WX210 & WX240
Hydraulic Excavator
Service Manual

Service Manual

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A Tenneco Company

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Data sheet for cylinders

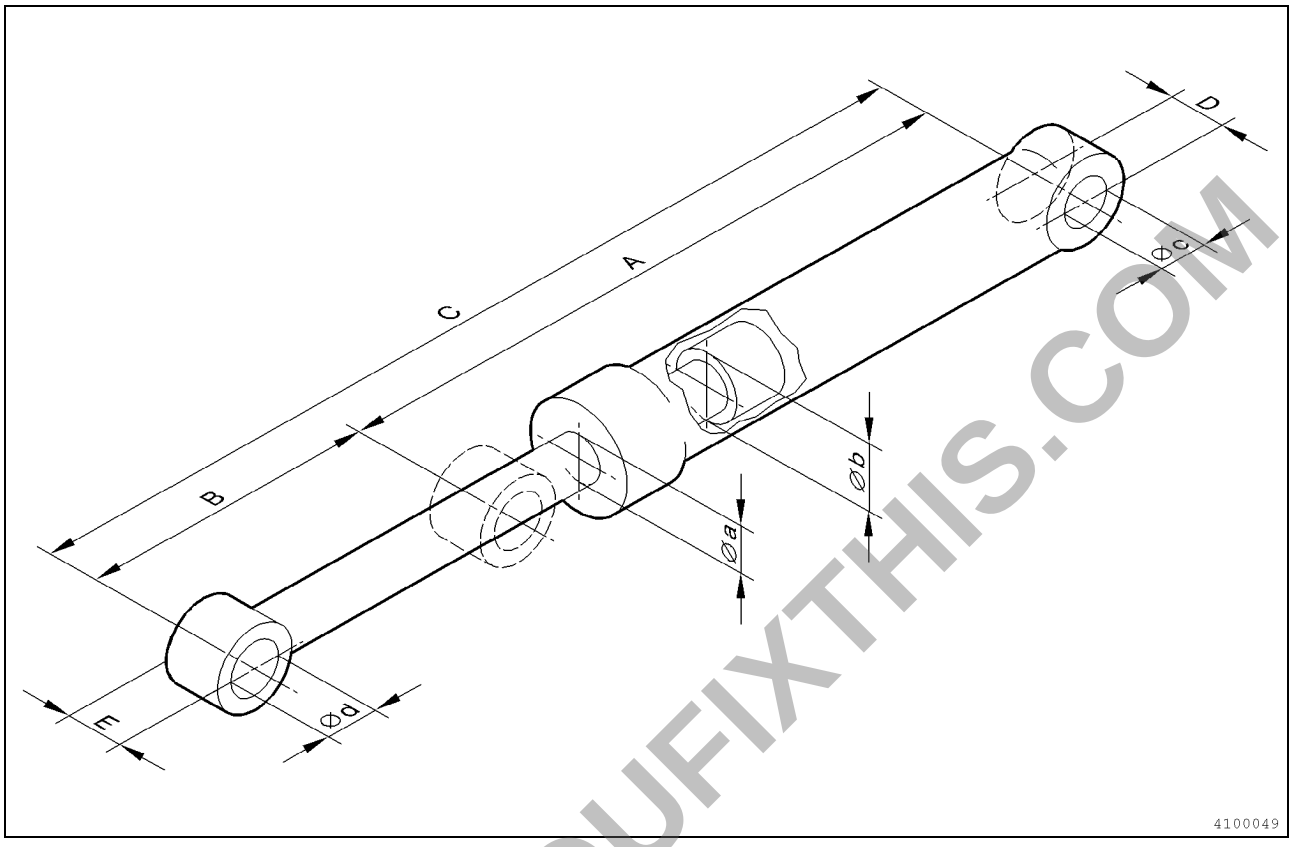


Fig. 1

WX210	P/N	Piston	Piston rod	Length	Stroke	Length	Cylinder barrel		Piston rod	
							Eye	Width	Eye	Width
		∅ b	∅ a	A	B	C	∅ c	D	∅ d	E
Monoblock boom	7211 3778	135	85	1050±1.8	630±1.8	1680±3.6	$90^{+0.25}_{+0.05}$	$116^{0}_{-0.5}$	$100^{+0.25}_{+0.05}$	$106^{0}_{-0.5}$
Boom adjusting	7210 4531	135	85	1565±1.8	985±1.8	2550±3.6	$90^{+0.25}_{+0.05}$	$116^{0}_{-0.5}$	$100^{+0.25}_{+0.05}$	$106^{0}_{-0.5}$
Stick cylinder	7210 4546	135	95	1975±1.8	1400±1.8	3375±3.6	80	$116^{0}_{-0.5}$	80	$116^{0}_{-0.5}$
Bucket cylinder	7211 3790	115	80	1660±1.8	1075±1.8	2735±3.6	$70^{+0.25}_{+0.05}$	$96^{0}_{-0.5}$	$80^{+0.25}_{+0.05}$	$96^{0}_{-0.5}$
Neck	33 27 103	180	100	1360	745	2105	$110^{+0.457}_{+0.370}$	126±1.2	$110^{+0.457}_{+0.370}$	$126^{}_{-0.5}$

WX240	P/N	Piston	Piston rod	Length	Stroke	Length	Cylinder barrel		Piston rod	
							Eye	Width	Eye	Width
		∅ b	∅ a	A	B	C	∅ c	D	∅ d	E
Monoblock boom	7211 2074	145	90	1630±1.8	1050±1.8	2680±3.6	$90^{+0.25}_{+0.05}$	$116^{0}_{-0.5}$	$100^{+0.25}_{+0.05}$	$106^{0}_{-0.5}$
Boom adjusting	7210 4481	145	90	1565±1.8	985±1.8	2550±3.6	$90^{+0.25}_{+0.05}$	$116^{0}_{-0.5}$	$100^{+0.25}_{+0.05}$	$106^{0}_{-0.5}$
Stick cylinder	7210 4471	145	95	1975±1.8	1400±1.8	3375±3.6	$90^{+0.25}_{+0.05}$	$123^{0}_{-0.5}$	$90^{+0.25}_{+0.05}$	$123^{0}_{-0.5}$
Bucket cylinder	7211 1697	125	85	1665±1.8	1075±1.8	2740±3.6	$80^{+0.25}_{+0.05}$	$123^{0}_{-0.5}$	$80^{+0.25}_{+0.05}$	$123^{0}_{-0.5}$
Neck	33 26 713	185	100	1360	745	2105	$110^{+0.457}_{+0.370}$	126±1.2	$110^{+0.457}_{+0.370}$	$126^{0}_{-0.5}$

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Bolts with standard thread DIN 13 – 13

Thread nominal Ø	Material quality	Tightening torques M_A in Nm		
		total 0.10 [1]	total 0.12 [2]	total 0.16 (L) [3]
M 5	8.8 10.9 12.9	4.9 7.3 8.5	5.5 8.1 9.5	6.5 9.5 11.2
M 6	8.8 10.9 12.9	8.5 12.5 14.5	9.5 14 16.5	11.2 16.5 19.5
M 8	8.8 10.9 12.9	20.5 30 35	23 34 40	27 40 47
M 10	8.8 10.9 12.9	41 60 71	46 68 79	55 80 94
M 12	8.8 10.9 12.9	71 104 195	79 117 215	94 140 260
M 16	8.8 10.9 12.9	170 250 300	195 280 330	230 340 400
M 20	8.8 10.9 12.9	350 490 580	390 560 650	470 670 780
M 24	8.8 10.9 12.9	600 850 1000	670 960 1120	800 1140 1350
M 30	8.8 10.9 12.9	1190 1700 2000	1350 1900 2250	1600 2300 2700
M 36	8.8 10.9 12.9	2100 3000 3500	2350 3300 3900	2800 4000 4700

[1] Screw and/or nut electro-galvanized.

[2] Screw black-plated or phosphatized, thread oiled.

[3] Screws with liquid screw fixer, e.g. Loctite 242, 243.

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Power supply, starter/engine

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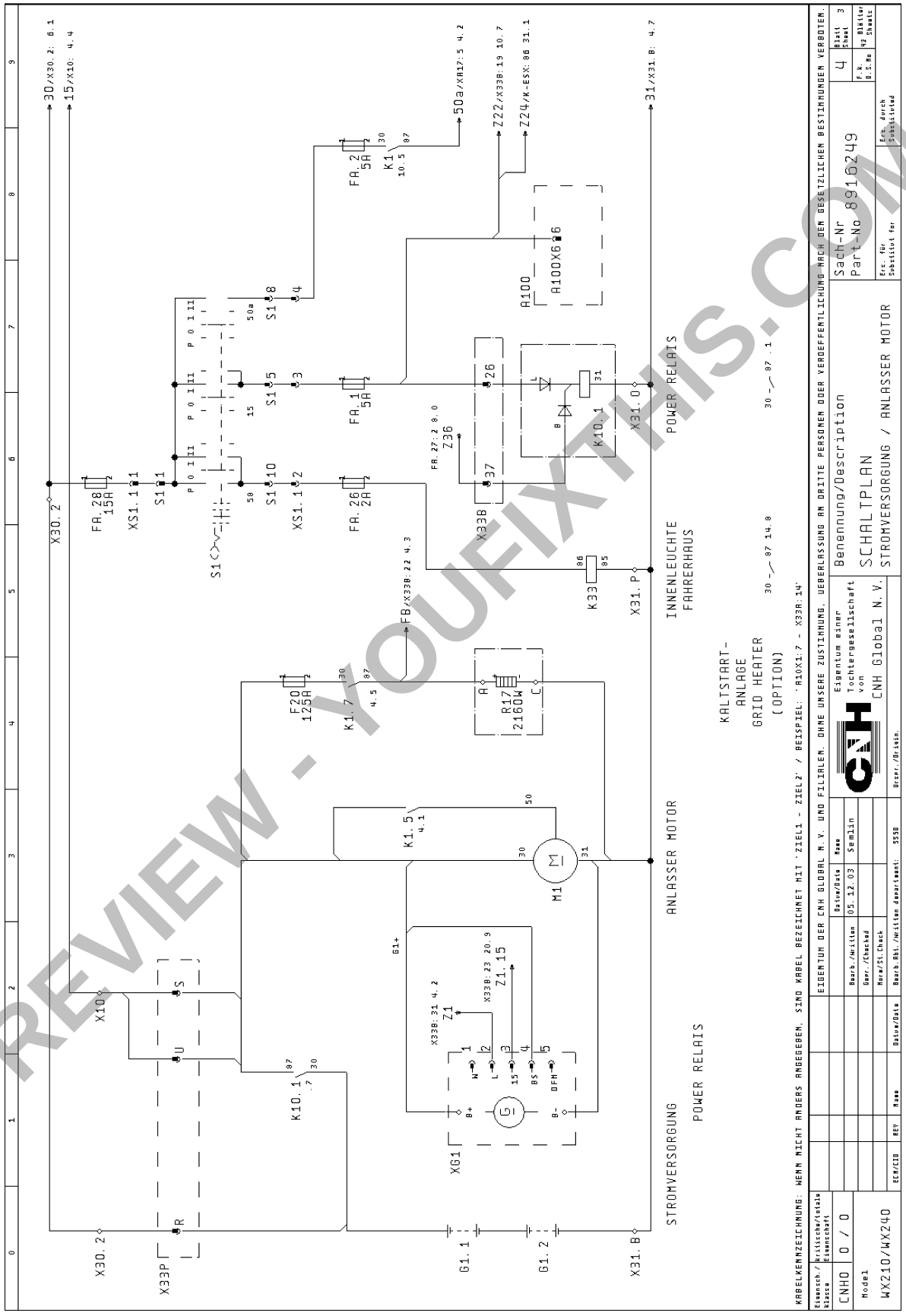


Fig. 3

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Hydraulic circuit diagram WX210 with monoblock boom equipment

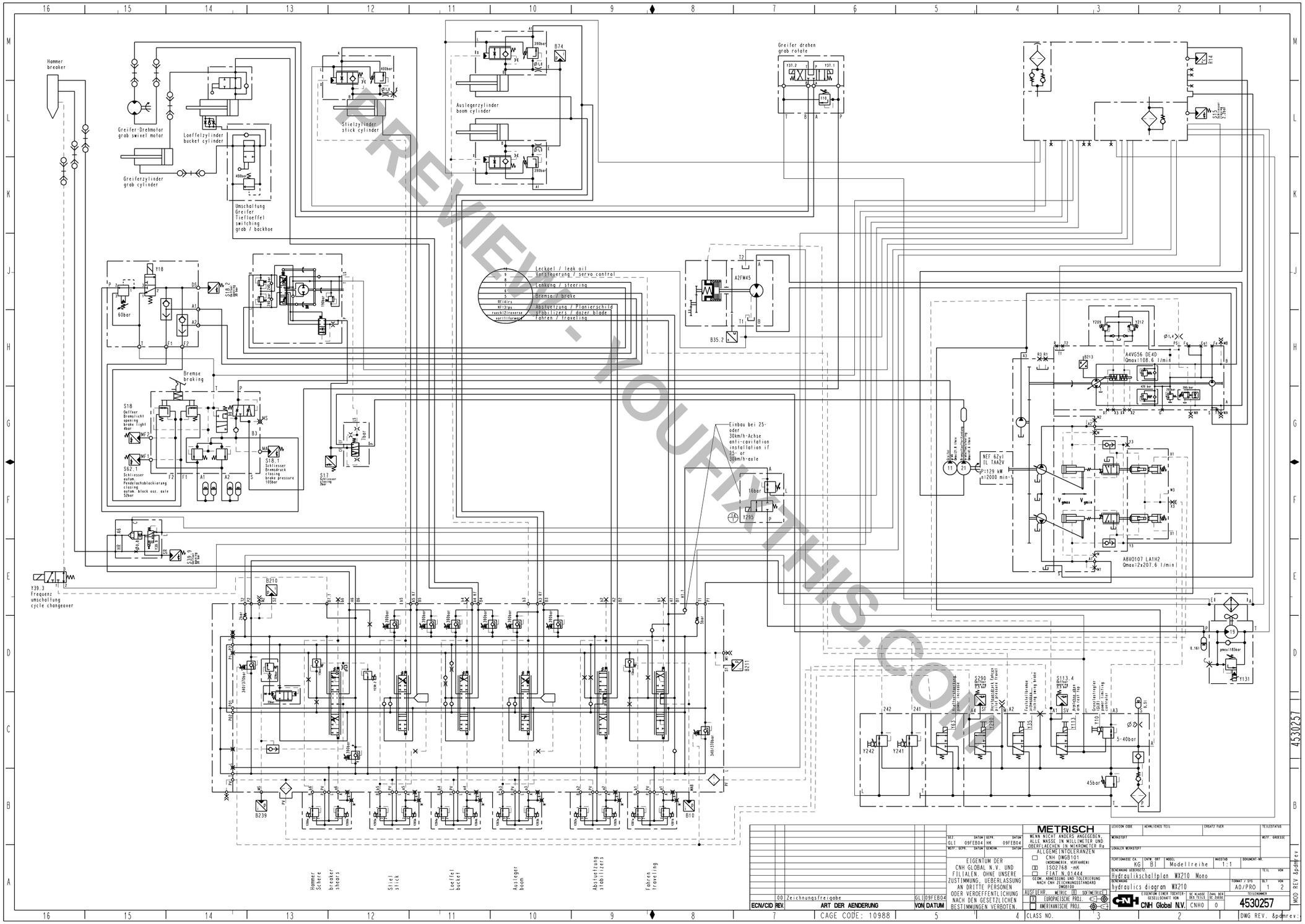


Fig. 1

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Fault codes

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9000 (German)
9011 ESX checksum fault
9012 ESX cutoff fault
9013 SPI communication of ESX defective
9014 SPI bus of ESX reserved
9015 Checksum fault on initialization of ESX system monitoring
9016 Plausibility fault on initialization of ESX system monitoring
9017 ESX reset through user watchdog
9018 ESX reset through system watchdog
9019 ESX hardware fault
9020 Checksum fault during readout of ESX fault memory
9021 Fault in reading of ESX fault memory
9022 ESX value outside valid range
9023 Supply voltage of ESX operation amplifier and multiplexer defective
9024 ESX temperature outside permitted range
9025 Processor configuration faulty due to ESX hardware
9026 Multiplexer or ESX A/D converter defective.
9027 Threshold voltage of ESX inputs faulty
9028 ESX frame potential faulty
9029 Supply voltage of ESX watchdog module defective
9030 Frame potential at BTS module of ESX faulty
9031 ESX relay defective
9032 ESX watchdog module cannot switch off relay
9033 ESX watchdog module defective
9034 CPU of ESX defective
9035 ESX flags cannot be set
9036 ESX flags cannot be scanned
9037 ESX arithmetic unit defective
9038 ESX multiplier defective
9039 Fault in CPU test sequence of ESX
9040 External RAM or ROM of ESX defective
9041 Shadow memory module of ESX defective
9042 Net current measurement on start of ESX faulty
9043 Cyclic net current measurement of ESX faulty
9044 Internal RAM defective on start of ESX
9045 Cyclic internal RAM test of ESX defective
9046 Ignition lock input status of ESX faulty
9047 Cyclic diagnosis of ESX faulty

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FAULT CODES

40000572-en

General information on fault codes

The following units of the machine are permanently monitored:

- Central Unit (CU)
- Power-Control-System (PCS)
- Electro-Hydraulic Controller (ESX)
- Multi-function display

In the event of a fault, a **fault code** (e.g. N°7004) is diplayed in the upper half of the multi-function display (108, Fig. 1) in combination with two **coloured warning lights** (112 yellow and 113 red, Fig. 1) which will light up individually or together, depending on the type of fault. Depending on the severity of the fault, a special tone signal will be heard in addition.

Meaning of signals:

RED **+** **CONTINUOUS TONE**	**Severe fault** The safety of persons and/or the functioning of essential units of the machine is at risk.
⚠	**Severe faults must be rectified immediately.** **Shut off the machine at once.**
YELLOW **+** **SINGLE BEEP**	The fault signalled is not relevant to the safety of persons or to the functioning of the machine. These faults must be rectified as fast as possible. In most of the cases, however, the machine remains fully functional.

(see also "Multi-function display")

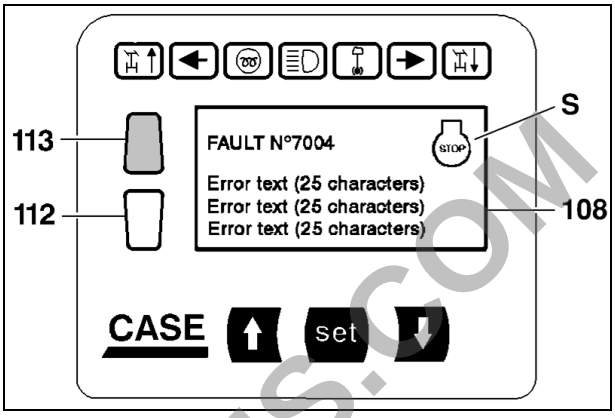


Fig. 1

In addition to the fault code, the lower half of the multi-function display (108, Fig. 1) gives an explanation of the fault code (error text).

In individual cases there is the possibility of several faults occurring at the same time.

The corresponding error codes are then displayed one after another in alternation with the normal display contents.

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Driver's seat

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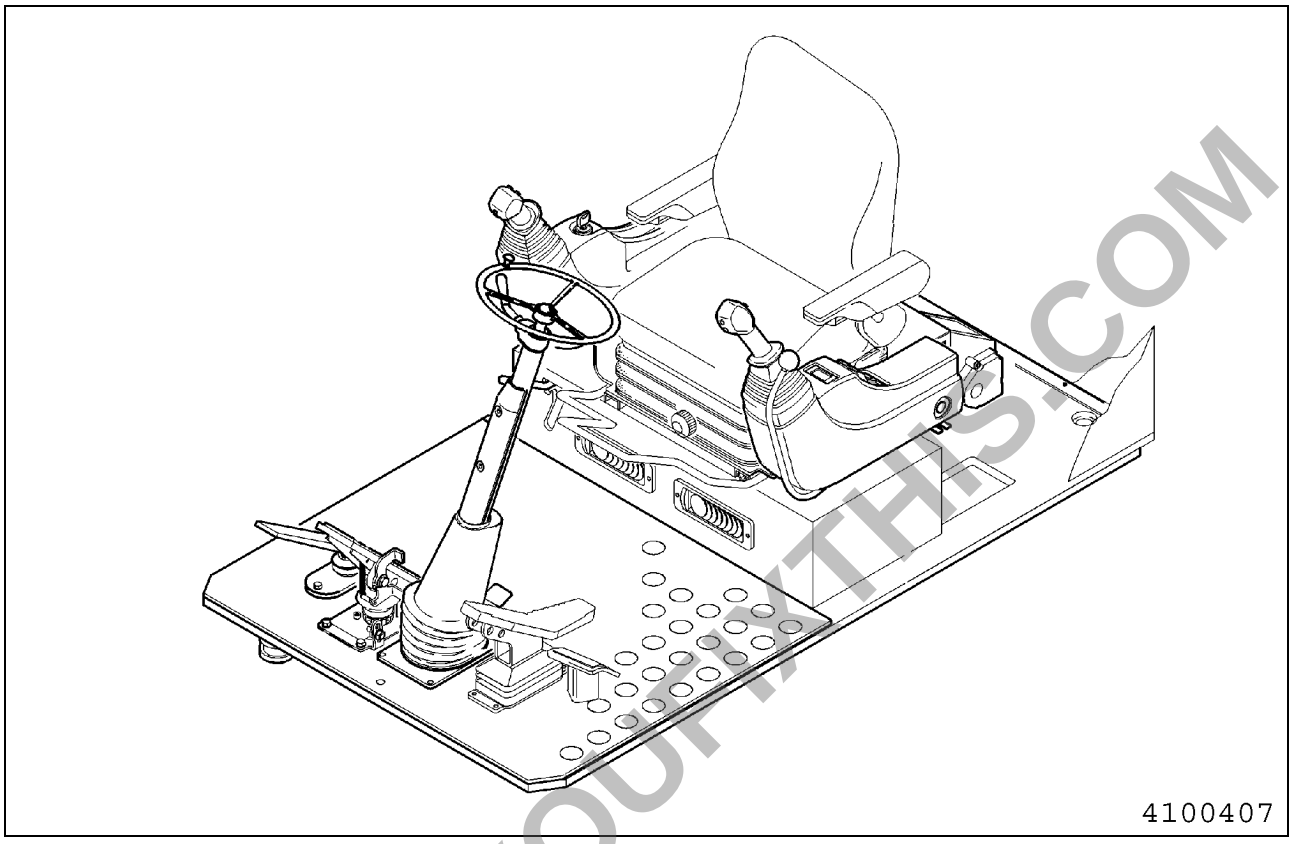


Fig. 1

Preparations

- Secure the machine as described under 'Securing the machine'.

Removing the driver's seat

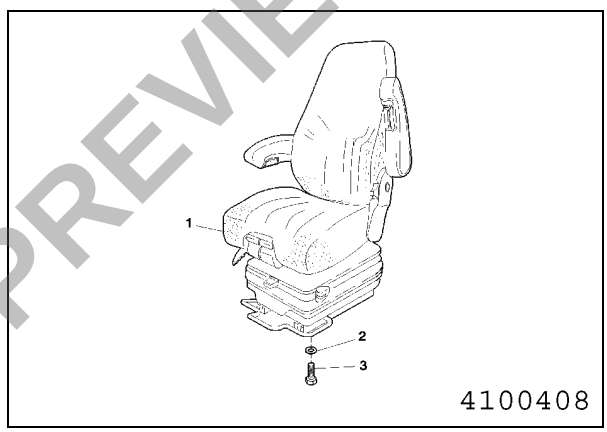


Fig. 2

The driver's seat (1) is installed on a slide rail which accomodates also the operating consoles of the excavator.

- Loosen the four screws (3) fixing the driver's seat.
- Unplug the connector for the automatic height adjustment.
- Remove the driver's seat cautiously from the cab.

Weight of the seat:

Seek the assistance of a second person when lifting the seat out of the cab.

Installing the driver's seat

- Lift the seat into the cab and position it over the screw holes.
- Fasten the driver's seat with the four screws (3).

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Rigid axle, gearbox housing

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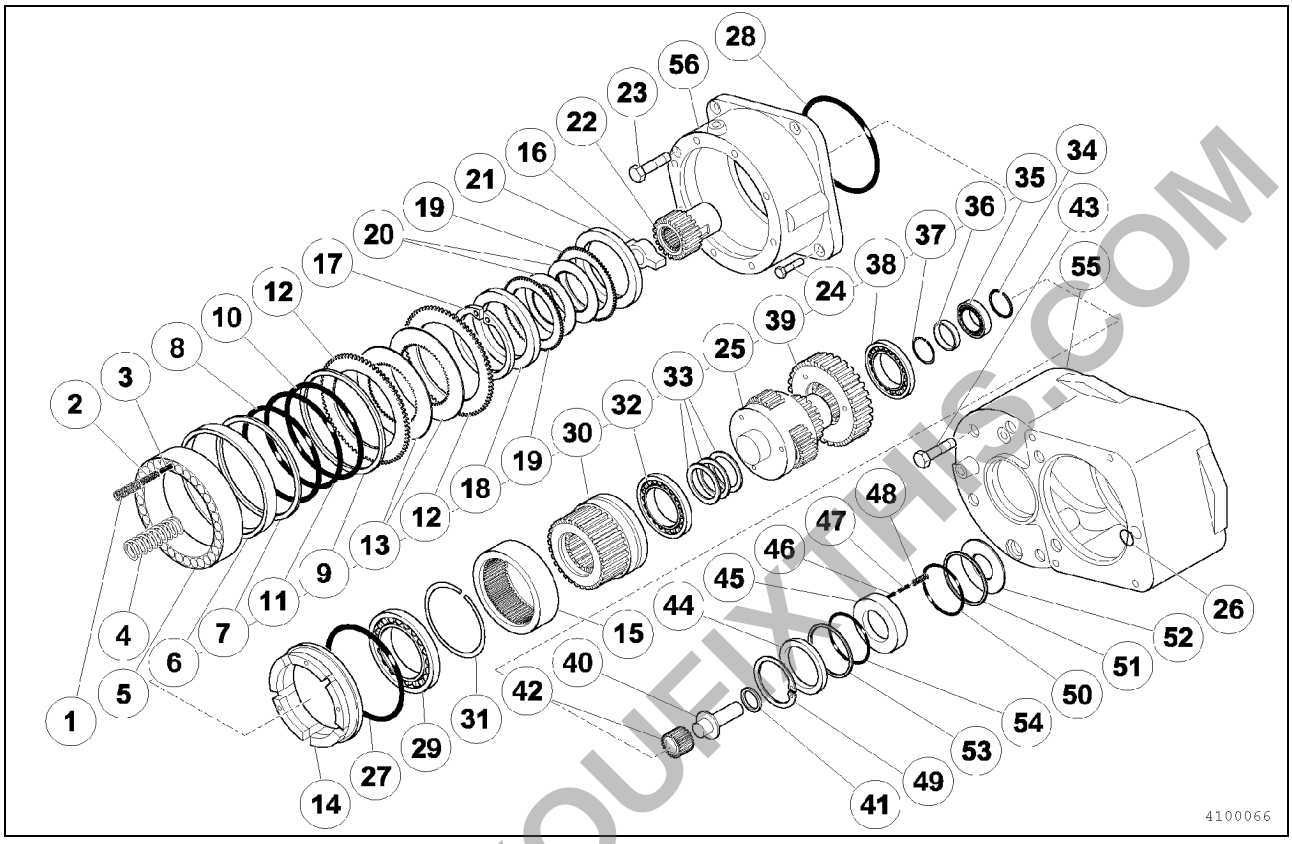


Fig. 1

Removing and fitting the gearbox housing

Removal and fitting of the gearbox housing are described in the axle manual.

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Legend

No.	Quantity	Designation
1	24	Compression spring
2	24	Compression spring
3	10	Compression spring
4	1	Compression spring
5	1	Piston
6	1	Intermediate ring
7	1	Piston seal
8	1	O-ring
9	1	Ring
10	1	Ring
11	1	Ring
12	8	Outer disk
13	7	Inner disk
14	1	Flange
15	1	Hollow wheel
16	1	Thrust piece
17	1	Retaining ring
18	1	Ring
19	11	Outer disk
20	11	Inner disk
21	1	Thrust ring
22	1	Bushing
23	8	Screw
24	4	Screw
25	1	Sun wheel
26	1	O-ring
27	1	O-ring
28	1	O-ring

No.	Quantity	Designation
29	1	Bearing
30	1	Coupling wheel
31	1	Retaining ring
32	1	Bearing
33		Adjusting washer
34	1	Retaining ring
35	1	Bearing
36	1	Ring
37	1	Retaining ring
38	1	Bearing
39	1	Spur wheel
40	1	Pin
41	1	Spacer
42	1	Pinion
43	4	Screw
44	1	Washer
45	1	Piston
46	12	Compression spring
47	24	Compression spring
48	24	Compression spring
49	1	Retaining ring
50	1	O-ring
51	1	O-ring
52	1	Ring
53	1	Washer
54	1	O-ring
55	1	Housing
56	1	Housing

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Machine layout

(Legend of Fig. 1)

1 - Refuelling station / optional equipment
2 - Fuel tank
3 - Hydraulic oil reservoir
4 - Hydraulic pumps
5 - Engine
6 - Counterweight
7 - Combined radiator
8 - Air intake system
9 - Batteries
10 - Slewing gearbox
11 - Rotor
12 - Backhoe bucket
13 - Toggle link
14 - Toggle lever
15 - Bucket cylinder
16 - Stick
17 - Stick cylinder
18 - Upper boom section
19 - Boom cylinder
20 - Stabilization / outriggers
21 - Rigid axle
22 - Slewing ring
23 - Tool box
24 - Access ladder
25 - Cardan shaft
26 - Steered axle
27 - Stabilization / levelling blade
28 - Driver's cab

Undercarriage

The undercarriage of the hydraulic excavator is used as a stable base and for travelling.

The undercarriage is moreover equipped with components permitting stabilization of the machine during working operations, such as the levelling blade or outriggers.

The machine is driven hydraulically by oil motors and travel gearboxes acting on both axles.

Undercarriage and superstructure are connected by a slewing ring.

Superstructure

The superstructure accommodates the drive engine and part of the hydraulic and electrical systems.

The superstructure carries also the working equipment.

Hydraulic system

All travelling and working movements are executed hydraulically. The working commands are initiated by hand and transmitted through control circuits. The oil flow between superstructure and undercarriage is ensured by the rotor. The hydraulic system is protected against overloading by pressure relief valves.

Steering

The machine is equipped with a hydrostatic power steering system, i.e it can be steered by hand with increased force when the engine is not running or when the hydraulic steering pump has failed.

Service brake

The service brake is composed of four multiple-disk brake integrated in the wheel-hubs. The brake is operated hydraulically.

To ensure the braking function at all times, the braking system is equipped with hydraulic pressure accumulators which are permanently monitored.

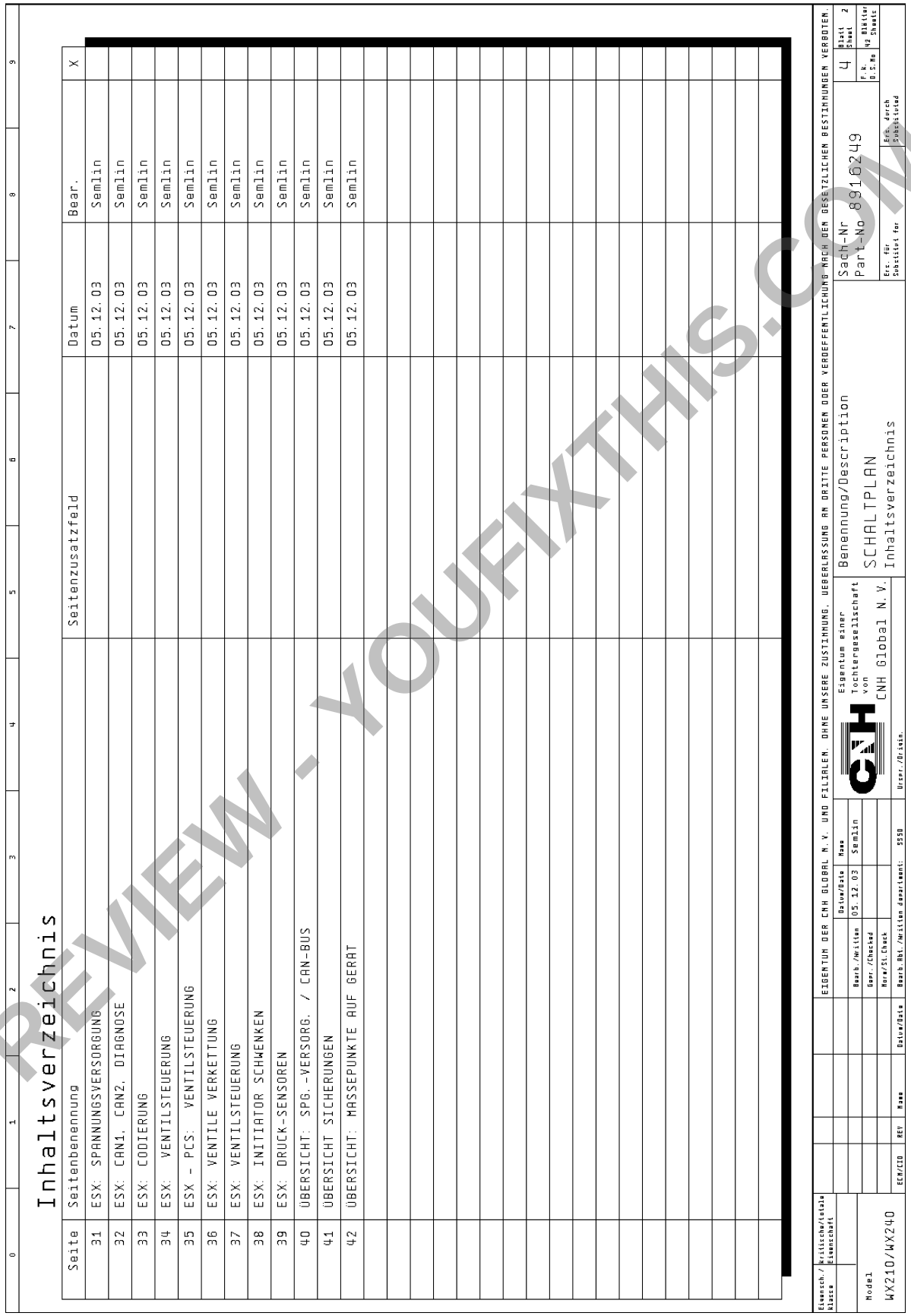
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Model: WX210/WX240

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Fig. 2

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Electrical system of pilot-control unit, solenoid valves, sensors and switches

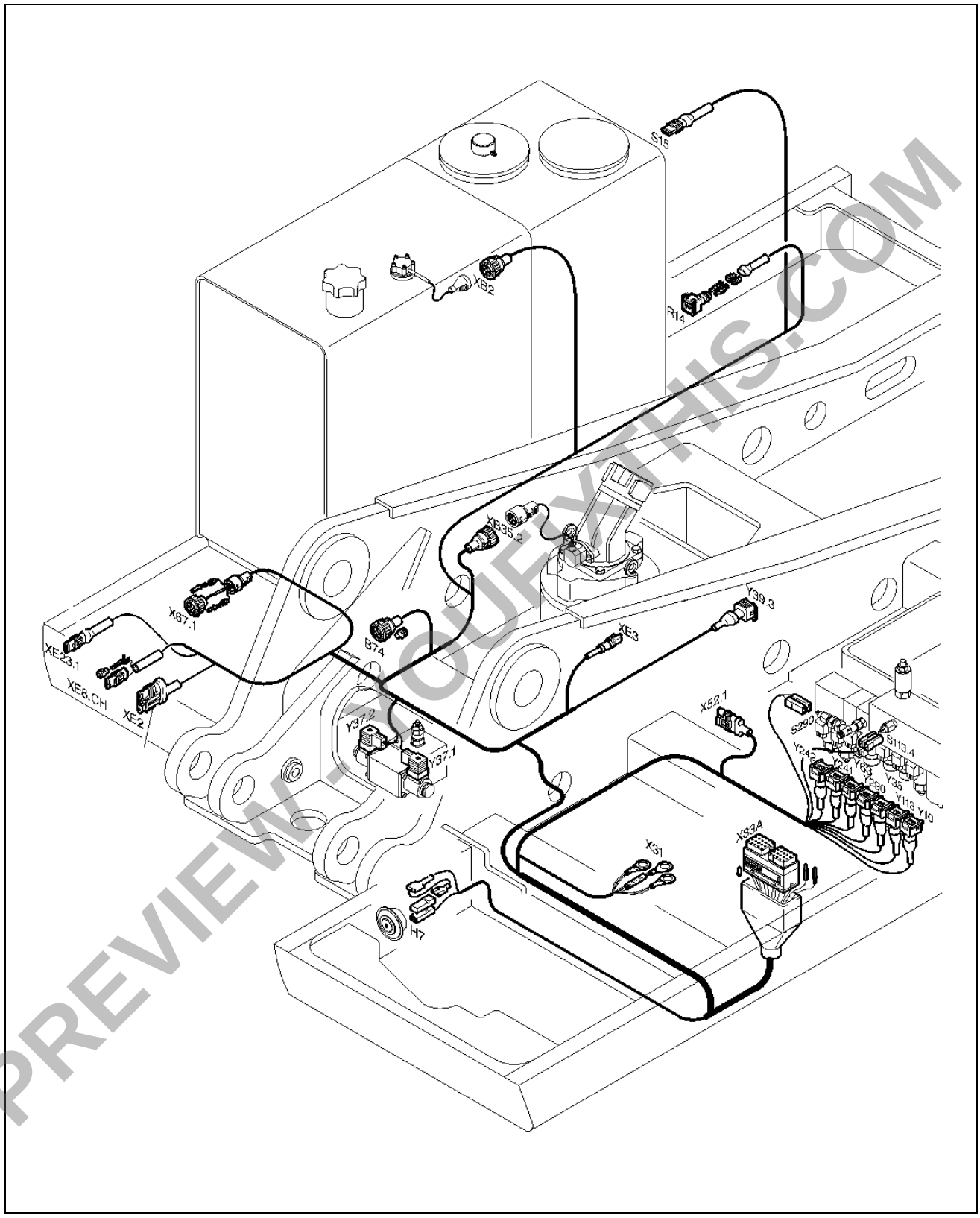


Fig. 4

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ESX coding

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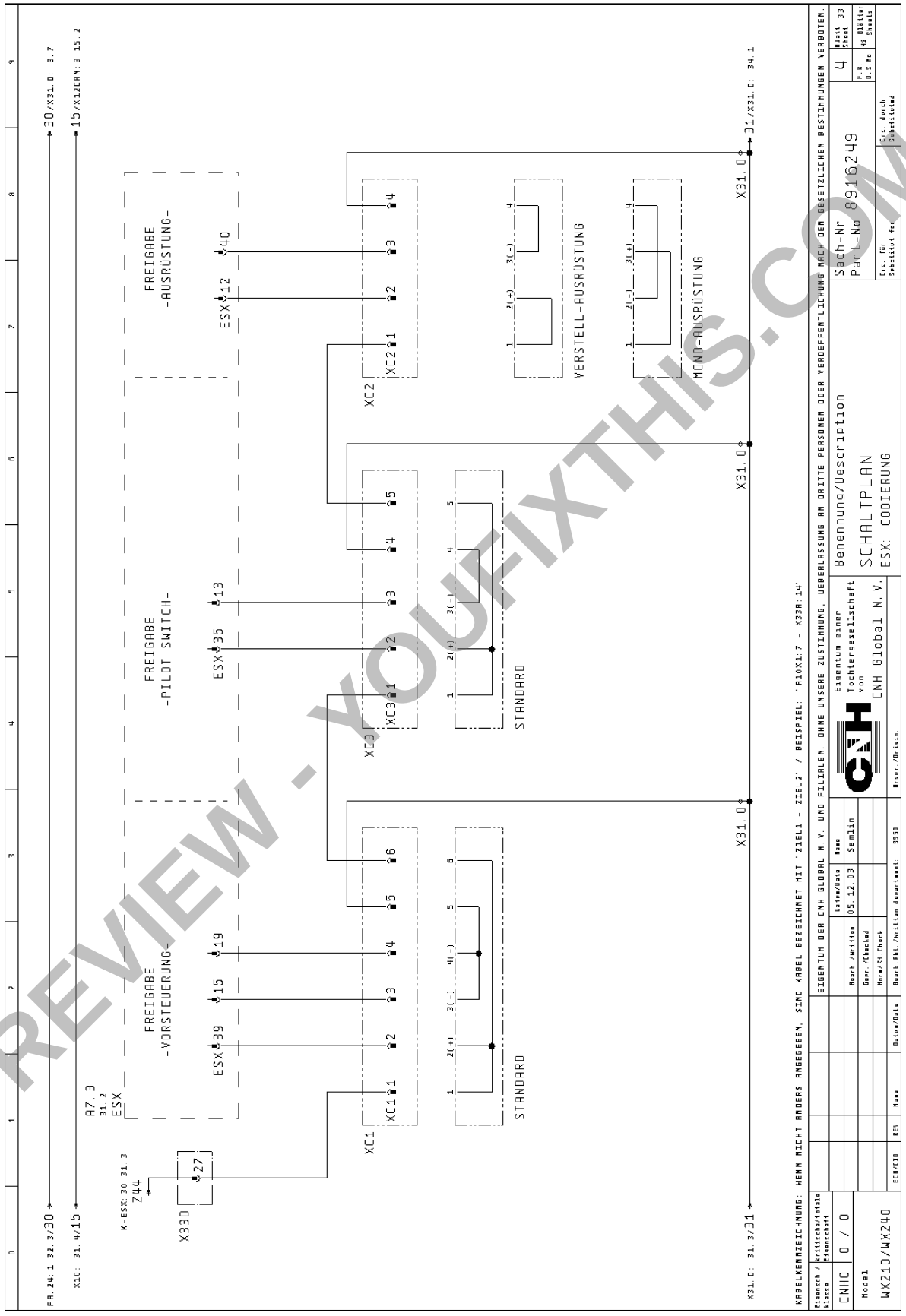


Fig. 33

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Undercarriage levelling blade A2 stabilization individual control, sheet 6 of 7

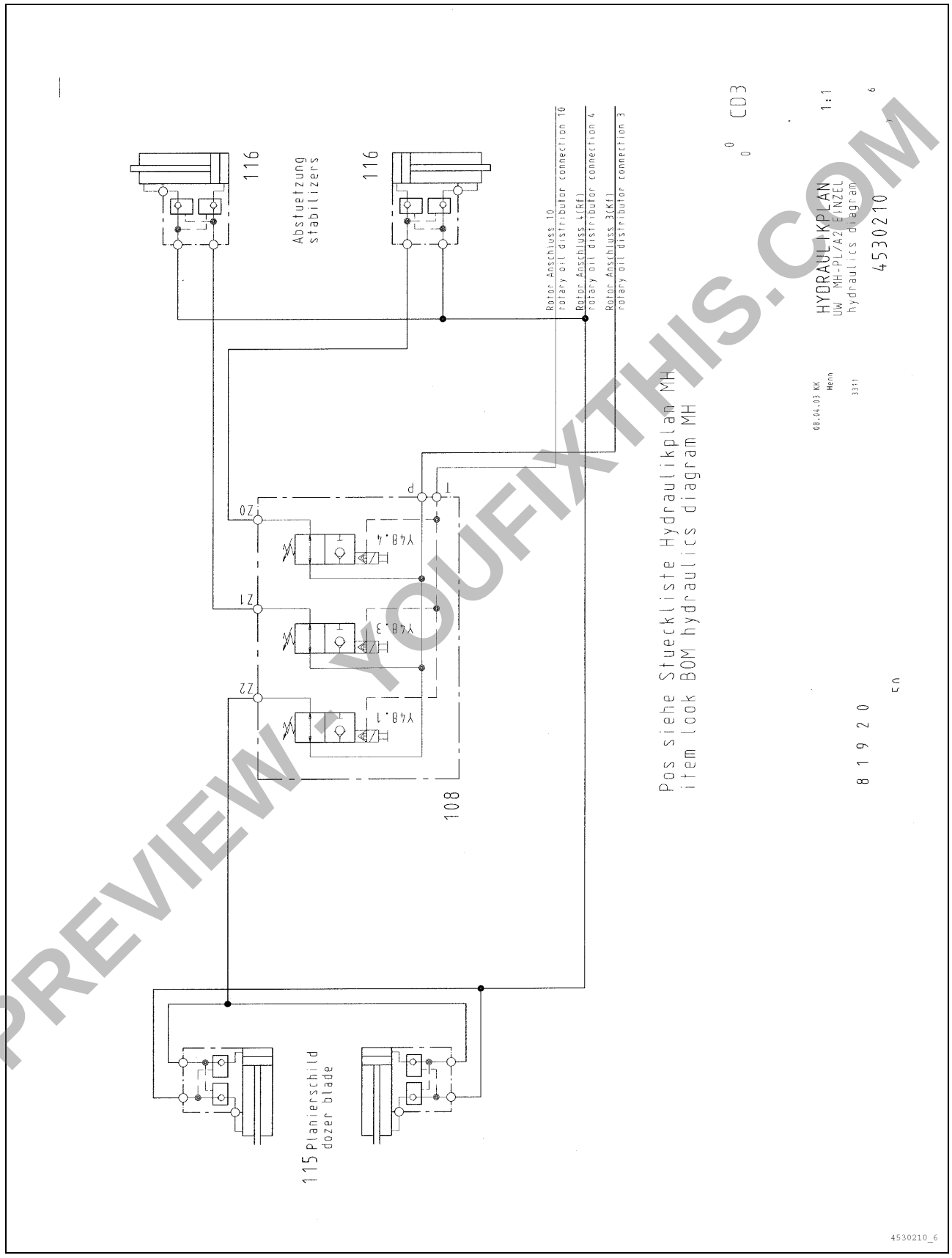


Fig. 6

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Travel oil motor, regulator (No. 102)

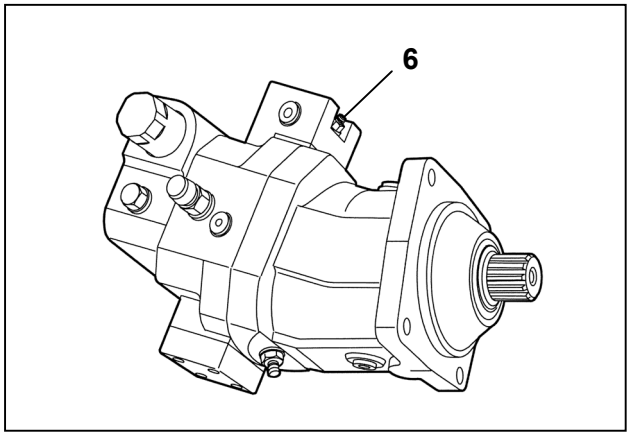


Fig. 1

No.	Description
1	Adjusting piston
2	Spring
3	Compensator spring
4	Spring plate
5	Control piston
6	Setscrew for regulation start
RF	Rod side of adjusting piston
KF	Piston side of adjusting piston

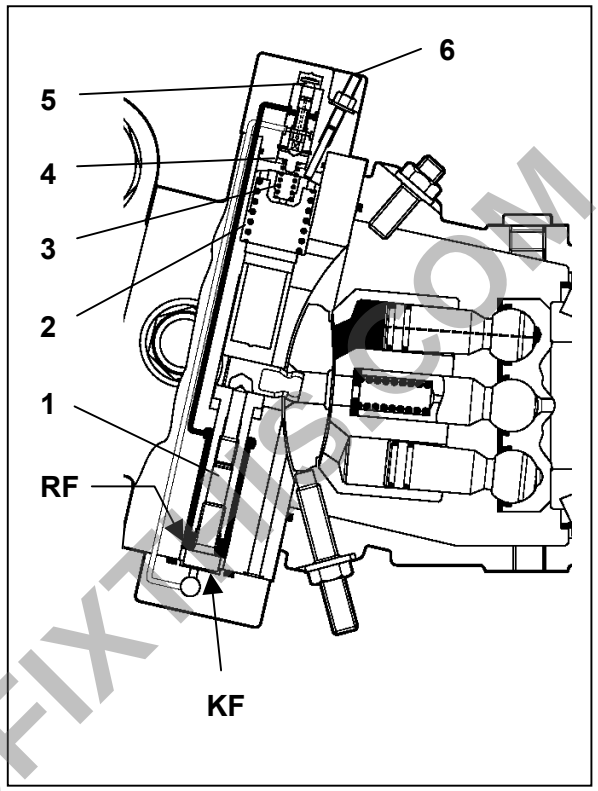


Fig. 2

Description

The travel oil motor is an axial piston motor in bent-axis design with variable displacement.

The angle of the axial-piston unit can be varied by a regulator as a function of high pressure.

Automatic regulation

In neutral position and during travelling in the low-pressure range, the piston unit (2) is in the Vgmin position. The angle plate (3) is in contact with the Vgmin setscrew (6). The hydraulic power supplied in the form of discharge flow and pressure is converted by the short-stroking axial pistons to high output speed at low torque. The pressure built up during travelling is admitted to the rod side of the adjusting piston and to the metering side at the control piston of the regulator. The hydraulic force at the adjusting piston keeps the unit at the Vgmin limit stop. The hydraulic force at the metering side of the control piston acts against the spring under the control piston. The spring force is adjustable and determines the regulation start of the travel motor.

With increasing travelling resistance, the high pressure rises until regulation start is reached. The high pressure displaces the control piston with its control edge so that the high pressure reaches the large surface of the adjusting piston. The adjusting force tilts the cylinder block (2) to a greater angle so that the stroke of the axial pistons increases. The output torque of the oil motor increases whereas the output speed diminishes. The machine travels with greater traction and lower speed. The position of the piston unit is continuously varied with the high pressure until the end of the regulation range is reached.

The end of the regulation range is reached when the piston unit with the angle plate runs into the Vgmax stop (7).

When the travelling resistance has been overcome, the high pressure decreases and the control piston is set back by spring force. The pressure under the adjusting piston escapes towards the housing and the piston unit (2) is tilted towards Vgmin. The output speed increases and the output torque diminishes.

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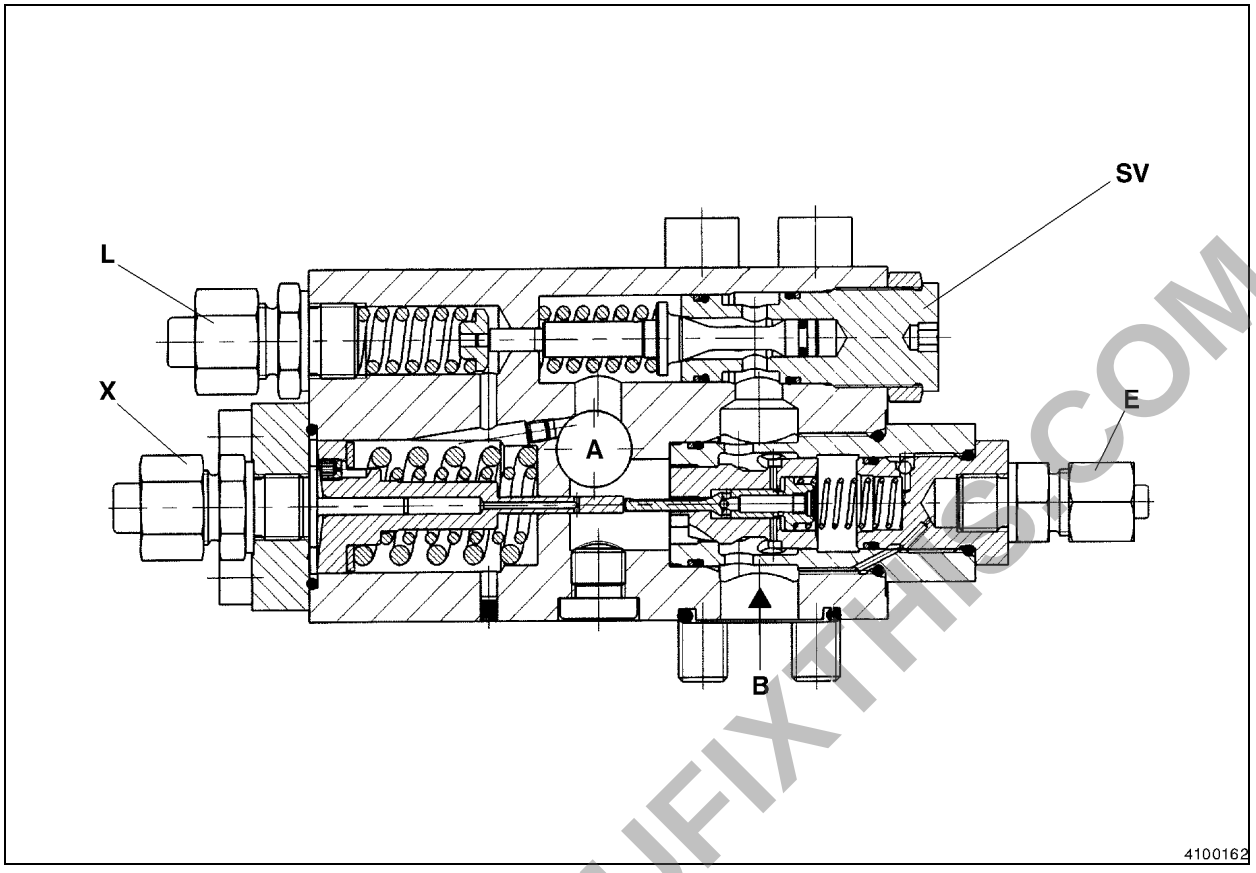


Fig. 3

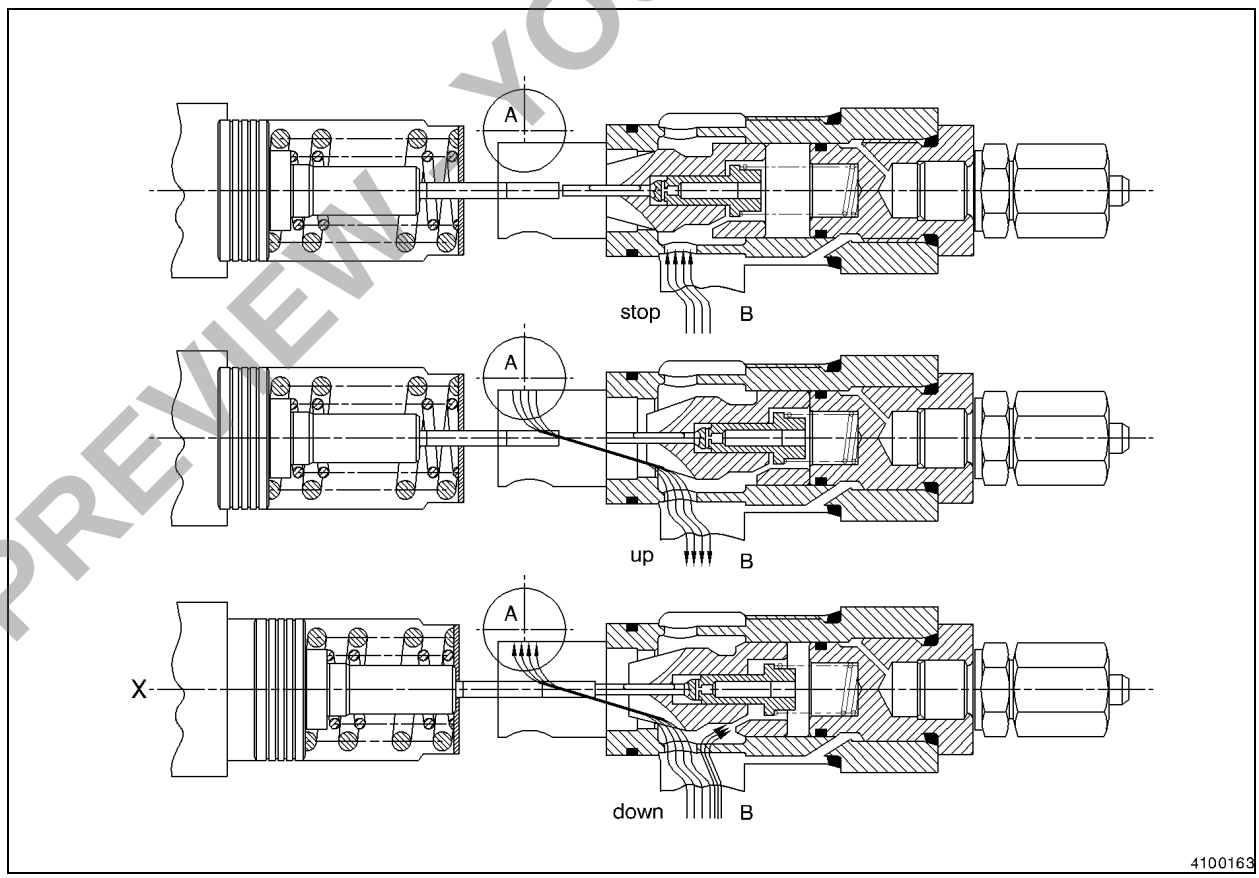


Fig. 4

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Hydraulic hammer control spool

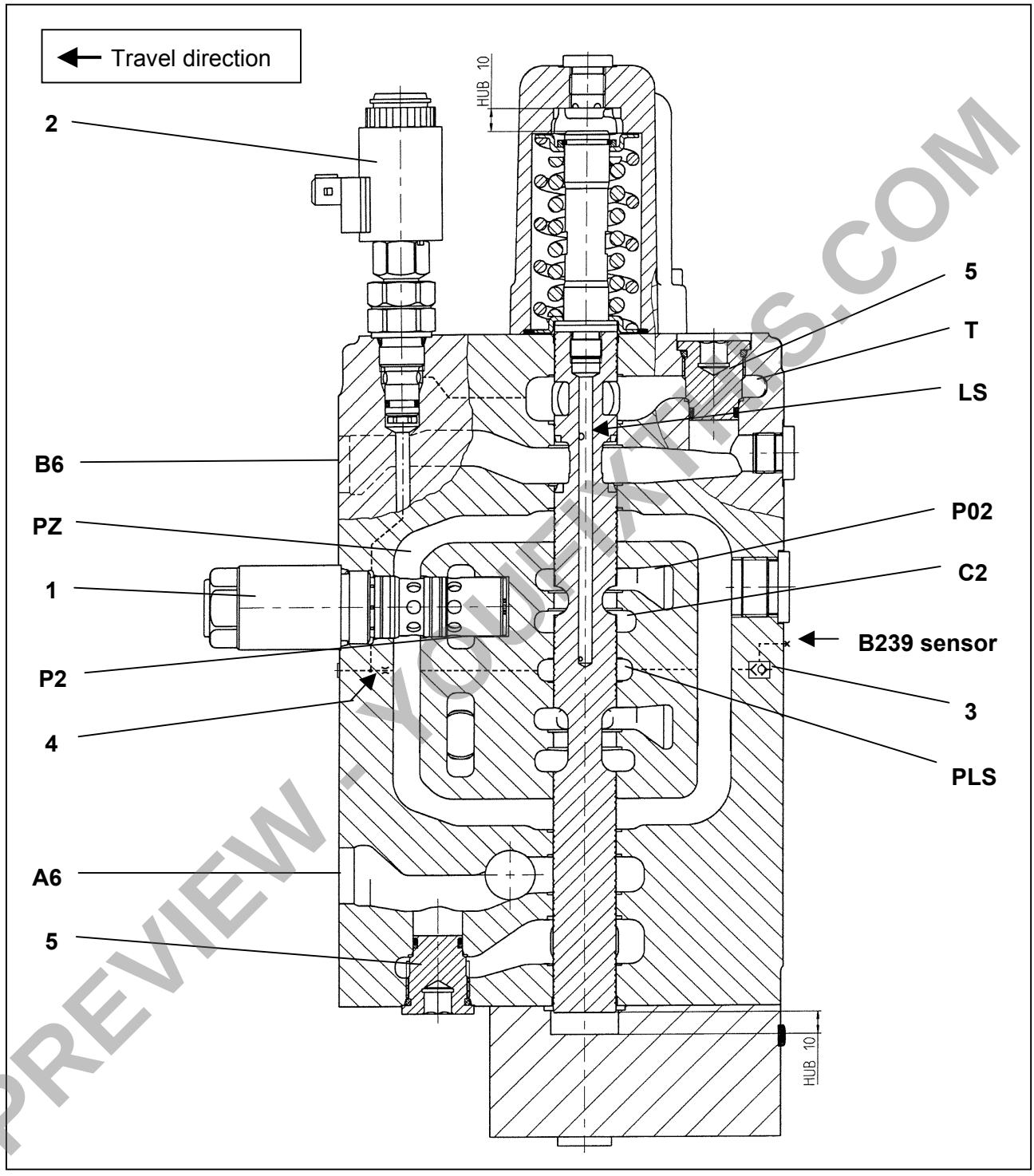


Fig. 2

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9272 Slewing delay key not responding
9273 Slewing delay key, display fault left LED
9274 Slewing delay key, display fault right LED
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9319 Right joystick, sensor in "X" direction not installed
9320 Right joystick, sensor in "X" direction defective
9321 Right joystick incompatible status in "X" direction
9322 Right joystick, sensor in "Y" direction not installed
9323 Right joystick, sensor in "Y" direction defective
9324 Right joystick incompatible status in "Y" direction
9331 Left joystick, failure
9332 Left joystick, message counter faulty
9333 Left joystick, CAN communication faulty
9334 Left joystick, initialization message faulty
9335 Left joystick, faulty EEPROM access
9336 Left joystick, inverse message failure

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Battery box panelling

40000355-en

Removing the metal panel

To remove the combined radiator, the panel must be slided a bit in forward direction. The components fastened to the panel may therefore remain in place.

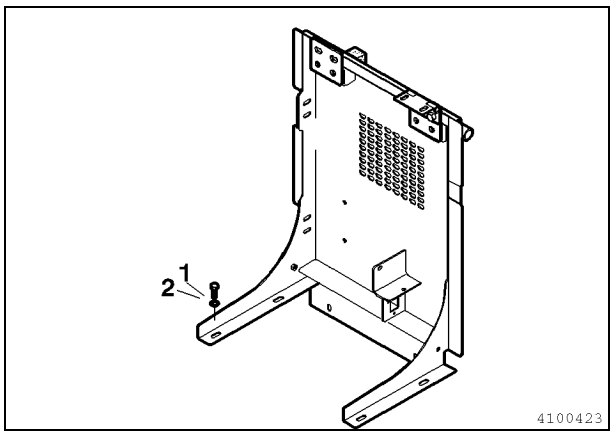


Fig. 1

- Loosen the screws holding the panel in place.
- Slide the panel forwards.

Refitting the metal panel

- Fasten the metal panel with the screws to the frame.

□

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Changing a wheel

Read and observe:

"Tyres and wheels, safety instructions".

- Park the machine on firm and level ground.
- Apply the parking brake.
- Slacken the wheel-nuts by about 1 full turn.
- Raise the axle with the defective wheel until the tyres lose contact with the ground by jacking up the machine with the help of the working equipment or the stabilizers on the respective side of the machine.
- Support the raised axle with squared timber to prevent it from lowering.
- Secure the machine as described under "Securing the machine".
- Deflate the tyres.

The wheels have been pre-fitted pairwise at the factory. When removing the wheels for the first time, the complete pair must be removed and then dismantled.

- Slacken the wheel-nuts and remove the damaged wheel and the intermediate ring (optional equipment) using appropriate lifting gear.
- Mark inner and outer wheel. Do not lose centering rings, spring washers and wheel-nuts. Reuse these parts when refitting the wheel.

Fitting new wheels

- Inflate both tyres with approx. 1 bar. Observe the fitting sequence:
- Place inner wheel (rim with high-offset dish) on the mounting studs.
- Place intermediate ring (optional equipment) on the wheel.
- Place outer wheel (rim with low-offset dish) on the ring. Observe the fitting sequence. Incorrect mounting of the wheels may result in the total admissible width of the machine being exceeded.
- Observe the information set out in "Wheels, tread position".
- Do not damage the threads of the wheel-studs.
- Center the intermediate ring.
- Make sure there are no foreign objects between tyre and intermediate ring.
- Apply special tool (WXXX) on opposite studs.
- Prestress the wheel pair by tightening the special tool until the wheel-nuts can be screwed onto the studs.
- Tighten the wheel-nuts with centering rings crosswise until the axle is in contact with the disk wheel.
- Remove the timber from under the raised axle and lower the axle.
- Tighten the wheel-nuts with the prescribed torque.
- Inflate the tyres with the correct pressure.
- Recheck the wheel-nuts after several hours in operation with a torque wrench for tight fit.

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