# Service Manual

# PC3000-6

## HYDRAULIC MINING SHOVEL

### SERIAL NUMBER 06208 and up
### 46151 and up



June 2006



KOMATSU
MINING GERMANY

# III. SPECIFICATIONS

## Temperature

Fahrenheit – Centigrade Conversion; a simple way to convert a Fahrenheit temperature reading into a Centigrade temperature reading or vise versa is to enter the accompanying table in the center or boldface column of figures.

These figures refer to the temperature in either Fahrenheit or Centigrade degrees.

If it is desired to convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left.

If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the righ.

| °C | | °F | °C | | °F | °C | | °F | °C | | °F |
|---|---|---|---|---|---|---|---|---|---|---|---|
| –40.4 | –40 | –40.0 | –11.7 | 11 | 51.8 | 7.8 | 46 | 114.8 | 27.2 | 81 | 117.8 |
| –37.2 | –35 | –31.0 | –11.1 | 12 | 53.6 | 8.3 | 47 | 116.6 | 27.8 | 82 | 179.6 |
| –34.4 | –30 | –22.0 | –10.6 | 13 | 55.4 | 8.9 | 48 | 118.4 | 28.3 | 83 | 181.4 |
| –31.7 | –25 | –13.0 | –10.0 | 14 | 57.2 | 9.4 | 49 | 120.2 | 28.9 | 84 | 183.2 |
| –28.9 | –20 | –4.0 | –9.4 | 15 | 59.0 | 10.0 | 50 | 122.0 | 29.4 | 85 | 185.0 |
| –28.3 | –19 | –2.2 | –8.9 | 16 | 60.8 | 10.6 | 51 | 123.8 | 30.0 | 86 | 186.8 |
| –27.8 | –18 | –0.4 | –8.3 | 17 | 62.6 | 11.1 | 52 | 125.6 | 30.6 | 87 | 188.6 |
| –27.2 | –17 | 1.4 | –7.8 | 18 | 64.4 | 11.7 | 53 | 127.4 | 31.1 | 88 | 190.4 |
| –26.7 | –16 | 3.2 | –7.2 | 19 | 66.2 | 12.2 | 54 | 129.2 | 31.7 | 89 | 192.2 |
| –26.1 | –15 | 5.0 | –6.7 | 20 | 68.0 | 12.8 | 55 | 131.0 | 32.2 | 90 | 194.0 |
| –25.6 | –14 | 6.8 | –6.1 | 21 | 69.8 | 13.3 | 56 | 132.8 | 32.8 | 91 | 195.8 |
| –25.0 | –13 | 8.6 | –5.6 | 22 | 71.6 | 13.9 | 57 | 134.6 | 33.3 | 92 | 197.6 |
| –24.4 | –12 | 10.4 | –5.0 | 23 | 73.4 | 14.4 | 58 | 136.4 | 33.9 | 93 | 199.4 |
| –23.9 | –11 | 12.2 | –4.4 | 24 | 75.2 | 15.0 | 59 | 138.2 | 34.4 | 94 | 201.2 |
| –23.3 | –10 | 14.0 | –3.9 | 25 | 77.0 | 15.6 | 60 | 140.0 | 35.0 | 95 | 203.0 |
| –22.8 | –9 | 15.8 | –3.3 | 26 | 78.8 | 16.1 | 61 | 141.8 | 35.6 | 96 | 204.8 |
| –22.2 | –8 | 17.6 | –2.8 | 27 | 80.6 | 16.7 | 62 | 143.6 | 36.1 | 97 | 206.6 |
| –21.7 | –7 | 19.4 | –2.2 | 28 | 82.4 | 17.2 | 63 | 145.4 | 36.7 | 98 | 208.4 |
| –21.1 | –6 | 21.2 | –1.7 | 29 | 84.2 | 17.8 | 64 | 147.2 | 37.2 | 99 | 210.2 |
| –20.6 | –5 | 23.0 | –1.1 | 30 | 86.0 | 18.3 | 65 | 149.0 | 37.8 | 100 | 212.0 |
| –20.0 | –4 | 24.8 | –0.6 | 31 | 87.8 | 18.9 | 66 | 150.8 | 40.6 | 105 | 221.0 |
| –19.4 | –3 | 26.6 | 0 | 32 | 89.6 | 19.4 | 67 | 152.6 | 43.3 | 110 | 230.0 |
| –18.9 | –2 | 28.4 | 0.6 | 33 | 91.4 | 20.0 | 68 | 154.4 | 46.1 | 115 | 239.0 |
| –18.3 | –1 | 30.2 | 1.1 | 34 | 93.2 | 20.6 | 69 | 156.2 | 48.9 | 120 | 248.0 |
| –17.8 | 0 | 32.0 | 1.7 | 35 | 95.0 | 21.1 | 70 | 158.0 | 51.7 | 125 | 257.0 |
| –17.2 | 1 | 33.8 | 2.2 | 36 | 96.8 | 21.7 | 71 | 159.8 | 54.4 | 130 | 266.0 |
| –16.7 | 2 | 35.6 | 2.8 | 37 | 98.6 | 22.2 | 72 | 161.6 | 57.2 | 135 | 275.0 |
| –16.1 | 3 | 37.4 | 3.3 | 38 | 100.4 | 22.8 | 73 | 163.4 | 60.0 | 140 | 284.0 |
| –15.6 | 4 | 39.2 | 3.9 | 39 | 102.2 | 23.3 | 74 | 165.2 | 62.7 | 145 | 293.0 |
| –15.0 | 5 | 41.0 | 4.4 | 40 | 104.0 | 23.9 | 75 | 167.0 | 65.6 | 150 | 302.0 |
| –14.4 | 6 | 42.8 | 5.0 | 41 | 105.8 | 24.4 | 76 | 168.8 | 68.3 | 155 | 311.0 |
| –13.9 | 7 | 44.6 | 5.6 | 42 | 107.6 | 25.0 | 77 | 170.6 | 71.1 | 160 | 320.0 |
| –13.3 | 8 | 46.4 | 6.1 | 43 | 109.4 | 25.6 | 78 | 172.4 | 73.9 | 165 | 329.0 |
| –12.8 | 9 | 48.2 | 6.7 | 44 | 111.2 | 26.1 | 79 | 174.2 | 76.7 | 170 | 338.0 |
| –12.2 | 10 | 50.0 | 7.2 | 45 | 113.0 | 26.7 | 80 | 176.0 | 79.4 | 175 | 347.0 |

**Legend for illustration Z 24011**

| | |
|---|---|
| **A** | Side view from main control blocks (front) |
| **B** | Top view |
| 1 | Main hydraulic pumps (3 tandem swash plate pumps) |
| 2 | PTO lubrication pump |
| 3 | Fan pump |
| 4 | Suction oil reservoir |
| 5 | Control oil pump (pilot oil pump) |
| 6 | PTO (pump distributor gear) |
| 7 | Engine mounts (elastic) |
| 8 | Flexible coupling, oil filled |
| 9 | Diesel engine |
| 10 | Coolant pump |
| 11 | Radiator fan |
| 12 | Coolant radiator |
| 13 | Expansion tank for radiator |
| 14 | Engine turbo charger |
| 15 | Engine air cleaner |
| 16 | Exhaust muffler |
| 17 | Engine oil reserve tank integrated part of main frame. |

Legend for illustration (Z 24028):

| | |
|---|---|
| **A** | View from machine frond |
| **B** | View from machine right side |
| **C** | Top view |
| 1 | Cab base |
| 2 | Working light housing |
| 3 | Lifting device only for assembling |
| 4 | Walk way |
| 5 | Elastic cab mounts |
| 6 | Access door |
| 7 | Mounting brackets |
| **8** | Pilot control frame |
| **9** | Main electric switch board, X2 box |

# 2. DRIVE

Legend for illustration Z25218

| | |
|---|---|
| 1 | Main filler plug |
| 2 | Breather |
| 3 | Coupling for main pump 1 |
| 4 | Coupling for main pump 2 |
| 5 | Coupling for main pump 3 |
| 6 | Coupling for pilot pump |
| 7 | Spline shaft housing of pilot pump. |
| 8 | Main shaft (intake) |
| 9 | Oil level dip stick |
| 10 | Spray nozzle for cooling and lubricating |
| 11 | Leak oil inlet from valve block |
| 12 | Cooler by pass inlet |
| 13 | Spline shaft housing of main pumps |
| 14 | Suction port to PTO lubrication pump |
| 15 | Main gear |
| 16 | Output gear |
| 17 | Plug for pre heater |
| 18 | Connection flange to diesel engine |

## Description

The pump distribution gear (PTO gear) is from a spur gear design and driven by an diesel engine and external lubrication/ cooling system.

The PTO gear runs in anti friction bearings and has been provided with a splash lubrication system. The oil supply of the bearings and tooth contacts takes place by an injection. The gearwheels are of case-hardened steel. The hydraulic pumps are directly attached to the gearbox. O-rings included in the supply enable the unit to be reliable sealed statically.

The gear box housing is a one-piece design and made of grey cast iron. Gear box design allows a direct attachment to the diesel engine via connection flange. The gear box has been provided with connections for a separate cooling system respectively for a pre heating system.

Always check gear box oil level with un-screwed dip stick and stopped engine.

Each drive shaft is sealed by two radial seal rings, one lip to the outer and one to the inner side of the gear box.

Legend:Z 21602(

| | |
|---|---|
| 1 | Coupling Assy |
| 2 | Input drive flange |
| 3 | Leave spring assy |
| 4 | Output drive flange |
| 5 | Dip stick |
| 6 | Bleeder plug |
| 7 | O-Rings |
| 8 | Spacer |
| E | Engine input flange |
| G | Gear box output flange |

## Function: "GEISLINGER COUPLING"

The combination of the high elasticity of its leaf springs with complimentary viscous damping by oil displacement, ensures that the GEISLINGER-COUPLING removes major critical speeds outside the engine speed range and dampens minor torsional vibrations effectively.

The widest engine speed range free of vibration periods and dangerous resonance is thus obtained.

Furthermore, employment of these couplings with their very dampening characteristics generally results in lower stresses in all engine driven shafts and gears as well as in the crankshaft permitting further power development on standard components.

In any similar application, a simple vibration damper and/ or a pure flexible coupling would not confer the same advantages.

The springs (3) together with the inner driving and outer driven member form chambers A and B which are filled with oil.

If the outer member is displaced in relation to the inner member, the deflection of the leaf springs displaces oil from one chamber to the next, by this action the relative movements of the two members of the coupling are braked and the vibrations are dampened.

The spacers (8) limits the movement of the leaf springs.

**Legend for illustration Z 21500**

| | |
|---|---|
| 1 | Filter cover retainer |
| 2 | Filter cover with o-ring |
| 3 | Pre-tensioning spring |
| 4 | Retainer |
| 5 | Filter assembly |
| 6 | Filter pot with machined cover |
| 7 | Main filter element,<br>return filter = 10 micron filtration<br>leak oil filter = 3 micron filtration |
| 8 | Safety filter element<br>200 micron strainer filter, for return and leak oil |
| 9 | By pass-valve (opened at 2,3 bar) |
| 9.1 | Valve cone |
| 9.2 | Valve spring |
| 9.3 | O-ring |
| 10 | Profile gasket |
| 11 | Seal ring |
| 12 | Self locking nut |
| 13 | Self locking nut |

## Function:

The returning oil flows into the filter chamber (A) of the hydraulic reservoir. (The sketch shows one section only).

The chamber is divided in two sections; one section with 3 filters for the return oil and one for the leak oil. The four filters are all the same. The hydraulic oil enters the filter at the top and passes then on its way to the reservoir the filter-element (7*)*. "Inside to outside filtration."

The filter element condition is monitored by pressure switches connected to the filter chambers.

As soon as the pressure inside the filter chamber reaches the set pressure of those switches due to the restriction of the filter element which is caused by foreign matters, the fault message „Return oil filter restricted" or „Leak oil filter restricted“ is displayed at the operator's dash board The filter elements must be replaced. For safety pre-cautions the filter is equipped with a by-pass valve. As the filter chamber pressure increases the by-pass valve opens at 2.3 bar and protects the element from bursting.

But the oil flows not totally unfiltered into the reservoir because it must flow through the strainer (8).

**Legend for illustration Z XXXX**

| | |
|---|---|
| 1 | Fan |
| 2 | Fan hub |
| 3 | Fan motor support |
| 4 | Hydraulic motor |
| 5 | Cooler outlet |
| 6 | Cooler intake |
| 7 | Cooler frame with hinges (swing out cooler) |
| 8 | Main cooler frame support |
| 9 | Fan guard |

## General:

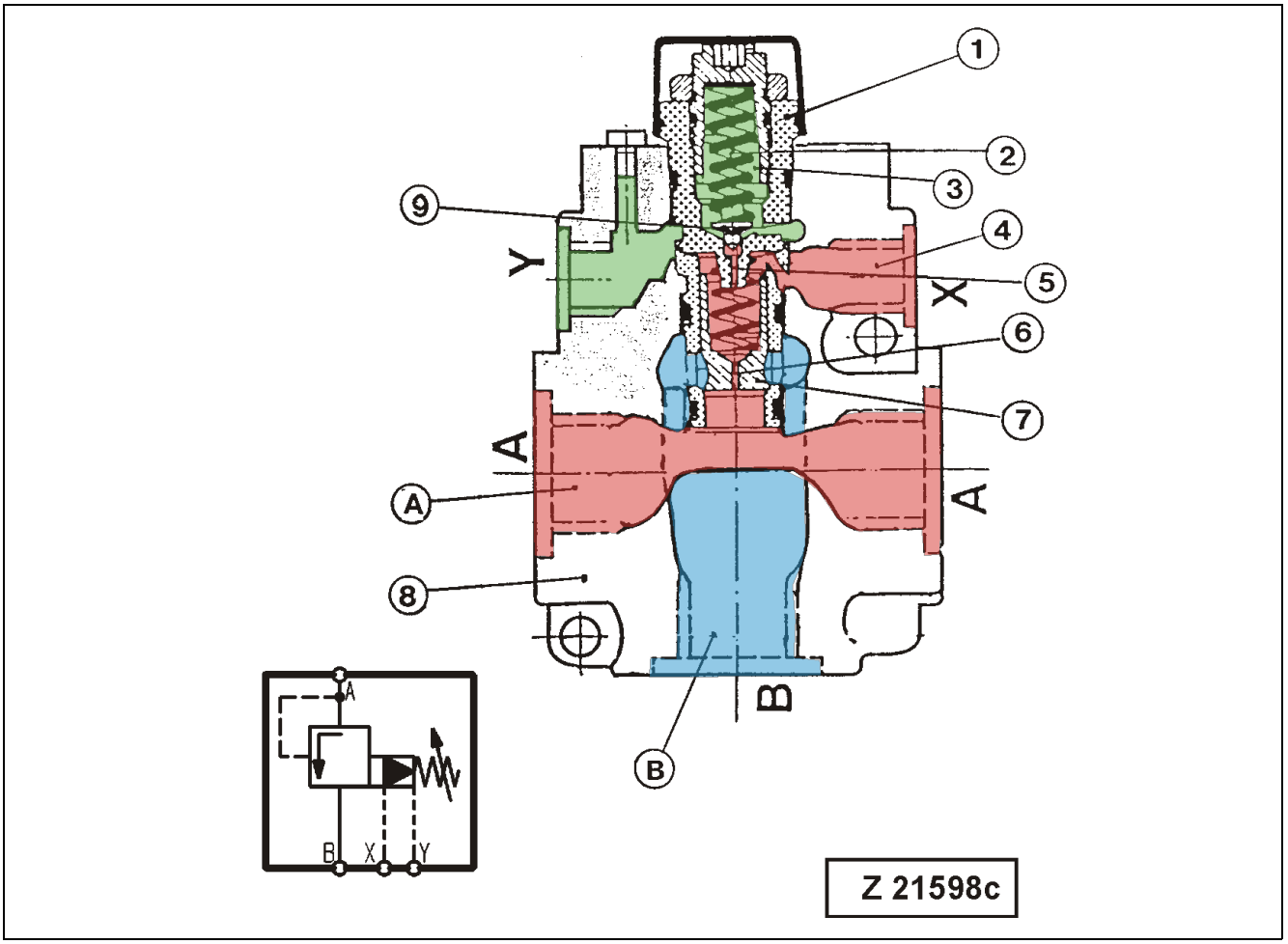
There are two (temperature range up to 40°C) or four (temperature range up to 55°C) hydraulic oil coolers in front of the hydraulic reservoir on the R.H. side of the platform.

Two cooler elements mounted in one frame, one above the other. The air stream needed for the cooling is produced by hydraulic driven fans. The air flows from **inside** to **outside** through the coolers.

For a better cleaning, the cooler frame is mounted via hinges to the cooler support so the cooler frame can be opened. ("Swing out cooler")

The two cooler fans are driven by hydraulic motors. The motors are supplied by one hydraulic pump. The fans are mounted direct to the hydraulic motors drive shaft.

## 4.4.2 Pressure relieve valve




**Legend for illustration Z 21598c**

| | |
|---|---|
| 1 | Pressure relieve valve cartridge |
| 2 | Spring |
| 3 | Spring chamber |
| 4 | X-port (external pilot control) |
| 5 | Jet bore to pilot control valve (valve cone) |
| 6 | Jet bore, main valve spool |
| 7 | Main valve spool |
| 8 | Valve housing |
| 9 | Pilot valve cone |
| A | Valve inlet (pressure port) |
| B | Valve outlet to tank |
| X | Remote control port |
| Y | Leak oil port, external |

Legend for illustration Z 25274

| | |
|---|---|
| 1 | Controls |
| 2 | Remote control valve and distribution board |
| 3 | Main control valves |
| 4 | Floating control valves (only FSA) |

## Function:

Study together with the hydraulic circuit diagram of the respective machine.
The X2 supply pressure to the controls are control from the solenoid valve Y15. It is used as a safety function to prevent unattended moving of the attachment controlled from the safety lever of the operators seat and is acting as pilot control lock with activated emergency button, ladder or service arm down. Only for machines with FSA is a additional solenoid valve installed only to control the supply to the clam control pedals. Only the swing brake pedal get permanent X2 supply pressure.
On the left lower side of the diagram sheet 3 is the electrical and hydraulically priority written and drawn. For later check of the correct priority use the control logic check.

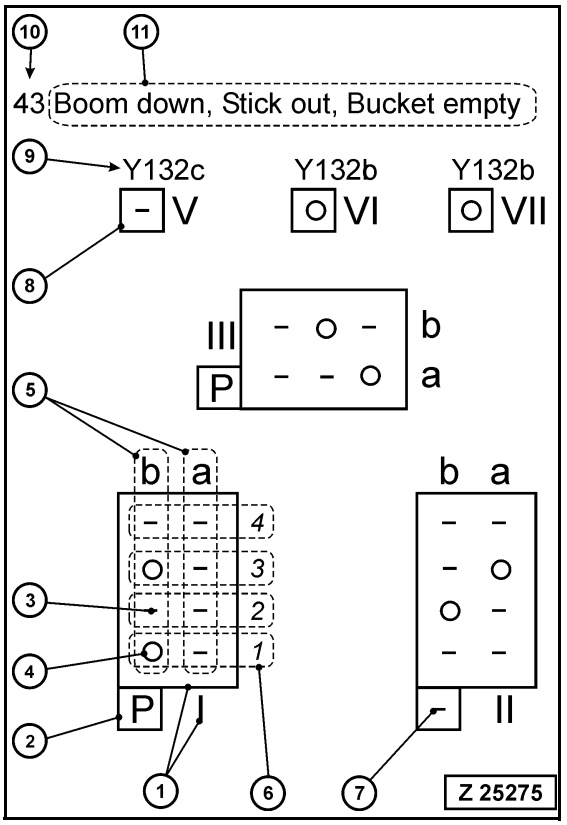
Only BHA:
The solenoid valves Y11a, Y11b, Y11c and Y11d are priority valves to give the travel priority at the control block I and II. The hydraulic controlled valve (36.1) is a priority valve to cancel the stick extracting function in main control block I only in combination with boom rising. The hydraulic controlled valve (36.5) is a priority valve to cancel the bucket filling function only in combination with stick out function.

Only FSA:
Solenoid valve Y40 is additional to the priority valve Y11a to stop the bucket function (filling) with to hot hydraulic oil or faulty lubrication system (CLS and SLS). Solenoid valve Y11a, Y11b, Y11c and Y11e are priority valves to give the travel function priority over the bucket function.
The hydraulic controlled valve (36.2) is a priority valve to cancel the bucket filling function in main control block I only in combination with the stick extracting function. The hydraulic controlled valve (36.3) is a priority valve to cancel the stick extracting function in main control block I only in combination with the boom raising function. The hydraulic controlled valve (36.4) is a priority valve to cancel the bucket dump function in main control block II only in combination with boom raising.
The hydraulically controlled single spool valves 132.1 and 132.2 are used only during the pressure less retracting function of the stick (floating function). The solenoid valves Y132b are installed in this floating spool valves to cancel the floating function this is necessary to pressurize the stick retracting function for any reason. The hydraulically controlled single spool valve 132.32 are used only during the pressure less lowering function of the boom (floating function). The solenoid valves Y132c are installed in this floating spool valve to cancel the floating function this is necesSary to pressurize the boom lowering function for any reason.

# 5.4 Check of the pilot control logic

## Reading the control logic chart

The control logic chart visualize the output condition of the main control blocks and floating valves with different combinations of the controls.




Legend for illustration Z 25275

| | |
|---|---|
| 1 | Main control block with the block number ex. I |
| 2 | Main input pressure condition, ex. pressure build up |
| 3 | Pilot control pressure (0-35bar), ex. pressure less |
| 4 | Pilot control pressure (0-35), ex. pressurized |
| 5 | Pilot control cab |
| 6 | Control spool number, counted from the input side |
| 7 | Main input pressure condition, ex. pressure less |
| 8 | Floating valve block, only with FSA |
| 9 | Solenoid valve in pilot line to floating valve |
| 10 | Item number of test condition |
| 11 | Test condition at the controls |

**NOTICE**
**Illustration Z 25275 shows only an example.**

## Explanation of the shown test section Z 25276:

Item 43 (10), the operator activates boom down, stick out and bucket empty (11) with running engine and operating condition. The following pilot pressure and main oil pressure condition must result.

Main control block I
Control spool 1 (6), cab b (5) pressurized
Control spool 3 (6), cab b (5) pressurized
Main pump input pressurized

Main control block II
Control spool 2 (6), cab b (5) pressurized
Control spool 3 (6), cab a (5) pressurized
Main pump input pressure less

Main control block IIII
Control spool 2 (6), cab b (5) pressurized
Control spool 3 (6), cab a (5) pressurized
Main pump input pressure less

Floating valve VI and VII (8) pilot controlled activated.

## Check sheet FSA Page 9

**PC3000/6_Frontshovel** **Ser. No.:** **Date:**

36 Boom down, Boom Unfloat switch pressed, Stick out

| Y132b | Y132b | Y132c |
|---|---|---|
| - | - | - |

| | | |
|---|---|---|
| III | - - - | b |
| P | - - O | a |

| b | a |
|---|---|
| - | - |
| O | - |
| - | - |
| O | - |
| P | I |

| b | a |
|---|---|
| - | - |
| - | O |
| - | - |
| O | - |
| P | II |

37 Stick in, Boom Unfloat switch pressed

| Y132b | Y132b | Y132c |
|---|---|---|
| O | O | - |

| | | |
|---|---|---|
| III | - - - | b |
| - | - - - | a |

| b | a |
|---|---|
| - | - |
| - | - |
| - | - |
| - | - |
| - | I |

| b | a |
|---|---|
| - | - |
| - | - |
| - | - |
| - | - |
| - | II |

38 Stick in, Stick Unfloat switch pressed

| Y132b | Y132b | Y132c |
|---|---|---|
| - | - | - |

| | | |
|---|---|---|
| III | - - O | b |
| P | - - - | a |

| b | a |
|---|---|
| - | - |
| - | - |
| - | - |
| - | - |
| - | I |

| b | a |
|---|---|
| - | - |
| O | - |
| - | - |
| - | - |
| P | II |

39 Stick in, Stick Unfloat switch pressed, Bucket fill

| Y132b | Y132b | Y132c |
|---|---|---|
| - | - | - |

| | | |
|---|---|---|
| III | - - O | b |
| P | - O - | a |

| b | a |
|---|---|
| - | - |
| - | O |
| - | - |
| - | - |
| P | I |

| b | a |
|---|---|
| - | - |
| O | - |
| - | O |
| - | - |
| P | II |

## Check sheet BHA Page 6

29 Boom down, Stick out, Bucket empty, Swing right

| III | - | - | - | b |
|---|---|---|---|---|
| P | O | O | O | a |

| b | a |
|---|---|
| - | - |
| O | - |
| O | - |
| O | - |
| P | I |

| b | a |
|---|---|
| - | - |
| - | O |
| O | - |
| O | - |
| P | II |

30 Boom down, Stick in, Bucket fill

| III | - | - | O | b |
|---|---|---|---|---|
| P | - | O | - | a |

| b | a |
|---|---|
| - | - |
| - | O |
| - | O |
| O | - |
| P | I |

| b | a |
|---|---|
| - | - |
| O | - |
| - | O |
| O | - |
| P | II |

31 Boom up, Stick in, Bucket empty, Swing left

| III | O | O | O | b |
|---|---|---|---|---|
| P | - | - | - | a |

| b | a |
|---|---|
| - | - |
| O | - |
| - | O |
| - | O |
| P | I |

| b | a |
|---|---|
| - | - |
| O | - |
| O | - |
| - | O |
| P | II |

32 Boom up, Stick out, Bucket empty, Swing left

| III | O | O | - | b |
|---|---|---|---|---|
| P | - | - | O | a |

| b | a |
|---|---|
| - | - |
| O | - |
| - | - |
| - | O |
| P | I |

| b | a |
|---|---|
| - | - |
| - | O |
| O | - |
| - | O |
| P | II |

33 Boom up, Stick in, Bucket fill, Swing left

| III | O | O | O | b |
|---|---|---|---|---|
| P | - | - | - | a |

| b | a |
|---|---|
| - | - |
| - | O |
| - | O |
| - | O |
| P | I |

| b | a |
|---|---|
| - | - |
| O | - |
| - | O |
| - | O |
| P | II |

**Legend for illustration Z 25279**

Numbers in brackets are component numbers for the hydraulic diagraml

**Control block III**

| | |
|---|---|
| 6 | SRV (66.1), bucket cylinder rod side |
| 7 | SRV (66.2), stick cylinder rod side |
| 8 | ACV (68.5), stick cylinder piston side |
| 21 | MRV block III |

**Floating system**

| | |
|---|---|
| 17 | solenoid valve Y132c, boom |
| 18 | solenoid valve Y 132b, stick |

**Legend for illustration Z 21834**

The illustration shows the valve block up side down

| | |
|---|---|
| 1 | Throttle adjustment pin |
| 2 | Back up ring |
| 3 | O-ring |
| 4 | Retainer |
| 5 | Back up ring |
| 6 | O-ring |
| 7 | Spring |
| 8 | Spring cup |
| 9 | Throttle valve sleeve |
| 9.1 | Adjustable throttle holes |
| 9.2 | Permanent throttle holes (safety channel) |
| 10 | O-ring |
| 11 | Housing |
| 12 | Return line port, T |
| 13 | Pressure relief valve |
| 14 | Bolt |
| 15 | Clip ring |
| 16 | Lock nut |
| A | Line ports from the control valve |
| B | Line port to the cylinder |
| M | Pressure check point |
| Y | Control oil drain port |

## Function:

Setting of the maximum permissible cylinder speed (flow B to A) is carried out by pin (1). Depending on the pin (1) setting the radial holes (9.1) in the valve sleeve (9)will be partially opened to achieve the required throttling of the oil flow. The safety holes (9.2) prevents the valve from becoming completely closed.

For the lifting operation (flow A to B) the valve sleeve which is guided by the spindle (1) is pressed against spring (7) so that the valve will be completely open.

SRV (13) limits the maximum system pressure from the cylinder and relieves oil to the tank line T when the pressure reach the valve setting.

**Legend for illustration Z 22219**

| | |
|---|---|
| 1 | Valve cone guide and plug |
| 2 | Valve spring |
| 3 | Valve cone |
| 4 | Main control valve body |
| 5 | Passage from pump, line P |
| 6 | Passage to control port via valve spool |

## Function:

The load holding valves are fitted into separate spaces of the control block housing. For each spool are one load holding valve.

**The load holding valve have three tasks:**

1. When circuit pressure due to attachment weight is higher than pump pressure the load holding valves prevent dropping of the attachment within to the sensitive (fine controlling) range.

2. Due suddenly pressure peaks in the service lines the valves also protect the pump.

3. When two pump flows are used for one function together they ensure that at least the flow of one pump reaches the user in case of a MRV is defect or not correct adjusted.

The system pressure forces onto the front area of the valve cone (1). This force moves the valve cone against the spring (2) and allows the oil to flow from the pump to the main valve spool. In neutral position of the main valve spool no further flow is possible. If the spool is not more in neutral the flow continues to the user.

If due to an external force the pressure directed to the pump overcomes the pump line pressure this pressure forces the valve into the seat so that the flow back to the pump is blocked.

**Legend for illustration Z 25285**

| | |
|---|---|
| 22 | Control block ladder (258) |
| 23 | Pressure relieve valve ladder control pressure (258.3) |
| 24 | Check point M37.2, ladder lowering pressure (4.4) |
| 25 | Check point M37.1, ladder lifting pressure (4.3) |
| 26 | Solenoid valve Y123a, Y123b, ladder control (258.2) |
| 27 | Solenoid valve Y125, ladder speed control (258.1) |
| 28 | Control block refilling arm (259) |
| 29 | Check point M38.2, lowering pressure (4.4) |
| 30 | Check point M38.1, lifting pressure (4.3) |
| 31 | Solenoid valve Y124a, Y124b refilling arm control (259.1) |
| 32 | Solenoid valve Y124c, refilling arm lock (259.2) |

## Function:

The compact valve block assembly is a modular arrangement of different valve blocks with a common oil supply for auxiliary hydraulic systems. Each single control block (4, 10, 15, 22,28) is direct flanged to the support plate (1) and is connected via the support plate connected to the control pressure line X2 (2), X4 (3)and tank line (33). Cartridge valves, check points and pressure switches direct screwed in the blocks and solenoid valves direct flanged to the blocks so that there is no additional piping between the valves and ports. For adjustment of the valves see respective circuit.

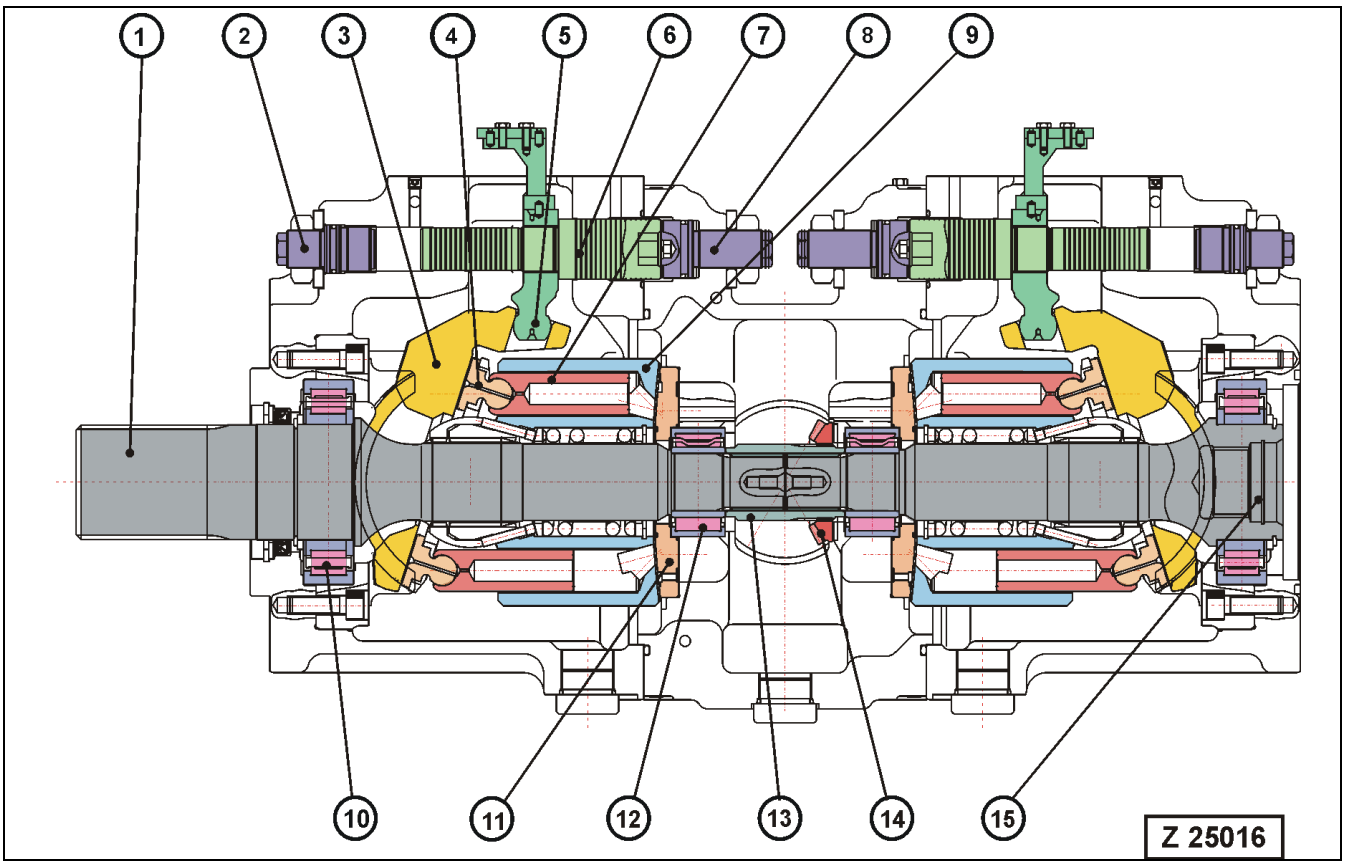
## General

The rotative energy from main motor or engine propel the gears in the pump distributor gear box and the gears propel the main and auxiliary pumps. The pumps create a hydraulically oil flow to the cylinder or hydraulic motors.

The main high pressure hydraulic circuit are supplied from three swash plate tandem pumps. Each tandem pump consist two main pumps and one charge pump. The charge pump supply the suction side of the main pump with oil from the oil tank.

Each main pump has a drive shaft straight through the pump so that a auxiliary pump can flanged direct to the main pump head. Main pump 2 is equipped with the oil cooler fan pump and main pump III is equipped with the pump for the PTO oil circulation.

## Main pump function




Legend for illustration Z 25015

| | |
|---|---|
| 1 | Main spline shaft |
| 2 | Qmin stop bolt |
| 3 | Swash plate 1st pump |
| 4 | Slipper pad |
| 5 | Swash plate governor |
| 6 | Positioning piston |
| 7 | Pump piston |
| 8 | Qmax stop bolt |
| 9 | Pump cylinder |
| 10 | Main drive shaft bearing |
| 11 | Pump valve plate |
| 12 | Inner pump bearing |
| 13 | Coupling sleeve |
| 14 | Bevel gear for charge pump (centrifugal pump) |
| 15 | Drive shaft coupling for auxiliary pump |

## General

The pump regulation is working as a engine load limiting system to ensures optimum use of the power required for the excavator under varying operating conditions and to avoiding overload of the engine. With a undesirable overload of the engine the engine rpm drops under the maximum engine output power (max. power by 1800 1/min) and results in bad excavator performance up to engine problems.

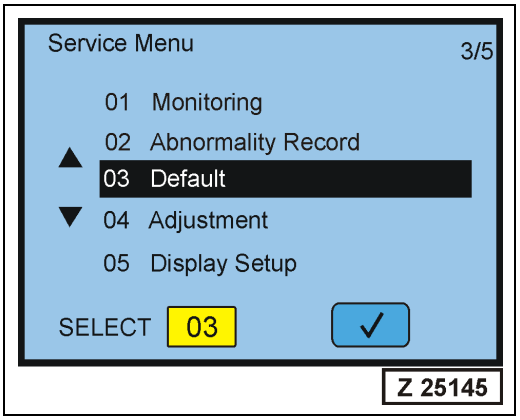
The main engine load indicator is the engine rpm, it is indicated by a pic up (rpm sensor) at the engine fly wheel. The frequency of the sensor is proportional to the engine rpm and direct connected to the pump controller CR700. If the engine rpm is more as 1800 1/min the controller moves the main pumps via the EPC proportional valves to maximum output volume (Qmax). If the engine rpm is stalled to 1800 1/min or lower the pump controller reduce via the EPC proportional valves the pump output volume to limit the pump power just to keep the engine at 1800 1/min (maximum engine power).

Independent of the engine load the pump controller CR700 reduce the pump output volume to Qmin if the pump pressure increase up to 300 bar. The pump output pressure signal comes from the pressure transducer at the high pressure filter: This function is called "cut off function" to prevent high oil flow (Qmax) through the main relieve valves (MRV) in time when the oil flow is restricted or blocked like a cylinder in final stop position.

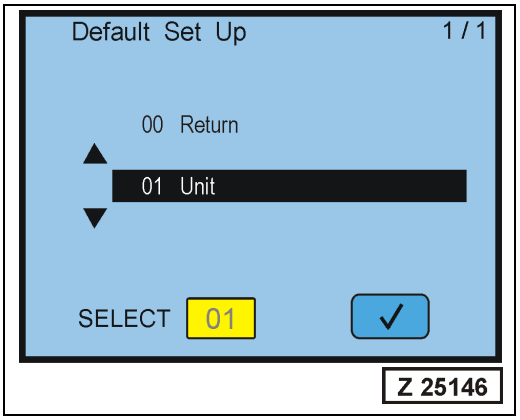
Selected pilot signals from the X2 board are connected to the pump controller CR700. This signals are used to give different main pump priorities of the torque and volume distribution during selected excavator functions. E.g. with activated swing system the respective pump is out of the regulation (torque priority) so that the swing system operates with fixed pump volume. In the same time the controller lower the pump volume to a pre set value so that there is no over speed risk for the swing motor (volume distribution).

## 7.7.5 Default (menu item 03)

The default menu is used to reset all electronically pump controller adjustments to the basic factory setting. Select item 03 Default at the Service Menu with the up ▲ , down ▼ key or write " 0 3 " with the number keys and confirm with the enter key ✓ .

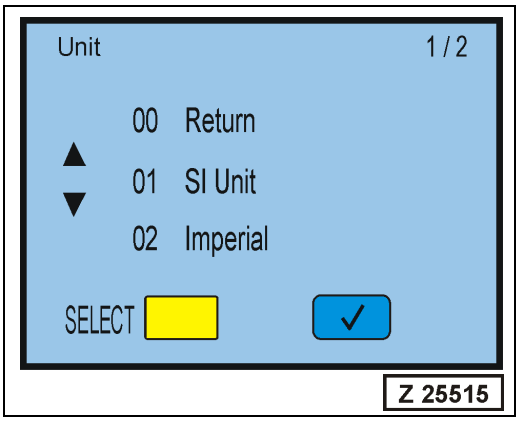



The menu item "Default Set Up" appears Z 25146. Select with the up ▲ or down ▼ key item 01 Unit and confirm with the enter ✓ key.




Screen Z 25515 appears. Select your choice of SI or Imperial units. Select with the up ▲ or down ▼ key item 01 SI Unit or 02 Imperial and confirm with the enter ✓ key. Confirm again with the enter ✓ key to change the unit.

To convert from MPa to bar multiply MPa with 10.
E.g. the display shows 25.64 MPa multiplied with 10 results in 256,4 bar.




| System | Physical item | Unit abbreviation | Unit |
|---|---|---|---|
| Si | pressure | MPa | Mega Pascal |
| | torque | Nm | Newton meter |
| | current | mA | Millie Ampere |
| | temperature | °C | Grad Celsius |
| Imperial | pressure | psi | pound-force per square inch |
| | torque | lb·ft | pound-force ·foot |
| | current | mA | Millie Ampere |
| | temperature | °F | grad Fahrenheit |

| No. | Code | Title | Remark | PC3000-6 | | SI |
|---|---|---|---|---|---|---|
| | | | | Diesel | Electric | |
| 42 | 03807 | - Reserve1 | Reserve1 | | | --- |
| | | - Reserve2 | Reserve2 | | | --- |
| | | - Reserve3 | Reserve3 | | | --- |
| | | - Reserve4 | Reserve4 | | | --- |
| 43 | 03808 | Error display Sig | Error display signal | | | |
| | | - Caution in CAB | Failure output for CAB panel | X | X | --- |
| | | - Engine run | Engine run signal | X | X | --- |
| | | - Error LED1 | LED1 for error display | X | X | --- |
| | | - Error LED2 | LED2 for error display | X | X | --- |
| 44 | 04401 | Hydr. Oil Temperature | Temperature of oil | | | °C |
| 45 | 04102 | Coolant Temperature | Temperature of coolant | | | °C |
| 46 | 13400 | Adjusting Item | Adjust item number | X | X | No. |
| 47 | 13401 | Adjusting Memory | Adjust item memory data | X | X | Data |
| 48 | 13402 | Adjusting Parameter | Adjust item parameter data | X | X | Data |
| 49 | 13500 | Prim P-factor saved | Primary P-factor saved value | X | X | Data |
| 50 | 13501 | Prim P-factor Potentio | Primary P-factor potentio input | X | X | Data |
| 51 | 13600 | | | | X | Data |
| 52 | 13601 | | | | X | Data |
| 53 | 20212 | Prog Ver. Pump controller | Software No.:Pump controller | X | X | No. |
| 54 | 20200 | Prog Ver. Multi Monitor | Software number:Monitor | X | X | No. |

| | |
|---|---|
| (grey box) | Inot used for PC 3000-6 Diese |

**Legend for illustration Z 25295**

| | |
|---|---|
| 1 | Pilot controlled floating spool valve, boom (132.3) |
| 2 | Pilot controlled floating spool valve, stick (132.2) |
| 3 | Pilot controlled floating spool valve, stick (132.1) |
| 4 | Solenoid valve stick Y132b |
| 5 | Solenoid valve boom Y132c |

## General:

The excavator (only front shovel attachment) operates automatically with the floating position for boom and stick if one of the function is activated in lowering direction.That means the lowering function is moving only by gravity. Oil from the cylinder can flow direct to the oil reservoir which make also possible to move the attachment up by a external force.

It is possible to eliminate the floating position manually and individually for boom or stick via a button in the respective pilot control lever. The lowering (boom) or retracting (stick) function is pump supported with activated button so that the attachment can build up a force.

Floating switch arrangement of the lever in the cab:

- S95 in the right lever (E19) is for the boom lowering function
- S95a in the left lever (E19) is for the stick retracting function.

Press the respective button and keep it depressed as long as the floating position shall be deactivated. When releasing the button the floating position is activated again.

## Function:

The floating spool valves (1), (2), (3) are pilot controlled two position spool valves with a proportional resistance function. In neutral condition (no pressure at the pilot port PST) all service line ports A, B and T are closed.Port P is always plugged and not used. With activated pilot port the port A, B and T are connected together but the flow to port A is flow restricted. The restriction reduces proportional to increasing pilot pressure. The piston and rod side of the connected cylinder are now in floating position because the rod side, piston side and reservoir are connected together. So the cylinder can move in both direction activated from a external force. The restriction in port A limits the flow to reduce the cylinder retracting speed because of the gravity force. For the stick there are two floating valves parallel connected.

For pressurized lowering of the boom or pressurized retracting of the stick cylinder the pilot pressure change from the floating valve via the solenoid valves to the respective function of the main valve block. The solenoid valves are controlled from the switch in the lever. Solenoid valve Y132b controls via switch S95a the stick floating system and Y132c controls via switch S95 the boom floating system.

**Table 1: SRV location chart FSA**

| Function | Qty total | Location | SRV Component No. | Section Position Port No.(*) | Pressure [bar] |
|---|---|---|---|---|---|
| boom up | 3 | Manifold | 63.8 | B, rear | 350 |
| | | Manifold | 63.9 | N, rear | 350 |
| | | Block II | 98 | A1, right | 350 |
| boom down | 1 | Block II | 66.3 | B1, left | 350 |
| stick out | 4 | Manifold | 65.2 | G, rear | 350 |
| | | Manifold | 63.5 | J, front | 350 |
| | | Manifold | 63.6 | J, rear | 350 |
| | | Block II | 66.6 | B3, left | 350 |
| stick in | 2 | Block II | 66.7 | B3, left | 350 |
| | | Block III | 66.2 | B3, left | 350 |
| bucket fill | 4 | Manifold | 63.2 | C, rear | 350 |
| | | Manifold | 63.1 | C, front | 350 |
| | | Manifold | 63.1 | M, rear | 350 |
| | | Block II | 66.4 | A4, right | 350 |
| bucket dump | 2 | Block II | 66.5 | B2, left | 350 |
| | | Block III | 66.1 | B2, left | 350 |
| clam close | 2 | Manifold | 112.1 | K, rear | 350 |
| | | Block I | 67 | A2, right | 150 |
| clam open | 1 | Manifold | 63.3 | E, rear | 350 |

* Section: Section of the distribution manifold,
Position: front or rear of the manifold in operation direction
Port No. from the control valve block

**Legend for illustration Z 21936**

| | |
|---|---|
| 1 | Drive shaft |
| 2 | Housing |
| 3 | Case drain port |
| 4 | Retaining plate |
| 5 | Piston |
| 5a | Pivot center pin |
| 6a | Upper dead point |
| 6b | Lower dead point |
| 7 | Cylinder |
| 8 | Control lens |
| 9 | End plate |
| 10 | Centering spring |
| 11 | Taper roller bearing |
| 12 | Spring |
| 13 | Slipper pads |
| 14 | Thrust washer |
| 15 | Roller bearing |
| 16 | Circlip |
| 17 | Sealing flange |
| 18 | Radial seal ring |

## General:

Axial piston motor A2FLM 355 is a axial piston unit with fixed displacement. The drive speed is proportional to the consumption capacity. The output torque increases with the pressure drop between high and low pressure side.

The motor converts hydrostatic energy into mechanical energy. The main part of the axial force is supported by the slipper pads (13) which are installed on the driving circular side of the drive shaft. Each piston is allocated to one slipper pad.

This slipper pads are located in the cylinder chamber and get pressurized via piston bore hole (5). The slipper pads support themselves on the thrust washer (14) and discharge axially the tapered roller bearing (11). Without pressure the slipper pads are kept on the thrust washer by means of spring (12).

The pressure oil inlet (A or B)and consequent oil outlet (B or A) determine the output drive direction of the drive shaft (1).

## Function

**Brake applied:**

The outer disks engaged to the housing by serration and the inner disks in serrated connection with the drive shaft are pressed together by the springs. This results in a fixed connection between housing and drive shaft due to the friction between the spring pressurized discs.

**Brake released:**

Oil pressure via the pilot port reaches the bottom of the piston and forces the piston upwards against the thrust washer and the spring force. This eliminates the spring force towards the disks so that the friction between the discs is released and the inner shaft can rotate. Only the brake of the L&S gear box uses a additional spacer ring (sinus ring) to keep the discs apart from each other it should reduce the friction in released condition.

The minimum releasing pressure is 12 bar. In normal working condition is the releasing pressure 35 bar X2 pressure.

**NOTICE**
**The swing parking brake must only be applied with the Superstructure at complete standstill. Applying the parking brake with superstructure still slewing may result in severe damage to the brake.**

**⚠ WARNING**

- **Use the swing parking brake only in an emergency situation for stopping the rotating superstructure.**
- **If the parking brake has been used for emergency stopping, it is necessary to shut down the Excavator and to have the parking brake of each swing gear inspected and repaired if necessary. Contact your Komatsu dealer for repair of the brakes.**

**Legend for illustration Z 22270a**

| | |
|---|---|
| 1 | Main pump I |
| 2 | Main pump II |
| 3 | Main pump III |
| 9 | Main control block I |
| 10 | Main control block II |
| | Main control block III |
| 14.1 | Travel brake valve block left |
| 14.2 | Travel brake valve block right |
| 58 | Rotary joint |
| 59.1 | Travel motor left |
| 59.2 | Travel motor right |
| 62 | Travel control pedal left |
| 74 | Travel control pedal right |
| 75.1 | Shuttle valve pilot line left |
| 75.2 | Shuttle valve pilot line left |
| 75.3 | Shuttle valve pilot line left / right |
| 76.1 | Pressure switch B37 pilot pressure monitoring 7 bar |

## Function

The travel system is divided in two separate circuits. One for the left track and the second for the right track. Each circuit is supplied by one pump. Left track from pump I (1) via control block I (9) and the right track form pump II (2) via control block II (10).

Control pedal (62) controls the left track and (74) the right track. In the pilot line are shuttle valves connected which leads the pilot oil independent from the pressurized travel pilot line to pressure switch B37. The electrical signal from pressure switch B37 is used to give the travel function in control block I and II priority over the attachment function because the travel spool valve is the last in the control block and have the last hydraulically priority.

When operating the control pedals for travelling pump oil flows via the activated control block through the rotary joint and the travel brake valve to the respective travel motor.

The rotary joint enables a hydraulic oil flow through the center of the machine from the superstructure to the car body independent from machine rotation.

The travel brake valve protects the travel motors from over speeding during down hill traveling.

## Function

**Control oil flow from the travel control pedals (62), (74) to the control block (9) and (10)**

The pilot control units (travel pedals) are controlling all travel motions. For each travel side and direction is one mechanical operated proportional valve in the pedals installed. Two per pedal. Only one valve per side can be operated in the same time, forward or back ward. According to the pedal position the activated proportional valve creates a pilot pressure to the respective control cab of the spool in control block (9) or (10).

Pump oil flows through the activated spool valve via rotary joint and travel brake valve to the travel motor.

The travel brake valve (14.1) and (14.2) acts as a flow limiting valve in order to avoid the travel motors increasing speed when travelling downhill.

If the engine is running the parking brake is released so the track is only locked against the closed service line with pedals in neutral position. To protect the service line to the travel motor a SRV for each track and direction is mounted in the travel brake valve block (14.1) (14.2).

## Cushioning

The track is via hydraulic cylinder extended. To cushion external force caused through impacts to the idler or obstacle between track and idler or track and sprocket there are accumulators installed. During a external force the tensioning cylinder push oil back into the system. The flow is blocked against the pilot pressure supply circuit by the check valves (91.1) for the left track and (92.2) right track. The check valves (92.1) and (92.2) are acting like a shuttle valve it means the check valves distribute the pressure peaks from one of the track side to the pressure increasing valve (87) whisout to pressurize the other track side. A certain amount from the displaced oil of the tensioning cylinders is taken up by the pressure accumulators. Proportional to the absorbed volume the oil pressure increase up to the PIV relieve pressure. With reduction of the external force accumulator pressure pushes oil back into the tensioning cylinder.

If the displaced oil volume from the tensioning cyinder was higher as the accumulators could absorb oil is added from the pilot pressure supply via the check valve (91.1) or (91.2) as long as the pressure is lower as 35 bar.

The gas pressure of the accumulators (100.1) and (100.2) is lower as the pilot pressure and the low pressure setting of the PIV. So the accumulator absorb oil and maintain the track tension pressure during engine stop to compensate oil volume caused through internal leaks and decreasing oil volumen due to reducing oil temperature.

The pressure accumulators (93.1) and (93.2) absorb oil until the system pressure reaches the gas pressure of 150 bar.

# 10. ACCESS LADDER HYDRAULICALLY OPERATED

**Legend for illustration Z 22472a**

| | |
|---|---|
| 5 | Pilot pump SAR 56 |
| 52 | Suction tank |
| 121 | Service arm cylinder |
| 252 | Control (pilot) oil valve block |
| 259 | Service arm control valve block |
| 26.1 | Pilot oil filter |
| 33.2 | Solenoid valve, service arm control |
| 252.1 | Pressure regulation valve, X2-pressure 35bar |
| 252.2 | Pressure relieve valve, X4-pressure 60bar |
| 259.4 | Check valve, flow back protection |
| 259.3 | Check valve act as anti cavitation valve |
| 259.2 | Solenoid valve, leak free seat valve, cylinder lock |
| 259.5 | Orifice, restriction to limit the cylinder travel speed |
| Y124a | Solenoid valve for service arm up |
| Y124b | Solenoid valve for service arm down |
| Y124c | Solenoid valve, leak free cylinder lock |

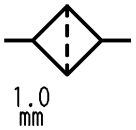
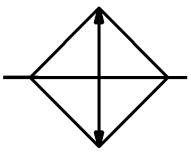
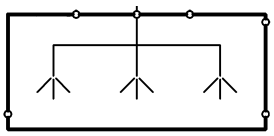
## Function of service arm control

### 1. Engine is running

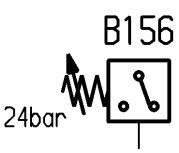
The gear pump (5) delivers oil through filter (26.1) to pressure regulation valve (252.1) and parallel to pressure relieve valve (252.2). The pressure relieve valve limits the pilot pump pressure to 60bar X4 pressure. The pressure at the outlet of the pressure regulation valve (252.1) is 35bar. Both lines are connected to the support plate with the distribution lines for the X2 (35bar) and X4 (60bar) pressure. The refilling arm control valve block (259) is connected to both lines but the X4 line is internal of block (259) plugged. The supply pressure of the service arm control block (259) is therefor 35bar. In the supply to the ladder control valve (33.2) the oil flow pass the check valve (259.4) it protect the X2 supply circuit against pressure peaks from the service arm circuit.

If the solenoid Y124a or Y124b is energized the valve (33.2) change the position from the blocked service line to a connection between X2 pressure to the cylinder (121) and return from the cylinder (121) to the tank. The service arm move up or down. Return oil flows back through solenoid valve (33.2) port T and through the orifice (259.5) back into the oil reservoir. The orifice (259.2) restrict the oil flow to control the cylinder travel speed. Via solenoid valve Y124c (259.2) is the piston side of the cylinder locked when the engine is stopped. It prevent slowly lowering of the service arm because of internal leaks of solenoid valve (33.3).

## 12.2.2 Components, valves

| Item | Symbol | Description | Used as / at / on |
|---|---|---|---|
| 15. |  | Accumulator<br>is filled with nitrogen gas with for the respective accumulator specified pressure | Input line to the remote control valves, return oil collecting tube, track tensioning system |
| 16. |  | Screen filter<br>min screening size is 1,0 mm | Installed in suction lines to the pumps, oil tank outlet, return oil collecting tube |
| 17. |  | Oil cooler | Hydraulic oil cooler, PTO oil cooler |
| 18. |  | Breather filter | On top of PTO or Hydraulic oil reservoir |
| 19. |  | Spray nozzles<br>inside of a case for cooling and lubricating | Gearbox (PTO) cooling and lubricating system |

## 12.2.3 Sensors

| Item | Symbol | Description | Used as / at / on |
|---|---|---|---|
| 20. |  | Pressure switch / sensor<br>Input = pressure<br>Output = electrical signal analogue or digital | e.g. return/ leak oil chamber (digital), high pressure filter (analogue) |
| 21. |  | Pressure switch<br>Input = pressure<br>Output = digital electrical switch point 24 bar | e.g. swing or travel detection PC3000 |

# 13. HINTS FOR READING THE ELECTRIC CIRCUIT DIAGRAM

## Explanation of the drawing concept

### Legend for illustration Z 22375

| | |
|---|---|
| 1 | Drawing number |
| 2 | Sheet number / quantity of sheets |
| 3 | Designation of drawing |
| 4 | Designation of component or assembly |
| 5 | Column (vertical sections) |
| 6 | Lines (horizontal sections) |
| 7 | Component symbol |
| 8 | Negative power line, machine ground |
| 9 | Designation of phase |
| 10 | Positive power supply line, coming form F12 |
| 11 | Terminal, one of the X2 board terminal rail |
| 12 | Cable plug and pin number |
| 13 | Relay coil |
| 14 | Relay contacts, partially with detailed information |
| 15 | Cross reference, link to further connection |
| 16 | Indication of relay contact condition (open or close) and contact location |

## Introduction

The electronic text and monitoring system **ETM** with a plain text display provide continuos monitoring of all hydraulic shovel functions and operating conditions.

Fault messages are displayed, stored and can be called up at any time.

A print out or down load to a computer is possible via a connector at the dash board.

## General

The **ETM** has the capability to cover a total amount of 60 different messages.

Up to 1300 messages can be stored in the record memory and registered in the statistic's memory.

Data protection for all texts, clock, date and values at 25° C for approximately.

10 to 20 years. at 60° C for 5 to 10 years.

The text messages can be selected in two languages.

The **ETM** works in the last (most important) message mode. the messages are divided into four groups according to their importance. The last message received by the **ETM** will be displayed. If there are several messages at the same time, the most important message will be displayed. All other messages are kept in the background. They are indicated by a flashing number on the screen and can be called up by pushing a button of the display.

Recording of the messages is accomplished with „coming - going“ registration.

The statistic's memory counts the frequency of coming messages and establishes their total amount.

**NOTICE**
**More detailed information how to use the System see Section 3.4 of the OPERATORS MANUAL**

## Function of a lubrication cycle

See illustration Z 24043, Z24042b and Z22023b and the respective electric and hydraulic circuit diagram

**PT-phase**

With the pump and control system in a rest state a pre-set pause time interval occurs as determined by a time relay.

**Diagram position (a)**

A 24 $V_{DC}$ signal from a time relay activates solenoid valve (4) it opens and hydraulic oil flows to the lubrication pump drive. Oil flows at first through the flow control valve (2) to limit the pump stroke speed and then to the pressure reducing valve (3). The lowers the hydraulically pilot oil pressure to the operating range of the hydraulic driven lube pump. The reduced pilot oil pressure operates now the pump drive cylinder and the cylinder operates the grease pump (15). Correct adjusted shuttle's the lubricant pump at 18 – 20 double strokes per minute and deliver 612 – 680 cm³ (37.3 – 41.5 in³) of lubricant per minute (approximately 550 – 612 g / 19.64 – 21.45 oz.)

Parallel to solenoid valve (4) the 24 $V_{DC}$ signal energize release valve (9), it close now the release line (11) to the lubrication container (18).

**PI-phase**

With energized release valve (9) and solenoid valve (4) the pump (15) continues to cycle until maximum pressure is achieved and the injectors (13) have metered lubricant to the bearings (24) or to the lubrication pinion (23).

**Conversion of illustration numbers to circuit diagram designation**

| System circuit | Solenoid valve (4), hydraulic oil supply | Solenoid valve (9), lubricant release valve | End line pressure switch |
|---|---|---|---|
| CLS 1 | Y7 | Y7a | B43 |
| CLS 2 (option) | Y8 | Y8a | |
| SLS | Y9 | Y9a | B46 |

**CLS** = **C**entral **L**ubrication **S**ystem

**SLS** = **S**lew ring teeth **L**ubrication **S**ystem

## Adjustments lubricating pump pressure

**Maximum pump operating pressure (P)**

The pressure reducing valve (3) mounted in the oscillation control block reduce the pump drive cylinder pressure internally. The maximum allowed pressure is 45 bar but there is no direct pressure check required.

The pressure ratio is 6,55 to 1, that means 45 bar supply pressure result in 295 bar maximum lubricant pressure.

At the end line pressure switch the pressure should be $180 \pm 5$bar. With the lubricant line resistance and different lubricant viscosity the pressure at the lubricant pump must be higher as 180 bar. 220 – 250 bar pump pressure (pressure gauge at lubrication station) is sufficient to achieve the 180 bar end line pressure after line resistance and different lubricant viscosity.

**Procedure:**

1. Disconnect quick coupling (10), so the pump supply line from the pump to the injectors is blocked.
2. Start engine and run at high idle.
3. Activate the required lube system manually, the gauge (14) should show 220-250 bar.
4. If adjustment is required:
5. Loosen lock nut (3.1)
6. Turn adjustment (3) until the right pressure is shown at the gauge (7) turn set screw ccw to lower pressure and cw to increase the pressure until the required pressure is achieved.
7. Tighten lock nut (3.1).
8. Change engine to low idle or stop engine which stop the lubricant pump and opened relieve valve (9) to relieve the lubricant pressure.
9. Reconnect quick coupling (8).

## End line pressure switch

### General

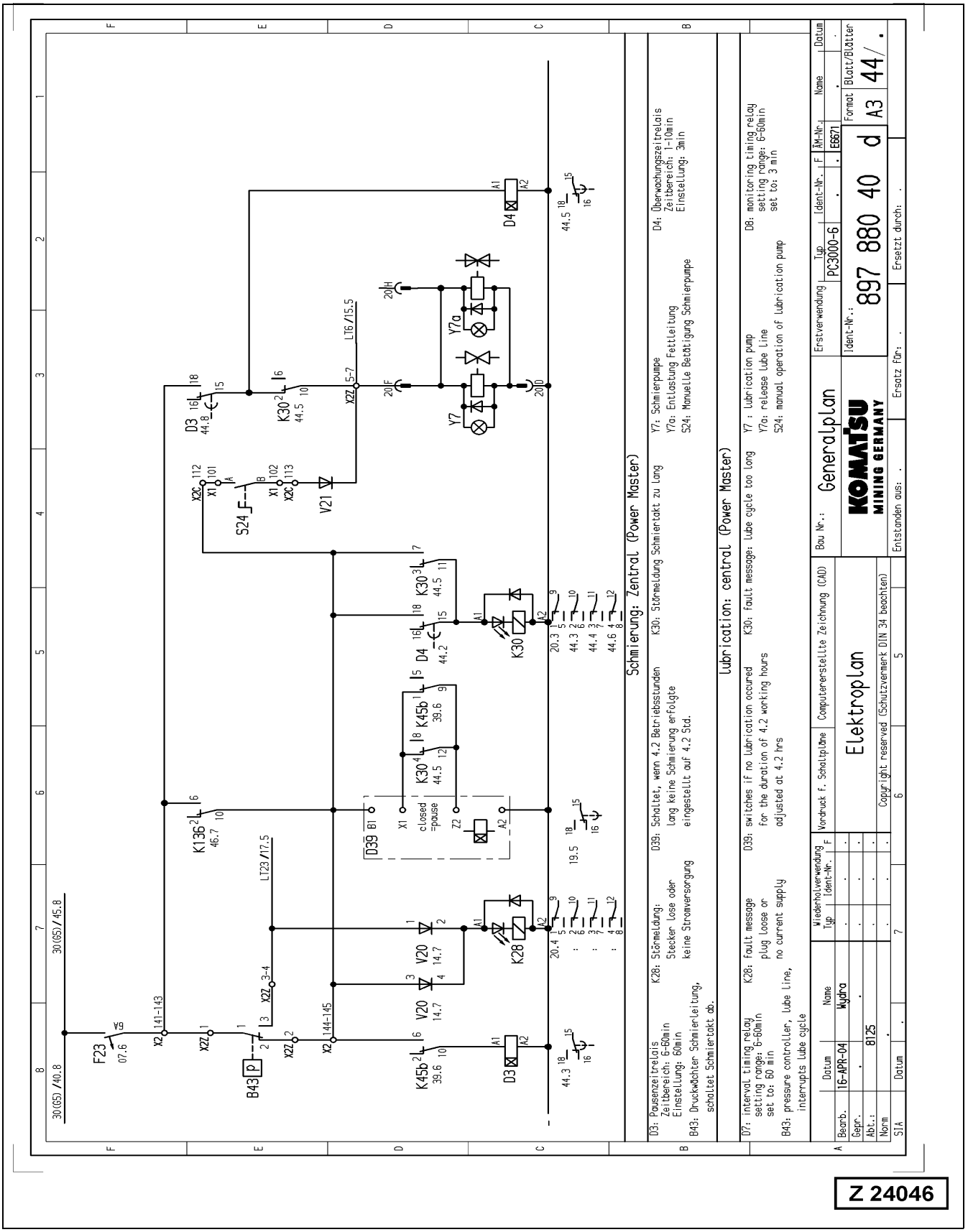
The end line pressure switch is a main part to monitor and control the lubrication system. It stops the lubrication pump when the lubricant reaches the maximal adjusted pressure and it.

### Function:

One end line pressure switch is installed at the end of the lubricant supply line.The pressure inlet port (7) is parallel connected to the injector input port. The lubricant pressure push against piston (1), disc (2) and spring (4). The spring force is adjustable with sleeve (6). If the lubricant reaches the adjusted pressure, the disc (2) push against the spring and the switch actuator (3) activates switch contact (5) as long as the pressure is below the set point.

Behind a protection cover (9) is the adjustment sleeve (6). Turn with an ellen key cw to increase and ccw to decrease the pressure setting.

## Central Lubrication System (CLS) function and controlling with ETM system (PC 3000)



**NOTICE**
**If the following trouble shooting checks does not help to find the problem contact a factory authorized service center.**

## 15.11.1 Lubrication pump cylinder does not move

- Check if there is a fault message on the text display at the dash board.
- Check if the electrical control system start currently a lubrication cycle. Try to activate the lubrication system manually with the switch at the dash board.
- SLS only: move the slewing lever for a short time the SLS lubrication pump start only after activated swing lever.
- Check correct function of lubrication pump solenoid valve (4) and lubricant pressure release solenoid valve (9), both must be energized, pressure release valve (9) must block the relieve line completely.
- Check seal and correct function of quick coupling (10). If the cuppling is not complytely connected a internal check valve will close the line.
- Bleed the pump. Let the pump run with electricaly unplugged pressure release valve (9). Open bleeder plug (26) at the pump outlet. Loosen lock screw at electrical plug of solenoid valve (4). Place a receptacle to bleeder plug (26) and start the pump until bubble free lubricant comes out and then stop pump immediately by disconnecting electrical plug at solenoid valve (4). Close bleeder plug and remove electrical connections.
- Check if the pump get enough lubricant (lubricant container empty or blocked pump intake)
- Check lubricant pump seals and worn pump components.
- Check hydraulic pilot pressure (X-4 pressure) at the filter and control panel in the machinery house it should have 60bar
- Check the hydraulic oil supply (6) and return (5) line coupling If the cupplings are not completely connected a internal check valve will close the line.
- Check pressure relieve valve (3) (lubrication pump pressure) function and setting.
- Check flow control valve (2) (lubrication pump speed) function and setting.