WAGO,E–BOX	
X1:114	004	2	WAGO,E–Kasten	WAGO,E–BOX	
X1:115	004	2	WAGO,E–Kasten	WAGO,E–BOX	
X1:118	004	2	WAGO,E–Kasten	WAGO,E–BOX	
X1:119	004	11	WAGO,E–Kasten	WAGO,E–BOX	
X1:120	004	7	WAGO,E–Kasten	WAGO,E–BOX	
X1:121	004	7	WAGO,E–Kasten	WAGO,E–BOX	
X1:122	004	7	WAGO,E–Kasten	WAGO,E–BOX	
X1:123	004	7	WAGO,E–Kasten	WAGO,E–BOX	
X1:124	004	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:125	004	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:126	004	8	WAGO,E–Kasten	WAGO,E–BOX	
X1:127	004	8	WAGO,E–Kasten	WAGO,E–BOX	
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X1:129	004	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:130	004	12	WAGO,E–Kasten	WAGO,E–BOX	
X1:131	004	12	WAGO,E–Kasten	WAGO,E–BOX	
X1:132	004	13	WAGO,E–Kasten	WAGO,E–BOX	
X1:133	004	13	WAGO,E–Kasten	WAGO,E–BOX	
X1:134	004	15	WAGO,E–Kasten	WAGO,E–BOX	
X1:135	004	15	WAGO,E–Kasten	WAGO,E–BOX	
X1:136	004	19	WAGO,E–Kasten	WAGO,E–BOX	
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X1:140	004	18	WAGO,E–Kasten	WAGO,E–BOX	
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X1:144	004	17	WAGO,E–Kasten	WAGO,E–BOX	
X1:145	004	17	WAGO,E–Kasten	WAGO,E–BOX	
X1:146	004	19	WAGO,E–Kasten	WAGO,E–BOX	
X1:147	004	19	WAGO,E–Kasten	WAGO,E–BOX	
X1:148	005	2	WAGO,E–Kasten	WAGO,E–BOX	
X1:149	005	2	WAGO,E–Kasten	WAGO,E–BOX	
X1:150	005	2	WAGO,E–Kasten	WAGO,E–BOX	
X1:151	005	2	WAGO,E–Kasten	WAGO,E–BOX	
X1:160	005	8	WAGO,E–Kasten	WAGO,E–BOX	
X1:161	005	10	WAGO,E–Kasten	WAGO,E–BOX	
X1:163	005	8	WAGO,E–Kasten	WAGO,E–BOX	
X1:164	005	10	WAGO,E–Kasten	WAGO,E–BOX	
X1:165	005	10	WAGO,E–Kasten	WAGO,E–BOX	
X1:30A	004	7	WAGO,E–Kasten	WAGO,E–BOX	
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X1:31A	004	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:31E	004	9	WAGO,E–Kasten	WAGO,E–BOX	
X1:32A	004	13	WAGO,E–Kasten	WAGO,E–BOX	
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X1:33A	004	15	WAGO,E–Kasten	WAGO,E–BOX	
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X1:35A	005	2	WAGO,E–Kasten	WAGO,E–BOX	
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X5:14	003	10	Amaturentafel	Dashboard	
X5:15	003	8	Amaturentafel	Dashboard	
X9:1	003	13	AMP Warnsummer	AMP, buzzer	
X9:2	003	13	AMP Warnsummer	AMP, buzzer	
XS	002	1	Steckdose	Socket	
Y01	002	9	Magnetventil Startmehrmenge	Solenoid valve, start boost fuel	MAX. 3.9A
Y04	003	9	Magnetventil Bremse	Solenoid valve, brake	MAX. 1,8A
Y07	003	18	Magnetventil Vibration vorne gross	Solenoid valve, vibration, front, high	MAX. 2,5A
Y08	003	19	Magnetventil Vibration vorne klein	Solenoid valve, vibration, front, low	MAX. 2,5A
Y30	003	14	Magnetventil Stufenumschaltung vorn	Solenoid valve, speed range sel., front	MAX. 1,67A
Y31	003	15	Magnetventil Stufenumschaltung hinten	Solenoid valve, speed range sel., rear	MAX. 1,23A
Y58	002	17	Magnetventil Kraftstoffabschaltung	Solenoid valve, fuel switch off	MAX. 3.8A

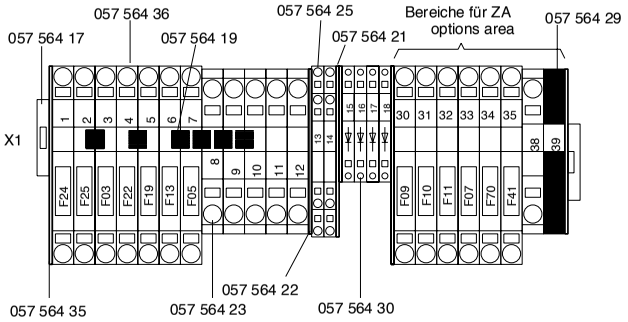
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Name: Seis
Gepr.: 23.01.2001
Name: Werner

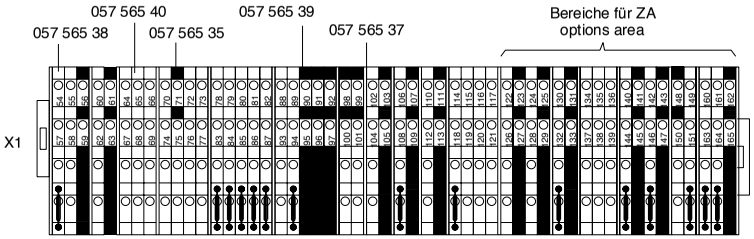
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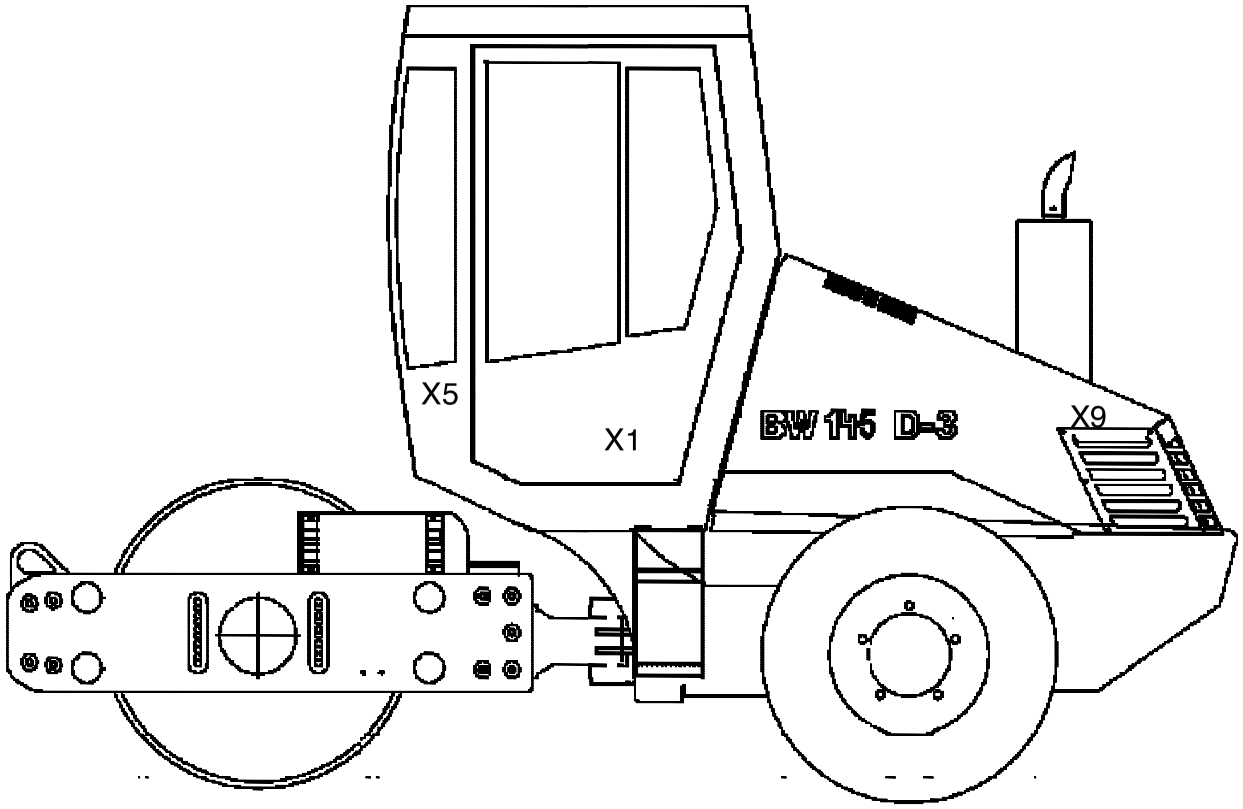


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		Gepr.: 23.01.2001 Name: Werner		TS001															
				Schaltkastenübersicht BW 145–3 overview e–box BW 145–3												Seite: 1 von: 1 page: 1 from: 1		582 700 75	
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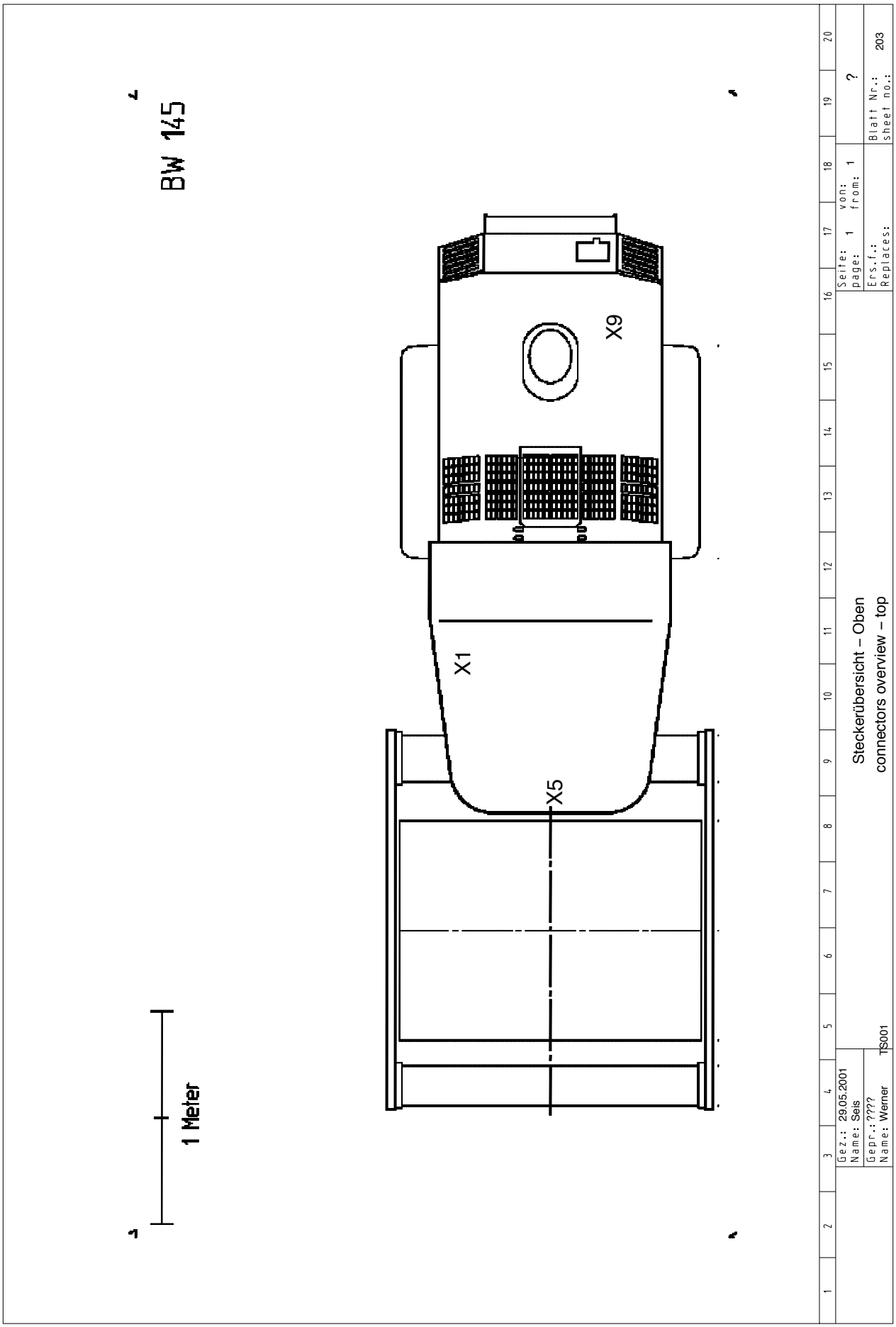


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	Gepr.: ???? Name: Werner TS001		Ers.f.: Replaces:	Blatt Nr.: sheet no.: 202

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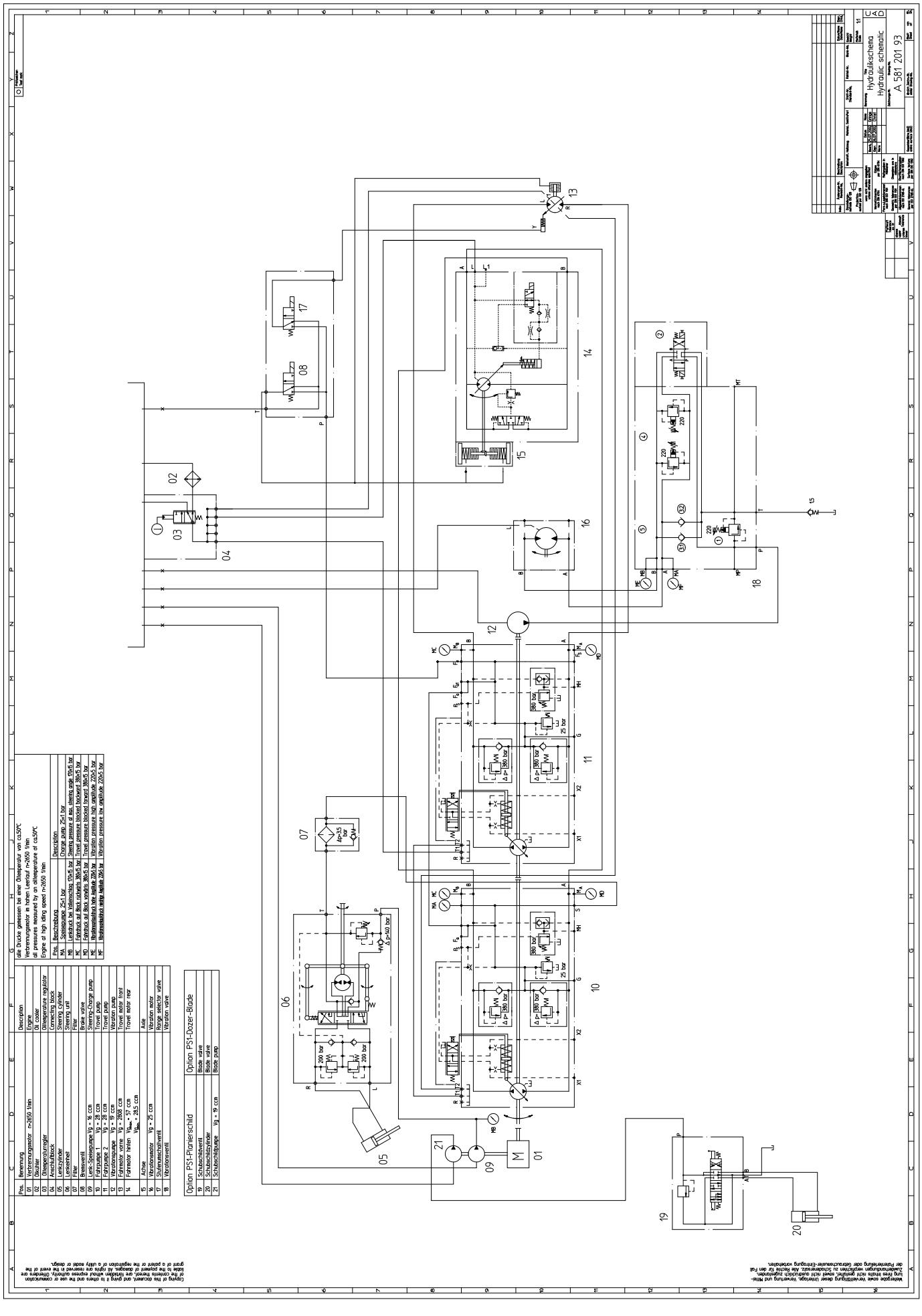
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8.1 Electrics

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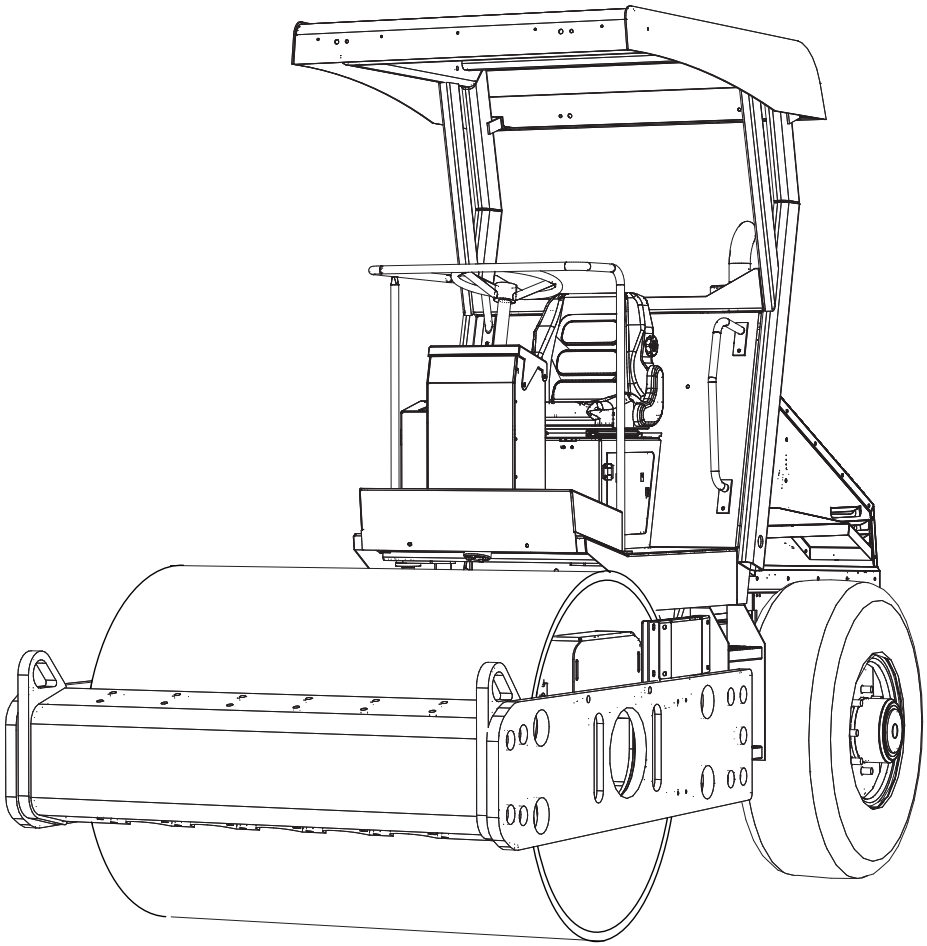


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BOMAG

Service Training



Single Drum Rollers
BW 145 D/DH/PDH-3

02/2010

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Foreword

Reliable construction equipment is of greatest advantage for all parties involved:

- for the customer/user it is a basis for an exact calculation of utilization periods and the completion of projects as scheduled.
- in the rental business it means that the equipment can be reliably used and planned without having to stock a large number of stand-by machines.
- for the manufacturer it means that customers are satisfied, provides him with a good image and gives him a feeling of confidence.

It is BOMAG's philosophy to design and produce the machines with highest possible reliability. This aspect of simple and easy maintenance was one of the key issues when developing and designing the machine:

- the location of components in the machine eases maintenance work,
- the high quality standard of BOMAG is the basis for the considerable extension of the service and maintenance intervals.
- the After Sales Service of BOMAG, including excellent operating and maintenance instruction manuals, high quality training courses and on-site machine demonstrations helps the customer to maintain their machines in good condition over a long period of time.

Permanent training of BOMAG's own service personnel as well as the service personnel of BOMAG Profit Centres and dealers is therefore a general prerequisite for BOMAG's excellent world-wide service.

This program of permanent training is only possible with appropriate and up-to-date training material for trainers as well as persons attending the training courses.

This training manual has not only been written as a support for the professional work of the trainer, but also for the trainees attending these training courses.

The different levels of product training demand, that the training performed by BOMAG, its Profit Centres or its dealers reflects the high quality of the training conducted at the Training Centre at BOMAG in Boppard. For this reason we invested a lot of time in the preparation of these materials .

The structure of this training manual enables us to change or up-date individual chapters in case of alterations to the machine.

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Documentation

For the BOMAG machines described in this training manual 90 the following documentation is additionally available:

Attention!

The currently valid part numbers for the documents can be found in the Coclist or the Customer Service Homepage in the BOMAG Intranet or Extranet (BOMAG Secured Area) in compliance with the serial number of the machine.

1. **Operating and maintenance instructions**
2. **Spare parts catalogue**
3. **Wiring diagram ***
4. **Hydraulic diagram ***
5. **Repair instructions**
6. **Service Information**

* The versions of these documents valid at the date of printing of this manual are part of this training manual.

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General

These light single drum rollers of generation 3 are self-propelled earth compactors which are particularly suitable for compaction tasks in earth construction.

The product group of light single drum rollers includes the rollers:

- BW 145 D / DH / PDH-3

These machines are available with two different drum types, whereby the selection of the right drum is determined by the material to be compacted.

The smooth drum is particularly suitable for compaction of mixed soils, sand, gravel and rock, whereas the padfoot drum is of special advantage when compacting cohesive soils. It is not recommended to use machines with padfoot drum on sand or gravel.

All models of product range BW 145-3 are powered by an air/oil cooled 4 cylinder Deutz engine of series BF4L 2011.

Engine driven pumps transfer the engine output power via hydrostatic circuits to drum and wheels. These hydrostatic drives ensure lowest possible power losses and high efficiency.

Front and rear frames of the machine are joined by an oscillating articulated joint. The amply dimensioned oscillation angle ensures that drum and wheels are always in ground contact.

The rear axle is fitted with multi disc brakes in the planetary drives. These brakes serve as parking brakes. When starting the engine the brakes are automatically relieved by the charge pressure building up in the system. When shutting the engine down the brakes are automatically closed by spring pressure. The brakes can also be applied when the engine is running. This only requires actuation of a special brake control valve. However, this should only be used if the machine is to be parked for a short time with the engine running. These parking brake should not be used as service brake, because the deceleration effect is extremely high and the braking process may damage the brake discs.

All machines of this family work with hydraulic travel systems for rear wheels and drum. The D-versions are fitted with a common pump for drum and drive axle.
The DH / PDH-versions are equipped with a so-called double pump drive, i.e. axle and drum are supplied by one pump each and by two separate hydrostatic circuits. Under very difficult traction conditions this configuration ensures that, if one drive component starts slipping, the other one will still be able to drive the machine.

The actual compacting tool, the drum, is equipped with an exciter shaft. This shaft runs in cylinder roller bearings. The exciter shaft is driven by a hydraulic motor via a Bowex coupling.

Vibration of the drum is caused by the centrifugal forces generated by the rotating eccentric weights mounted on the exciter shaft.

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The sense of rotation of the exciter shaft can be reversed. Changing the sense of rotation also changes the position of the change-over weights inside the eccentric weights on the exciter shaft. This also changes the centrifugal force and the amplitude. The rotary speed of the exciter shaft is identical to both directions of rotation. This means that the vibration frequency is independent from the amplitude.

The individual machine functions like travel system, vibration and steering are described in more detail in the corresponding chapters.

BOMAG Central Service - Technical data and adjustment values

Status: 2010-02-01

Product type:	**BW 145 D-3**
Type No.:	581 47
Serial numbers from:	901581471030>
Engine:	
Manufacturer:	Deutz
Type:	BF4L 2011
Combustion principle:	4-stroke-Diesel
Cooling:	Air/Oil
Number of cylinders:	4
Power acc. to ISO 9249:	53.5kW (72.7hp)
Power data at nominal speed of	2650 1/min
Low idle speed:	1010+/- 50 1/min
High idle speed:	2675+/- 75 1/min
Spec. fuel consumption:	238 g/kWh
Valve clearance, inlet:	0,3 mm
Valve clearance, outlet:	0,5 mm
Opening pressure, injection valves:	245+8 bar
Starter voltage:	12 V
Starter power:	2,2 kW
Travel pump:	
Manufacturer:	Hydromatik
Type:	A10VG 63 HW
System:	Axial piston-swash plate
Max. displacement:	63 cm^3/U
Max. flow ratio:	179,6 l/min
High pressure limitation:	405 +/-5 bar
Pressure override:	380 +/-5 bar
Charge pressure, high idle:	25 +/-2 bar
Travel motor, rear:	
Manufacturer:	Hydromatik
Type:	A10VM 63
System:	Axial piston-swash plate
Max. displacement (stage 1):	57 cm^3/U
Min. displacement (stage 2):	28,5 cm^3/U
Perm. leak oil quantity:	2 l/min
Rinsing oil quantity:	6,5 l/min
Drum drive:	
Manufacturer:	Poclain
Type:	MSE 08 1CX
System:	Radial piston
Displacement stage 1:	1260 cm^3/U
Perm. leak oil quantity:	1,5 l/min

Vibration pump:

Manufacturer:	Bosch
Type:	HY/ZFS11/19
System:	Gear pump
Max. displacement:	19 cm^3/U
Starting pressure:	220 +/-5 bar
Operating pressure, soil dependent:	45-65 bar

Vibration motor:

Manufacturer:	Sauer-Danfoss
Type:	MMF 025
System:	Axial piston-swash plate
Displacement:	25 cm^3/U
Frequency:	34 Hz
Amplitude:	1,7/0,85 mm

Steering and charge pump:

Manufacturer:	Bosch / Commercial
Type:	HY / 1PX
System:	Gear pump
Displacement:	16 cm^3/U
Max. steering pressure:	165 +/-10 bar

Steering valve:

Manufacturer:	Sauer-Danfoss
Type:	OSCP 315 LS
System:	Rotary valve

Rear axle:

Manufacturer:	Dana
Type:	172/442
Differential:	No-Spin
Degree of locking:	100 %
Reduction ratio:	27

Filling capacities:

Engine oil:	10,5 l (SAE 15W-40, API SJ/CF)
Hydraulic oil:	60 l (HVLP 46 VI 150)
Vibration bearing housing:	2,1 l (SAE 15W-40, API SJ/CF)
Rear axle:	5,5 l (SAE 90 EP, API GL 5)
Rear axle wheel hubs:	1 l (SAE 90 EP, API GL 5)

BOMAG Central Service - Technical data and adjustment values

Status: 2010-02-01

Product type:	**BW 145 DH-3**
Type No.:	581 48
Serial numbers from:	901581481003>
Engine:	
Manufacturer:	Deutz
Type:	BF4L 2011
Combustion principle:	4-stroke-Diesel
Cooling:	Air/Oil
Number of cylinders:	4
Power acc. to ISO 9249:	53.5kW (72.7hp)
Power data at nominal speed of	2650 1/min
Low idle speed:	1010+/- 50 1/min
High idle speed:	2675+/- 75 1/min
Spec. fuel consumption:	238 g/kWh
Valve clearance, inlet:	0,3 mm
Valve clearance, outlet:	0,5 mm
Opening pressure, injection valves:	245+8 bar
Starter voltage:	12 V
Starter power:	2,2 kW
Travel pump:	
Manufacturer:	Hydromatik
Type, front:	A10VG 28 HW
Type, rear:	A10VG 28 HW
System:	Axial piston-swash plate
Max. displacement:	45 cm^3/U
Max. flow ratio:	2x 79,8 l/min
High pressure limitation:	405 +/-5 bar
Pressure override:	380 +/-5 bar
Charge pressure, high idle:	25+/-5 bar
Travel motor, rear:	
Manufacturer:	Hydromatik
Type:	A10VM 63
System:	Axial piston-swash plate
Max. displacement (stage 1):	57 cm^3/U
Min. displacement (stage 2):	28,5 cm^3/U
Perm. leak oil quantity:	2 l/min
Rinsing oil quantity:	6,5 l/min
Drum drive:	
Manufacturer:	Poclain
Type:	MSE 18 2CX
System:	Radial piston
Displacement stage 1:	2800 cm^3/U
Displacement stage 2:	1400 cm^3/U
Perm. leak oil quantity:	2 l/min

Vibration pump:

Manufacturer:	Commercial
Type:	PE11A193BEEJ19-96
System:	Gear pump
Max. displacement:	19 cm^3/U
Starting pressure:	220 +/-5 bar
Operating pressure, soil dependent:	45-65 bar

Vibration motor:

Manufacturer:	Sauer-Danfoss
Type:	MMF 025
System:	Axial piston-swash plate
Displacement:	25 cm^3/U
Frequency:	34 Hz
Amplitude:	1,7/0,85 mm

Steering and working pump:

Manufacturer:	Bosch / Commercial
Type:	HY / 1PX
System:	Tandem-/Gear pump
Max. displacement:	16 + 5,5 cm^3/U
Max. steering pressure:	200 +/- 10 bar

Steering valve:

Manufacturer:	Sauer-Danfoss
Type:	OSCP 315 LS
System:	Rotary valve

Rear axle:

Manufacturer:	Dana
Type:	172/442
Differential:	No-Spin
Degree of locking:	100 %
Reduction ratio:	27

Filling capacities:

Engine oil:	10,5 l (SAE 15W-40, API SJ/CF)
Hydraulic oil:	60 l (HVLP 46 VI 150)
Vibration bearing housing:	2,1 l (SAE 15W-40, API SJ/CF)
Rear axle:	5,5 l (SAE 90 EP, API GL 5)
Rear axle wheel hubs:	1 l (SAE 90 EP, API GL 5)

BOMAG Central Service - Technical data and adjustment values

Status: 2010-02-01

Product type:	**BW 145 PDH-3**
Type No.:	581 49
Serial numbers from:	901581491016>
Engine:	
Manufacturer:	Deutz
Type:	BF4L 2011
Combustion principle:	4-stroke-Diesel
Cooling:	Air/Oil
Number of cylinders:	4
Power acc. to ISO 9249:	51,5 kW
Power data at nominal speed of	2650 1/min
Low idle speed:	1010+/- 50 1/min
High idle speed:	2675+/- 75 1/min
Spec. fuel consumption:	238 g/kWh
Valve clearance, inlet:	0,3 mm
Valve clearance, outlet:	0,5 mm
Opening pressure, injection valves:	245+8 bar
Starter voltage:	12 V
Starter power:	2,2 kW
Travel pump:	
Manufacturer:	Hydromatik
Type, front:	A10VG 28 HW
Type, rear:	A10VG 28 HW
System:	Axial piston-swash plate
Max. displacement:	45 cm^3/U
Max. flow ratio:	2x 79,8 l/min
High pressure limitation:	405 +/-5 bar
Pressure override:	380 +/-5 bar
Charge pressure, high idle:	25+/-5 bar
Travel motor, rear:	
Manufacturer:	Hydromatik
Type:	A10VM 63
System:	Axial piston-swash plate
Max. displacement (stage 1):	57 cm^3/U
Min. displacement (stage 2):	28,5 cm^3/U
Perm. leak oil quantity:	2 l/min
Rinsing oil quantity:	6,5 l/min
Drum drive:	
Manufacturer:	Poclain
Type:	MSE 18 2CX
System:	Radial piston
Displacement stage 1:	2800 cm^3/U
Displacement stage 2:	1400 cm^3/U
Perm. leak oil quantity:	2 l/min

Vibration pump:

Manufacturer:	Commercial
Type:	PE11A193BEEJ19-96
System:	Gear pump
Max. displacement:	19 cm^3/U
Starting pressure:	220 +/-5 bar
Operating pressure, soil dependent:	45-65 bar

Vibration motor:

Manufacturer:	Sauer-Danfoss
Type:	MMF 025
System:	Axial piston-swash plate
Displacement:	25 cm^3/U
Frequency:	34 Hz
Amplitude:	1,4/0,7 mm

Steering and working pump:

Manufacturer:	Bosch / Commercial
Type:	HY / 1PX
System:	Tandem-/Gear pump
Max. displacement:	16 + 5,5 cm^3/U
Max. steering pressure:	200 +/- 10 bar

Steering valve:

Manufacturer:	Sauer-Danfoss
Type:	OSCP 315 LS
System:	Rotary valve

Rear axle:

Manufacturer:	Dana
Type:	172/442
Differential:	No-Spin
Degree of locking:	100 %
Reduction ratio:	27

Filling capacities:

Engine oil:	10,5 l (SAE 15W-40, API SJ/CF)
Hydraulic oil:	60 l (HVLP 46 VI 150)
Vibration bearing housing:	2,1 l (SAE 15W-40, API SJ/CF)
Rear axle:	5,5 l (SAE 90 EP, API GL 5)
Rear axle wheel hubs:	1 l (SAE 90 EP, API GL 5)

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Maintenance

Single drum rollers are heavy-duty construction machines for extremely difficult tasks in earth construction. To be able to meet these demands the machines must always be ready to be loaded up to their limits. Furthermore, all safety installations, protections and guards must always be in place and fully functional.

Thorough maintenance of the machine is therefore mandatory. This not only guarantees a remarkably higher functional safety, but also prolongs the lifetime of the machine and of important components.

The time required for thorough maintenance is only minor when being compared with the malfunctions and faults that may occur if these instructions are not observed.

The maintenance intervals are given in operating hours. It is quite obvious that with each maintenance interval all the work for shorter preceding intervals must also be performed. During the 2000 hours interval you must also perform the work described for the service intervals after 250, 500 and 1000 hours.

It should also be clear that with the 2500 hour interval only the work for the 10, 250 and 500 hours intervals must be performed.

During maintenance work you must only use the fuels and lubricants mentioned in the table of fuels and lubricants or in the technical data (oils, fuels, grease etc.).

Attached please find the maintenance chart with short descriptions of all work to be performed. For detailed descriptions of the individual maintenance tasks please refer to the operating and maintenance instructions.

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Maintenance table

Maintenance work	Remark	Running-ininspect. (50 op. hours)	every 10 oper. hours	every 50 oper. hours	every 250 oper. hours	every 500 oper. hours	every 1000 oper. hours	every 2000 oper. hours	every 3000 oper. hours	as required
Tighten all bolted connections on air intake, exhaust, oil sump and engine mounts		X								
Check the engine for leaks.		X								
Check, adjust the valve clearance		X								
Change engine oil and oil filter		X								
Tighten the bolted connections on the machine		X								
Tighten the wheel studs with the specified torque		X								
Change the oil in the axle		X								
Change the oil in the planetary drives		X								
Change the oil in the vibrator housings drives	only after 500 op. hours	X								
Check the V-belt tension, tighten if necessary		X								
Check the engine oil level	Dipstick mark		X	X	X	X	X	X		
Check fuel filter water separator			X	X	X	X	X	X		
Check the fuel level	approx. 110 l*		X	X	X	X	X	X		
Check the hydraulic oil level	Inspection glass		X	X	X	X	X	X		
Check the tire pressure	1.8 bar**			X	X	X	X	X		
Adjust the scrapers				X	X	X	X	X		
Check the radiator cooling fins					X	X	X	X		
Clean the hydraulic oil cooler					X	X	X	X		

*(29 gal)
**(26.1 psi)

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Maintenance work	Remark	Running-ininspect. (50 op. hours)	every 10 oper. hours	every 50 oper. hours	every 250 oper. hours	every 500 oper. hours	every 1000 oper. hours	every 2000 oper. hours	every 3000 oper. hours	as required
Check the oil level in the drive axle					X	X	X	X		
Check the oil level in the planetary drives					X	X	X	X		
Check the oil level in the vibrator housings					X	X	X	X		
Darin the sludge from the fuel tank						X	X	X		
Battery maintenance	Grease the poles, fill up battery water					X	X	X		
Change engine oil and oil filter	min. 1 x per year					X	X	X		
Check the V-belt tension, adjust if necessary or replace						X	X	X		
Change fuel filter and fuel pre-cleaner cartridges							X	X		
Change the oil in the vibrator housings drives	1 X year; 2.1 l						X	X		
Check the engine mounts							X	X		
Check the fastening of the axle on the frame							X	X		
Tighten the wheel nuts							X	X		
Check the ROPS							X	X		
Checking and adjusting the valve clearance (on cold engine)	Inlet = 0.3 mm exhaust = 0.5 mm						X	X		
Change the oil in the drive axle	min. 1x per year						X	X		
Change the oil in the planetary drive	min. 1x per year						X	X		

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Maintenance work	Remark	Running-ininspect. (50 op. hours)	every 10 oper. hours	every 50 oper. hours	every 250 oper. hours	every 500 oper. hours	every 1000 oper. hours	every 2000 oper. hours	every 3000 oper. hours	as required
Change hydraulic oil and breather filter	min. every 2 years and after repairs in the hydraulic system							X		X
Change the hydraulic oil filter	min. every 2 years and after repairs in the hydraulic system							X		X
Change the toothed belt for camshaft drive	min. every 5 years								X	
Clean, replace the dry air filter element	min. 1 x year, safety cartridge min. every 2 years									X
Adjust the parking brake										X
Change the tires										X
Change the fresh air filter for the cabin										X
Tighten all bolted connections	Observe the tightening torques!									X
Engine conservation	Before longer periods of standstill									X

Note:

When changing filters use only the original filters specified in the operating and maintenance instructions for this machine. The installation of incorrect filters (e.g. insufficient pressure resistance) can lead to severe damage on engine or hydraulic components.

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Deutz diesel engine

Single drum rollers of series BW145-3 are powered by a oil/air cooled Deutz diesel engine of series BF4L 2011. This automotive engine is characterized by the following features:

- short and compact design,
- low noise level,
- low vibration running,
- low fuel consumption,
- low exhaust emissions and
- good access to all service points.

The engine is a turbo charged 4-cylinder 4-stroke inline engine with direct fuel injection.

The combustion method with direct fuel injection enables the use of a less expensive casting for the cylinder head, highest possible utilization of fuel and minimum heat transfer to the coolant.

This in turn enables the use of smaller, quieter cooling fans and a compact radiator.

Both the crankcase with cylinders as well as the cylinder head of this ebngine are made of a cast iron alloy. This provides strength and ensures high wear resistance.

The forged steel conrods are fitted with compensation weights near the conrod bearing seats. This weight compensates manufacturing tolerances with respect to weight and centre of gravity.

The pistons are made of an aluminium alloy. The combustion trough has been specially designed for efficient combustion. All pistons are fitted with three piston rings and are lubricated by an oil mist.

Each cylinder is fitted with one intake and one exhaust valve. The valve guides are shrunk into the cylinder head.

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Control side

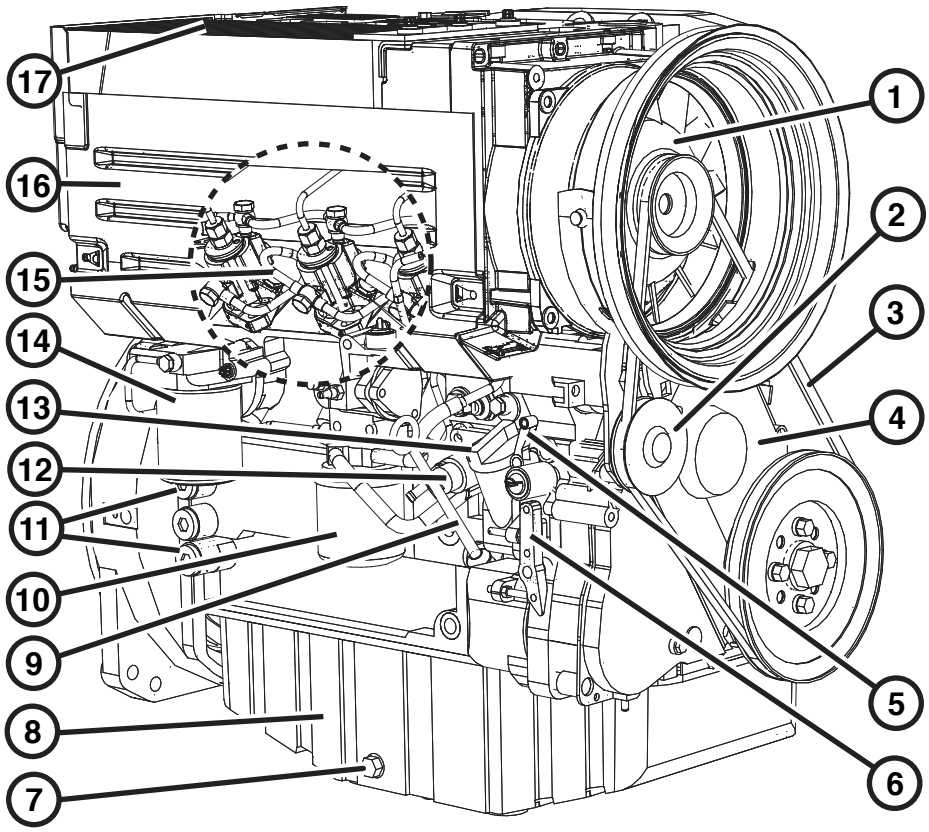


Fig. 1: Control side BF4L 2011

1	*Cooling fan (with integrated generator)*	2	*Tension pulley*
3	*V-belt (fan)*	4	*Timing belt cover*
5	*Engine Shut-downlever*	6	*Speed adjusting lever*
7	*Lubricating oil drain plug*	8	*Lubricating oil sump*
9	*Lubricating oil dipstick*	10	*Replaceable fuel filter*
11	*Connection for cab heating*	12	*Fuel supply pump with integrated screen filter*
13	*Lubricating oil filler*	14	*Lube oil replacement filter*
15	*Fuel Injection pumps*	16	*Removable air guidance cowling (access to fuel injectors)*
17	*Oil cooler*		

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Exhaust side

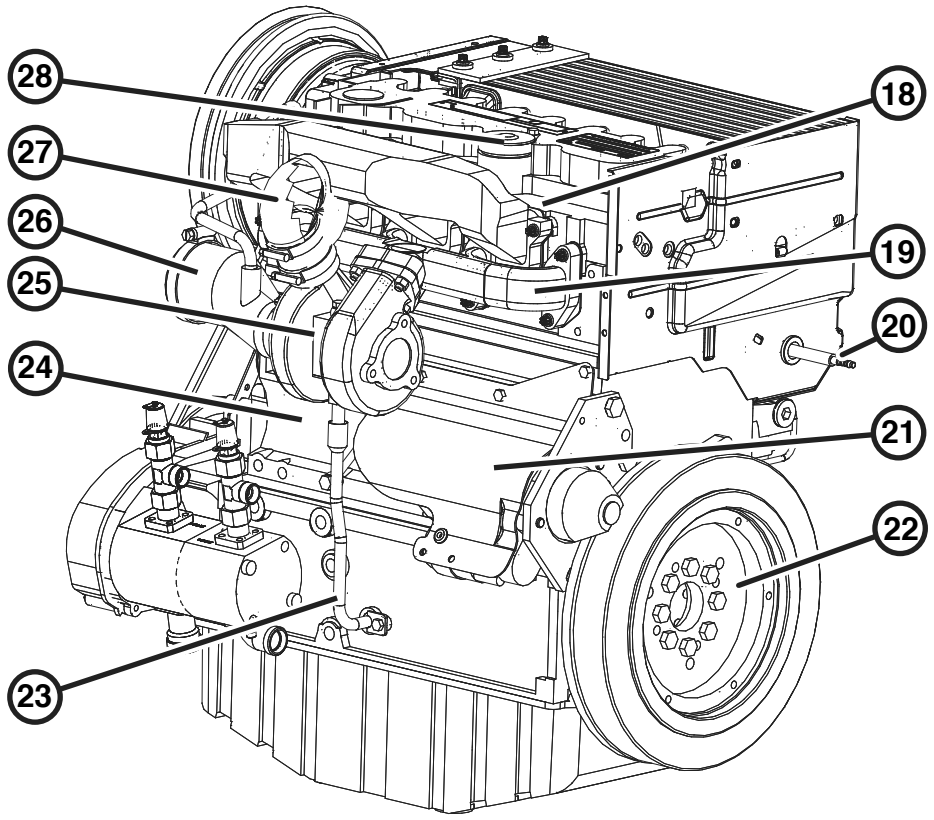


Fig. 2: Control side BF4L 2011

18 Cylinder head
19 Exhaust manifold
20 Fuel return to fuel tank
21 Starter
22 Flywheel with gear ring
23 Return oil line from turbo charger
24 Crankcase
25 Exhaust turbo charger
26 Air intake socket
27 Intake manifold
28 Oil filler neck

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Lubrication oil circuit

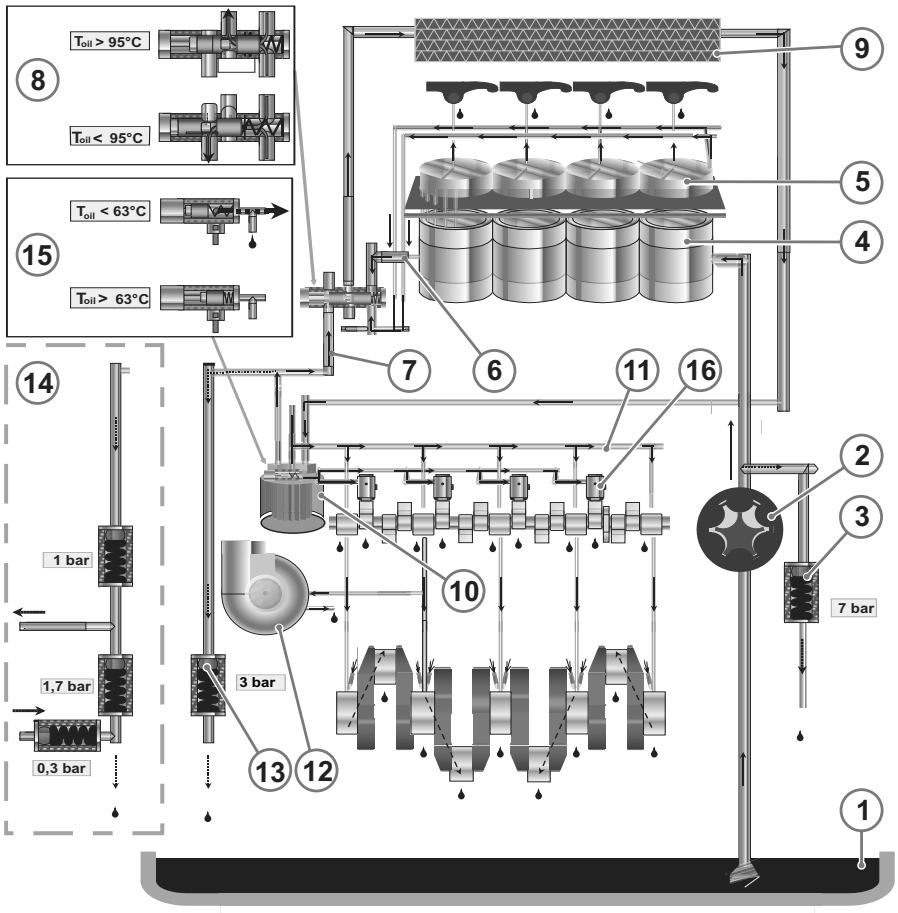


Fig. 3: Lubrication oil circuit

1 *Lubricating oil sump*

2 *Lubricating oil pump*

3 *Pressure limiting valve*

4 *Cylinder (lubricating oil-cooled) The lubricating oil is used first to cool the engine.*

5 *Cylinder head*

6 *Lubricating oil return from the cylinders*

7 *Lubricating oil collection pipe to the thermostat*

8 *Thermostat (engine cold) lubricating oil flow directly to the lubricating oil filter (engine warm) lubricating oil flow through the lubricating oil cooler*

9 *Lube oil cooler*

10 *Lubricating oil filter*

11 *Main lube oil channel*

12 *Turbocharger*

13 *Pressure holding valve*

14 *Connection possibility for cab heating The standard pressure holding valve must be replaced by a combination for this. Retrofitting only by authorized qualified personnel.*

15 *Lubricating oil filter console with integrated switching valve for controlling the hydraulic tappet. When the engine is cold, lubricating oil is fed to the hydraulic tappet. To achieve early adjustment of the fuel injection in a cold start, the hydraulic tappets under the fuel injectors are supplied with lubricating oil.*

16 *Hydraulic tappets*

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Fuel circuit

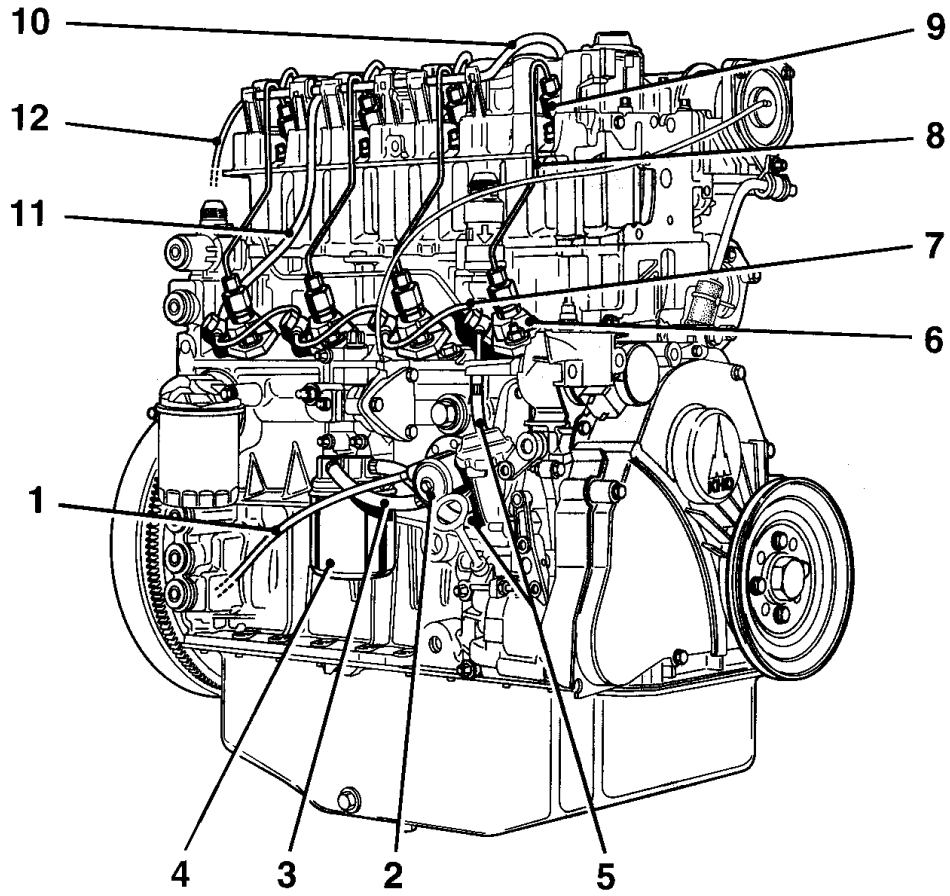


Fig. 4: Fuel circuit

1 Fuel line from tank to fuel lift pump
2 Fuel lift pump
3 Fuel line from fuel lift pump to fuel filter
4 Fuel filter
5 Fuel line from filter to injection pump
6 Injection pumps
7 Fuel distribution line
8 Injection lines
9 Injection valves
10 Fuel leakage line
11 Fuel overflow line
12 Fuel return line to tank

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Checking and adjusting the valve clearance

Excessive or insufficient valve clearance can cause failure of the engine as a result of mechanical and thermal overloads. The valve clearance must therefore be checked and, if necessary, adjusted at the intervals specified in the operating and maintenance instructions and whenever required.

Note:

The valve clearance is measured between the valve stem and the rocker arm. The correct valve clearance **on a cold engine (engine oil temperature <80°C(176°F)** is as follows:

Intake valve **= 0.3 mm** (immediately after replacing the cylinder head gasket 0.4mm)
Exhaust valve **= 0.5 mm** (immediately after replacing the cylinder head gasket 0.6 mm)

- Remove the valve cover.
- Turn the crankshaft by the V-belt pulley, until both valves on cylinder 1 are overlapping (exhaust valve not yet completely closed, intake valve starts to open).

Note:

Cylinder 1 is located at the flywheel end of the engine; sensor of rotation: V-belt pulley from front in clockwise direction.

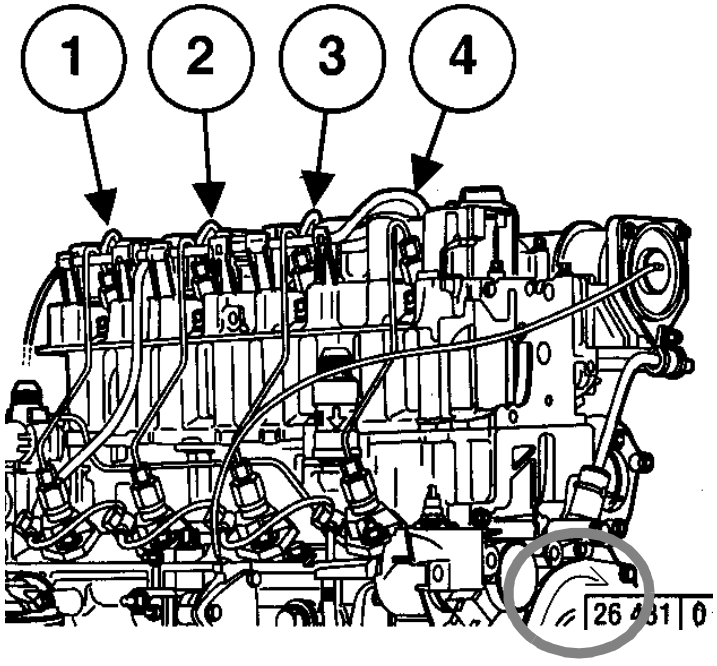


Fig. 5: Numbering of cylinders and sense of rotation of BF4L 2011

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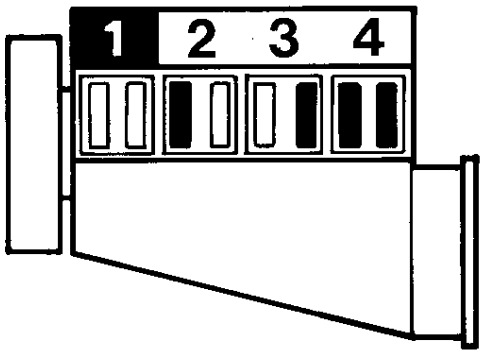


Fig. 6: Valve adjustment, position 1

Check and adjust the valve clearance on both marked valves (**Fig. 6**). A feeler gauge of appropriate thickness must fit through the gap between valve and rocker arm with only little resistance. If the gap is too narrow or too wide for the feeler gauge, the valve clearance needs to be adjusted.

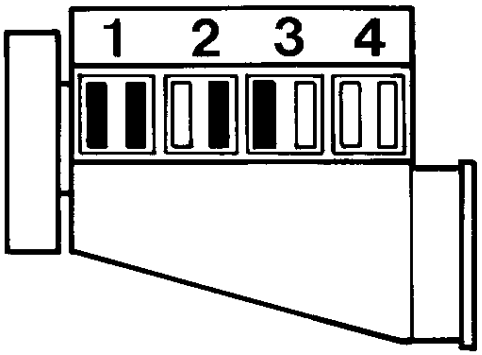


Fig. 7: Valve adjustment, position 2

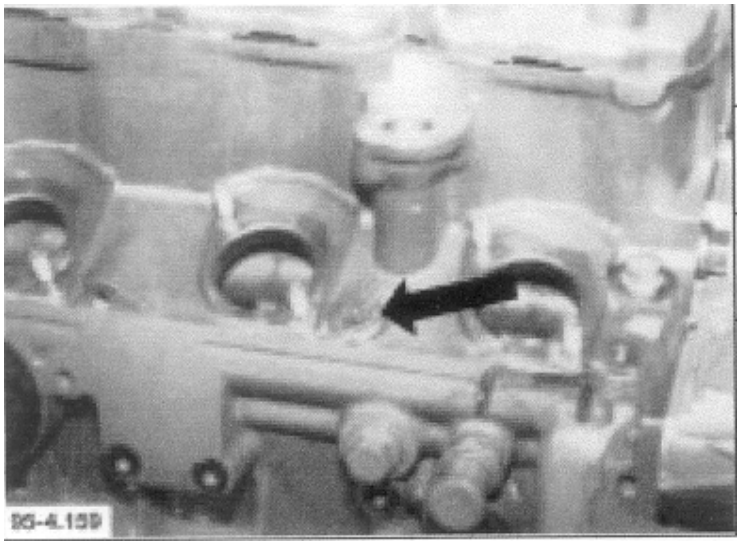
- Turn the engine by the crankshaft pulley for another full revolution (360°).
- Adjust the valve clearance on the remaining valves (**Fig. 7**)
- Assemble the cylinder head cover with a new gasket.

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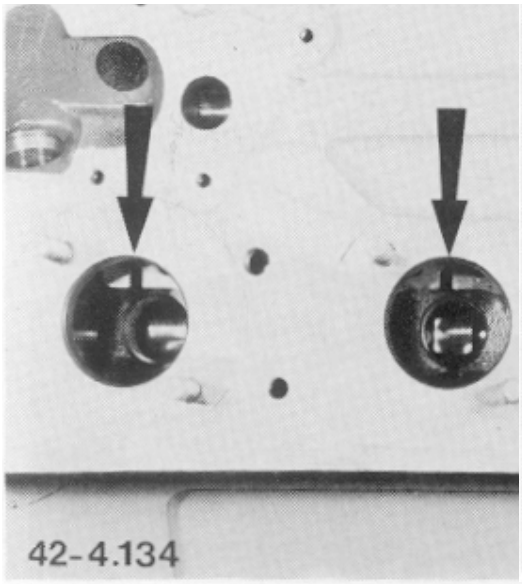
Assembly of the plug-in injection pumps

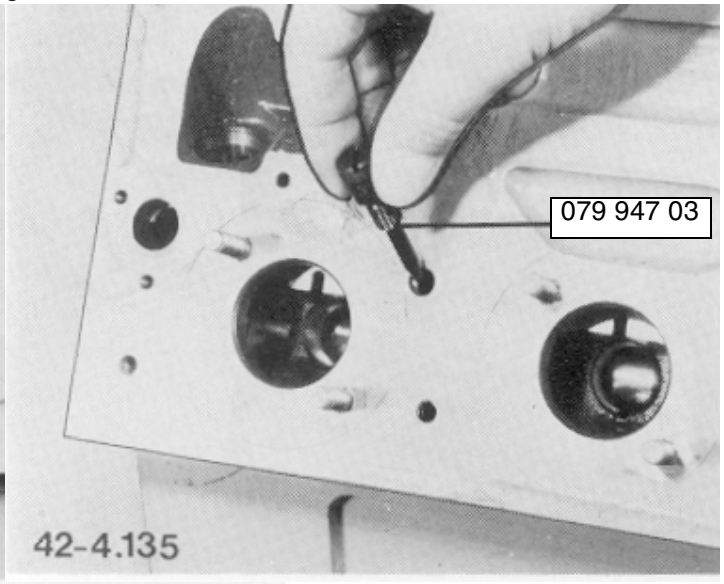
Engines of series 2011 are fitted with individual injection pumps for each cylinder. When installing the individual plug-in pumps the distance to the camshaft must be correctly adjusted with shims, because this determines the start of fuel delivery.

1. Unscrew the plug from the crankcase.



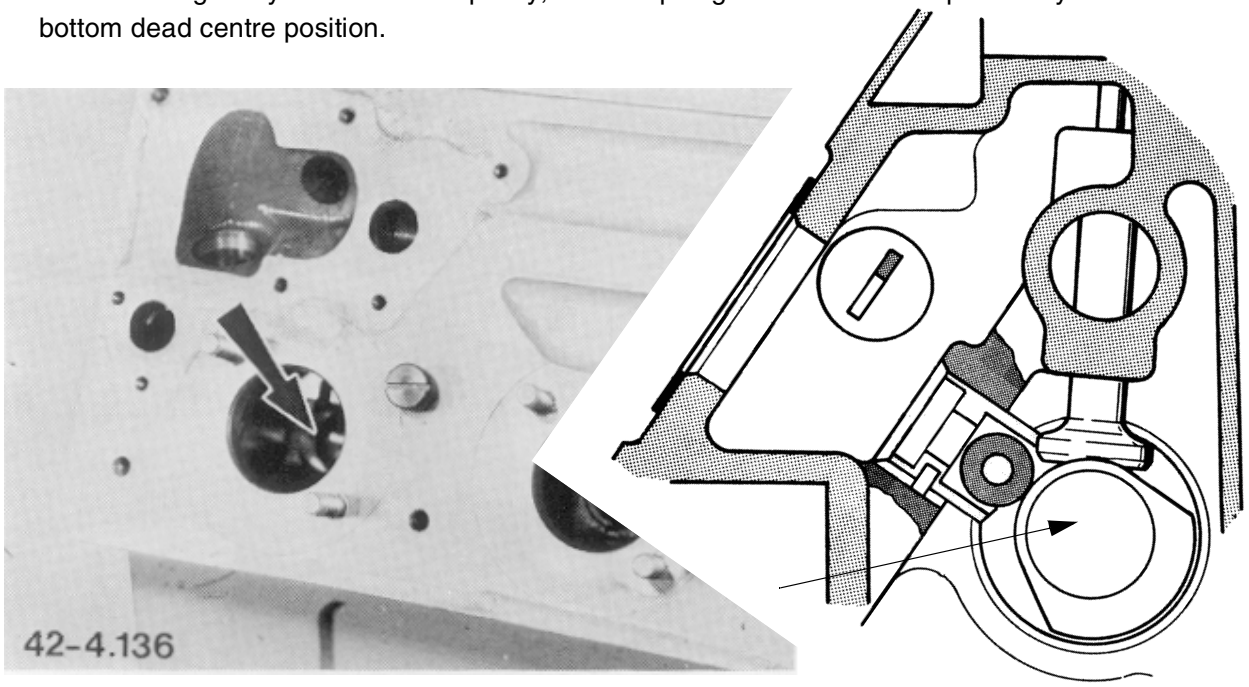
2. Operate the throttle lever to bring the governor rod to middle position and hold it. The screw the locating pin for governor rod (BOMAG part-no.: 079 947 03) into the crankcase.
   Then the throttle lever can be released again..



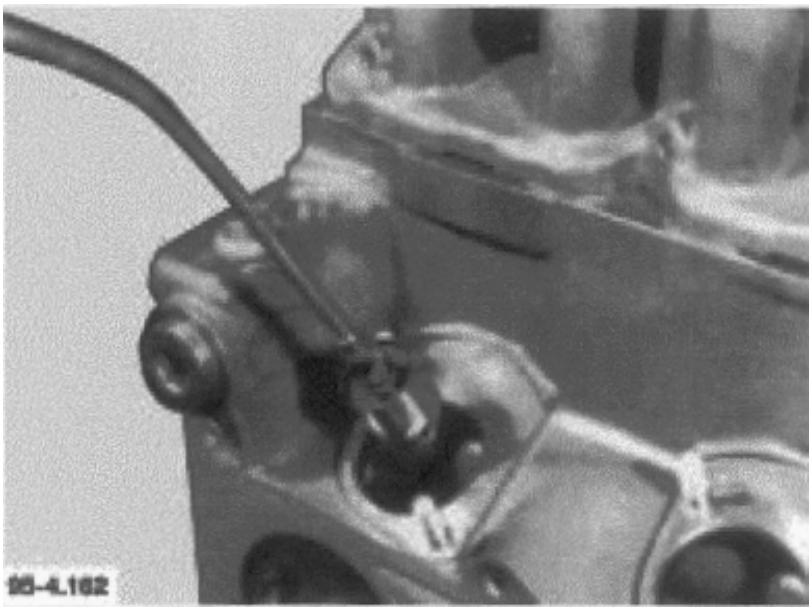


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3. Crank the engine by the crankshaft pulley, until the plunger stoke of the respective cylinder reaches bottom dead centre position.

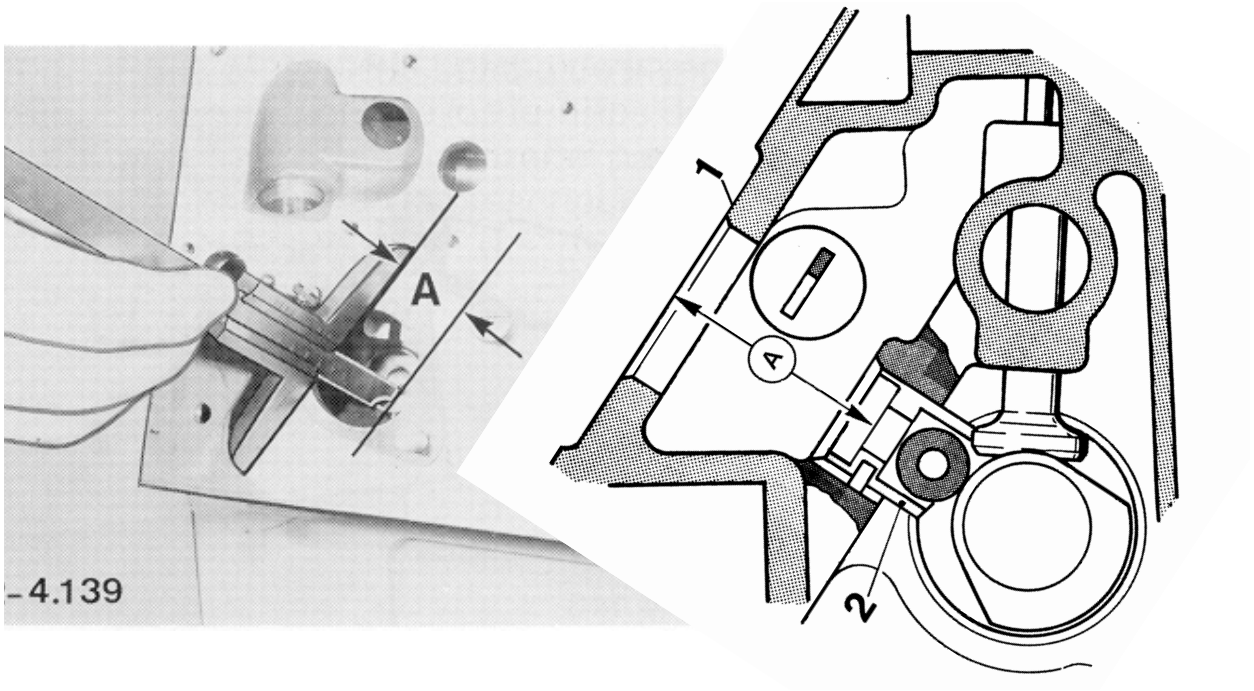


4. Assemble the injection pump roller plunger. Use a flexible magnetic lift for this purpose.



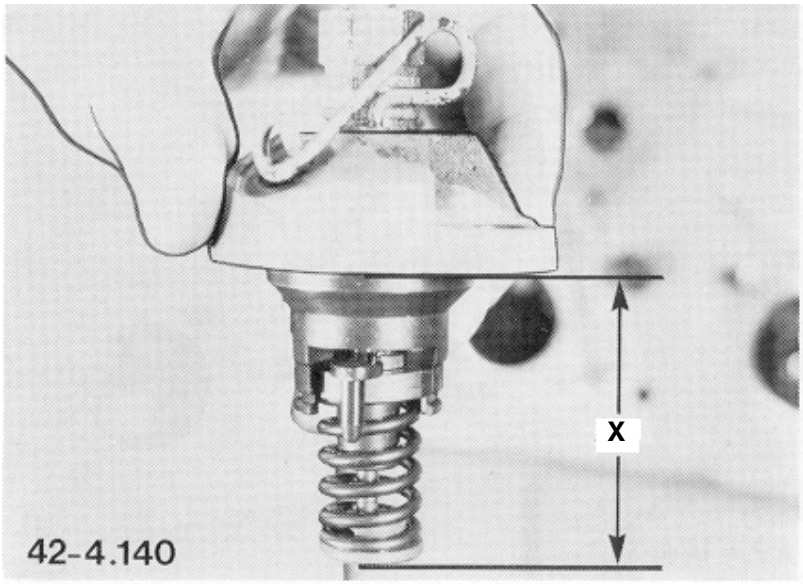
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5. Check measurement 'A' from the crankcase contact face to the spring cup contact face on the plunger.



1 Crankcase contact face *2 Roller plunger*

6. The nominal measurement X of the injection pump can be obtained from the BOMAG customer service department or the Deutz customer service against the data on the engine type plate. (There are various versions and adjustment measurements available).

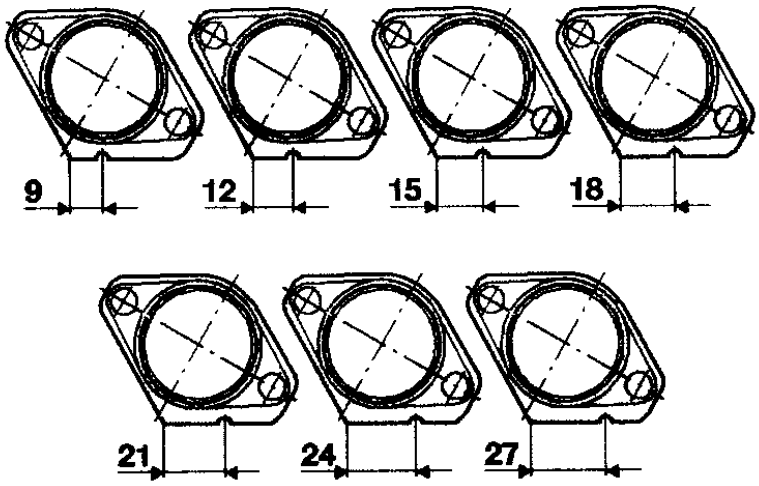


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7. Determine the difference between installation measurement „X“ and measured measurement ’A’

Example: Installation measurement “X“ = 59 mm
- measured depth A = 58.35 mm
Difference = **0.65** mm

8. Choose a compensating seal from the table by following the marking.



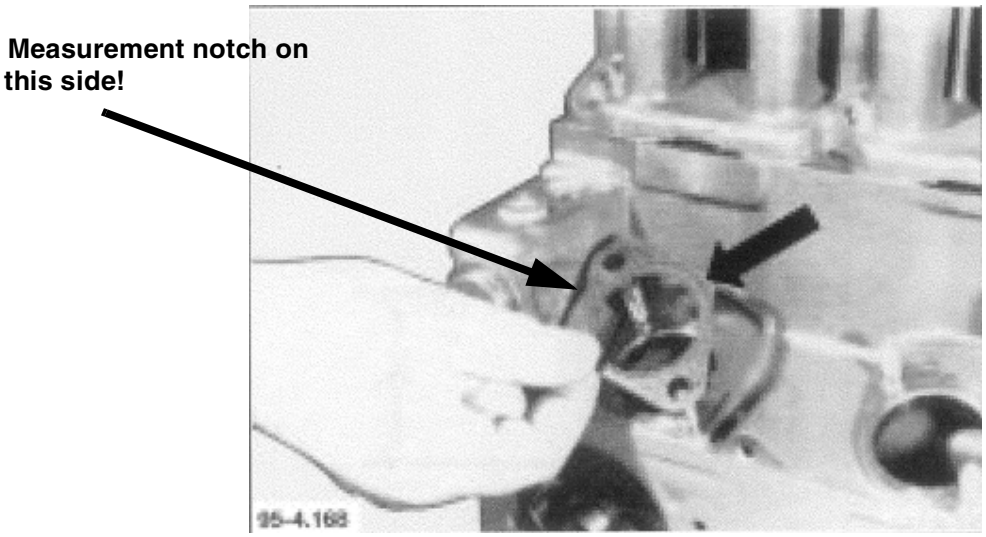
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Determine difference [mm]	Measurement of mark in illustration above [mm]	BOMAG-P/N
up to 0.4	9	057 115 44
0,401 - 0,5	12	057 114 45
0,501 - 0,6	15	057 114 46
0,601 - 0,7	18	057 114 47
0,701 - 0,8	21	057 114 48
0,801 - 0,9	24	057 114 49
0,901 - 1,0	27	057 114 50

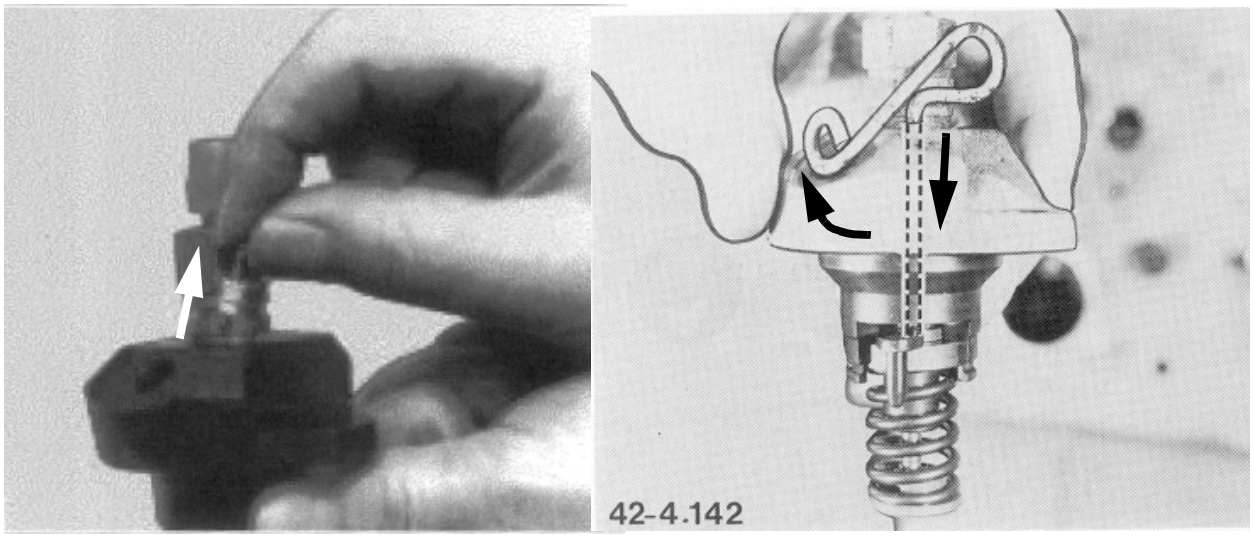
In the example above P/N 057 114 47 should be chosen.

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9. Attach the chosen gasket; **Observe the installation position!**



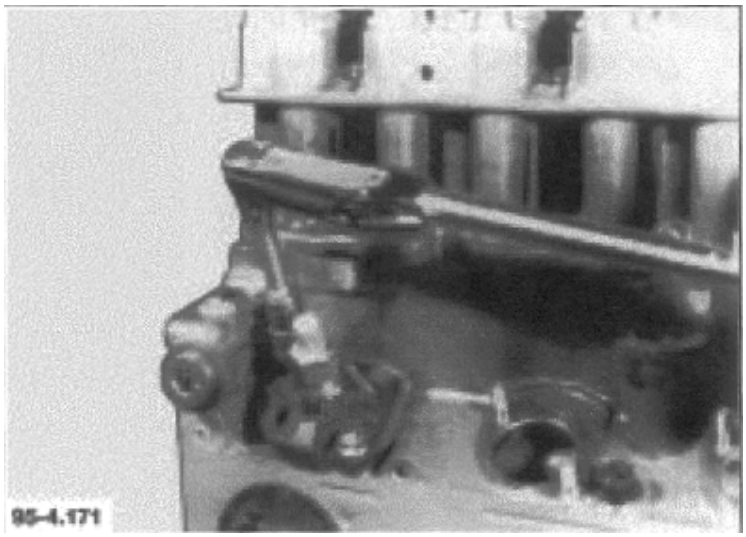
10. Take the locking pin out of the injection pump and insert the locking wire (BOMAG P/N 079 947 06 / 079 947 07) into this bore. Insert the locking wire into the bore in the injection pump lever and engage it in the tapped leak oil bore



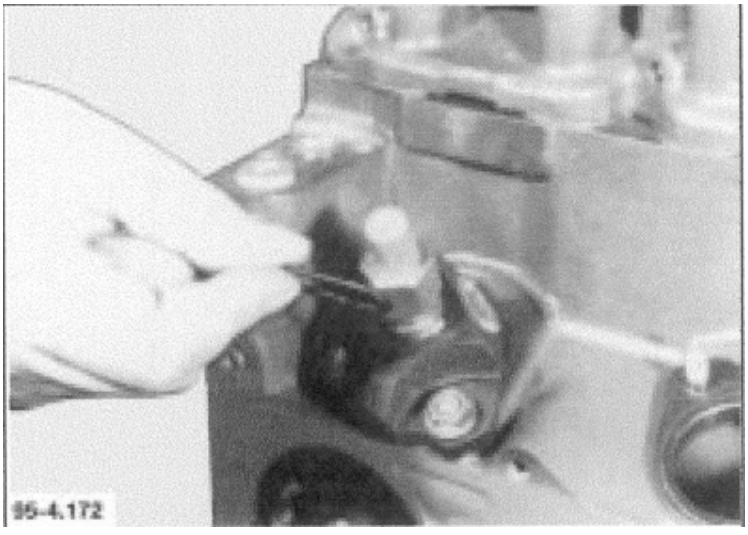
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11. Install the injection pump. Press the injection pump centrically down to the stop.
    Tighten the screws.
    Tightening torque: 21 Nm (15.5 lbf*ft)

.

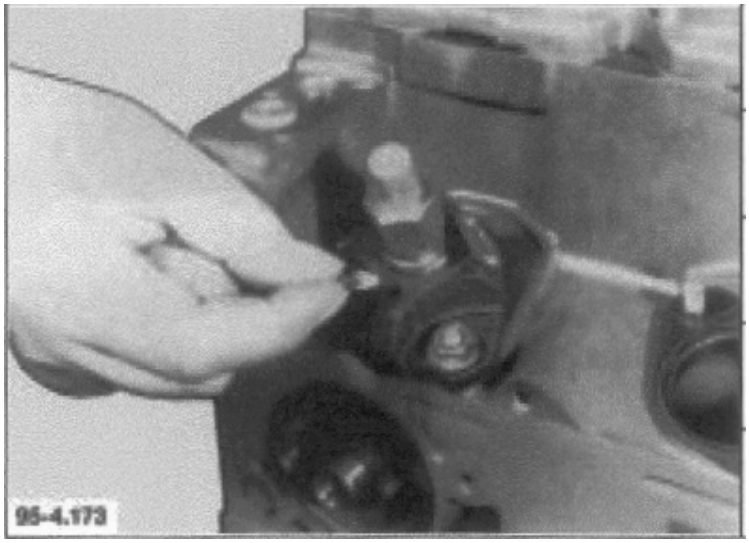


12. Pull the locking wire out.

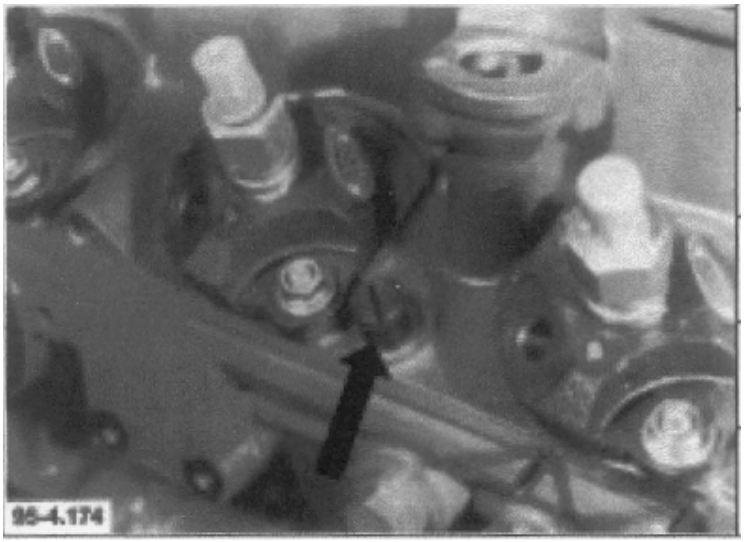


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13. Close the bore again with the locking pin

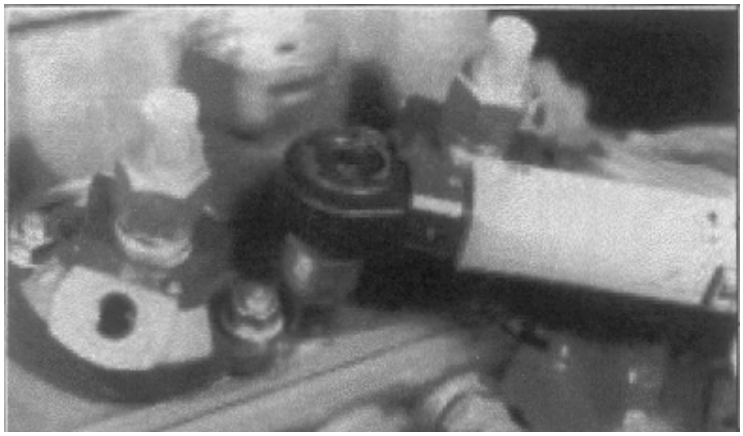


14. Remove the locating pin for the governor rod



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15. Install the plug with a new copper ring and tighten it: **Tightening torque 18 Nm (13.2 lbf*ft)**



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Replacing the toothed belt for camshaft control

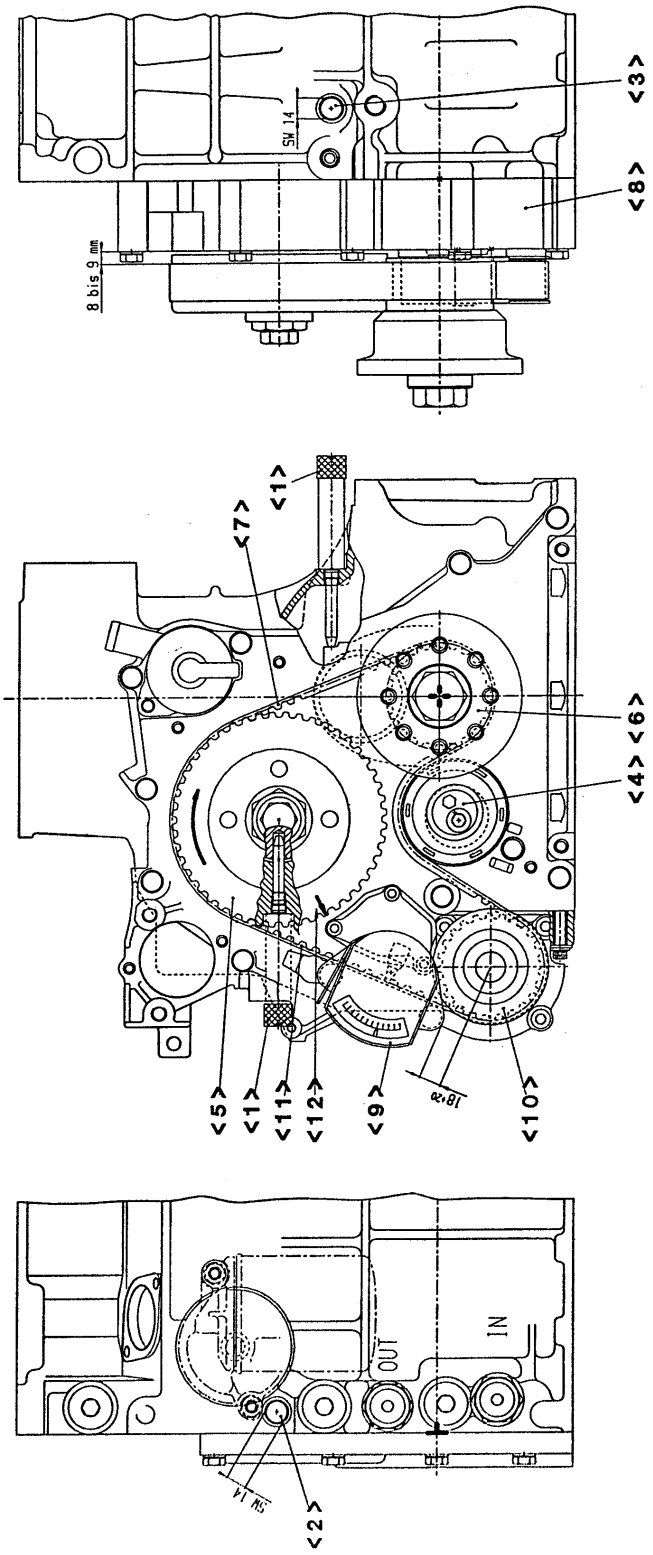


Fig. 8: Toothed belt change 1011

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The toothed belt for the camshaft control is a service part which must be replaced every 3000 operating hours and ***always together with the idler pulley***.

1. Unscrew the plugs with seal **(Fig. 8, Pos.2)**. Use a suitable lamp to light into the bore and crank the engine by the V-belt pulley, until the locating bore in the camshaft is aligned with the locking bore. Locate the camshaft by inserting the locating pin (BOMAG part-no. **079 947 02**) into the camshaft bore. Turn the pin completely in.

2. Remove the plug **(Pos.3)** with the sealing ring and screw the locating pin **(Pos.1)** completely in (two identical pins for crankshaft and camshaft).

3. Remove the toothed belt protection hoods.

4. Remove the idling pulley **(Pos. 4)** .

5. Take off the toothed belt, do not turn the crankshaft.

6. Turn the crankshaft in direction of engine rotation (direction of arrow) against the locating pin.

7. Install the new toothed belt so that the toothed belt is tight between camshaft pulley **(Pos. 5)** and crankshaft pulley **(Pos. 6)** (right hand end of belt, **(Pos. 7)** . Align the toothed belt approx. 8 to 9 mm to the front cover **(Pos. 8)**.

8. Press the new idler pulley in ***anti-***clockwise direction slightly against the toothed belt and lightly tighten the fastening screws.

9. Attach the toothed belt tension measuring unit **(Pos. 9,** BOMAG part-no. **079 947 04)** between oil pump pulley (Pos. 10) and camshaft pulley (left hand end of belt **(Pos. 11)**).

10. Increase the belt tension by turning the eccentric further in anti-clockwise direction, until the measuring unit shows the scale value 5.5 to 6.

11. Tighten the idler pulley fastening screw with 45 Nm*. Counter the eccentric during this process.

12. Mark any tooth on the camshaft pulley; e.g. with felt pen at the location shown **(Pos. 12).**

13. Remove the Locating pins.

14. Crank the engine by the crankshaft for 4 revolutions; tolerance: +/- 2 teeth on the camshaft gear. Do ***not*** turn the engine backward.

15. Check the toothed belt tension with the measuring instrument. Specified scale value: 6.5 to 9.5.

*(33.2 ft-lb)

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16. Check the timing with the locating pins: For this purpose screw in the camshaft locating pin completely. Load the engine at the crankshaft in direction of engine rotation with a certain and relieve it evenly; the torque should thereby be slightly higher than the maximum torque of the engine (approx. 220 Nm)*. >The crankshaft will slightly turn, (right hand end of belt **(Pos. 7)** is tight). *(162.2 ft-lb)
    Turn in the crankshaft pin, until it slightly contacts the crankshaft. Mark the pin position relative to the crankcase, e.g. with a felt pin. Screw the crankshaft locating pin in deeper, until it touches the crankcase; determine the number of pin revolutions. Specified screwing angle: **0.75 to 2.25 revolutions**.

17. If the specified values are not reached during pin inspection, the idler pulley can be used to carry out corrections within the toothed belt tension values.

18. Close the holes for the locating pins with the plugs and new seals.
    Tightening torque: 18 Nm (13.2 ft-lb)

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Test and adjustment points on diesel engine

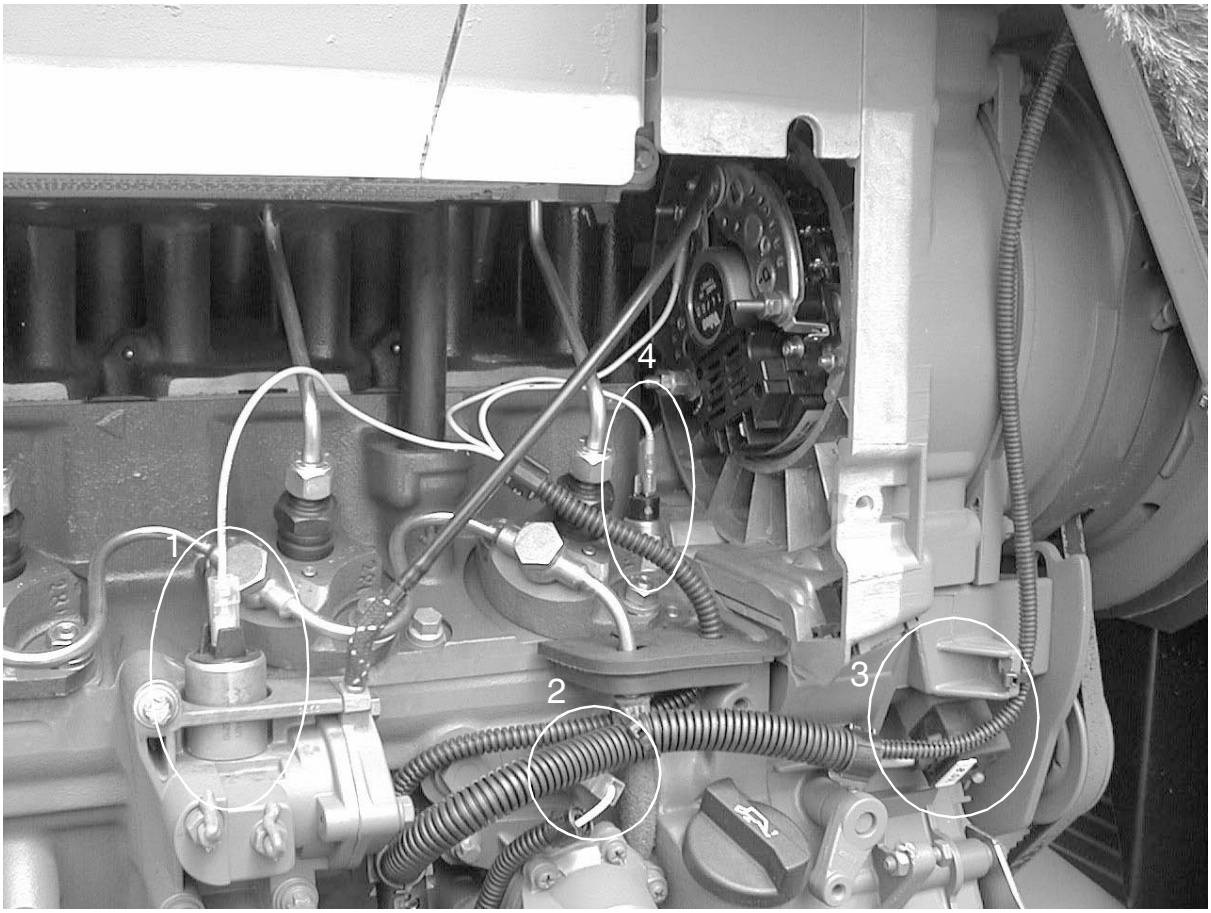
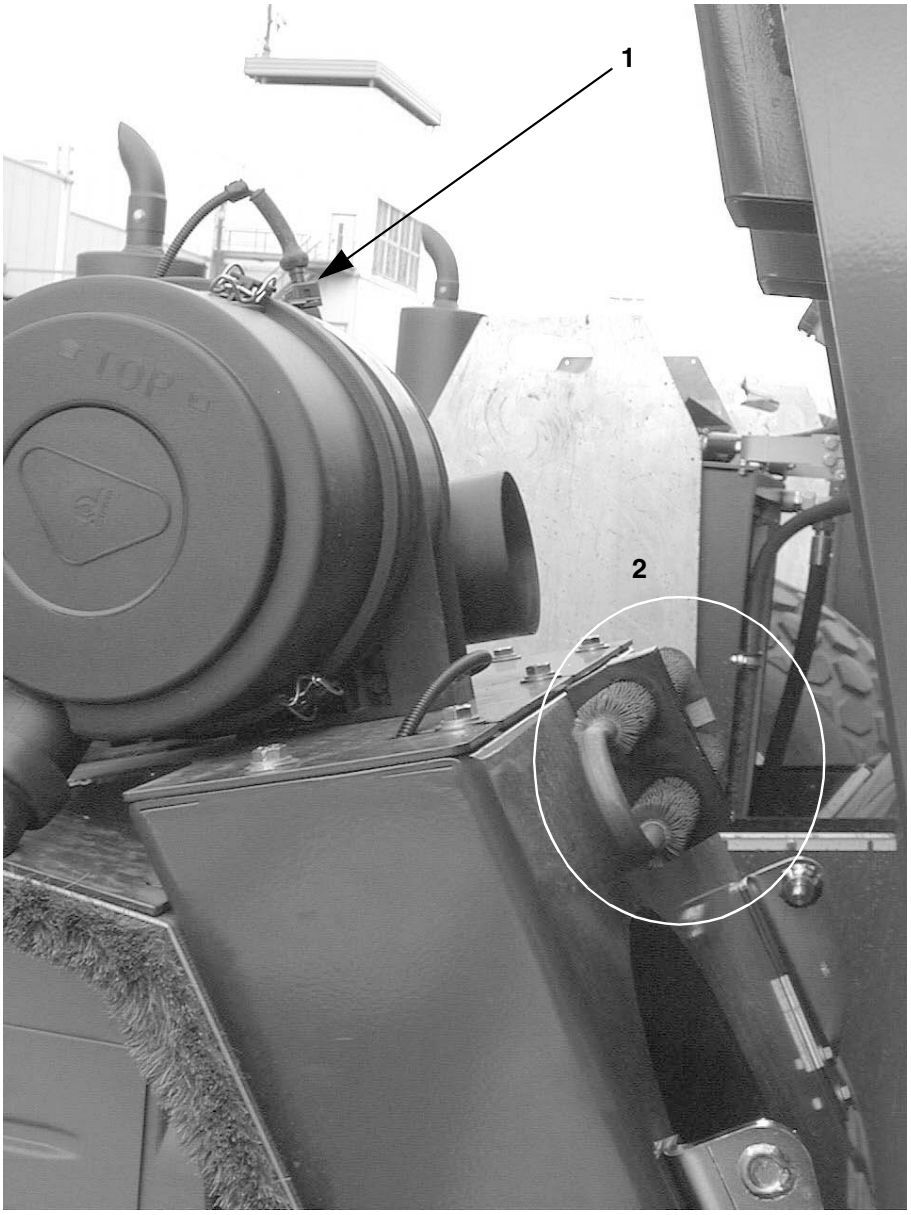


Fig. 9: Electric components on diesel engine

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Boost fuel valve	Y01		0/12 V
2	Oil pressure switch	B06		closed without pressure 0,5 bar (7.2 psi)
3	Fuel shut-off valve	Y58		0/12 V
4	Engine oil temperature switch	B30		cold opened, 130 °C (266 °F)

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Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Differential pressure switch for air filter	B03		opened without pressure; 50 mbar
2	Fuel cooling spiral			

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Travel system

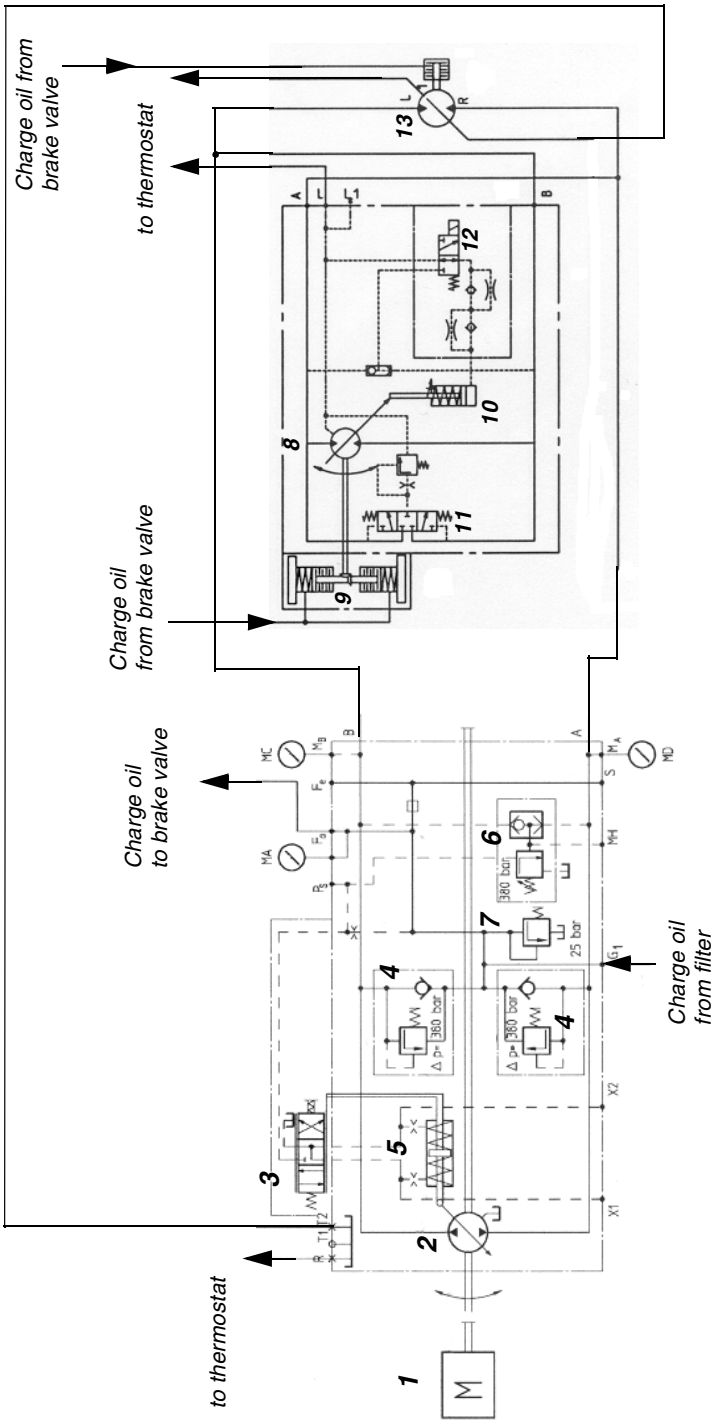


Fig. 1 Hydraulic diagram travel system ***BW 145 D-3***

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BW 145 D-3 (single pump, parallel drive)

The travel system on the single drum rollers of series BW 145 D-3 is designed as a closed hydraulic circuit. It mainly consists of travel pump with all integrated safety elements, two travel motors, the hydraulic oil filter and the hydraulic oil cooler.

The installation of a hydraulic pump with variable displacement in a closed hydraulic circuit is the perfect solution for a hydrostatic travel system, because this configuration enables reversing of the travel direction without any problems.

The travel pump is flanged to the flywheel side of the diesel engine. It is directly driven by the engine with constant speed.

The steering pump, which is driven by the auxiliary drive of the engine, has the additional function of a charge pump for the closed hydraulic circuit. The return flow from the steering valve flows through a fine filter and enters into the travel pump through the boost check valves.

Apart from its function to supply the closed circuits with cooled and filtered oil to compensate any leakage and flushing quantities, the oil from the charge circuit is also needed for the following machine functions:

- to control the variable displacement pump(s) in the travel system,
- to release the hydraulic multi-disc brakes.

All safety and control elements needed for the operation in a closed hydraulic circuit are integrated in the travel pump. These are:

- High pressure relief valves (Δp = 380 bar)* with integrated boost check valves *(5511.4 psi)
- Charge pressure relief valve (25 bar) (362.6 psi)
- Pressure override (380 bar) (5511.4 psi)
- Servo control

The axial piston motor for the rear axle is equipped with an additional flushing valve for the closed circuit.

The travel motors for drum and rear axle are hydraulically arranged parallel to each other.

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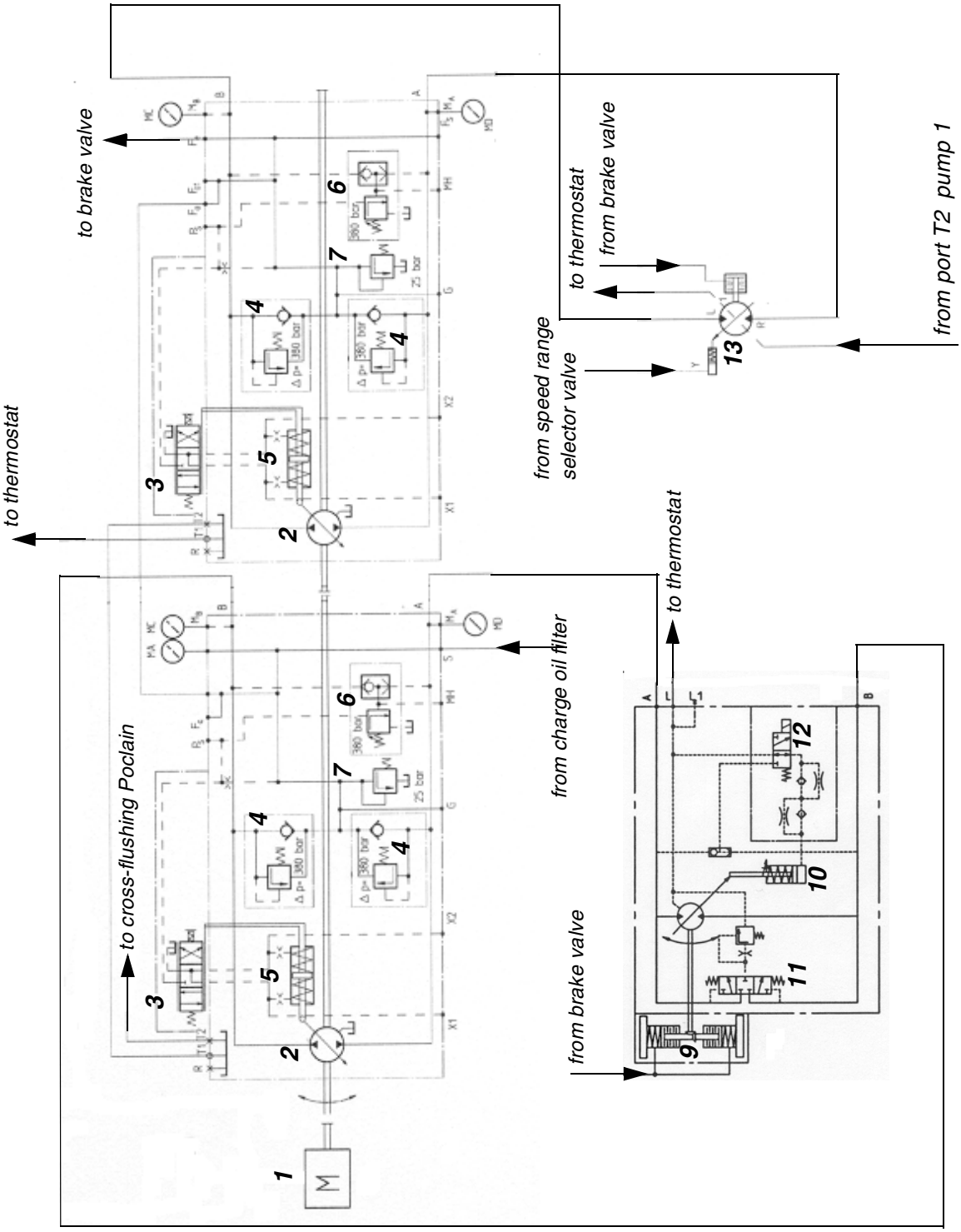


Fig. 2 Hydraulic diagram travel system ***BW 145 DH-3 / PDH-3***

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Legend Fig. 2

1 Diesel engine
2 Variable displacement pump
3 Pump control
4 High pressure relief valves with boost check valve function
5 Control piston
6 Pressure override
7 Charge pressure relief valve
8 Axle drive motor
9 Axle with brakes
10 Control piston, axle drive motor
11 Flushing valve
12 Speed range selector valve, axle drive motor
13 Drum drive motor with brake

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BW 145 DH-40 /PDH-3 (double pump drive)

The travel system on the single drum rollers of series BW 145 DH-3 / PDH-3 consists of two separate closed hydraulic circuits. Drum and axle drive motors are each driven by a travel pump of identical design..

Under severe traction conditions this design has the advantage that the machine, in contrast to machines with parallel drives, will still be driven by one drive circuit, even if one of the drive components (axle or drum) should slip.

Each travel circuit consists mainly of the travel pump with all integrated safety elements and the related travel motor;
however, charge pump, hydraulic oil filter and hydraulic oil cooler are used by both pumps and are therefore only installed once.

The travel pump unit is a tandem pump flanged to the flywheel side of the diesel engine. It is directly driven by the engine with constant speed.

The steering pump, which is driven by the auxiliary drive of the engine, has the additional function of a charge pump for the closed hydraulic circuit. The return flow from the steering valve flows through a fine filter and enters into the front travel pump through the boost check valves. The charge circuits of both travel pumps are connected by a connecting hose.

Apart from its function to supply the closed circuits with cooled and filtered oil to compensate any leakage and flushing quantities, the oil from the charge circuit is also needed for the following machine functions:

- to control the variable displacement pump(s) in the travel system,
- to release the hydraulic multi-disc brakes.

All safety and control elements needed for the operation in a closed hydraulic circuit are integrated in the travel pump(s). These are:

- High pressure relief valves (Δp = 380 bar)* with integrated boost check valves *(5511.4 psi)
- Charge pressure relief valve (25 bar) (362.6 psi)
- Pressure override (380 bar) (5511.4 psi)
- Servo control

The axial piston motor for the rear axle is equipped with an additional flushing valve for the closed circuit.

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Travel pump(s)

The travel pump on the BW 145 D-3 is a swash plate actuated variable displacement axial piston pump from Hydromatik, type A10VG 63 HWD.
The tandem pump unit used on the models BW 145 DH-3 / PDH-3 consists of two variable displacement axial piston pumps of the same type A10VG 28 HW.
The pumps are fitted with all control and safety elements needed for operation in a closed hydraulic circuit. These are:

- Servo control
- High pressure relief valves with integrated boost check valves
- Charge pressure relief valve
- Pressure override

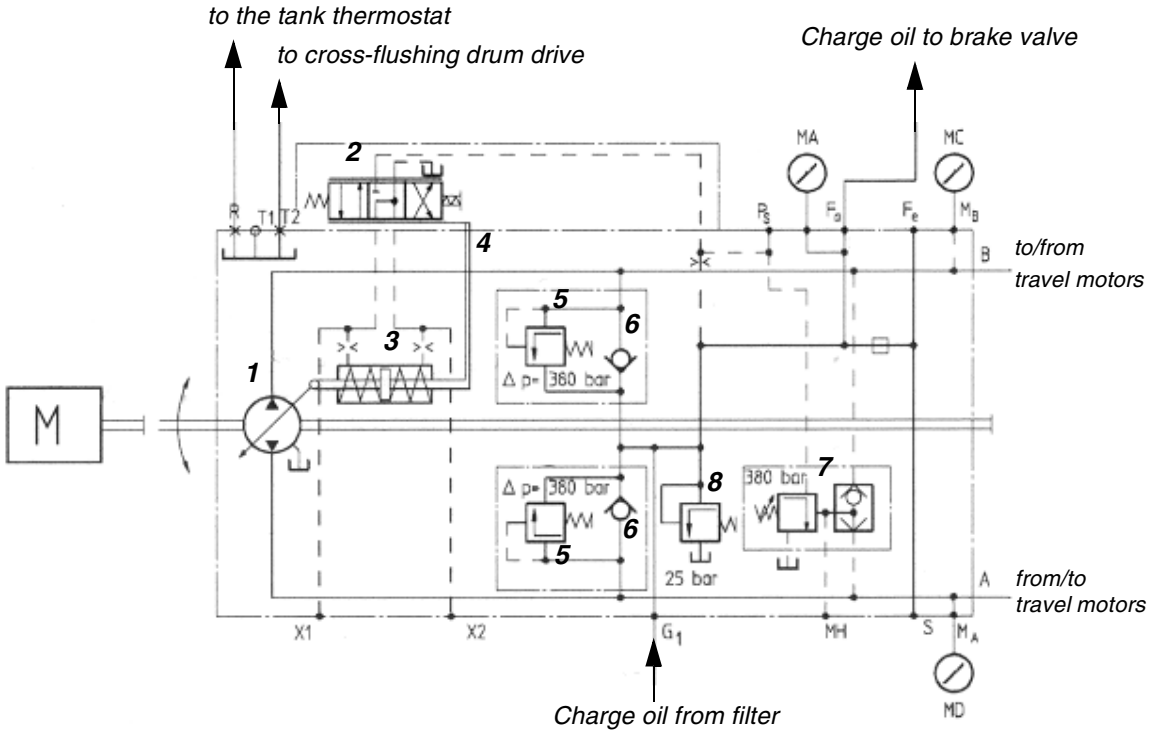


*Fig. 3 Hydraulic diagram travel pump **BW 145 D-**3(DH/PDH: Tandem pump of identical design)*

1	*Variable displacement pump*	*2*	*Servo valve (mech. control)*
3	*Control piston*	*6*	*Feedback lever*
5	*High pressure relief valves*	*6*	*Boost check valves*
7	*Pressure override*	*8*	*Charge pressure relief valve*

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Travel pump(s) and vibration pump are connected to a tandem unit (D-3)or a triple pump unit (DH-3 / PDH -3).

The travel pump unit is directly driven by the flywheel end of the diesel engine via an elastic coupling. The pump speed is therefore identical with the engine speed.

The spherical valve plate centres cylinder block, which is mounted on the splines of the drive shaft. This avoids the appearance of undesired transverse forces.

The complete drive consisting of

- valve plate
- cylinder block with working pistons and
- swash plate

is preloaded by a pressure spring. This immediately eliminates any appearing wear, increases the efficiency of the pump and considerably prolongs the lifetime of the pump.

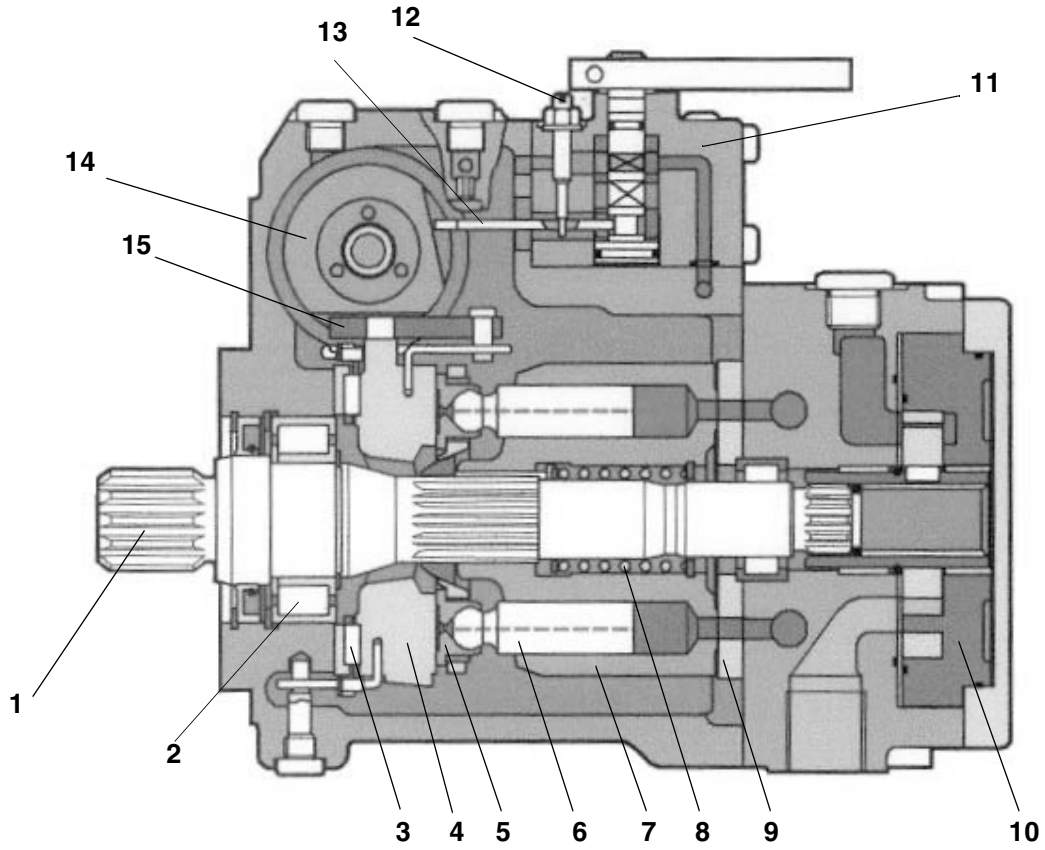


Fig. 4 Travel pump A10VG. HWD cross sectional view

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1	*Drive shaft*	*9*	*Valve plate*
2	*Roller bearing*	*10*	*Charge pump (not for BOMAG)*
3	*Swashing bearing*	*11*	*Control unit*
4	*Swashing cradle*	*12*	*Setscrew for hydraulic neutral position*
5	*Slipper pads*	*13*	*Feedback lever*
6	*Working pistons*	*14*	*Control piston*
7	*Cylinder block*	*15*	*Sliding block*
8	*Pressure spring*		

Pilot pressure is used to operate the pump out of neutral position to the desired pumping direction (direction of oil flow).

A manually operated 4/3-way valve directs the pilot oil flow (from the charge circuit) to the corresponding control piston side in the servo control. The 4/3-way valve is actuated by the travel lever and the travel control cable.

In neutral position both control chambers are loaded with case pressure. When opening the 4/3-way valve pilot oil (from the charge circuit) is directed to one of the control piston sides and moves the control piston to the corresponding direction.

The swashing lever between the control piston and the swash plate transfers the control piston movement to the swashing cradle. The needle bearing mounted swash plate swivels to the chosen direction. This causes the axial movement of the pistons inside the cylinder block. The axial movement draws oil into the pump and presses it to the travel motors.

All working pistons are drilled through their entire length. Pressure fluid flows through these bores into the areas between the slipper pads and the surface of the swashing cradle. This forms a hydraulically balanced field, on which the slipper pads can slide without any metal-to-metal contact between swashing cradle and slipper pads. The feedback lever on the control piston detects when the swashing cradle has reached a position that corresponds with the displacement of the travel lever. This feedback lever controls a pilot oil dosing valve which interrupts the pilot oil flow to the control chambers when the swashing angle corresponds with the position of the travel lever. Swashing angle and displacement of the working pistons (oil flow rate) remain constant, until a new control command requires a different swashing angle.

When changing the swashing angle through the neutral position to the opposite side, the flow direction of the oil and the sense of rotation of the travel motors will change.

When controlling the travel pump pressure will build up in the line between pump outlet and motor inlet. This pressure depends on the load acting on the travel motors. This pressure keeps the boost check valve inside the high pressure relief valve for this particular side of the closed hydraulic circuit closed.

Cool and filtered oil can now only enter into the closed circuit on the opposite side (low pressure side). The high pressure relief valve limits possibly occurring extreme pressure peaks to the adjusted value. If one of these valves responds, hydraulic oil will flow out of the high pressure side and enter the low pressure side through the corresponding boost check valve.

Since the cross-sections of these valves are very small and the hydraulic oil enters the low pressure side already inside the pump, the system would very quickly overheat if the pressure in the system

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would be permanently relieved via the high pressure relief valves. For this reason the pump is fitted with an additional pressure override valve. The pressure override valve interrupts the pilot oil flow to the control piston, thereby maintaining the pressure level at the adjusted value of the pressure override valve. If the pressure drops again, the pressure override valve will open and the pump can swash back to the previously chosen position. This installation prevents overheating of the hydraulic system and overloading of the diesel engine.

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Control

The servo control of the pump is an integral part of the pump housing and consists mainly of:

- the manually controlled proportional 4/3-way valve
- the control piston
- the feedback lever
- the pilot oil dosing valve
- the swashing cradle with swashing lever

When operating the travel lever the 4/3-way valve will move out of neutral position to the desired direction, thereby guiding the pilot oil flow to the corresponding control piston side. The control piston moves to the corresponding direction and operates the swashing cradle accordingly via the swashing lever.

The feedback lever, which is mounted with its ball head in the pump control shaft, follows the control piston and interrupts the pilot oil flow when the control piston has reached a position corresponding with the displacement of the travel lever. The pump can now deliver oil to the travel motors.

The oil from the opposite control chamber flows through the 4/3-way valve as leak oil into the pump housing.

The supply bores for both control chambers are fitted with nozzles (swashing time nozzles). These nozzles restrict the pilot oil flow and enable very sensitive controlling of the pump.

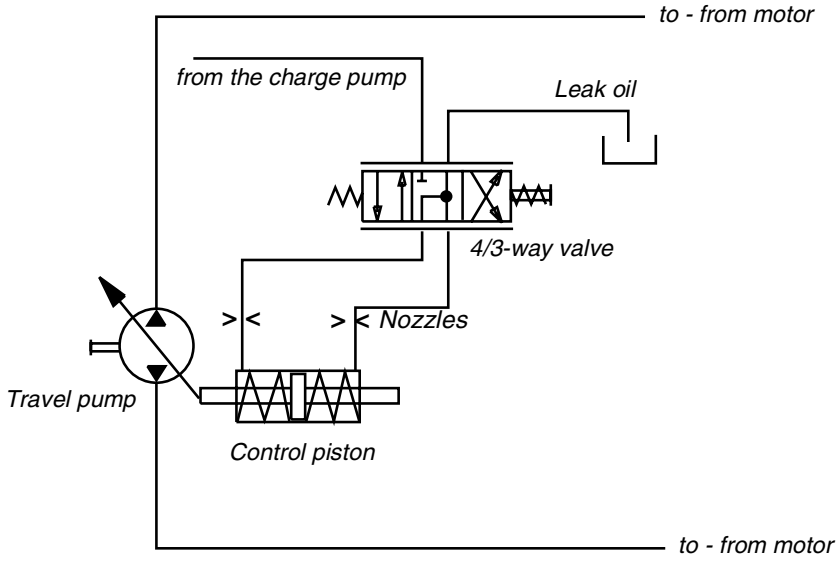


Fig. 5 Control in neutral position

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The feedback lever controls the pilot oil rating valve so that the swashing angle remains unchanged, until a new control command is triggered.

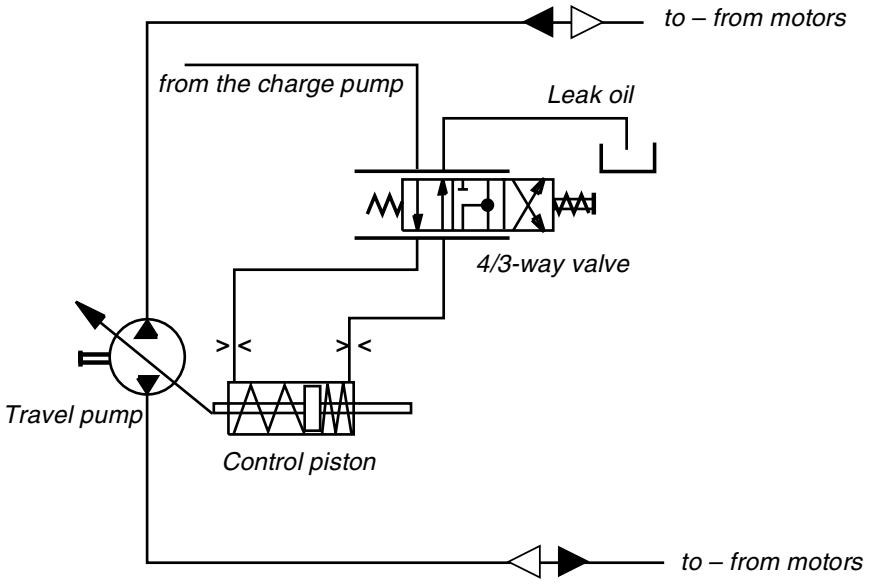
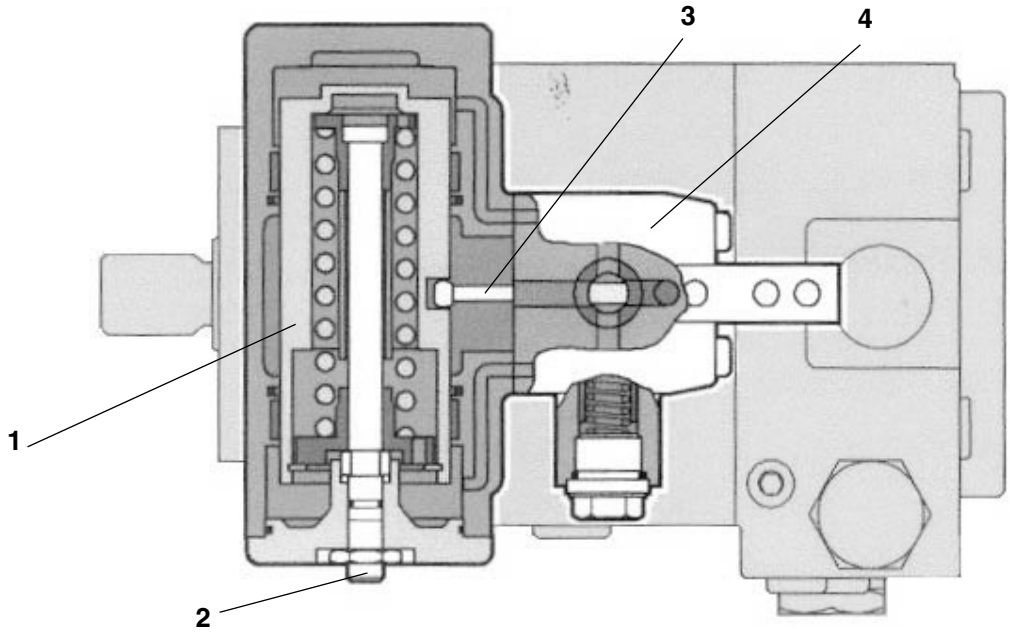


Fig. 6 Control actuated

When the 4/3-way valve is in neutral position, the pressure values in both control chambers are identical (case pressure = max. 3 bar).



1	*Control piston with spring pack*	*2*	*Setscrew mech. 0-position*
3	*Feedback lever*	*4*	*Mech. control unit*

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Charge pressure relief valves

The charge pressure relief valve belongs to the group of safety elements in a closed hydraulic circuit. This valve limits the pressure in the charge circuit to the adjusted value.

The DH/PDH-versions are fitted with a charge pressure relief valve in each travel pump.

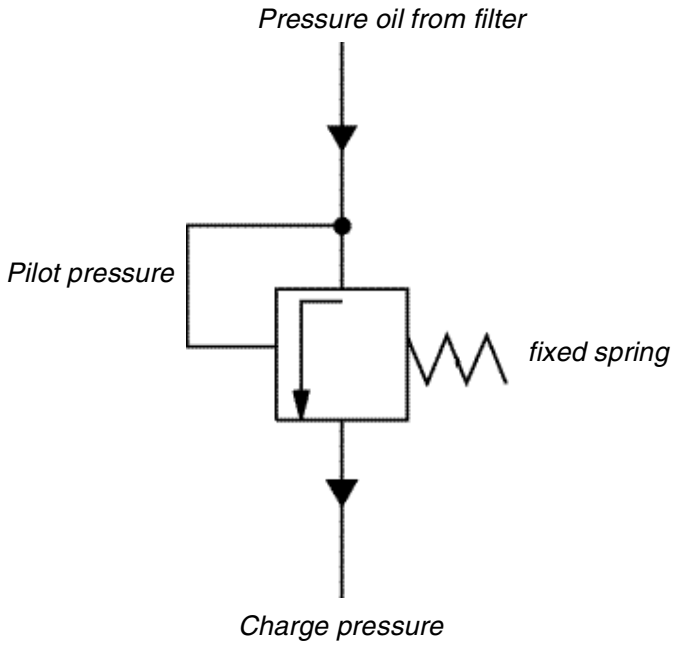


Fig. 7 Charge pressure relief valve

The charge circuit is needed for the compensation of leak oil and flushing quantities in the closed hydraulic circuit. Charge oil is also needed for the pump control, for speed range selection in the axle drive motor and for releasing the parking brake.

Since feeding of cool and filtered oil is only possible on the low pressure side of the closed circuit, the pressure in the low pressure side is identical with charge pressure. If the travel pump is in neutral position, both boost check valves can open and let in oil from the charge circuit. In this case the pressure in both sides of the closed circuit is identical with charge pressure.

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High pressure relief valves

High pressure relief valves are safety elements, which are needed in every hydraulic circuit. These valves limit the pressure in the hydraulic circuit to the value determined by the adjustment spring.

The high pressure relief valves in both sides of the hydraulic circuit protect the hydraulic system, the diesel engine and all other machine components against overloads.

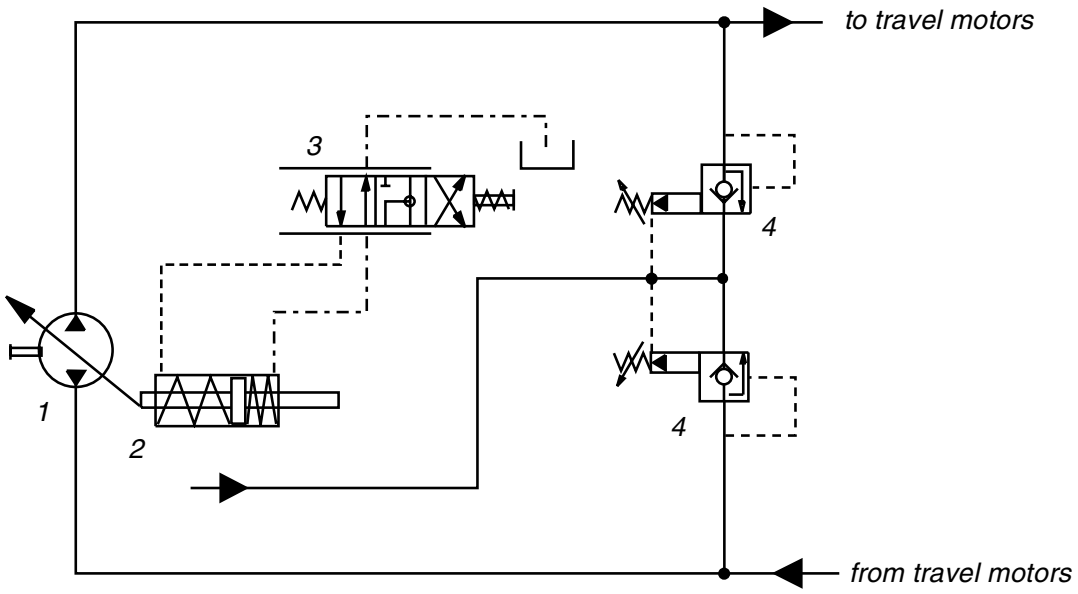


Fig. 8 High pressure relief valves, hydraulic diagram

1 Travel pump

2 Control piston (actuated)

3 4/3-way valve (actuated)

4 High pressure relief valves

The boost check valves are integrated in the high pressure relief valves. These valves open to the low pressure side and allow cool and filtered oil flow from the charge oil circuit to flow into the closed hydraulic circuit, in order to compensate leaks and flushing quantities.

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Pressure override

Since the cross-sections of the high pressure relief valves are very small, longer responding of these valves would cause very quick overloading of the hydraulic circuit and would subsequently lead to severe damage in pump or other components. In order to avoid this, the travel pump is equipped with another safety device, the pressure override.

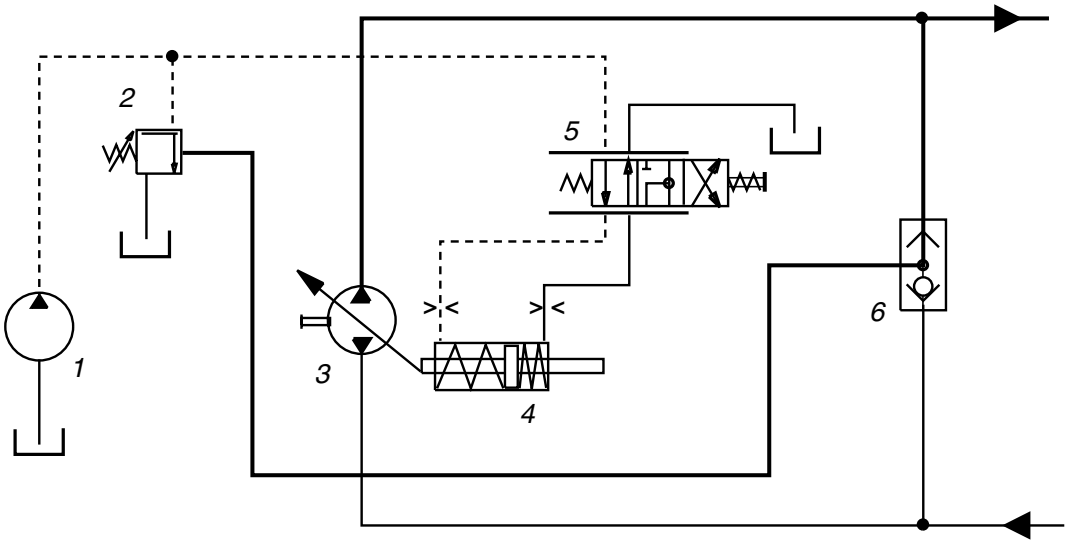


Fig. 9 Pressure override

1 Charge pump
2 Pressure override
3 Travel pump
4 Control piston
5 3/4-way valve
6 Shuttle valve

The pressure override is hydraulically arranged in the pilot oil flow to the pump control before the 4/3-way valve and consists off:

- axial spool with control edges,
- adjustment spring and
- setscrew with counter nut.

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The shuttle valve always connects the spool in the pressure override with the highest pressure in the closed circuit. As long as the pressure in the closed circuit is lower than the setting of the pressure override, the pilot oil flow to the corresponding control chamber is enabled through the 4/3-way valve. The pump can now be actuated up to maximum displacement.

If the pressure reaches the setting of the pressure override, the spool inside the valve will move and cut off the pilot oil flow to the control piston. The pump cannot be actuated any further. The system pressure is maintained at the setting of the pressure override, until the resistance causing this high pressure in the system is overcome or the operator actuates the pump back to neutral position.

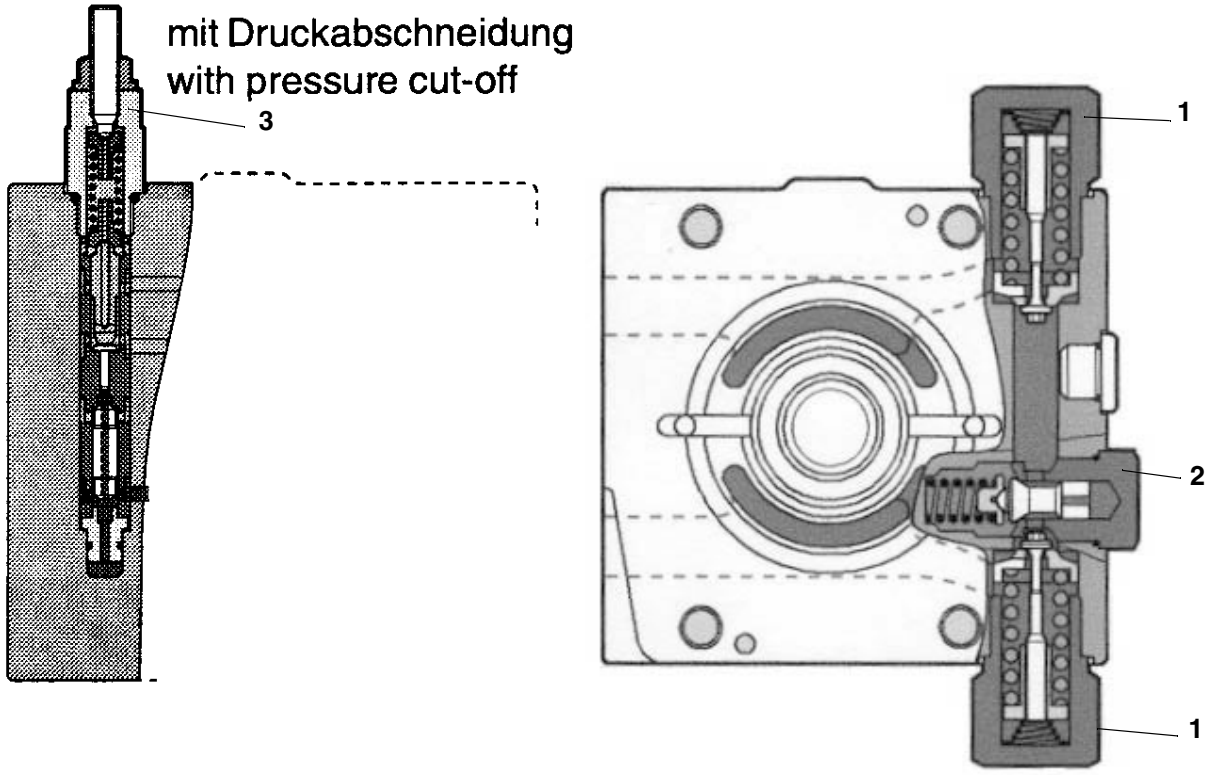


Fig. 10 Valve plate

1 High pressure relief valves

2 Charge pressure relief valve

3 Pressure override

Should the pressure in the closed circuit drop below the setting of the pressure override, the valve spool will be forced back by spring force, whereby the passage between charge circuit and pump control is

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opened again. Now pilot oil can flow to the corresponding control piston side again and the pump can be actuated.

The spring force of the pressure override and its reaction value can be adjusted via the adjustment screw.

Due to the construction and the hydraulic arrangement of the pressure override the high pressure relief valves will not respond. This type of pressure limitation does not release any oil from the closed circuit through the very narrow cross-sections in the high pressure relief valves. This avoids overheating of the hydraulic oil.

In order to ensure a safe function, the setting of the pressure override should always be approx. 10% lower than the setting of the high pressure relief valves.

High pressure relief valve Δp = 380 bar*, i.e. **approx. 405 bar**** absolute pressure (the charge pressure of 25*** bar must be added to the 380 bar*) *(5511.4 psi) **(5874.0 psi) ***(362.5 psi)

Pressure override 380 bar (5511.4 psi)

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Drum drive motor

On all single drum rollers of series BW 145 D-3 / DH-3 / PDH-3 the front drum is driven by a hydralic radial piston motor. On the DH / PDH models these motors are designed for two speed ranges (half displacement = 2nd gear), on the D model the motor is designed with a fixed displacement.

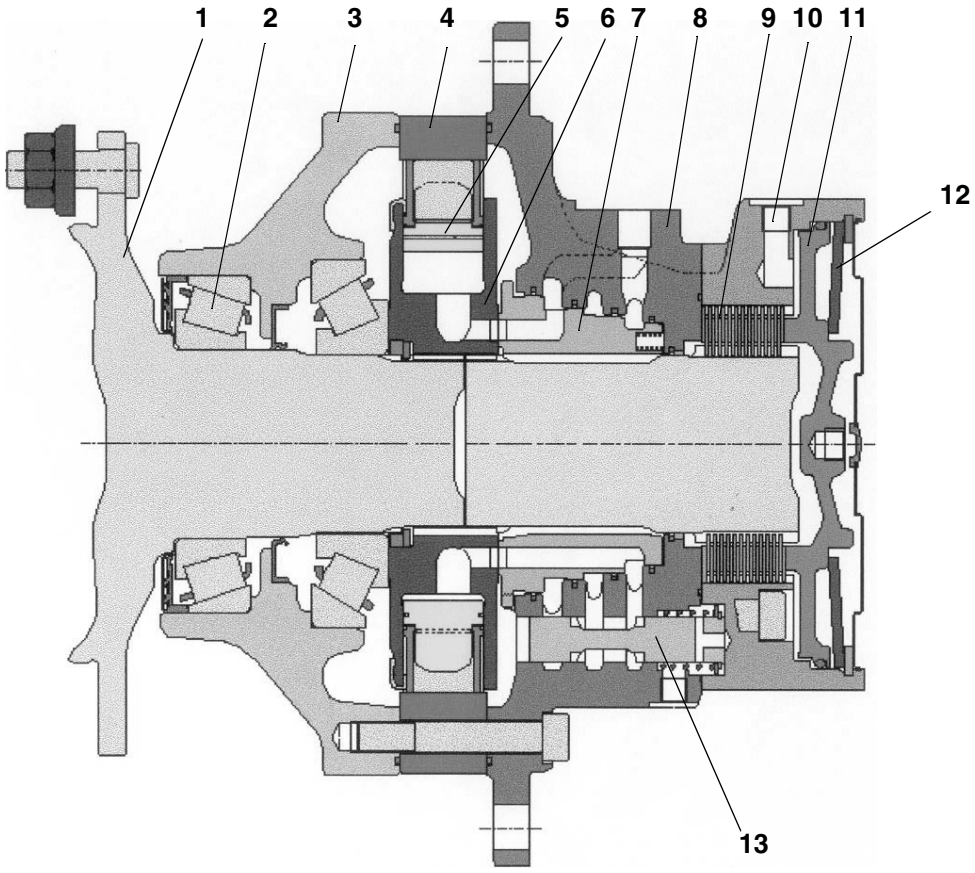


Fig. 11 Drum drive motor Poclain BW 145 D-3 / DH-3 / PDH-3

1	*Drive shaft*	*8*	*Oil distributor*
2	*Tapered roller bearing*	*9*	*Brake discs*
3	*Bearing plate*	*10*	*Brake housing with brake connection*
4	*Cam race*	*11*	*Brake piston*
5	*Working pistons*	*12*	*Brake spring*
6	*Cylinder block*	*13*	*Piston, speed range selection (only DH/PDH models)*

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The housing consists of:

- brake housing
- oil distributor.
- torque module (cam race) and
- bearing plate (bearing for output shaft),

Pressure oil flows through the flat distributor to the working pistons in the cylinder block. This pressure oil presses the working pistons with the rollers against the cam race of the torque section and forces the rollers to roll along the cam race.

During this process the axial movement of the pistons is converted to a radial movement of the cylinder block. The cylinder block transfers this rotation via a splined connection to the output shaft.

The output shaft runs in two tapered roller bearings. It transfers the rotational movement via drive disc and rubber elements to the drum.

The function of the radial piston motor is described hereunder. The piston positions described in this explanation can be seen in the related illustration.

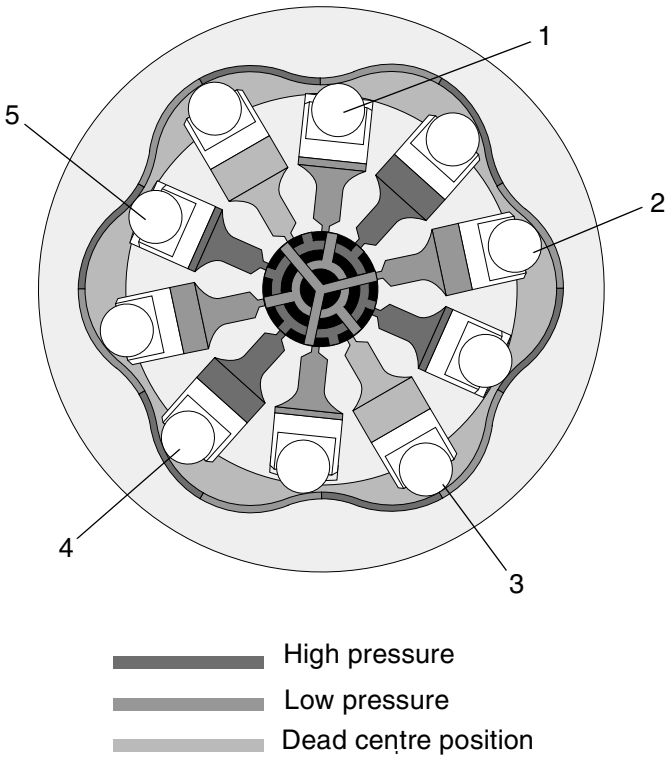


Fig. 12 Function of the radial piston motor

The movement of a piston along the cam race must be examined in several phases during a full rotation:

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Piston position 1:

The oil enters into the oil distributor under pressure, flows through the distributor and presses against the piston. This is the start of a rotation. The pressure applied to the back of the piston moves the roller along the cam and causes a rotation of the cylinder block.

Piston position 2:

At this point the opening cross-section for the oil flow to the piston has reached its maximum size. The piston continues his travel along the cam race towards the valley between two cams. As the rotation progresses the opening cross section for the oil supply becomes smaller and smaller.

Piston position 3:

Once the piston has reached the bottom of the valley, the oil flow to the piston is interrupted. The piston is no longer driven. It has reached its dead centre. Now another piston must be driven to move the first piston out of the dead centre.

Piston position 4:

Other driven pistons now move the first piston out of the dead centre. The oil behind the piston is now connected with the low pressure side and the reverse movement of the piston presses the oil back to the pump.

Piston position 5:

The pumping movement of the motor back to the pump comes to an end, the connecting bore between cylinder chamber and low pressure side slowly closes again. The piston reaches its second dead centre position. This point is the start of a new working cycle.

Reversing the oil flow reverses also the rotation of the motor.

The output shaft is resting in two taper roller bearings. It transmits the rotational movement via drive disc and rubber elements to the drum.

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Travel motor (axle)

All single drum rollers of series BW 145-D-3 / DH-3 / PDH-3 from construction date around 06/2002 (S/N see technical data) are equipped with hydraulic axial piston motors A10VM 63 EZ for the rear wheel drive.

The high pressure sections of this motor are directly connected to the travel pump.

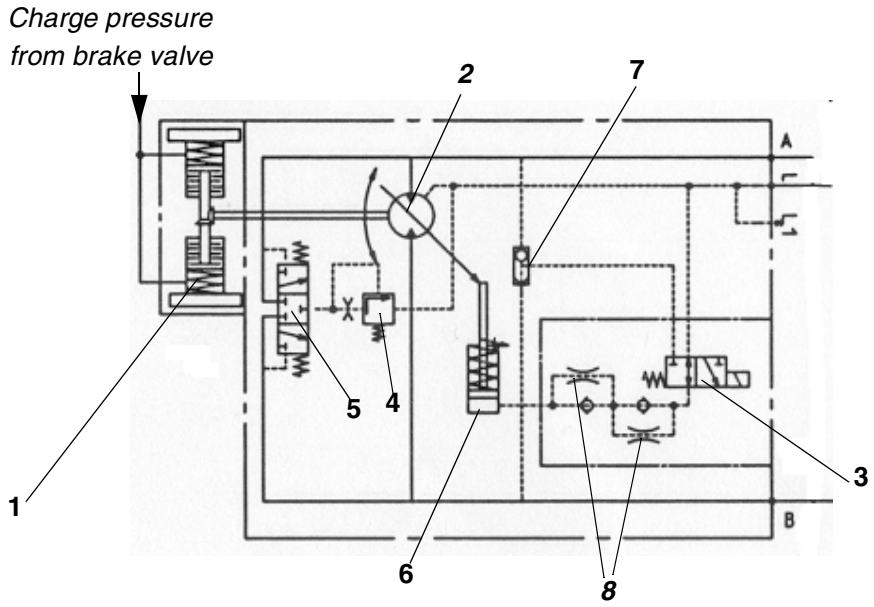


Fig. 13 Hydraulic diagram, axle drive motor

1	*Axle with brake*	*5*	*Flushing valve*
2	*Variable displacement motor*	*6*	*Control piston*
3	*Speed range selector valvewith control solenoid*	*7*	*Shuttle valve*
4	*Flushing pressure relief valve*	*8*	*Switching delay nozzles*

The pressure oil from the pump flows through the respective motor inlet to the back of the working pistons. Since the working pistons are arranged under a certain angle to the axis of the motor, the pressure oil causes and axial movement of the working pistons. The axial movement of the working pistons is transferred to a radial movement of the cylinder block in the motor housing.

Once a piston reaches its top dead centre (max. extension position), it changes over to the low pressure side of the closed circuit. The retaining plate pulls the piston back into the rotating cylinder block, thereby pressing the hydraulic oil through the motor outlet back to the pump.

The travel motor is equipped with an electrically controlled solenoid valve, which enables changing of the motor displacement and thereby the rotary speed of the motor. At high displacement the motor works with a high torque, but also with low speed.

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The displacement and thereby the swashing angle is limited to both sides (Q_{min} and Q_{max}) by setscrews. These setscrews are correctly adjusted in the factory and do n ot need to be adjusted when using original BOMAG motors for replacement. However, if the setscrews have been deadjusted by mistake, the setscrews must be exactly adjusted as shown in Fig. 13 especially on DH / PDH machines (double pump drive), to avoid one travel circuit blocking the other.

The Qmin screw directly limits the swashing angle of the swash plate, the Qmax screw limits the maximum stroke of the control piston.

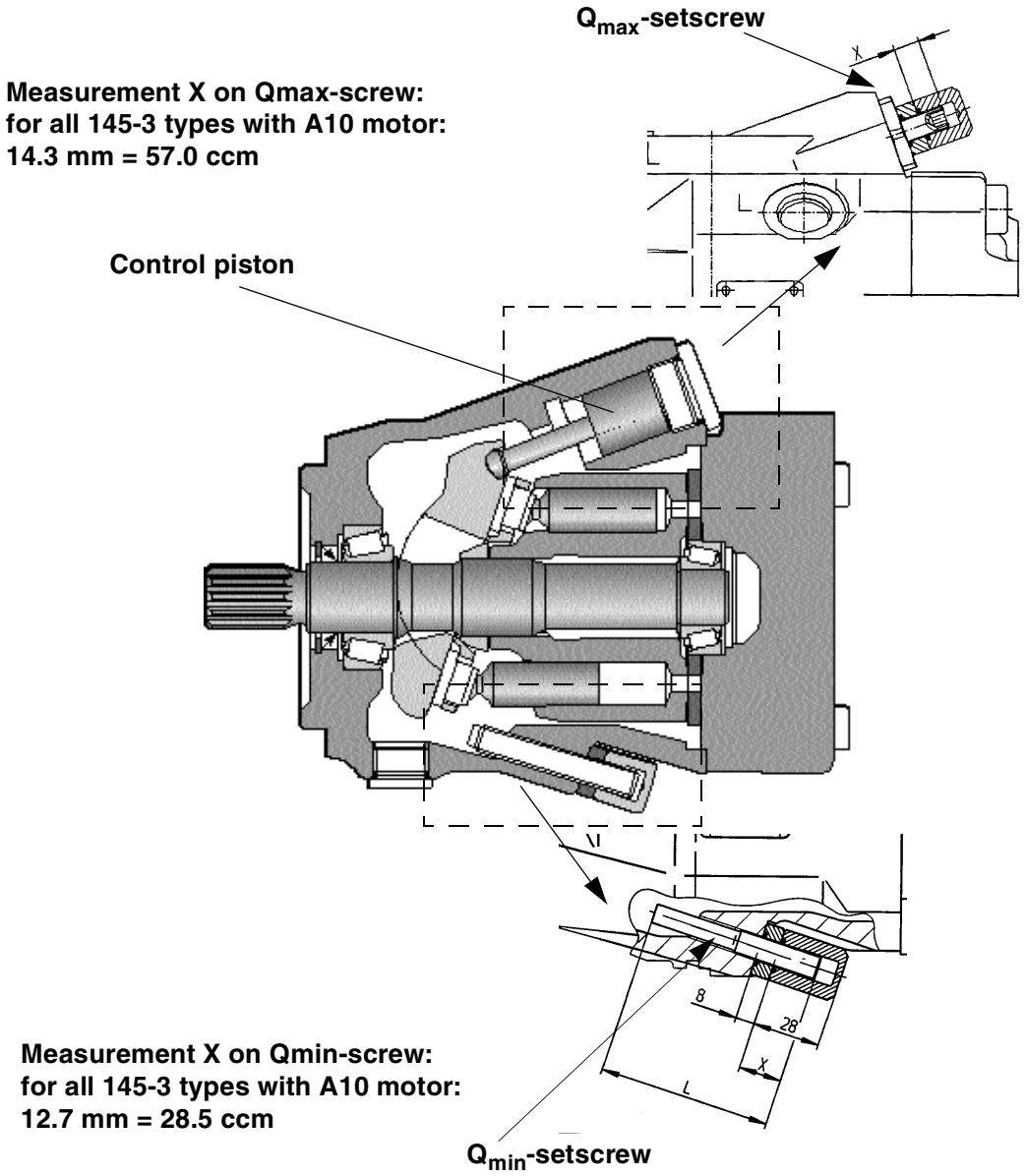


Fig. 14 Axle motor A10 VM 63

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A flushing valve integrated in the travel motor permanently flushes oil out of the low pressure side into the motor housing, in order to supply the circuit permanently with cooled and filtered oil. The flushed out oil leaves the motor together with the leak oil and flows to the tank thermostat.

Test and adjustment points, travel system

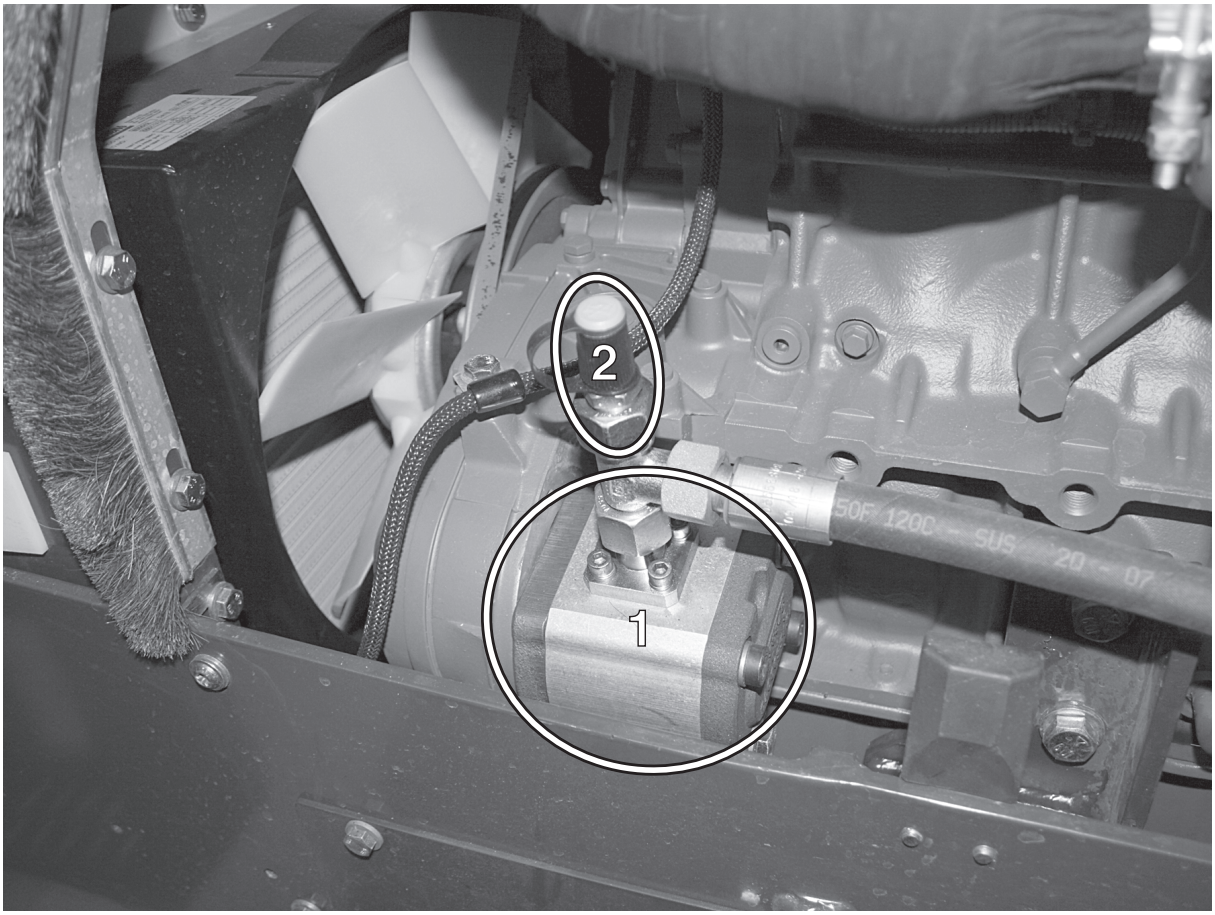


Fig. 15 Charge and steering pump

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Charge and steering pump		09	
2	Steering pressure test port		MB	170 +/- 15 bar*

* (2465.6 +/- 217.5 psi)

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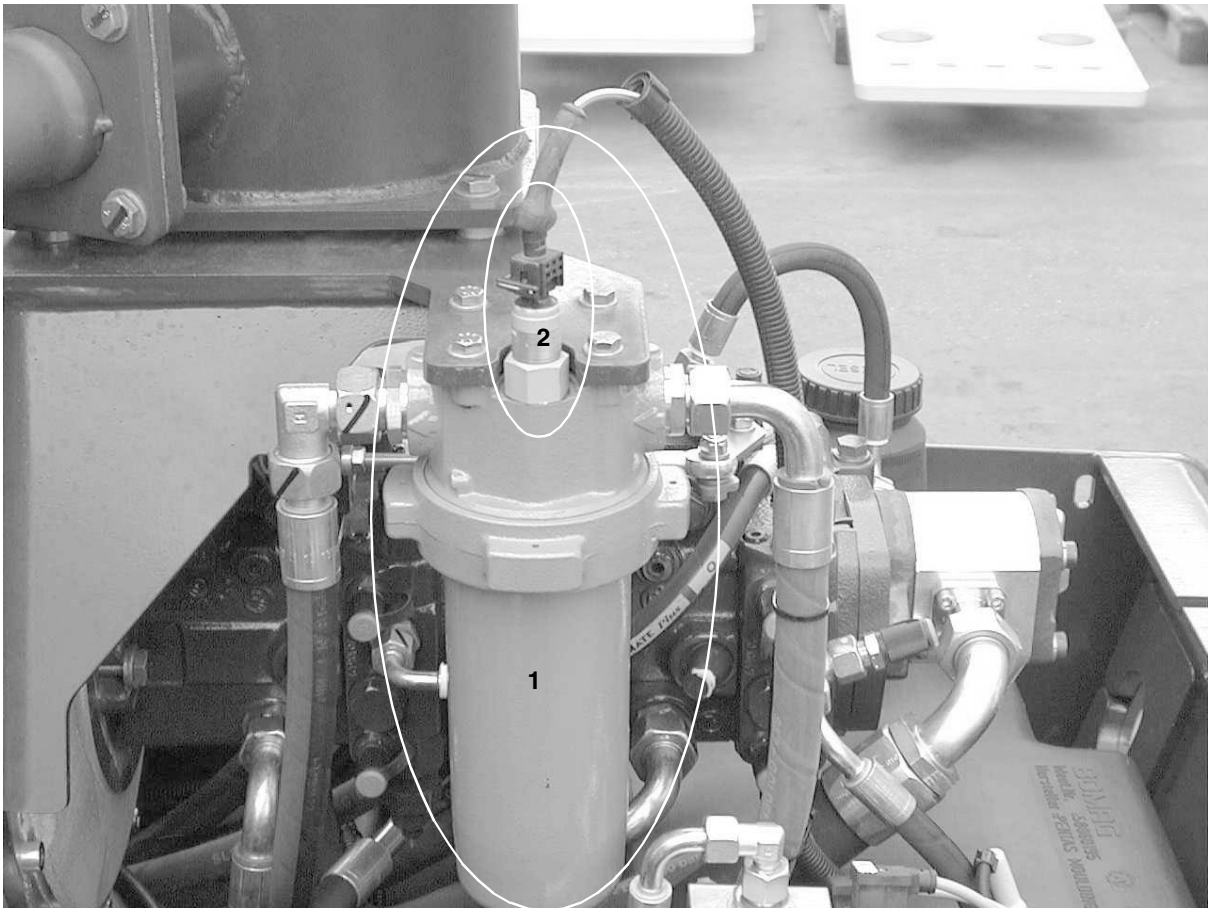


Fig. 16 Charge pressure filter

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Charge pressure filter		07	
2	Differential pressure switch	B21		opened without pressure, 2.5 mbar*

*(0.03 psi)

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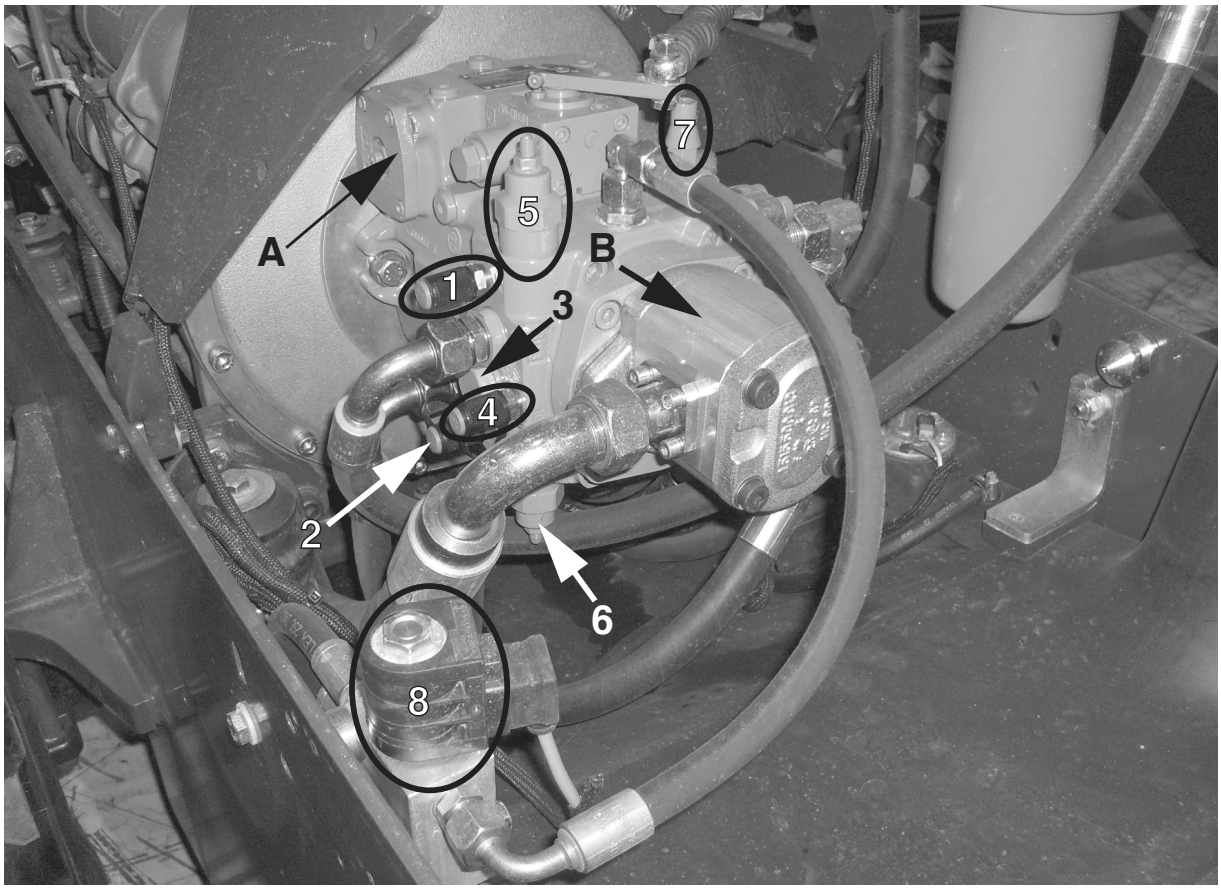


Fig. 17 Pump unit BW 145 D-3

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
A	Travel pump		10	
B	Vibration pump		11	
1	Pressure test port, travel pressure forward		MC (pump MB)	380 +/- 15 bar*
2	Pressure test port, travel pressure reverse		MD (pump MA)	380 +/- 15 bar*
3	Charge pressure relief valve			25 +/- 1 bar**
4	Charge pressure test port		MA	25 +/- 1 bar**
5	High pressure relief valve forward			405 +/- 5 bar*** absolute
6	High pressure relief valve, reverse)			405 +/- 5 bar*** absolute
7	Pressure override			380 +/- 5 bar****
8	Brake valve	Y04		0 / 12 V

*(5511.4+/- 217.5psi) **(362.6+/-14.5psi) ***(5874.0+/-72.1psi) ****(5511.4+/-72.1psi)

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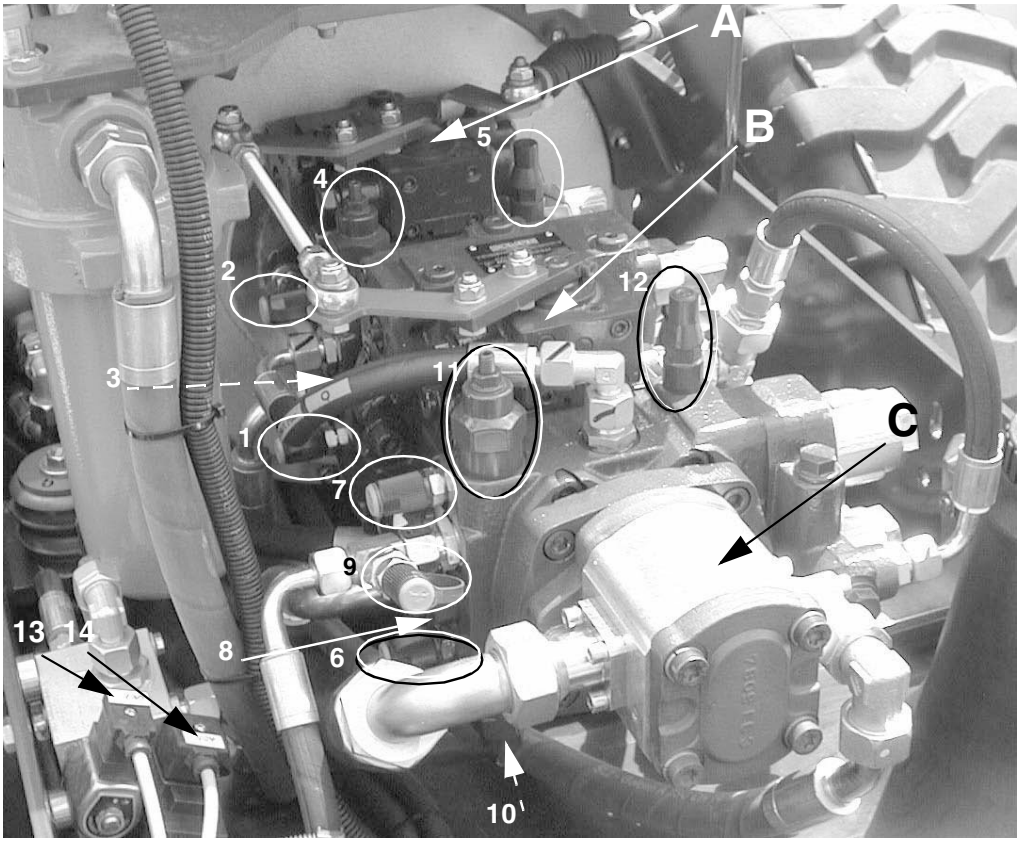


Fig. 18 Pump unit BW 145 DH /PDH -3

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
A	Travel pump, wheel drive		11	
B	Travel pump, drum drive		10	
C	Vibration pump		12	
1	Pressure test port, travel pressure reverse, axle		MD (pump MA)	380 +/- 15 bar*
2	Pressure test port, travel pressure forward, axle		MC (pump MB)	380 +/- 15 bar*
3	Charge pressure relief valve, front pump			25 +/-1 bar**
4	High pressure relief valve forward, front pump			405 +/-5 bar*** absolute
5	Pressure override, front pump			380 +/-5 bar****
6	Pressure test port, travel pressure reverse, drum		MD (pump MA)	380 +/- 15 bar*
7	Pressure test port, travel pressure forward, drum		MD (pump MB)	380 +/- 15 bar*
8	Charge pressure relief valve, rear pump			25 +/-1 bar**

*(5511.4+/- 217.5psi) **(362.6+/-14.5psi) ***(5874.0+/-72.1psi) ****(5511.4+/-72.1psi)

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Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
9	Charge pressure test port		MA	25 +/- 1 bar*
10	High pressure relief valve reverse, rear pump			405 +/- 5 bar** absolute
11	High pressure relief valve forward, rear pump (drum)			405 +/- 5 bar** absolute
12	Pressure override, rear pump			380 +/- 5 bar***
13	Speed range selector valve, drum drive motor	Y30		0 / 12 V
14	Brake valve	Y04		0 / 12 V

*(362.6+/-14.5psi) **(5874.0+/-72.1psi) ***(5511.4+/-72.1psi)

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Fig. 19 Drum drive motor ***BW 145 D-3***

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	High pressure port reverse		12, R	
2	High pressure port forward		12, L	
3	Brake releasing line		12	
4	Cross flushing inlet		12	
5	Cross flushing outlet		12, 1	

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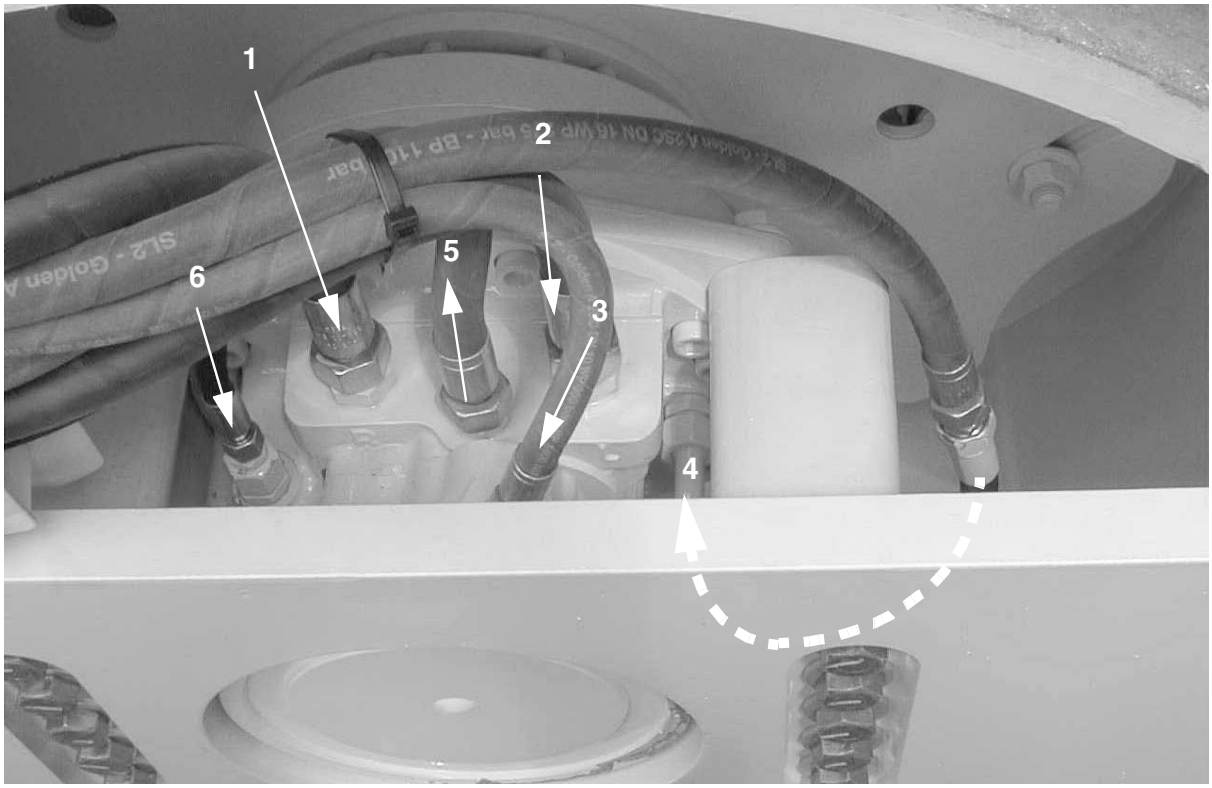


*Fig. 20 Drum drive motor **BW 145 DH / PDH-3***

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	High pressure port reverse		13, R	
2	High pressure port forward		13, L	
3	Brake releasing line		13	
4	Cross flushing inlet		13	
5	Cross flushing outlet		13, 1	
6	Speed range selection		13, Y	

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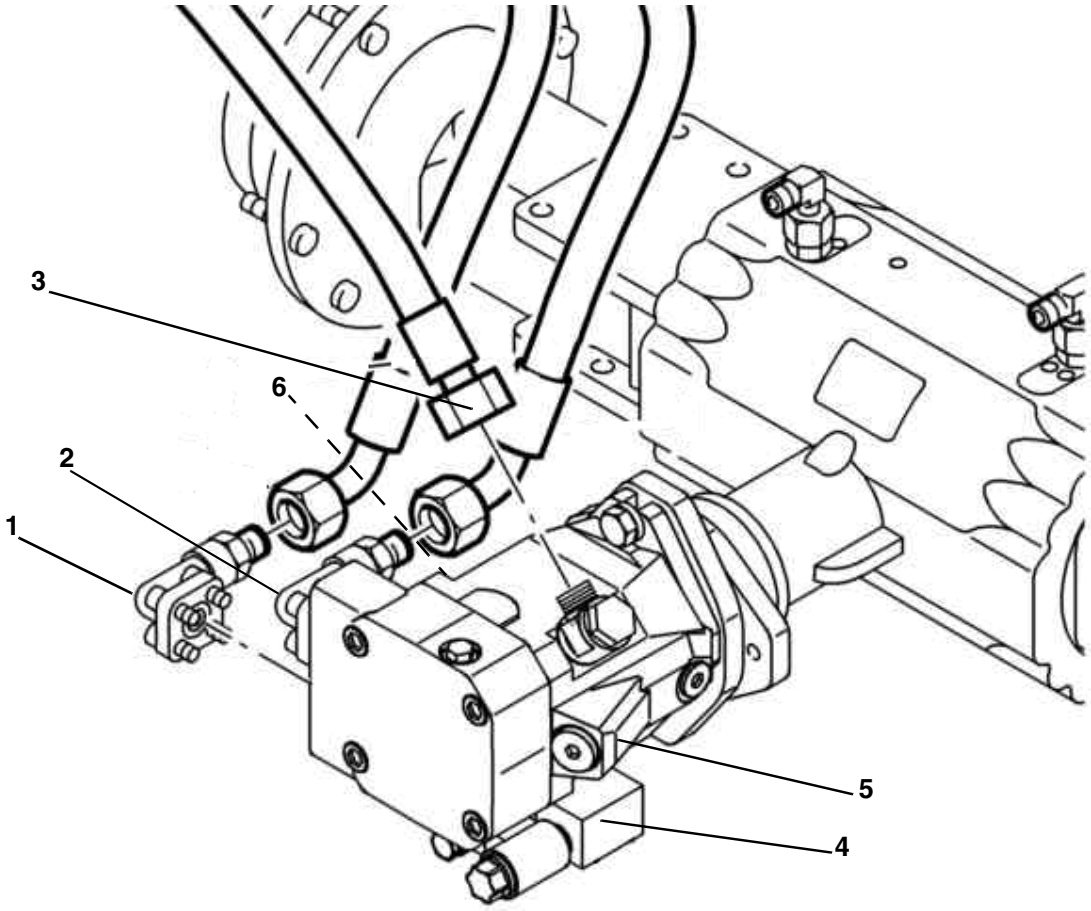


Fig. 21 Axle drive motor A10 VM 63

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	High pressure port reverse		14, B	
2	High pressure port forward		14, A	
3	Leakage line (incl. flushing oil)		14, T	
4	Speed range selector valve	Y31	14	
5	Qmax setscrew		14	
6	Qmin setscrew		14	

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Adjustment / inspection of the double pump actuation kinematics

The two pumps of the tandem travel pump unit (only BW 145 DH / PDH-40) must deliver absolutely identical flow rates for drum and axle drives. If this is not true the travel system will lock up, the system will overheat and the machine does not reach the full travel power.

For this reason the mechanical control kinematics must be exactly adjusted. The adjustment / inspection of the adjustment must be performed as follows:

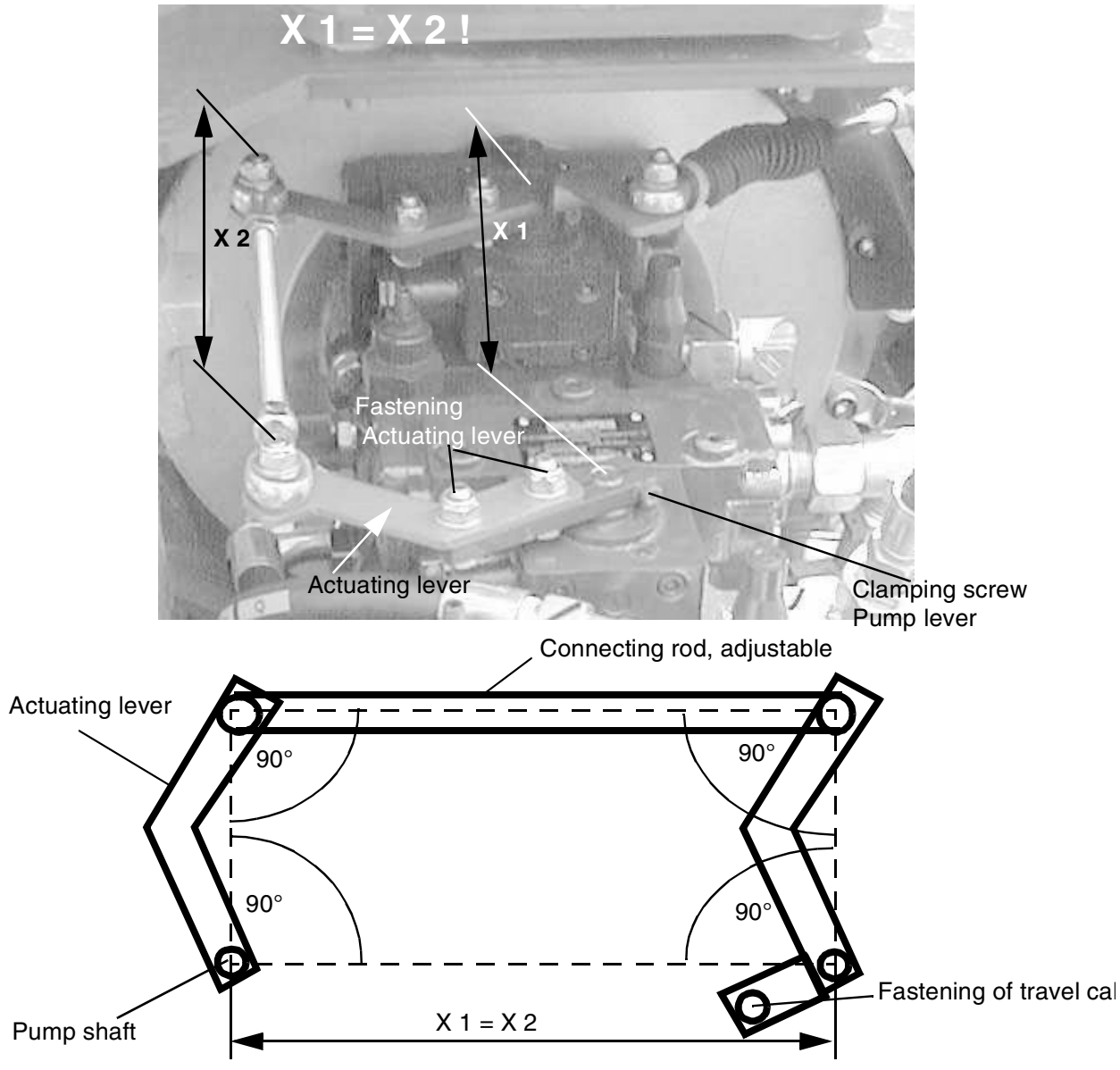


Fig. 22 Adjusting the actuating kinematics

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- Detach the travel cable (front pump)
- make sure that the fastening screws of the actuating levers are tightened on the pump lever and that the actuating levers are not damaged / bent.
- Slacken the pump lever clamp screws, so that the levers can rotate freely on the shafts. This is necessary, so that the pump control shaft stays in neutral position during the following adjustment.
- Measure dimension X 1 between the centres of the control shafts.
- Measure dimension X 2 between the centres of the fastening screw heads on the connecting rod. The ´values for X 1 and X 2 must be identical. Furthermore, the 4 points – centres of pump shafts and pivot points of the connecting rod – must form an imaginary rectangle (4 x 90°, see sketch). If necessary adjust dimension X 2 on the connecting rod. For this purpose slacken the counter nut and turn the rod. After the adjustment tighten the counter nut again and check dimension X2 again.
- Retighten the clamp screws for the pump levers.
- Pull the plug off the brake valve, connect 600 bar pressure gauges to all 4 travel pressure test ports Start the machine and check all pressures in neutral position. All pressure test ports must only show charge pressure. Otherwise the pump adjustment needs to be corrected as described above.
- Set the travel lever on the operator's platform to neutral position. Then check whether the bore in the travel cable aligns with the bore in the actuating lever. If necessary correct the travel cable adjustment at the guide tube fastening point.
- Attach the travel cable to the actuating lever.
- Check the pressures once again at neutral position.

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Trouble shooting

The following trouble shooting chart contains a small selection of possible faults, which may occur during operation of the machine. The fault list is by no means complete, however, the fault table is based on the experience of the central service department, i.e. the list covers almost all faults that have occurred in the past.

Procedure:

The following trouble shooting table contains both electrical as well as mechanical and hydraulic faults.

The number specified in the table indicate the probability of the fault cause and thereby the recommended trouble shooting sequence, based on our latest field experience.

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TROUBLE SHOOTING TRAVEL SYSTEM BW 145-FAMILY

SYMPTOMS	Machine does not drive (in either direction)	Machine drives only in one direction	Machine drives with travel lever in 'neutral' position	Max.Travel speed is not reached	Hydraulic oil too hot						
POSSIBLE CAUSES											
Bake valve (electrical/mechanical/hydraulical)	1										
Bremse in Fahrmotor / Achse (mechanisch/hydraulisch)	3			2	3						
Speed range selector switch Position /defective/wiring				1							
Charge pump / Charge pressure relief valve(s) ditry/defective	2			3							
Pump control (Servo control)	3	1	2	3							
High pressure cut off/ High pressure relief valves travel pump dirty/misadjusted/defective	3	2		3	3						
Travel cable adjustment			1	2							
mech. Neutral position travel pump			3	3							
Adjustment of actuation kinematics travel pump (DH/PDH only)				2	2						
Travel pump(s) defective	3		3	2							
Qmax-Adjustment Axle drive motor					2						
Qmin-Adjustment Axle drive motor				2	2						
Flushing valve Axle drive motor sticks		3									
Travel Motor(s) defective	3			3							
Hydraulic oil cooler dirty (internally/externally)					1						
Thermostat (Hydraulic) dirty/sticky/defective					2						
Coupling Engine-Pump	2										
Diesel Engine				1							

TROUBLE SHOOTING

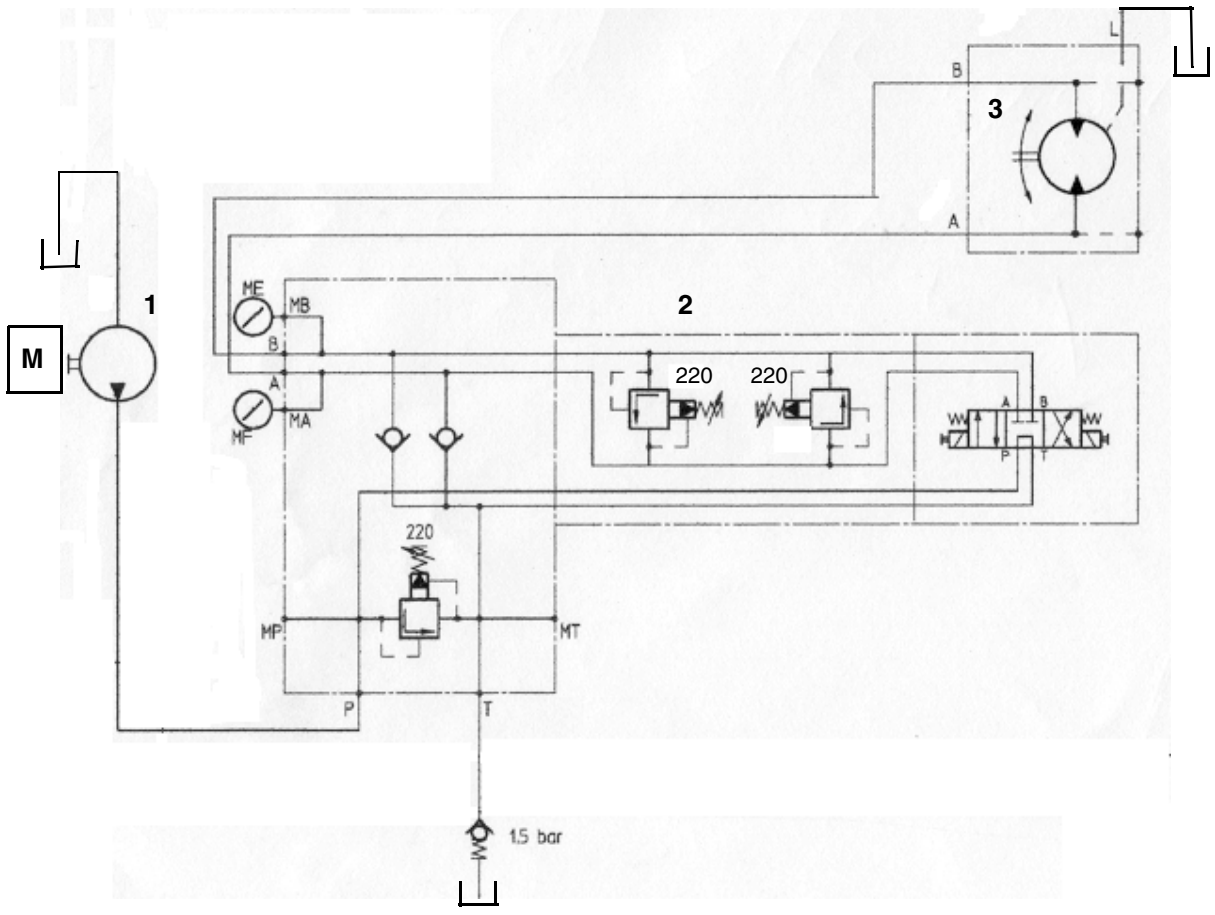
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Vibration system

The vibration system of the single drum rollers BW 145 of generation 40 works with two amplitudes. This enables perfect adaptation of the machine to various types of soil and different applications.

The vibration drive is an open hydraulic circuit. The circuit consists of:

- the vibration pump,
- the vibration control valve with integrated safety elements,
- the pressure resistant connecting hoses.
- and the vibration motor



1 Vibration pump

2 Vibration control valve with integrated safety elements

2 Vibration motor

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Vibration pump and travel pump are joined together to a tandem or triple pump unit. This unit is directly driven by the diesel engine.

The vibration pump is a gear pump and therefore delivers a permanent oil flow, as soon as the engine is running. In neutral position of the vibration control valve the complete oil flow is directed through the vibration control valve back to the tank. When actuating the 4/3-way solenoid valve on the vibration control valve out of neutral to one of the two possible positions, oil is delivered to the vibration motor. The vibration motor starts and rotates the vibrator shaft inside the drum.

Depending on the switching position of the vibration control valve the oil is delivered to inlet ports A or B on the vibration motor. This results in two different directions of rotation of the exciter shaft.

The eccentric weights on the vibrator shaft are fitted with additional change-over weights. Depending on the sense of rotation of the vibrator shaft these change-over weights add to or subtract from the basic weights.

This results in the following constellations:

- Basic weight + change-over weight = high amplitude
- Basic weight - change-over weight = low amplitude

After the oil has left the vibration motor it flows back through the vibration control valve to the tank. The tank is equipped with an upstream 1.5 bar* pressure relief valve *(21.7 psi).

When switching the vibration off the vibration motor for a short moment works as a pump, because the kinetic energy of the exciter shaft must first be eliminated. This energy is relieved through the respective secondary high pressure relief valve /220 bar** inside the vibration control valve. In order to avoid cavitation, the respective low pressure side of the vibration motor is connected with an anti-cavitation valve inside the vibration control valve. The anti-cavitation valves then deliver oil from the 1.5 bar*** preloaded pump flow back to the tank.
(3190.8 psi) *(21.7 psi).

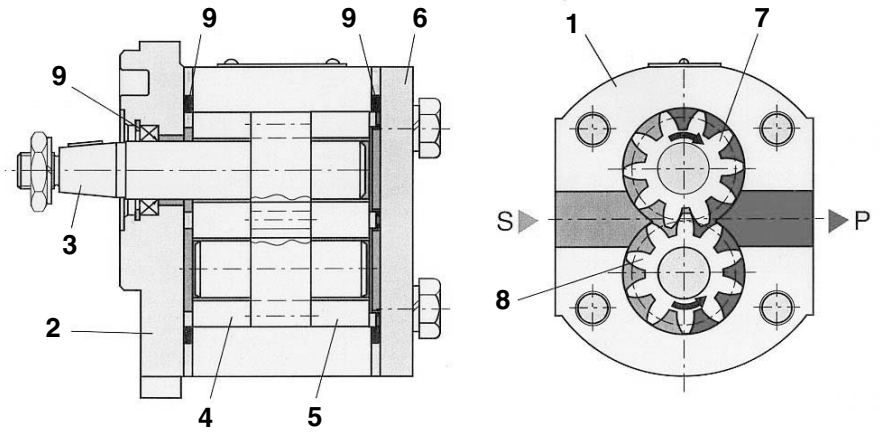
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Vibration pump

The vibration pump is a gear pump with fixed displacement.

The pump flow rate is proportional to the engine speed.

The pump is mounted to the back of the travel pump unit and is driven by the diesel engine via a mechanical through-drive. The pump draws the hydraulic oil from the hydraulic oil tank.



1	*Housing*	*4, 5*	*Bearing plates*	*9*	*Seals*
2	*Flange*	*6*	*Cover*		
3	*Shaft*	*7, 8*	*Pinions*		

Function of the gear pump

Drive gear and driven gear are positioned by a bearing plate in such a way, that the teeth of both gears mesh with minimum clearance when rotating.

The displacement chambers are formed between the tooth flanks, the inside wall of the housing and the faces of the bearing plates. The chambers transport the hydraulic oil from the suction side to the pressure side. This generates a vacuum in the suction line, which draws the hydraulic oil out of the tank. These tooth chambers transport the hydraulic oil along the inside wall of the housing from the suction side to the pressure side, from where it is pressed to the consumers. To ensure a safe function of the pump the tooth chambers must be so tightly sealed that the hydraulic fluid can be transported from the suction side to the pressure side without any losses.

Outer gear pumps are provided with gap seals. This results in pressure level dependent fluid losses from the pressure side to the suction side. An axial pressure field presses the bearing plate on the cover side against the front face of the gears, making sure that only a very little quantity of oil will leak from the pressure side to the suction side when the pressure increases during operation.

The pressure field is always under system pressure.

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Vibration control valve

The vibration control valve contains the following functions:

- Vibration on and off
- Changeover of amplitude
- Pressure limitation (primary and secondary side).

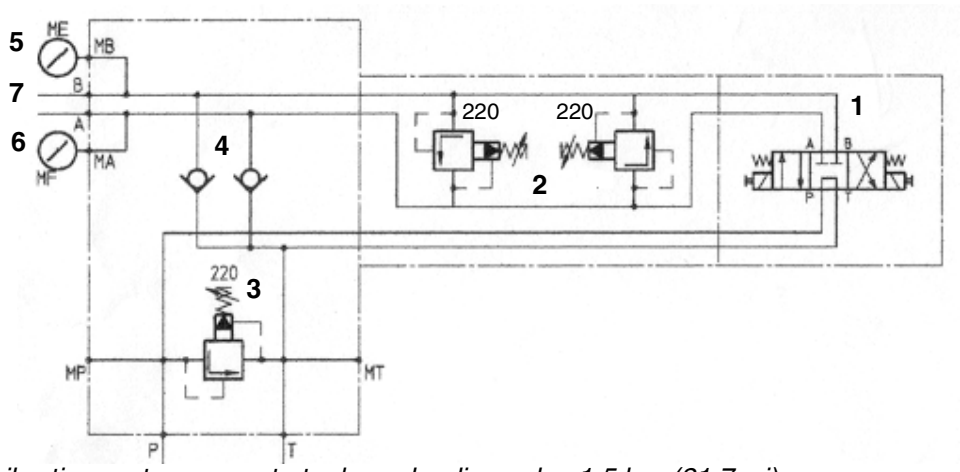


Fig. 1: Vibration control valve, hydraulic diagram

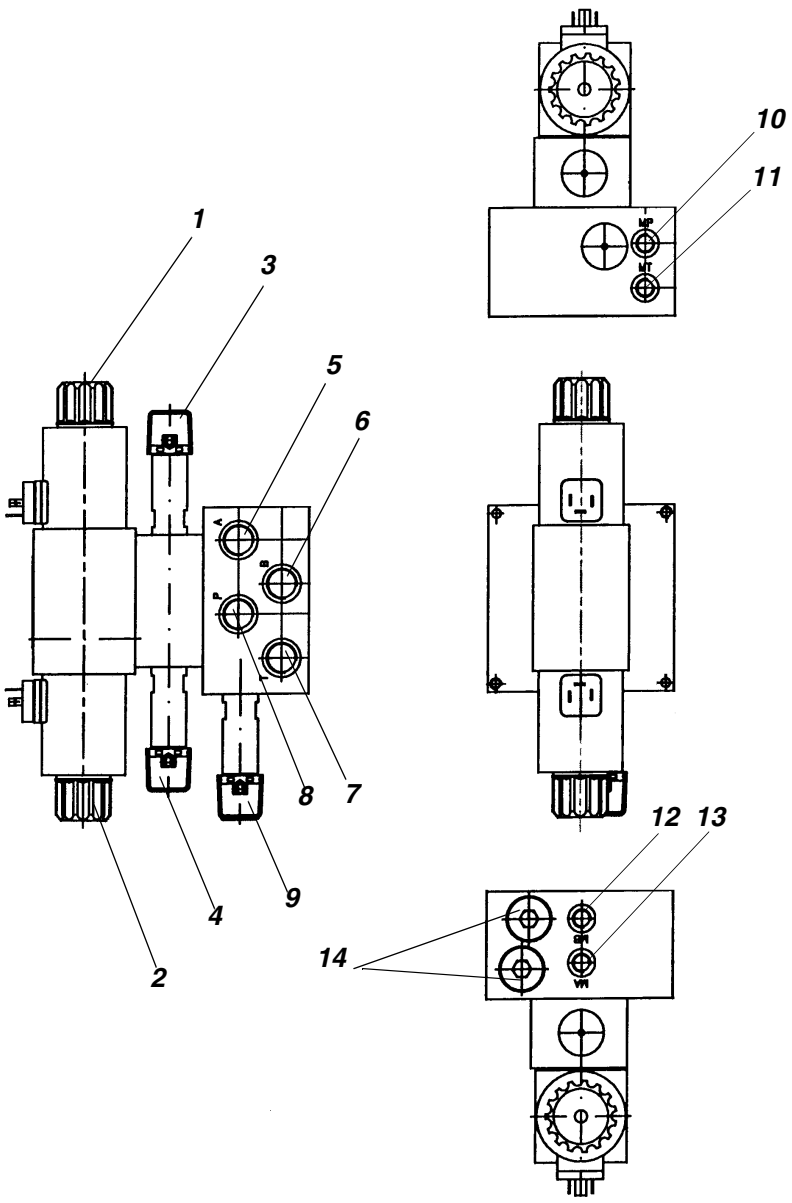
1	*4/3-way solenoid valve*	*4*	*Anti-cavitation valves*
2	*Secondary pressure relief valve*	*5*	*Test port for high amplitude*
3	*Primary pressure relief valve*	*6*	*Test port for low amplitude*
7	*Outlets to the vibration motor*		

When the engine is running the full flow volume from the vibration pump is permanently applied to port P of the vibration control valve. As long as the vibration is switched off the spool of the 4/3-way solenoid valve is in neutral position. In this position the complete flow volume flows through the internal connection in the valve back to the tank.

When switching the vibration on, one of the solenoids (depending on the selected amplitude) is supplied with
12 V, the spool of the 4/3-way valve moves to the corresponding position, the vibration starts. Since the exciter shaft has to overcome its moment of inertia during the acceleration process, a so-called vibration start-up pressure wilol build up for a short moment, which is limited by the promary pressure relief valve in the control valve block.

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When switching the vibration off the vibration motor for a short moment works as a pump, because the kinetic energy of the exciter shaft must first be eliminated. Depending on the sense of rotation this energy is relieved through the respective secondary high pressure relief valve (220 bar*) inside the vibration control valve. In order to avoid cavitation, the respective low pressure side of the vibration motor is connected with an anti-cavitation valve inside the vibration control valve. The anti-cavitation valves then deliver oil from the 1.5 bar** pre-loaded pump flow back to the tank. *(3190.8 psi) **(21.7)



1 *Solenoid valve Y08*

2 *Solenoid valve Y07*

3 *Secondary pressure relief valve*

4 *Secondary pressure relief valve*

5 *Outlet A, low amplitude*

6 *Outlet B, high amplitude*

7 *Output T, to tank pre-load valve*

8 *Input P, from vibration pump*

9 *Primary pressure relief valve*

10 *Test port for test connection MP*

11 *Test port for test connection MP*

12 *Pressure test port MB, high amplitude*

13 *Pressure test port MA, low amplitude*

14 *Anti-cavitation valves*

Fig. 2: Vibration control valve, external views

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4/3-way solenoid valve

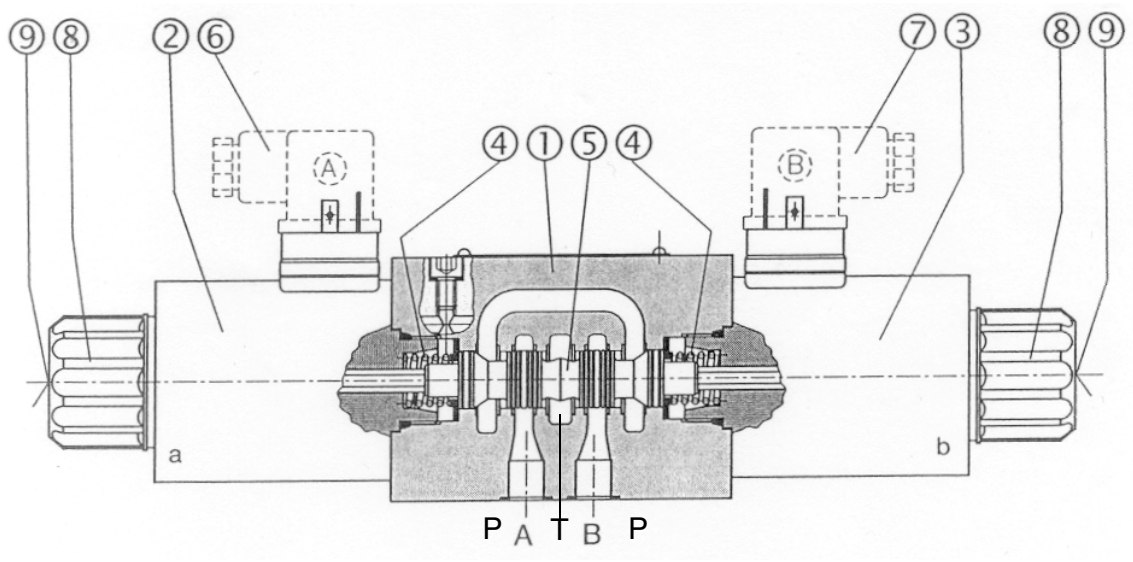


Fig. 3: 4/3-way solenoid valve

1 Valve housing
2 Magnetic coil
3 Magnetic coil
4 Centring springs
5 Control piston
6 Plug
7 Plug
8 Fastening nut
9 Emergency operation (only with special control pin)

The valve spool geometry is designed in such a way that P and T are joined in neutral position and that all channels are connected when switched.

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Pressure relief valves

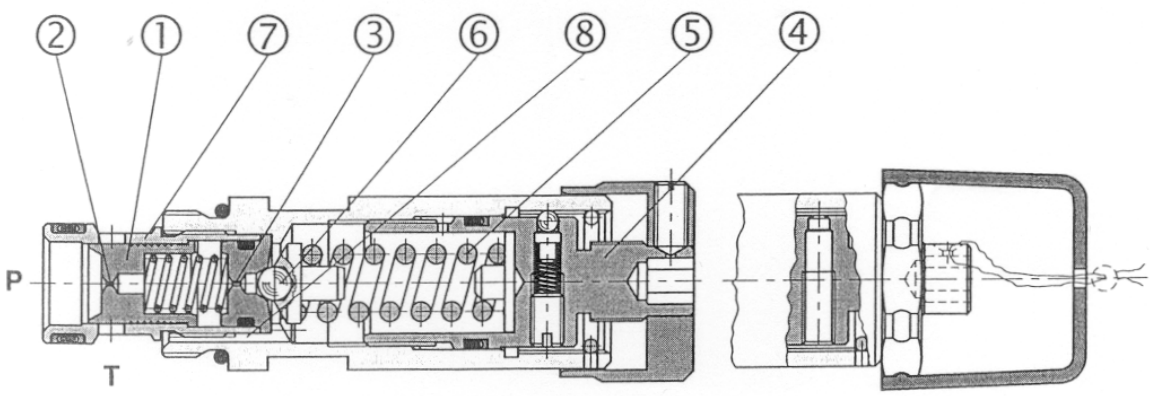


Fig. 4: Primary and secondary pressure relief valve

1 Control piston
2 Nozzle
3 Nozzle
4 Setscrew
5 Spring
6 Ball, pilot control valve
7 Bushing
8 Groove

The pressure relief valves on primary and secondary side are similar in design and pressure setting. These valves are pilot controlled pressure relief valves. The primary valve limits the vibration start-up pressure, the secondary valve protects the system against overpressure when switching the vibration off.

The pressures are adjusted by the setscrew (*Fig. 4, Pos. 4).* If no pressure is applied the valve is closed. Pressure is applied to the front face of the control piston *(Pos.1)* and, at the same time, through nozzle *(Pos. 2)* on its spring loaded back and also through nozzle *(Pos. 5).* on the ball *(Pos. 6)* of the pilot control valve.
When the increasing pressure reaches the value determined by spring *(Pos.5)*, the pilot control valve will open and the pilot oil flow is released. The spring loaded side of the control piston is relieved, the function edge of the control piston opens the radially arranged bores in the bushing *(Pos. 7)* and the oil flows from P to T. The pilot oil is discharged through the groove *(Pos.8)* to port T.

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Anti-cavitation valves

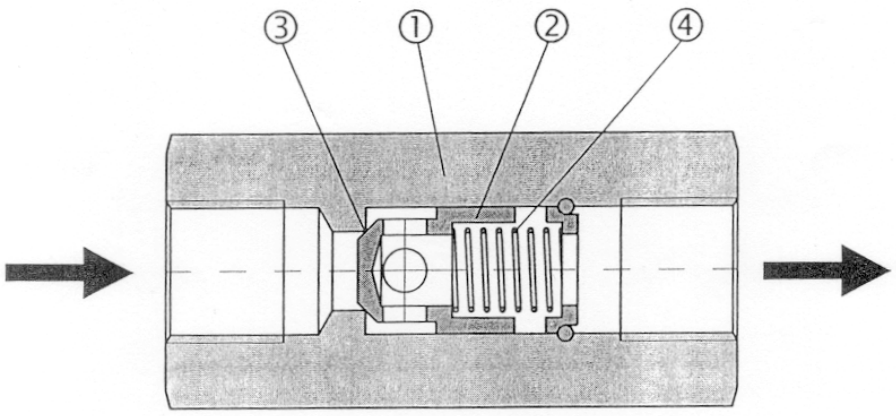


Fig. 5: Anti-cavitation valve

1 Housing
2 Cone
3 Valve seat
4 Spring

The anti-cavitation valves are fixed spring loaded check valves, which protect the low pressure side against cavitation when switching the vibration off.

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Vibration motor

The vibration motor is a swash plate type axial piston motor with fixed displacement of series MMF 025 from Sauer-Sundstrand. Since the motor is designed for pressure application from both sides, it is most suitable for closed circuit installation and alternating loads.

The output speed of the motor depends on the oil quantity supplied by the vibration pump. As this oil quantity solely depends on the engine speed, the exciter frequency also depends on the engine speed.

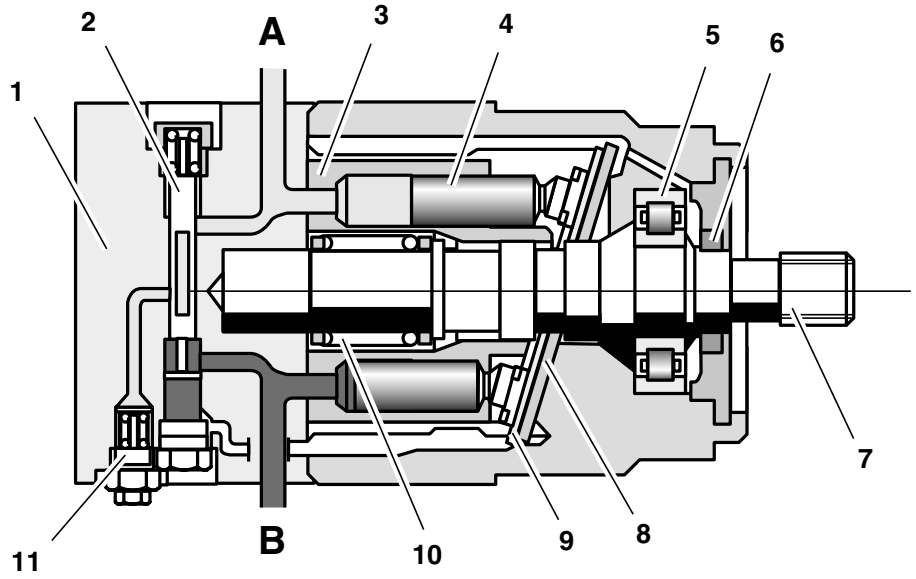


Fig. 6: Cross-sectional view of vibration motor

1	*Connecting plate*	*7*	*Output shaft*
2	*Flushing valve*	*8*	*Swash plate*
3	*Cylinder block*	*9*	*Retaining plate*
4	*Pistons with slipper pads*	*10*	*Pre-loading spring*
5	*Roller bearing for output shaft*	*11*	*Flushing pressure relief valve*
6	*Radial seal*		

When switching the vibration on the motor must first accelerate the resting vibration shaft up to maximum speed. This resistance causes a hydraulic starting pressure, which is limited to 220 bar* by the primary high pressure relief valve inside the vibration control valve. Once the vibrator shaft has reached its final speed, the pressure will drop to a value between 45 and 65 bar** (operating pressure). This pressure mainly depends on the condition of the soil (degree of compaction, material etc.).
*(3190.8 psi) **(652.6 and 942.7 psi).

- Hard ground = high operating pressure
- Loose ground = low operating pressure

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After the oil has left the vibration motor it flows back through the vibration control valve to the tank. The tank is equipped with an upstream 1.5 bar (21.7 psi) pressure relief valve.

When switching the vibration off the vibration motor for a short moment works as a pump, because the kinetic energy of the exciter shaft must first be eliminated. This energy is relieved through the respective secondary high pressure relief valve /220 bar*) inside the vibration control valve. In order to avoid cavitation, the respective low pressure side of the vibration motor is connected with an anti-cavitation valve inside the vibration control valve. The anti-cavitation valves then deliver oil from the 1.5 bar** preloaded pump flow back to the tank.
**(3190.8) **(21.7)

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Drum

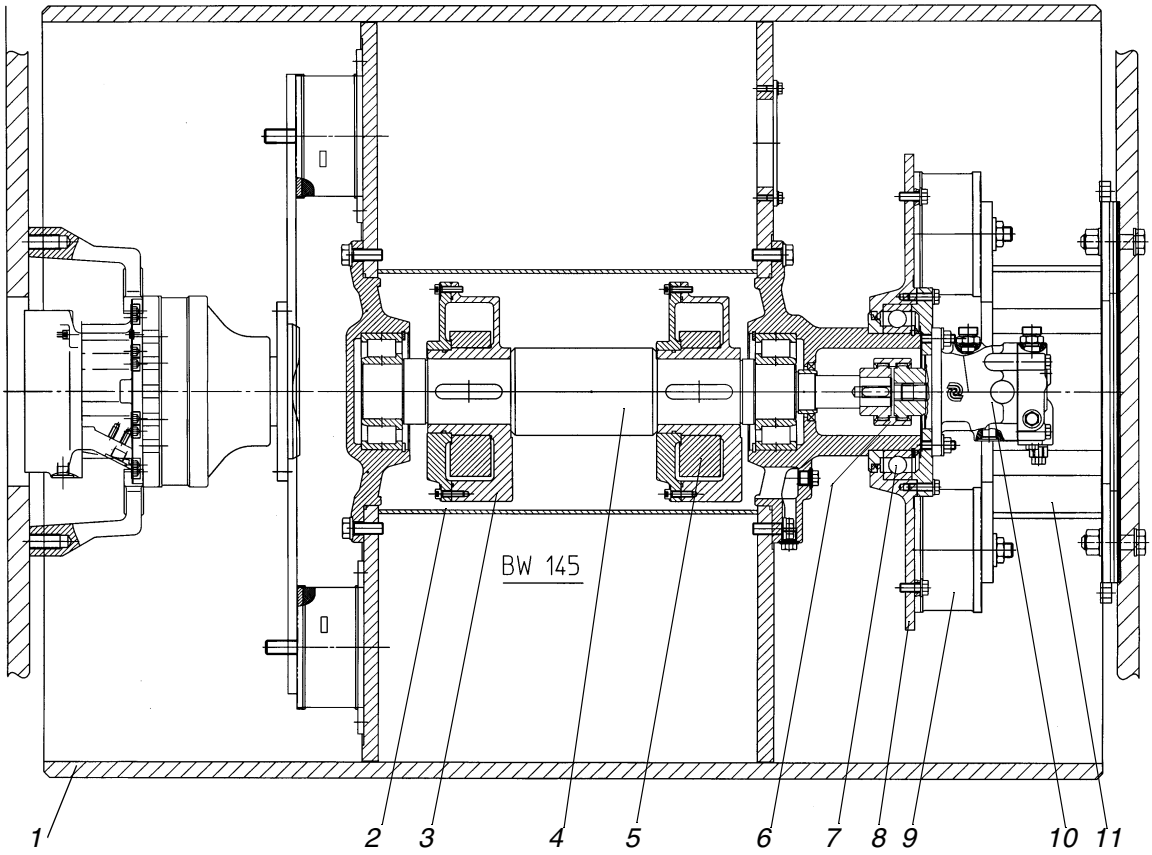


Fig. 7 Cross-sectional view of drum

1	*Drum shell*	*7*	*Travel bearing*
2	*Vibration bearing housing*	*8*	*Travel bearing housing*
3	*Basic weight*	*9*	*Rubber buffer*
4	*Vibrator shaft*	*10*	*Vibration motor*
5	*Change-over weight*	*11*	*Flanged housing*
6	*Coupling vibr.-motor – vibrator shaft*		

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Test and adjustment points in vibration system

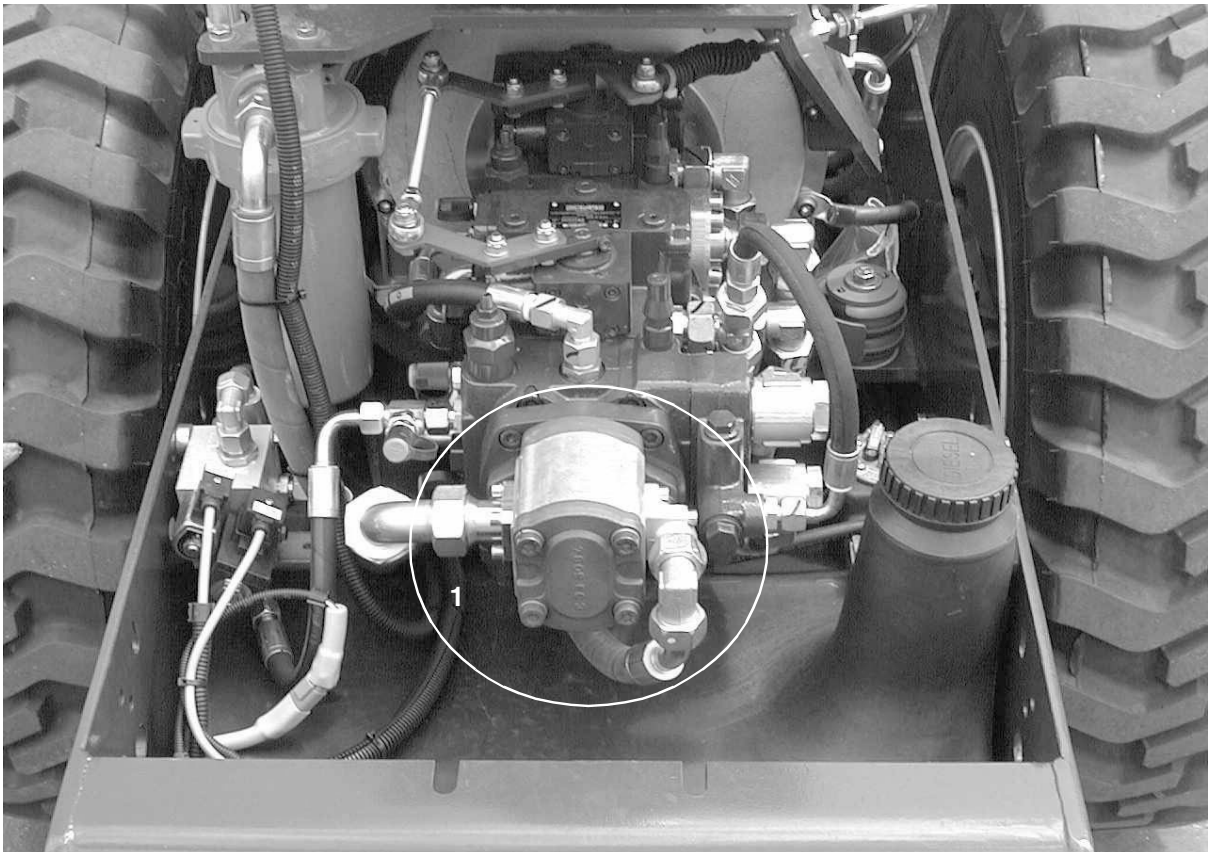


Fig. 8 Vibration pump

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Vibration pump		12	

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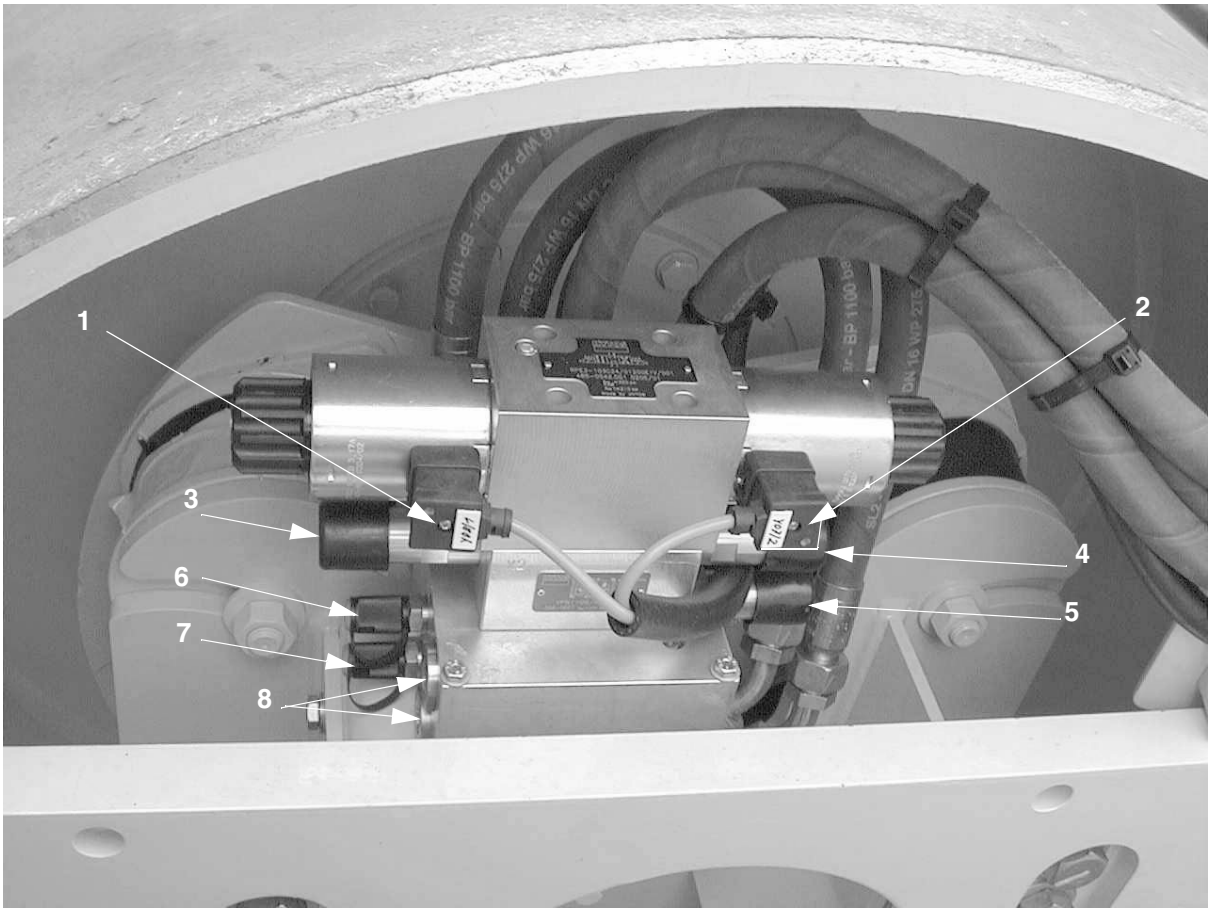


Fig. 9: Vibration control valve

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Solenoid valve, low amplitude	Y08	18, 2	0 / 12V
2	Solenoid valve, high amplitude	Y07	18, 2	0 / 12V
3	Secondary pressure relief valve		18, 4	220 bar
4	Secondary pressure relief valve		18, 4	220 bar
5	Primary pressure relief valve		18, 1	220 bar
6	Pressure test port vibration pressure high amplitude		18, MA, MF	220 +/-5 bar *start-up pressure
7	Pressure test port vibration pressure low amplitude		18, MB, ME	220 +/-5 bar *start-up pressure
8	Anti-cavitation valves		18, 3.1, 3.2	

*(3190.8+/-72.5psi)

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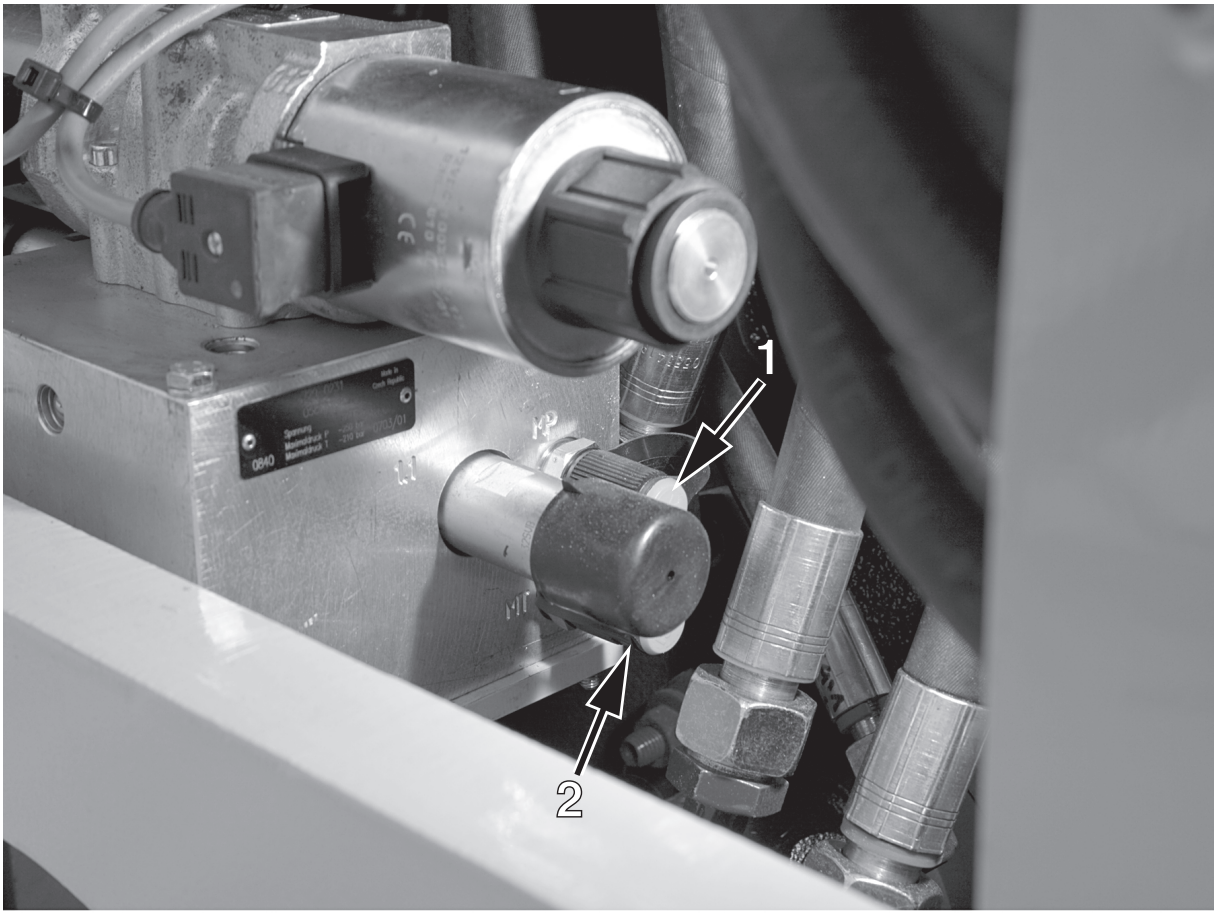


Fig. 10: Vibration valve, rear view

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Pressure test port, tank line		18, MT	approx. 1,5 bar*
2	Test port, pump pressure		18, MP	1,5- 220 bar**

*(72.5psi) **(72.5- 3190.8psi)

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Trouble shooting

The following trouble shooting chart contains a small selection of possible faults, which may occur during operation of the machine. The fault list is by no means complete, however, the fault table is based on the experience of the central service department, i.e. the list covers almost all faults that have occurred in the past.

Procedure:

The following trouble shooting table contains both electrical as well as mechanical and hydraulic faults.

The number specified in the table indicate the probability of the fault cause and thereby the recommended trouble shooting sequence, based on our latest field experience.

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TROUBLE SHOOTING
VIBRATION
BW 145-40-FAMILY

POSSIBLE CAUSES	SYMPTOMS	No Vibration (in either Amplitude)	Vibration only in one Amplitude	frequency too low									
Vibration switchr (Amplitude selector switch)		2	1										
Vibration button (on/off)		1											
Wiring		1	2										
Vibration valve solenoids defctive, valve dirty / sticky		2	1	2									
Pressure relief valve(s) in vibration valve dirty/misadjusted/ defective		3	3	2									
Vibration pumpe defective		3		3									
Coupling between travel pump and vibration pump defective		3											
Vibration valve defective				3									
Vibration motor coupling defective		2		2									
Vibration motor defective		3		3									
Diesel engine speed				1									

TROUBLE SHOOTING

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Steering

The single drum rollers of series BW 145-40 are equipped with hydrostatically operated articulated steering.

The steering system mainly consists of steering pump, steering valve, steering cylinder and the pressure resistant connecting hoses.

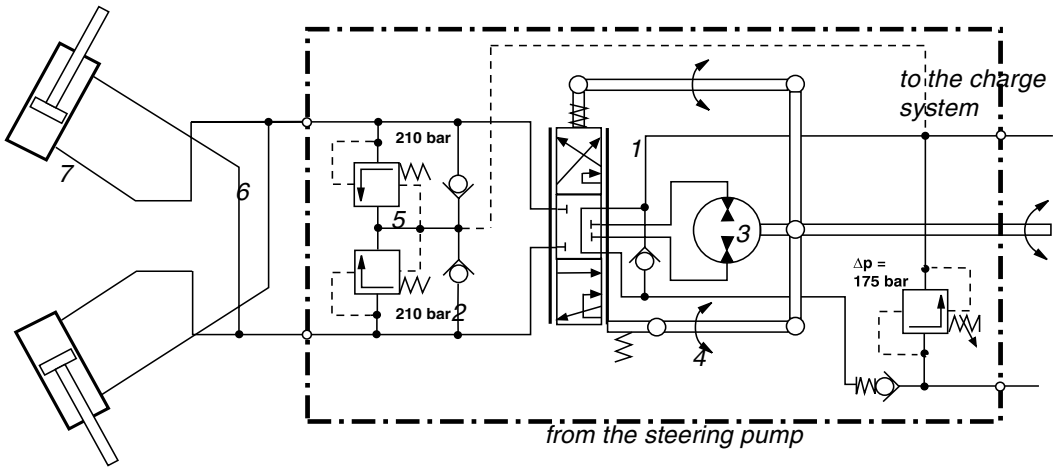


Fig. 1 Steering hydraulics

1 Rating pump
2 Distributor valve
3 Steering pressure relief valve (Δp =140 bar)(2030.5psi)
4 Check valve (pre-loaded to 0.5 bar)(7.2psi)
5 Anti-cavitation valve
6 Shock valves (200 bar)(2900.7psi)
7 Steering cylinder

The steering pump draws the hydraulic oil from the hydraulic oil tank and delivers it to the steering valve and the connected steering unit under the dashboard of the machine. If the steering is not operated, the complete oil flow flows through the fine filter to the charge ports for the closed circuits for travel drive.

When turning the steering wheel the distributor valve inside the steering unit will guide the oil flow to the corresponding side of the steering cylinder.

A rating pump inside the steering unit measures the exact oil quantity corresponding with the turning angle of the steering wheel and delivers the oil to the steering cylinder. The steering cylinder extends or retracts and articulates the machine.

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The steering valve is equipped with a pressure relief valve. This valve limits the steering pressure to 140 bar*. The charge pressure must, however, be added to this value, because the oil leaving the steering system enters the charge circuit. The actual steering pressure is therefore approx. 175 bar**.
*(2030.5psi) **(2538.1psi)

Steering pump

The steering pump is a gear pump with fixed displacement. It is driven by the auxiliary drive of the diesel engine, draws the hydraulic oil out of the hydraulic oil tank and pumps it through the steering valves to the steering cylinder or to the boost check valves for travel circuits.

Working principle of the gear pump

Similar to the vibration pump the steering pump also is a gear pump. The functional description of this pump can be found in the nchapter „Vibration system“.

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Steering valve

The steering valve block consists mainly of distributor valve, rating pump, steering pressure relief valve and the shock valves.

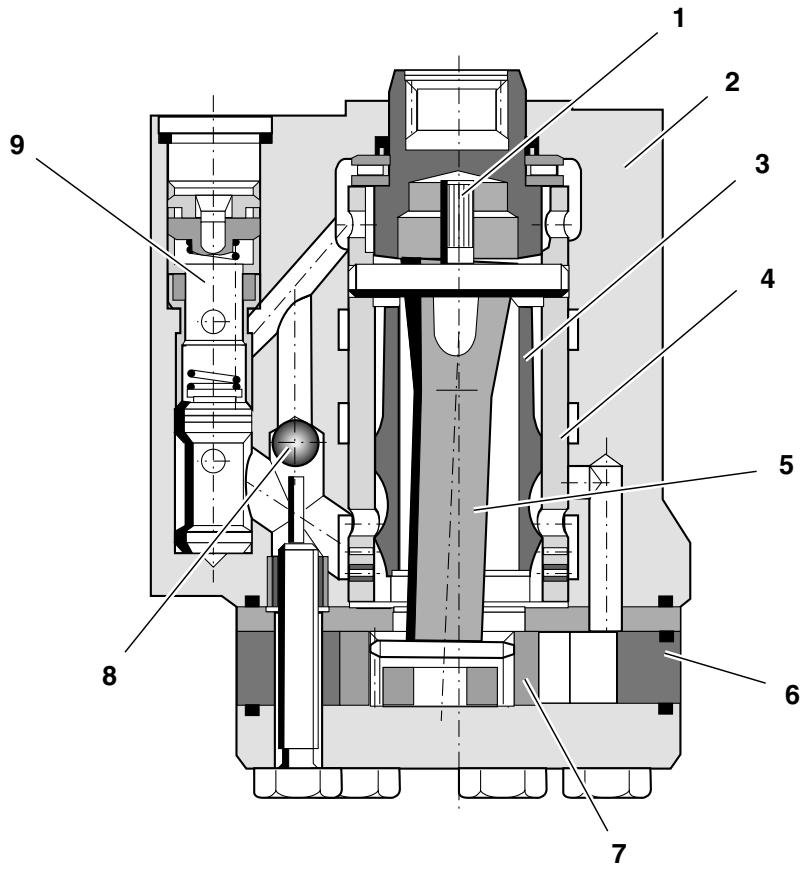


Fig. 2 Cross-sectional view of steering valve

1 Neutral setting springs
2 Housing
3 Inner spool
4 Outer spool
5 Universal shaft
6 Ring gear
7 Gear
8 Check valve
9 Pressure relief valve

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When turning the steering wheel the distributor valve directs the oil flow from the pump to the rating pump. The measuring pump, in turn, directs the oil flow through the distributor valve to the corresponding side of the steering cylinder.

The rating pump measures the exact oil quantity in dependence on the turning angle of the steering wheel.

This oil flow to the steering cylinder articulates the machine and causes a steering movement.

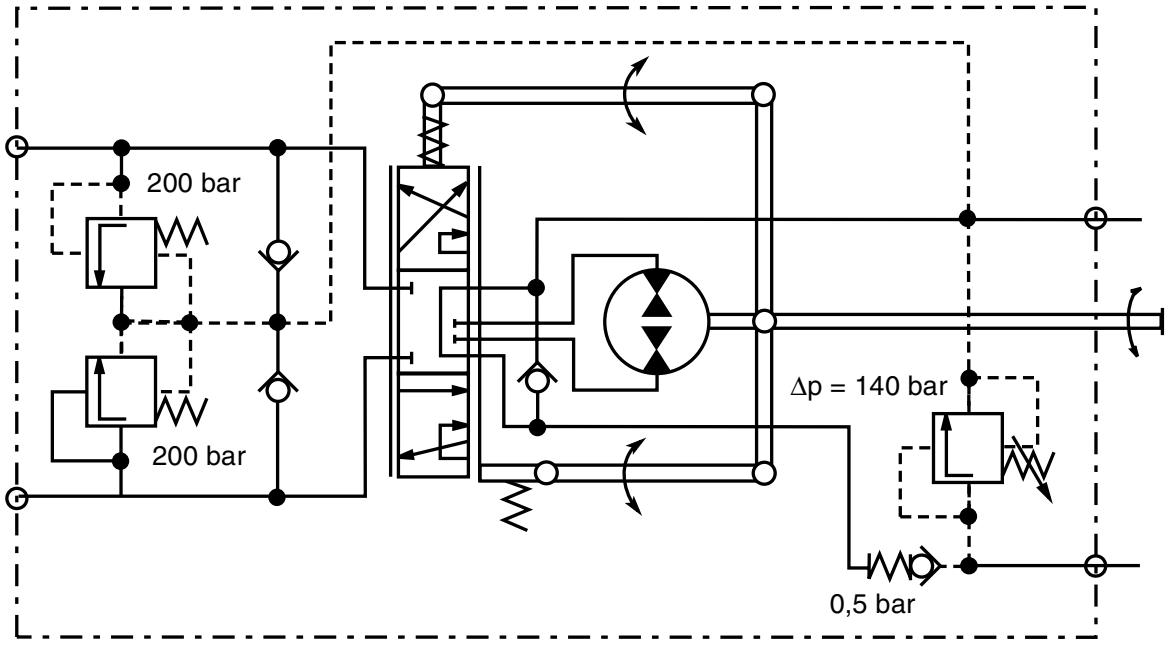


Fig. 3 Steering valve, hydraulic diagram

The high pressure relief valve in the steering unit limits the pressure in the steering system to 140 bar*. The charge pressure value must be added to this value, because the oil flowing out of the steering system enters into the charge circuit for travel circuits.

The steering unit is fitted with so-called shock valves in each supply line to the steering cylinder. These valves are adjusted to an opening pressure of 200 bar**. The valves compensate extreme pressure peaks which may occur, e.g. when driving over obstructions, and protect the system against overloads.

Each of these shock valves is fitted with an additional anti-cavitation valve. If the shock valves respond these anti-cavitation valves protect the system against cavitation damage.

A check valve at the inlet of the steering unit makes sure that no oil will flow back to the pump in case of pressure peaks caused by sudden steering movements. In such a case the steering cylinders would act as pumps and press the oil back to the pump.

*(2030.5psi) **(2900.7psi)

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Articulated joint

Front and rear frames of the single drum rollers BW 145-3are connected by an oscillating articulated joint. This ensures that drum and wheels will always have ground contact, even when driving around curves.

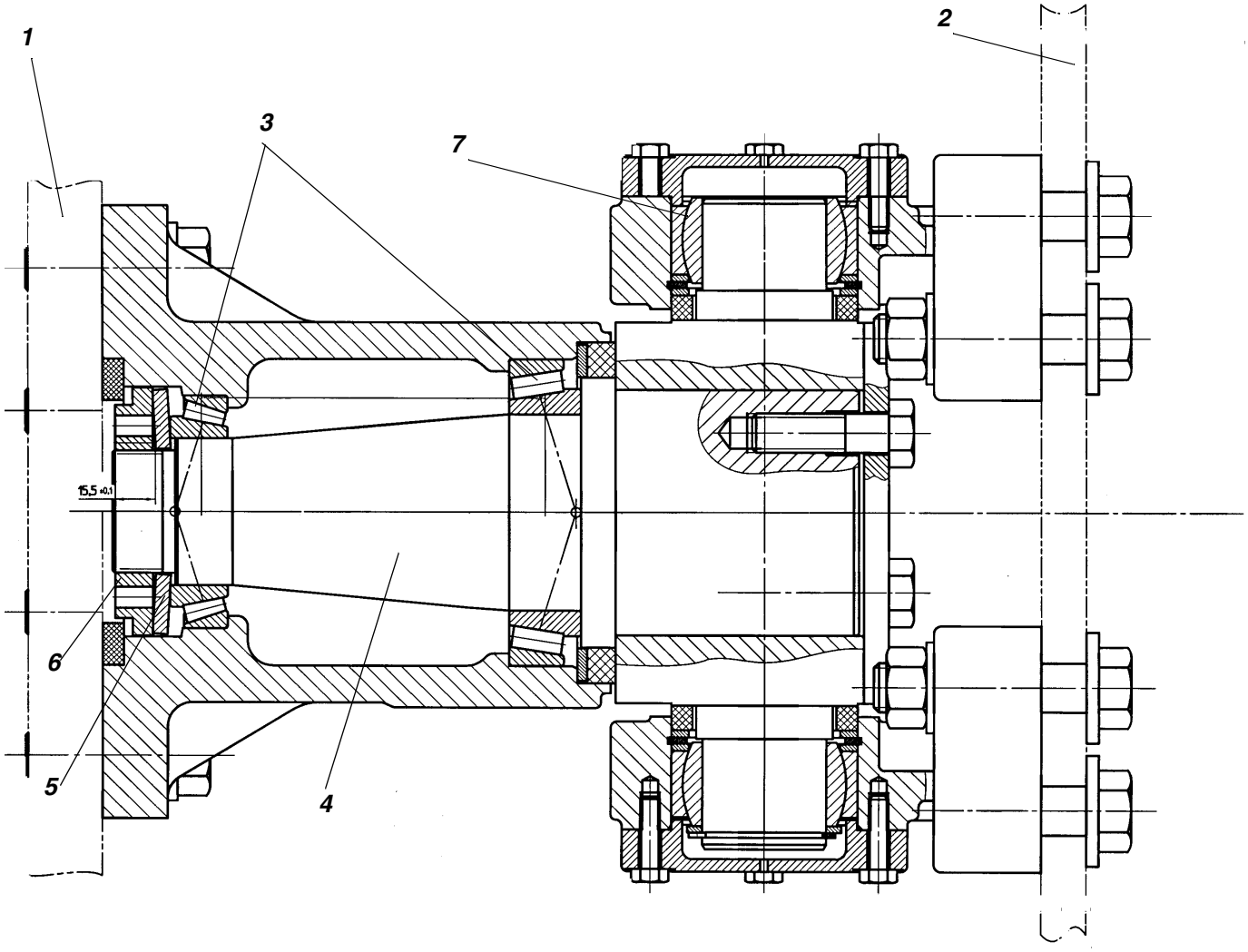


Fig. 4 Articulated joint

1	*Front frame*	*2*	*Rear frame*
3	*Tapered roller bearing*	*4*	*oscillation axis*
5	*Clamping nut*	*6*	*Belleville springs*
7	*Friction bearing (steering axis)*		

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The rear console is tightly bolted to the rear frame.

The front console is fastened with screws to the rear cross-member of the front frame. The use of tapered roller bearings between front and rear frame makes sure that both frames can oscillate by +/- 12° to each other. This ensures excellent ground contact for drum and wheels, even under difficult soil conditions.

The front console is connected with the rear console by two vertical bolts. These vertical pins are mounted in friction bearings.

The steering cylinder anchor point is cast to the front console.

When turning the steering wheel the steering cylinder will extend or retract. The piston rod swivels the front console around the vertical bolts. This articulates the machine and causes a steering movement.

All bearing points on the articulated joint are maintenance free, lubrication is not required.

Notes on assembly:

For assembly or repair of the articulated joint correct preloading of the oscillation axis bearing is of highest significance.

Note:
The correct preload is of highest importance, since an insufficient preload would cause extremely high wear in this area, because of the extremely high loads.

- Adjusting the tapered roller bearings

  Tighten the clamping nut, until the specified dimension of 15.5 $^{+0.1}$ mm between the Belleville springs and the clamping nut is reached.
  During tightening keep turning the oscillation axis, so that a sufficient wear pattern of the individual rollers is reached.
  Insert the oscillation axis into the carrier only after the bearings have been adjusted.

- Tightening torques for screws acc. to BOMAG factory standard 0201.

- secure all screws with Loctite type 270.

- fill tapered roller bearings with BOMAG multi-purpose grease P/N 009 960 00.

- Before inserting the oscillating axis into the carrier coat it with BOMAG multi-purpose grease P/N 009 960 00.

- Assemble joint bearings with sliding agent OKS 571 BOMAG P/N 009 700 26 – without grease!

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Trouble shooting

The following trouble shooting chart contains a small selection of possible faults, which may occur during operation of the machine. The fault list is by no means complete, however, the fault table is based on the experience of the central service department, i.e. the list covers almost all faults that have occurred in the past.

Procedure:

The following trouble shooting table contains both electrical as well as mechanical and hydraulic faults.

The number specified in the table indicate the probability of the fault cause and thereby the recommended trouble shooting sequence, based on our latest field experience.

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TROUBLE SHOOTING STEERING BW 145-FAMILY

SYMPTOMS	No steering	End stops are not reached	Steering jerky								
POSSIBLE CAUSES											
Steering orbitrol	2	2	1								
Steering-/charge pump	1	1	2								
Lenkzylinder	3	3	3								
Knickgelenk	3	3	2								

TROUBLE SHOOTING

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Electrics

Electric circuit diagrams

Electric circuit diagrams are graphic presentations of control logical conditions in the electric system. They do not contain any information on the type of wiring, their purpose is solely the clarification of control logics. Circuit diagrams are of help when performing trouble shooting and enable the fault free connection during modifications or changes to the electric equipment of the machine.

Structure:

- 1. Table of contents
- 2. Function groups
- 3. List of components

1. Table of contents

The table of contents lists all function groups, component lists and control module presentations of the machine.

The arrangement of all sheets in a sequence results in the total wiring diagram.

2. Function groups

Electric circuits with a function oriented interrelationship are combined on individual sheets (sheet-no.: 1, 2, ...) in function groups (brake, warning systems ...) and subdivided into 10 current paths (along the bottom end of the page). This allows easy tracking of functional interrelationships of the electric circuits.

Arrangement of current paths

The individual current paths must be read as follows:

- from top (plus potential) to bottom (minus potential)
- from left to right (current path 1 to 10, along the bottom of the page, Fig.1)

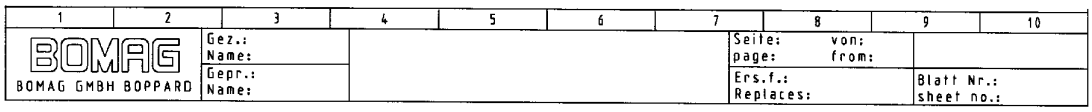


Fig. 1:

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- from function group (sheet-no.) to function group (sheet-no.)
- via cross references for potentials and relays

Line thicknesses

Within the presentation of the wiring diagram (Fig. 2) there is a differentiation between two types of connections.

1. thick drawn connections, standard wiring and components

2. thin drawn connections, wiring of printed circuit boards

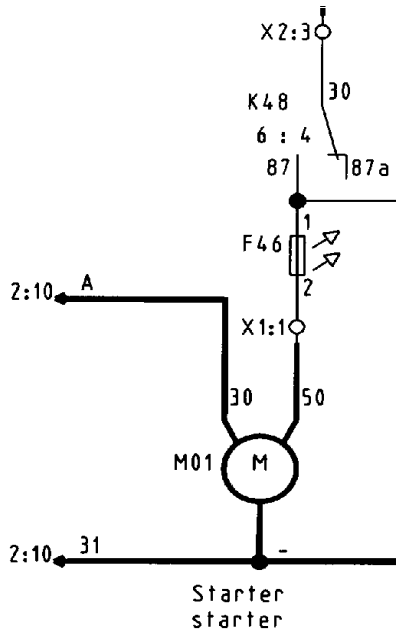


Fig. 2:

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Reference lines, frames

Components and connections that apply only for special versions of machines (accessories, retrofit kits or optional designs, Fig. 3) are drawn with thin dash – dot – line and specially marked with bilingual text.

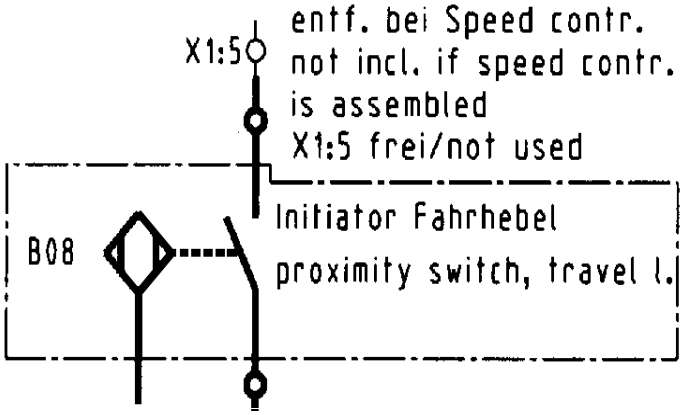


Fig. 3:

Potential cross references

Example potential 15:

4:10 ---------> Direction arrow (cross reference to page 4, current path 10)

Potentials stretching over a longer distance in the circuit diagram may be interrupted for the reason of clarity. In this case only the beginning and end of the potential is shown. The interrelationship of these cut-off points is represented by cross-references. Potential cross-references therefore enable tracking of signals transferred from one function group (sheet-no.) to another function group (sheet-no).

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Example 1 (Fig. 4):

Potential ”15" on sheet no. 6 continues to the left on sheet-no. 4 in current path ”10" and to the right on sheet-no 8 in current path ”1". To the right it ends at the nodal point (without arrow) on sheet-no. 8 in current path ”3".

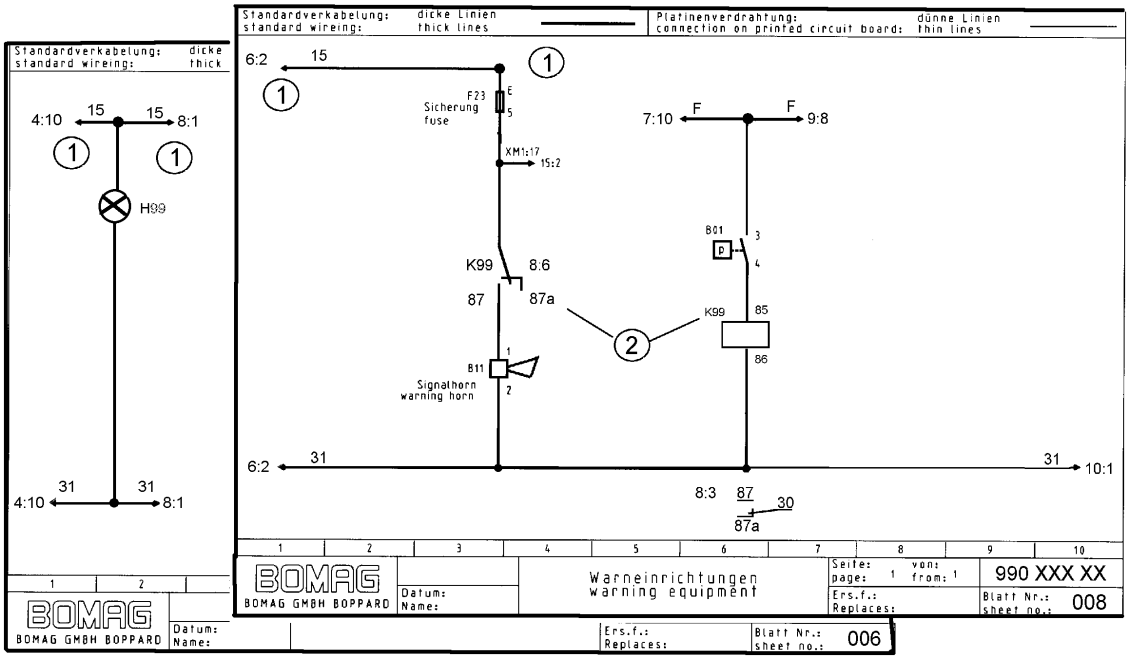


Fig. 4:

Relay cross reference in developed presentation

Switching symbols of parts of electric components (relays, switches ...) are drawn separately and arranged in such a way, that every current path can be easily tracked. The spatial relationship of individual contacts is of no importance. A straight and clear presentation without any crossing of the individual current paths is of highest importance. Relay cross references can therefore be used to trace signals which have to be followed on components with dependent contacts.

Apart from this there is a contact plan under each contactor coil providing information about the contact types of a relay and where these appear in the wiring diagram.

Example 2 (Fig. 55):

On sheet no. 8 the contactor coil of relay (K99) is located in current path ”6".

The contact diagram under the relay provides the information that a double-throw contact with the contact types 30, 87 and 87a is triggered. This double-throw contact is located on sheet no. 8 in current path ”3".

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3. List of components

This list contains all components used in alphabetical order, related to their component abbreviation (A01, A02....).

Standardverkabelung: dicke Linien — standard wireing: thick lines

Platinenverdrahtung: dünne Linien — connection on printed circuit board: thin lines

Name	F.-Nr.	Pf.	Benennung	title	TYP
A01	010	4	Intervallschalter Berieselungssystem	Interval switch, sprinkler system	
A02	014	2	Blinkrelais	Indicator relay	
A09	010	5	Intervallsch. Emulsionsberieselungssys.	Internal switch, emulsion sprinkler sys.	
A13	016	3	Steuergeraet Heizung	Control unit, heating	
A20	010	8	Platine Wasserstandskontrolle	Printed circuit, water level controll	
A23	004	8	Platine Generator	Printed circuit; generator	
A32	025	5	Verstärkerplatine	Printed circuit; amplifier	
A33	025	2	Platine Zeitverzögerung	Printed circuit; time delay	
B01	008	6	Druckschalter Stellkammer links	Pressure switch, control chamber, lh.	
B06	004	2	Druckschalter Motoroel	Pressure switch, engine oil	
B08	006	4	Naeherungsinitiator Fahrhebel '0'-Stell.	Proximity switch, travel lever '0' pos.	MAX 0,3A
B09	010	2	Druckschalter Berieselungssystem	Pressure switch, sprinkler system	
B10	024	10	Naeherungsinitiator Knickgelenk	Proximity switch, articulated joint	MAX 0,3A
B11	008	3	Signalhorn	Warning horn	50W
B30	004	5	Temperaturschalter Motoroel	Temperature switch, engine oil	
B33	010	8	Sensor Wassertankrestmenge	Sensor, water tank residual quantity	
E19	013	8	Arbeitsscheinwerfer rechts		
E29	015	3	Innenleuchte Kabine	Inside light, cabin	

1	2	3	4	5	6	7	8	9	10

BOMAG GMBH BOPPARD | Datum: Name: | Bauteilliste component listing | Seite: page: 1 von: from: 7 | 841 301 02 | Ers.f.: Replaces: | Blatt Nr.: sheet no.: 101

Fig. 5:

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Component cross references

Example (Fig. 5):

In the circuit diagram the warning horn ”B 11" is located on sheet no. 8 in current path 3.

Table of potentials

Potentials	Meaning
30	Battery positive
31	Vehicle ground
31-1	Vehicle ground battery negative
31-2	31-1 via terminal X1:91 and X5:5 for instruments
15/54	is supplied via K11 when ignition is ON
F03:2	15/54 via fuse F03
50	Start signal starter/boost fuel supply

Power supply (sheet 002)

Battery

When the engine is stopped the power supply for the vehicle electrics is assured by a rechargeable and maintenance free 12 Volt battery.

The minus pole of the battery (G01) is connected with vehicle ground (potential 31).

The plus pole of the battery (G01) is connected with potential 30 via the main fuse (F00).

There is a direct connection between battery (+),

- terminal B+ on generator (G02),
- starter (M01:05) (Fig. 3) terminal 30.

Note:
Potentials 30, 31 and B+ are always directly connected with the battery. The current can only be interrupted by fully discharging, disconnecting the battery or removing the main fuse.

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Generator

While the engine is running a 14 V generator (G02) supplies the vehicle electrics via terminals B+ (to potential 30) and B- (to potential 31) with current.

Terminal D+ delivers a (+) or (-) signal to the charge control, to relay K61 and to terminal S+ of the time relay for engine oil pressure. When the engine is not running terminal D+ is negative (ground potential). The charge control light (H08) lights up.

Socket

The machine is equipped with a socket (XS 12V). This socket is connected to potential 30 and secured by fuse (F05).

Ignition and starting circuit, monitoring

Ignition switch (S00) in position "0" (ignition off)

The ignition switch (S00) is permanently supplied with current from battery (G01) via main fuse (F00) (potential 30) and fuse (F13).

In this position the connection to the coil of relay (K11) is interrupted and the relay drops off. The solenoid valve (Y58) interrupts the fuel supply and stops the engine.

Ignition switch (S00) in position "1" (ignition on) with the engine at rest

In this position the coil of relay (K11) is supplied with current.

Relay (K11) switches potential 30 to potential K11.

- from potential K11,
- via fuse (F24),
- the closed emergency stop switch (S01),
- to solenoid valve (Y58) for interruption of fuel supply.

The engine is now ready for starting.

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Ignition switch (S00) in position "3" (starting)

Note:
Position "2" is not used.

In this position current flows from terminal 50a on ignition switch (S00) to the contact of relay (K05).

When the travel lever is in "0" - and brake position the contact of proximity switch (B13, sheet 003) opens, the coil of relay (K48, sheet 003) is no longer supplied with current and the contact of K48 switches over to terminal 87.

The coil of K05 is therefore no longer supplied with current, K05 switches over to terminal 87; terminal 50 on the starter and the boost fuel valve Y01 are thereby supplied with current and the engine starts.

Note:
The starter (M01) is supplied with current directly from potentials B+ and 31.

When releasing the ignition switch it will automatically return to position “1”.

To repeat the stating process the ignition must first be switched off and on again (start repetition interlock).

Ignition switch (S00) in position "1" (ignition on) with the engine running

When the engine is running the generator (G02) (Fig. 2) produces electric current of + 12 V at terminal D+. This current flows from terminal D+ to terminal 85 on relay K61. A + 12V current is thereby applied to both coil sides of relay K61 and the relay drops off. Current then flows through contact 87a of K61 to the operating hour meter P00 and to the coil of K62.

The D+ signal is then applied to the charge control, which is then also energized with +12V from both sides and goes out.

As soon as a D+ signal is available the input S+ on the time relay K37 is also triggered. After a period of 4 seconds the relay switches, i.e. 12V is applied to output 87 on relay K37. This circuitry prevents the warning buzzer (B11) from sounding because of a too low engine oil pressure during the stating process.

Monitoring

If, during operation of the machine (engine running, i.e. terminal 15 (relay K11) and D+ (relay K62) are present)

- the differential pressure switch on the charge oil filter responds,

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- or the engine oil temperature is too high
- or the engine oil pressure drops below the respective switching value,

terminal 85 of relay K13 is supplied with ground, K13 switches and the warning horn B11 sounds.

However, the machine is not shut down.

The engine oil pressure monitoring system will only respond with a delay of 4 seconds after the D+ signal has been applied (caused by time relay K37), to avoid sounding of the warning horn during starting.

Braking (sheet 003)

With the engine at standstill no hydraulic pressure is available, the brake discs cannot be relieved, the brake is automatically closed.

Travel lever in “brake”-position with the engine running

If the travel lever is in “brake”-position, the coil of relay (K48) is not supplied with current.

Current flows

- from potential K11,
- via fuse (F25)
- and the contacts of relay (K48)
- to the coil of relay (K05) (sheet 002).

Starting is now possible.

Current flows also

- from potential K11,
- via fuse (F25)
- and the contacts of relay (K48)
- to the control light “Brake applied” (H01), which will then light up.

Travel lever operated

When operating the travel lever out of braking position

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- proximity switch (B13) will close,
- relay (K48) switches over
- and the current flow to relay (K05) (starting) is interrupted.

The engine cannot be started.

From terminal 87 on relay K48 current flows through the emergency stop switch S01 to brake valve Y04.

The brake opens.

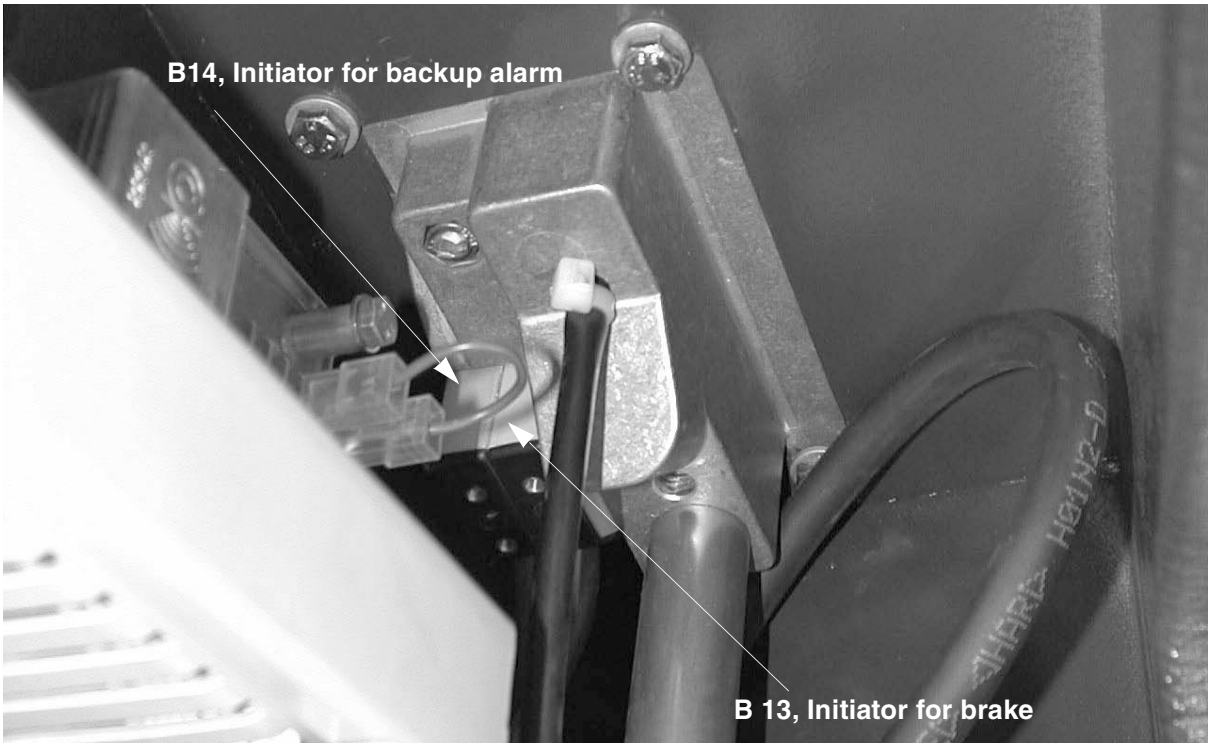


Fig. 6: Bottom view of travel lever

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Travel speed range selector

Reverse travel

When moving the travel lever to reverse while driving, the coil of relay (K26) is not supplied with current.

Current flows

- from potential K11 (15/54)
- via fuse (F25),
- through the closed contact (K26)
- to the back-up alarm buzzer (H14).

The back-up alarm will sound.

Forward travel

In this position the proximity switch (B14) closes.

Current flows

- from potential K11,
- via fuse (F25),
- the closed proximity switch (B14),
- to the coil of relay (K26).

The relay switches over, the current supply for warning buzzer (H14) is interrupted.

Current flows also

- from potential K11,
- via fuse (F25)
- to the travel speed range selector (S42).

Travel speed ranges

Depending on the position of the travel speed range (S42:23) the solenoid valves

- Y30 (only DH/PDH models), front travel motor
- and Y31, rear travel motor

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are triggered.

If the travel speed range selector switch (S42) is in position 1 ”turtle”, none of the solenoid valves is supplied with current. In this switch position all motors for drum and axle work with high displacement. The machine drives with low travel speed range (working speed).

If the travel speed range selector switch (S42) is in position 2 ”rabbit”, the solenoid valves (Y30, if present, and Y31) are supplied with current. In this switching condition both motors for drum (only DH / PDH) and axle are switched to low displacement. The machine drives with high speed range (transport speed).

Drum switched motors change to low displacement.

Vibration

Switching the vibration on

Current flows:

- from potential K11,
- via fuse (F03)
- to toggle relay (K04).

When pressing the push button (S13), the toggle relay switches and the contact of toggle relay (K04) closes.

Current flows to the selector switch for high / low amplitude (S35:29).

Depending on the switch position current flows to the solenoid valve (Y07) for high amplitude or (Y08) for low amplitude. The selected vibration starts.

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