6.9 Injection pump replacement during service

6.9.1 Disassembling the injection pump

NOTICE!

Ensure strict cleanliness when working on the injection system.

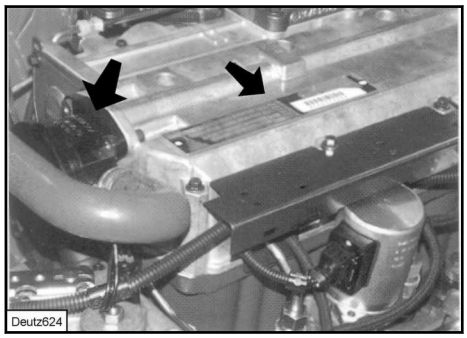


Fig. 191

1. Remove pressure control valve and cylinder head cover.
2. Disconnect the cable plugs from shut-down solenoid, governor and temperature sensor.
3. Swing the holding plate to the side.

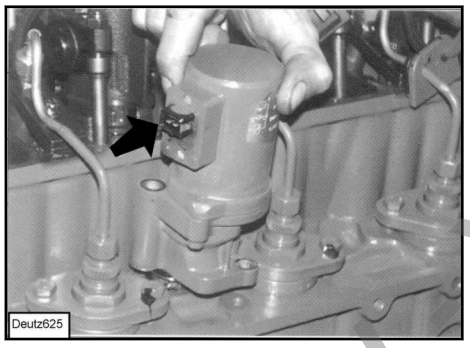


Fig. 192

4. Remove the engine shut-down assy.

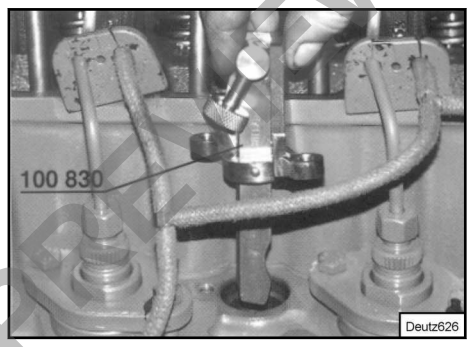


Fig. 193

5. Use the shut-down lever to push the governor rod to stop position.
6. Insert and fasten the pressing device 100 830.

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A.2 Hydraulic diagram 921 125 11

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A Circuit diagrams

A.1 Water spraying diagram 921 133 28

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12.3 Troubleshooting, electrical systems

12.3.1 Preliminary remarks

Malfunctions are frequently caused by incorrect operation of the machine or insufficient maintenance. Whenever a fault occurs you should therefore thoroughly read these instructions on correct operation and maintenance.

If you cannot locate the cause of a fault or rectify it yourself by following the trouble shooting chart, you should contact our customer service department.

Due to the fast technical development electric and electronic vehicle systems become more intelligent and more comprehensive day by day, and can hardly be dispensed with in hydraulic and mechanical vehicle systems.

Diagnostics according to plan

Well structured trouble shooting procedures can save time and money.

Random tests have revealed that purely electronic components or control units only very rarely are the actual cause of failures:

- In approx. 10 % of the examined cases the problems were caused by control units.
- In approx. 15 % sensors and actuators were the cause of the problems.

By far the highest proportion of all faults could be traced back to wiring and connections (plugs, etc.).

General:

Before changing any expensive components, such as control units, you should run a systematic trouble shooting session to eliminate any other possible fault sources. Knowledge in basic electrics is required for this purpose. If a fault was diagnosed without having pulled the plug of the control unit or inspected the wiring, this should be done before changing any parts.

Check for good cable and ground contacts, therefore keep all mechanical transition points between electric conductors (terminals, plugs) free of oxide and dirt, as far as this is possible.

Always use the machine related wiring diagram for testing. If one or more faults were detected, these should be corrected immediately.

Do not disconnect or connect battery or generator while the engine is running.

Do not operate the main battery switch under load.

Do not use jump leads after the battery has been removed.

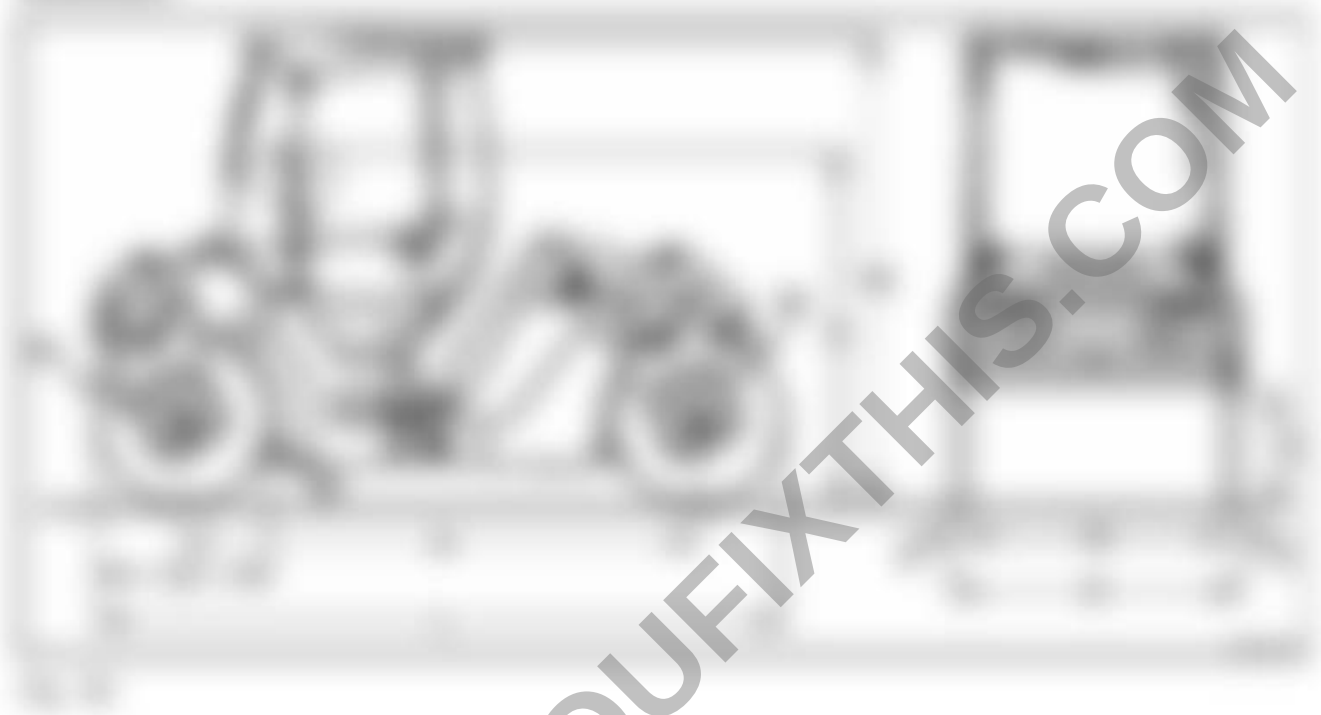
Sensors and electric actuators on control units must never be connected individually or between external power sources for the purpose of testing, but only in connection with the control unit in question.

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3.1 Technical data, BW 161 AD-50

3.1.1 Technical data



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Screw dimension	Tightening torques Nm (Coefficient of friction μ tot. = 0.14)		
	8.8	10.9	12.9
1 1/8″ - 12	1350	1900	2300
1 1/4″ - 12	1900	2700	3200
1 3/8″ - 12	2600	3700	4400
1 1/2″ - 12	3300	4600	5600

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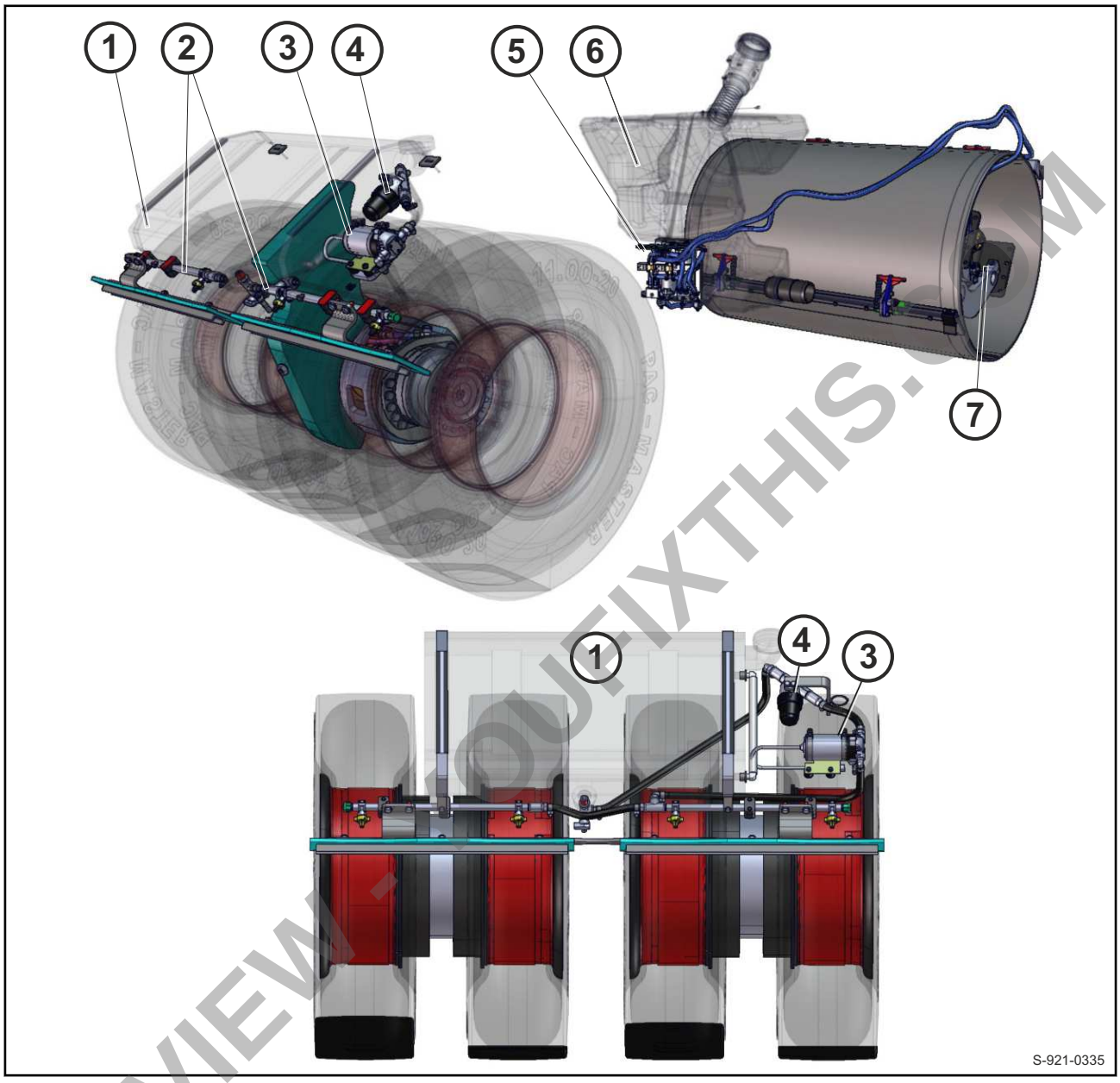


Fig. 64

1 Emulsion tank
2 Emulsion pipes, rear
3 Emulsion pump (M03)
4 Pressure filter
5 Spray pumps and edge cutter (Y06 and Y99) optional equipment
6 Water tank
7 Water spraying system for edge compression unit optional equipment

4.4.3 Pump overview

For the spraying system, BOMAG uses a proven system with two water pumps (redundantly mounted) and triple filtration.

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Fuse	Amperage	Designation
F67	15 A	BDC (potential 30)
F68	15 A	Reserve (potential 30)
F70	15 A	Direction indicators
F91	10 A	Sensors
F95	5 A	Engine control unit
F103	15 A	Reserve (potential 15)
F146	15 A	BAM (potential 30)
F148	10 A	BAM (potential 15)
F151	10 A	Edge illumination for drums
F153	15 A	BDC (potential 15)
F157	30 A	Starter
F161	15 A	BLM (potential 30)
F165	15 A	Seat (potential 15)
F166	5 A	Seat (potential 30)
F244	5 A	BOMAG TELEMATIC (potential 15)
FM1	1 A	Electric power supply for electric steering
FM2	1 A	Electric power supply for electric steering
FM8	1 A	Reserved

5.7.3 Engine compartment

5.7.3.1 Main fuses

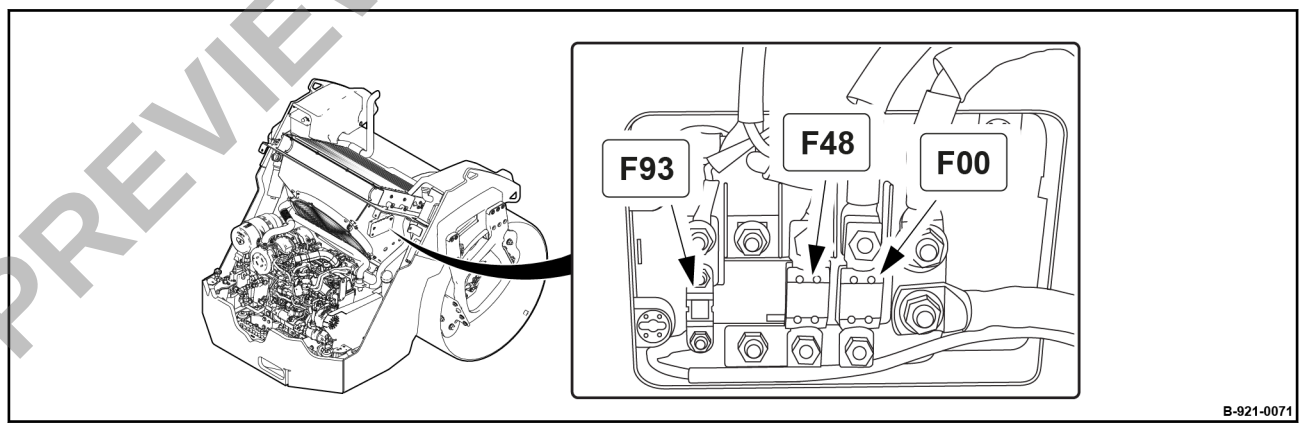


Fig. 100

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5.31.4 As required

5.31.4.1 Battery service during prolonged machine downtimes

WARNING!

Danger of injury caused by exploding gas mixture!

- Remove the plugs before starting to recharge the battery.
- Ensure adequate ventilation.
- Smoking and open fire is prohibited!
- Do not lay any tools or other metal objects on the battery.
- Do not wear jewellery (watch, bracelets, etc.) when working on the battery.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

Protective equipment:
- Working clothes
- Protective gloves
- Safety goggles

1. Switch off all consuming devices (e.g. ignition, light).
2. Measure the open-circuit voltage of the battery at regular intervals (at least 1 x per month).
   ⇨ Reference values: 12.6 V = fully charged; 12.3 V = discharged to 50%.
3. Recharge the battery immediately after an open-circuit voltage of 12.25 V or less is reached. Do not perform boost charging.
   ⇨ The open-circuit voltage of the battery occurs approx. 10 hours after the last charging process or one hour after the last discharge.
4. Switch off the charging current before removing the charging clamps.
5. After each charging process allow the battery to rest for one hour before taking it into service.
6. For standstill periods of more than one month you should always disconnect the battery. Do not forget to perform regular open-circuit voltage measurements.

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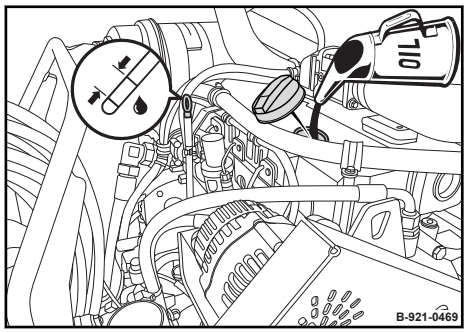


Fig. 265

10. Fill with fresh engine oil and close the cap.
11. After a short test run check the oil level on the dipstick; if necessary, top up to the top dipstick mark.
12. Check oil filter cartridge and drain plug for leaks.
13. Dispose of the oil and filters in line with environmental regulations.

6.13.4.2 Checking the anti-freeze concentration and the condition of the coolant

Protective equipment:
- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine in secured condition *Chapter 1.3.4 „Parking the machine in secured condition“ on page 59*.
2. Allow the engine to cool down.
3. Remove the cap and check the anti-freeze concentration with a conventional tester.
4. Check the condition of the coolant.
5. Thoroughly flush the cooling system if the coolant is contaminated by corrosion residues or other suspended matter *Chapter 6.13.6.1 „Changing the coolant“ on page 247*.
6. Close the cap.

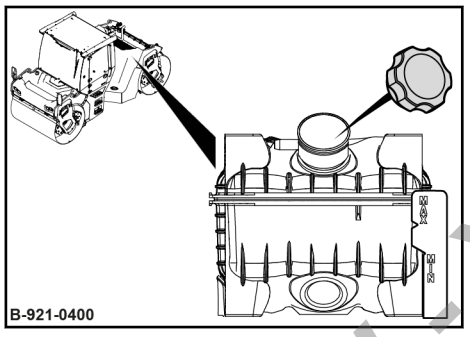


Fig. 266

6.13.5 Every 1000 operating hours

6.13.5.1 Adjusting the valve clearance

NOTICE!

Danger of engine damage!

We recommend to have this work carried out by trained personnel or our after sales service.

– Before checking the valve clearance let the engine cool down for at least 30 minutes. The engine oil temperature must be below 80 °C (176 °F).

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7.4 Charge circuit and fan circuit

Tandem pump unit - old design

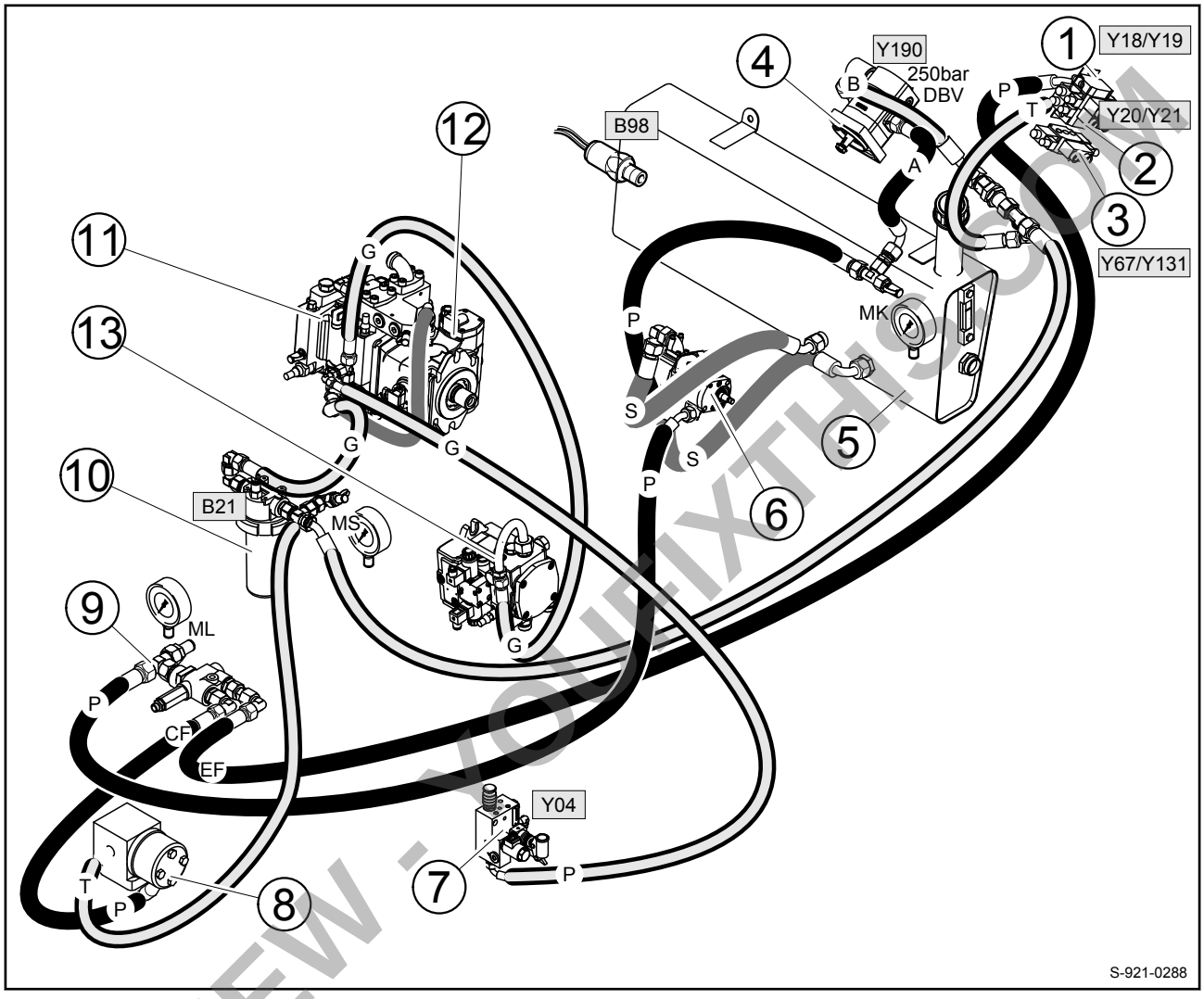


Fig. 334: Tandem pump unit - old design (11 and 12)

1 Solenoid valve for crabwalk optional equipment
2 Solenoid valve for edge compression optional equipment
3 Solenoid valve for chip spreader optional equipment
4 Fan motor with pressure limiting valve
5 Hydraulic oil tank
6 Tandem gear pump
7 Brake valve
8 Steering valve
9 Priority valve
10 Charge circuit filter
11 Vibration pump front, A10VG 28 EP
12 Travel pump, A4VG 71EP
13 Vibration pump rear, A10VG 28 EP

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7.9.8 Pressure tests in the rear vibration circuit

Special tools
Hydraulic test case

NOTICE!

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

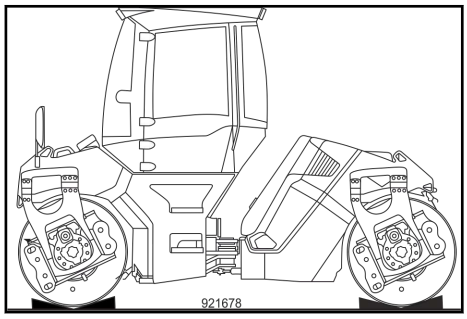


Fig. 394

1. Drive the machine with both drums on an elastic base .

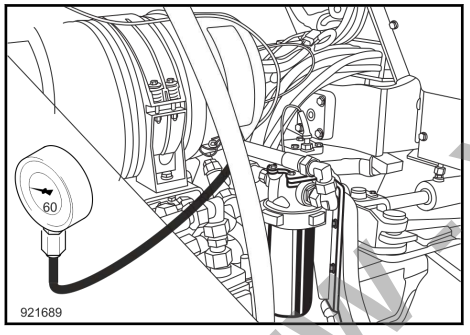


Fig. 395

2. Connect a pressure gauge (60 bar) to the charge pressure test port.

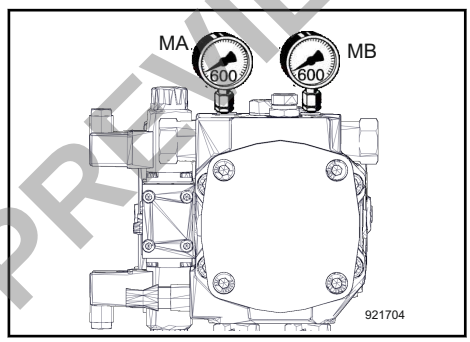


Fig. 396

3. Connect one high pressure gauge (600 bar) each to the pressure test ports M_A and M_B.

4. Start the engine and run it with maximum speed.

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8.1 Overview of water spraying system

8.1.1 Tandem rollers

Large tandem rollers are normally equipped with two water pumps (1 spare pump). All rollers are equipped with interval switches to save water. The switches are used to accurately meter the water quantity for the application concerned. In principle, the following applies: the drum surface needs to be moist, but not wet, which is why an excellent view of the drum surface is required.

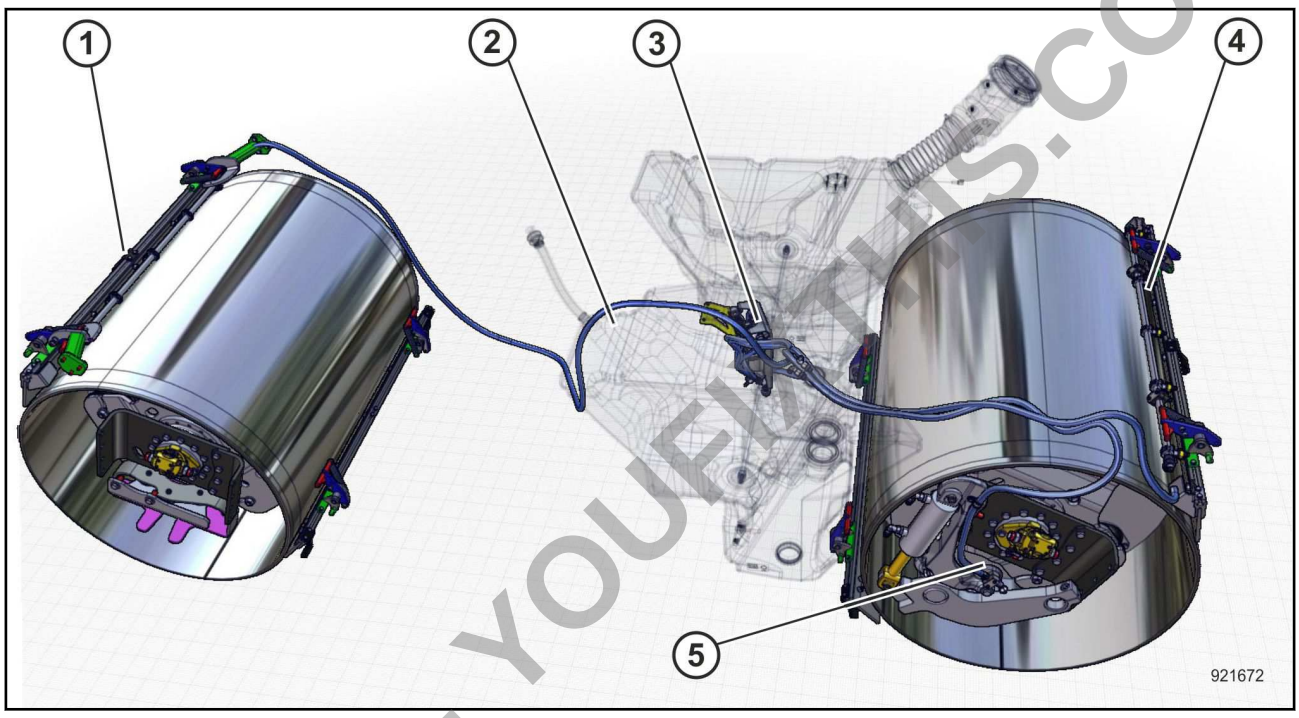


Fig. 485

1 Spray tube, rear
2 Water tank
3 Water spraying pumps and solenoid valves for edge cutter (Y06 and Y99) optional equipment
4 Front spray tube
5 Water spraying system for edge compression unit optional equipment

8.1.2 Combination rollers

Combination rollers are equipped with an additional pump to spray the rubber tyres with emulsion.

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9.13.3 Every 1000 operating hours

9.13.3.1 Cleaning the circulation air filter of the heating

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 1.3.4 „Parking the machine in secured condition“ on page 59*.
2. Loosen the locks and remove the cover.
3. Take out the filter.
4. Clean the filter, replace if necessary.
5. Insert the filter and reinstall the cover.

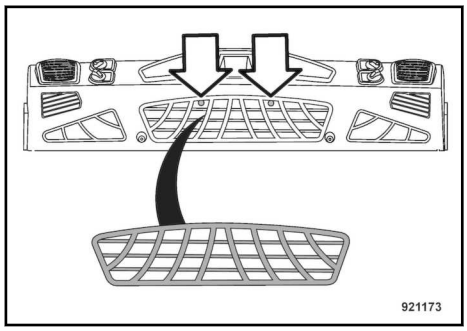


Fig. 533

9.13.3.2 Changing the fresh air filter in the cabin

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 1.3.4 „Parking the machine in secured condition“ on page 59*.
2. Pull the fastening pins out of the left cover and remove the cover.

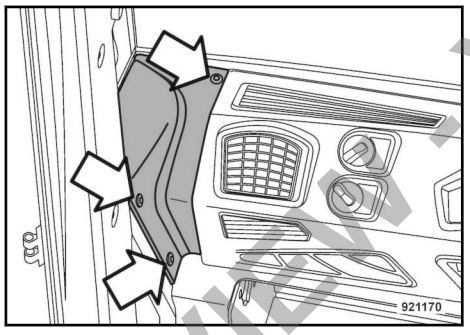


Fig. 534

3. Loosen the fastening screw.
4. Also remove the cover from the right hand side and loosen the fastening screw.

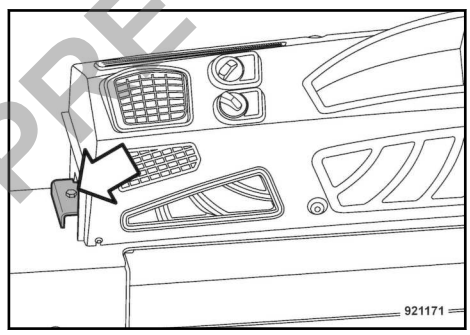


Fig. 535

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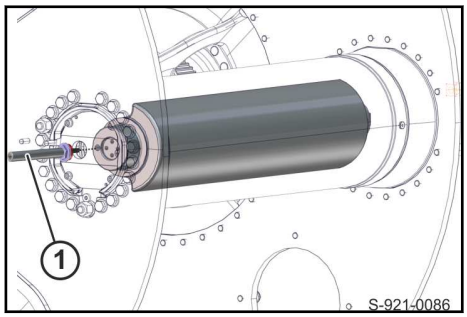


Fig. 647

17.

Perform the work step on both drum sides.

Unscrew the tool (1) ↳ Fig. 647.

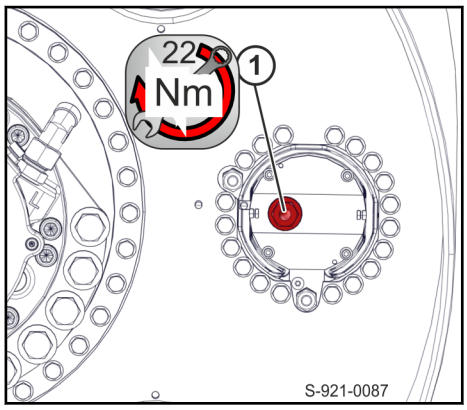


Fig. 648

18.

Perform the work step on both drum sides.

Screw in the magnetic plug (1) ↳ Fig. 648 and tighten with 22 Nm.

Vibration motor side, unbalanced mass pointing downwards

NOTICE!

The toothed belt tension must only be adjusted when the unbalanced mass of the exciter shaft is pointing upwards or downwards.

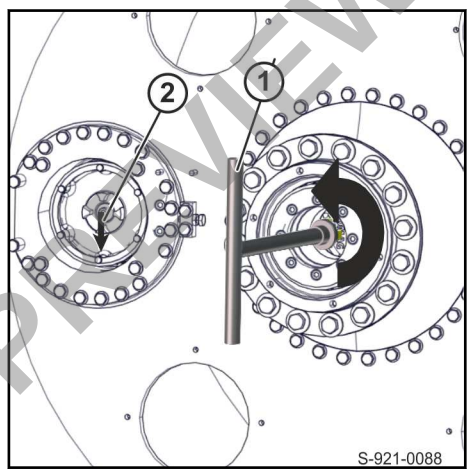


Fig. 649: Vibration motor side

1 BOMAG part number: 00721573

1. Attach the tool (1) ↳ Fig. 649 to the ring gear on the drive shaft.

2.

NOTICE!

Exciter shafts must have a 180° offset toward each other, otherwise oscillation is not possible.

Turn the drive shaft with the tool (1) for two complete revolutions.

3. Keep turning the drive shaft, until the mark (2) on the belt pulley points downwards.

⇨ On the vibration motor side the unbalanced mass of the exciter shaft points downwards.

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Protective equipment:
- Working clothes
- Protective gloves

The maintenance points for the exciter housing are located on the left hand side of the drum.

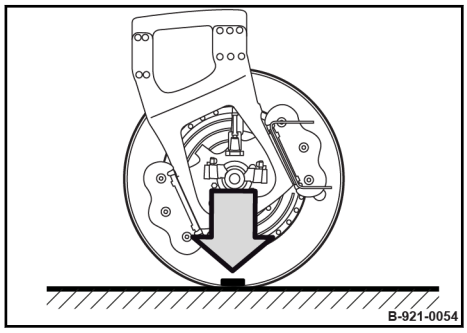


Fig. 764

1. Move the drum until the mark is in the lowest position.
   ⇨ The filler screw now points vertically up.
2. Park the machine in secured condition *Chapter 1.3.4 „Parking the machine in secured condition“ on page 59*.

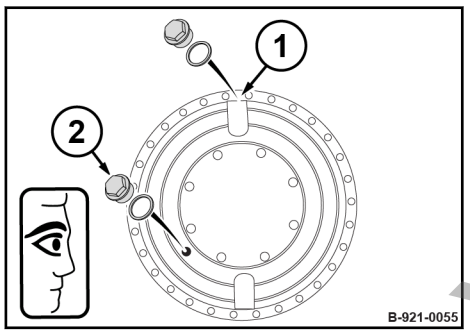


Fig. 765

3. Clean and unscrew the oil level inspection plug (2).
4. The oil level must reach the bottom edge of the inspection bore, if necessary top up oil through the filler opening (1).
5. Screw the filler and oil level control plug back in.

10.4.5 Every 500 operating hours, ADO machine

10.4.5.1 Checking the oil level in the front exciter housing

NOTICE!

Components may get damaged!

– Use only gear oil of the permitted specification *Chapter 2.1.5 „Gear oil SAE 75W-90“ on page 67*.

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List of components

Device tag list
Betriebsmittelliste

Device tag BMK	Page Blatt	Path Pfad	Mounting location Einbauort	Higher-level function Anlage	Function text	Funktionstext	characteristics Techn.-Kenngrößen
A12	35	3	+CAB	=MPH	Radio	Radio	
A48	18	0	+EBOX	=MPH	Engine-controller EMR3 (EDC7)	Motorsteuergerät EMR3 (EDC7)	
A66	25	4	+EBOX	=MPH	drive controller	Fahren Steuerung	Pin overview -->
A72	36	0	+CAB	=MPH	Controller air conditioning Heating Unit	Regler Luft Aufbereitung Heizung Einheit	
A79	40	0	+EBOX	=WDP	readings converter	Meßwertumformer	
A80	30	4	+EBOX	=MPH	data collector	Daten Sammler	Pin overview -->
A81	16	5	+SEAT	=MPH	LC-display	LCD-Anzeige	Pin overview -->
A83	46	1	+EBOX	=WDP	dosage controller	Dosierung Steuerung	Pin overview -->
A95	47	1	+BAT	=BDP	Value Transformer	Meßwertumformer	
A98	49	1	+REFR	=BDP	valve module BLM 2	Ventil Modul BLM 2	Pin overview -->
A99	17	2	+REFR	=MPH	controller module water BLM1	Steuerung Modul Wasser BLM1	Pin overview -->
A104	49	1	+REFR	=BDP	valve module BLM 3	Ventil Modul BLM 3	Pin overview -->
A107	37	2	+CAB	=MPH	splitter Box	Verteiler Box	
B03	30	4	+FRFR	=MPH	Vacuum switch	Unterdruckschalter	
B04	30	7	+FRFR	=MPH	pressure switch charge pressure 1	Druckschalter Speisedruck 1	
B05	31	5	+FRFR	=MPH	Pressure differential switch Gear-Box oil	Differenzdruckschalter Getriebeöl	
B11	35	4	+CAB	=MPH	Warning horn	Signalhorn	
B19	30	2	+FRFR	=MPH	Magnetic sensor contamination	magnetischer Schmutzsensor	
B21	30	8	+FRFR	=MPH	Differential pressure switch 1	Differenzdruckschalter 1	
B22	30	9	+FRFR	=MPH	Differential pressure switch 2	Differenzdruckschalter 2	
B23	30	6	+FRFR	=MPH	Level switch hydraulic oil	Füllstandsschalter Hydrauliköl	
B25	30	3	+FRFR	=MPH	Differential pressure switch return flow Filter	Differenzdruckschalter Rücklauffilter	
B28	35	5	+CAB	=MPH	Warning horn	Signalhorn	
B29	36	5	+CAB	=MPH	Temperature switch Heating	Temperatur Schalter Heizung	
B33	40	8	+FRFR	=WDP	water lack sensor	Wasser Mangel Sensor	
B42	30	9	+FRFR	=MPH	Differential pressure switch 3	Differenzdruckschalter 3	
B46	26	7	+REFR	=MPH	Sensor 2 steering Axle	Sensor 2 lenken Achse	
B47	26	6	+REFR	=MPH	Sensor 1 steering Axle	Sensor 1 lenken Achse	
B48	28	8	+REFR	=MPH	Sensor Cross-Slope 2	Sensor Querneigung 2	
B49	28	7	+REFR	=MPH	Sensor Cross-Slope 1	Sensor Querneigung 1	
B51	35	3	+CAB	=MPH	Loudspeaker	Lautsprecher	
B52	30	2	+FRFR	=MPH	Proximity switch Lubrication piston	Initiator Schmierkolben	
B52	35	2	+CAB	=MPH	Loudspeaker	Lautsprecher	
B55	30	5	+FRFR	=MPH	Sensor Coolant water level	Sensor Kühlmittel Wasser Füllstand	
B65	25	4	+REFR	=MPH	Sensor steering Buckling-link	Sensor lenken Knickgelenk	
B88	19	8	+MOT	=MPH	EMR engine oil pressure	EMR Motor Öl Druck	
B103	36	4	+CAB	=MPH	Temperature switch conditioner	Temperatur Schalter Klimaanlage	

Created Erstellt	M. Werner 31.01.2008	Stabilizer / Recycler MPH 125	BOMAG FAYAT GROUP	Component-Listing Bauteilliste	Page Blatt 55 / from von 96	593 200 24
Checked Geprüft	M. Vogt 26.10.2007				Higher-level function Anlage = DOC2 / Function Funktion == DOC / Mounting location Einbauort +	

Fig. 836: Example: List of components

The list of components, see example , is the first evaluation list that follows the representation of function. This list contains all components used in the wiring diagram, except terminal strips and plugs.

An electric component is a part, assembly or device in an electrical installation.

- Components are marked with a combination of letters and numbers. The identification with letters follows the standard DIN - EN 61346 T1-T2. A component identification (BMK), e.g.: “S04“ always identifies the same component. In this context the term "component" is always considered a function specific assignment and does not represent a parts or article number. This ensures that the component with the designation "S04" always refers to the "Brake Switch", irrespective of whether the abbreviation is used in a wiring diagram for a single drum roller, a tandem roller, a paver or a milling machine.
- The component identifications are alphabetically sorted in the list of components. Each component has the corresponding cross-references assigned, identifying where it can be found in the wiring diagram, which installation location it is assigned to and to which part of the system it belongs to. Moreover, the functions (function text) and the technical characteristics are also described.

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ESX terminal	Signal description	Nominal values (voltage / current)
X35:45	Output **Engine shut down relay**	Engine stop ☞ approx.12 V Engine running or not yet started ☞ 0 V
X35:46	Output **Steering valve front left** PWM digital output (max. 4A)	valid current range: approx. 0.. 1.8A
X35:47	Output **Steering valve front right** PWM digital output (max. 4A)	valid current range: approx. 0.. 1.8A
X35:48	Output valve crabwalk left	
X35:49	Output valve crabwalk left	
X35:50	Output **Brake valve**	Brake released ☞ approx. 12V Brake applied ☞ 0 V
X35:51	Output **backup warning buzzer rear**	
X35:52	Input **Air filter service switch**	---
X35:53	Interface **CAN-Bus 2** Wire **+**, is used to communicate with the travel lever.	Measurement not possible!
X35:54	Voltage supply for electronics (permanent voltage)	Control running ☞ approx.12 V Control not running ☞ 0 V
X35:55	Ground connection Electronics	approx. 0 V measured against ground
X35:56	Voltage supply for outputs (permanent voltage)	approx. 12V measured against ground
X35:57	Voltage supply for outputs (permanent voltage)	approx. 12V measured against ground
X35:58	Voltage supply for outputs (permanent voltage)	approx. 12V measured against ground
X35:59	Voltage supply for outputs (permanent voltage)	approx. 12V measured against ground
X35:60	Voltage supply for outputs (permanent voltage)	approx. 12V measured against ground
X35:61		
X35:62	Output **Water pump 2**	Pump running ☞ approx.12 V Pump not running ☞ 0 V
X35:63	Output **solenoid valve for spraying system**	Valve open ☞ approx.12 V Valve closed ☞ 0 V
X35:64	Output **Solenoid for engine speed control** (only on AD-50)	High speed ☞ approx.12 V Low speed ☞ 0 V
X35:65	Ground connection	approx. 0 V
X35:66	Ground connection	approx. 0 V
X35:67	Ground connection	approx. 0 V
X35:68	Ground connection	approx. 0 V

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8971	Fault: Undervoltage 8.5 V supply	System	4
8979	Fault: System voltage	System	4
8980	Warning: System voltage under 11 V	System	1
8981	Fault: System voltage under 10V	System	2
8996	Internal fault	System	4
8997	Internal fault	System	4
8998	Internal fault	System	4
8999	Internal fault	System	4
9000	Internal fault	System	4
9001	Internal fault	System	4
9002	Internal fault	System	1
9003	Internal fault	System	1
9004	Fault: CAN communication Bus 1, check bus hardware	System	1
9005	Fault: CAN communication Bus 1, check bus hardware	System	2
9006	Fault: CAN communication Bus 1, check bus hardware	System	1
9007	Internal fault	System	1
9008	Internal fault	System	1
9008	Internal fault	System	1
9009	Internal fault	System	4
9009	Internal fault	System	4
9011	Internal fault	System	3
9012	Internal fault	System	3
9013	Internal fault	System	3
9014	Internal fault	System	3
9015	Internal fault	System	3

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Pressure valves (primary)	
Malfunction	**Possible cause**
Fluctuation of pressure / flow volume	■ Intermittent counter pressure ■ Pressure valves set too low ■ Valve seat damaged
Pressure fluid too hot	Setting too high: ■ Increase of gap losses in all components ■ increased leakage ■ Excessive load rhythm caused by machine Setting too low: ■ Power loss ■ Generation of heat ■ Valve cone jams in open position

Pressure accumulator	
Malfunction	**Possible cause**
Abnormal noises	■ Accumulator bladder defective ■ Nitrogen filling enters into hydraulic circuit ■ defective seals ■ Inflow and outflow velocity too high Note: Accumulators in connection with throttle losses can form resonant systems
No or insufficient volumetric flow	■ Nitrogen filling level too low
No or insufficient pressure	■ Nitrogen filling pressure too low or too high ⇨ Stored power is not enough
Fluctuation of pressure / flow volume	■ Resonant system between hydraulic accumulator, pressure and flow valves and pump

Return flow lines	
Malfunction	**Possible cause**
Abnormal noises	■ Line not connected below the pressure fluid level ■ Turbulences towards the suction side ■ missing shut-off ■ mechanical oscillations ■ insufficient fastening
Pressure fluid too hot	■ Cross section too small

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X22 136
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Circuit diagrams



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