Operation & Maintenance Manual

PC5500-6

HYDRAULIC MINING SHOVEL

SERIAL NUMBER 15050

December 2006

KOMATSU
MINING GERMANY

- Always keep at a distance from the edges of building pits and slopes.
- Avoid any operation that might be a risk to machine stability.
- Never travel across slopes; always keep the working equipment and the load close to the ground, especially when travelling downhill.
- On sloping terrain always adapt your travelling speed to the prevailing ground conditions. Never change to a lower gear on a slope but always before reaching it.
- Before leaving the driver's seat always secure the machine against inadvertent movement and unauthorized use.

SPECIAL WORK IN CONJUNCTION WITH UTILIZATION OF THE MACHINE AND MAINTENANCE AND REPAIRS DURING OPERATION; DISPOSAL OF PARTS AND CONSUMABLES

- Observe the adjusting, maintenance and inspection activities and intervals set out in the Operation,- Lubrication and Maintenance Manual, including information on the replacement of parts and equipment. These activities may be executed by skilled personnel only.
- Brief operating personnel before beginning special operations and maintenance work, and appoint a person to supervise the activities.
- In any work concerning the operation, conversion or adjustment of the machine and its safety-oriented devices or any work related to maintenance, inspection and repair, always observe the start-up and shut-down procedures set out in the Operation,- Lubrication and Maintenance Manual and the information on maintenance work.
- Ensure that the maintenance area is adequately secured.
- If the machine is completely shut down for maintenance and repair work, it must be secured against inadvertent starting by:
  - locking the principal control elements and removing the ignition key and/or
  - attaching a warning sign to the main switch
- Carry out maintenance and repair work only if the machine is positioned on stable and level ground and has been secured against inadvertent movement and buckling.
- To avoid the risk of accidents, individual parts and large assemblies being moved for replacement purposes should be carefully attached to lifting tackle and secured. Use only suitable and technically perfect lifting gear and suspension systems with adequate lifting capacity. Never work or stand under suspended loads.

INSTRUCTIONS FOR USE

Open the lock, lift the harness by the catch hook (C), the blue straps (leg straps J) are below. The harness is being put on just like a jacket. Pull the belly strap (E) through the lock, as shown on the illustration, and secure it.

By closing the breast strap, you avoid the shoulder straps to side-slip. Bring the leg straps (J) around the legs to the front, pull them in, as shown in the illustration, and tighten them. Adapt the harness to body form, seeing to perfect fit, in particular that the catching hook (C) be in the center of the back.

The safety harness should belong to its wearer personally.

The safety harness should only be used together with connectors acc. to EN 354, and fall arrest acc. to EN 355, or fall protection devices acc. to EN 360.

The attachment point for the safety harness should be above the wearer, and the carrying capacity of the attachment point should be sufficient to correspond with the minimum carrying capacity acc. to EN 795.

Legend for illustration Z 22649

(1) Final drive

(2) Crawler carrier

(3) Track roller

(4) Carrier roller

(5) Guide wheel

(6) Swing circle guard

(7) Hydraulically operated access ladder, see page 46 for more information

(8) Battery main switches

(9) Control switch for access ladder

(10) Monitor box for central refilling system, see page 278 for more information

(11) Push button for emergency shut down of both main drive motors.
DO NOT use the emergency shut down button for normal stopping procedure.

(12) Sliding window of operator’s cab, see page 56 for more information

(13) Emergency escape ladder, see page 46 for more information

(14) Air conditioner unit for high voltage switch cabinet

(15) Hydraulically driven grease pump of the Swing circle pinion Lubrication System (SLS)

(16) Hydraulically driven grease pump of the Central Lubrication System (CLS)

Legend for illust. Z25827

(1) Sliding window, serves also for emergency exit

(2) Release lever for hinged railing bar (3)

(3) Hinged railing bar

(4) Rigidly mounted emergency escape ladder

(5) Rope ladder. The upper end of the rope ladder is fixed onto the lower rung of the rigid escape ladder (4) by means of the fasteners (6). The lower end of the rope ladder is fixed on brackets (8) and secured with rubber fasteners (7).

(6) Hooks for fastening the rope ladder onto the rigid ladder (4)

(7) Rubber fasteners for rope ladder in lifted position

(8) Bracket for rope ladder in lifted position. The lower rung of the rope ladder is hooked up into the brackets (8)

(9) Escape hatch on the top of the counterweight

(10) Emergency escape ladder located on the counterweight. Acess via the escape hatch (9)

Using the emergency escape ladder

In case of emergency with normal walkways obstructed use escape ladder (4) and (5) for leaving the machine. Proceed as follows:

1. Move up lever (2) and pull out.
2. Open the hinged railing bar (3).
3. Unhook fasteners (7) and take out rope ladder rung from brackets (8).
4. Let the rope ladder fall down to the ground. The upper end of the rope ladder is fixed onto the lower rung of the rigid ladder (4).
5. Use the rigid ladder (4) and then the rope ladder (5) for leaving the shovel.

Sound Pressure Level in the Operator’s Cab

The sound pressure level in the operators cab is 75 dB (A)measured according to ISO 6396 (Dynamic test method).

The sound pressure value is also shown on the decal attached to the wall inside the operator’s cab. See Illusration Z25215

Controls with Backhoe Attachment

Legend for illustration (Z 25063)

(1) Control lever for stick and slew gear

(2) Control lever for boom and bucket

(3) Push button for Truck counter. For counting loaded trucks press this button. The total number of trucks loaded is shown on the ECS display for five seconds, refer to page 88 for more information.

(4) Signal horn button and emergency override switch for cable drum initiated reverse travel cut off.

⚠ CAUTION

If reverse travel cut off occurs the warning buzzer on the instrument panel sounds and the message "Reverse travel cut off by cable drum" appears on the ECS display. There are three possible causes for reverse travel cut off:

- Power cable too slack or
- The ground contact sensing bar of the cable drum hits an obstruction or
- Temperature of cable drum drive motor too high

Call service personnel for solving the problem.

⚠ WARNING

If such a travel cut off happens with a dangerous situation for man or machine which requires reverse travelling for moving away from a collapsing face or bench, press button (4) and move the Excavator out of the endangered area. Then stop moving backwards and call your supervisor for advice. The power cable and/or cable drum may be damaged through the reverse movement.

(5) Travel control pedal, left track forward - reverse

(6) Travel control pedal, right track forward - reverse

(7) Swing brake pedal

Switch Board

Legend for illust. Z25828

(16) Switch, cab ventilation blower. Blower runs with low speed, even with switch in -0- position. (Cab pressurizing prevents ingress of dust).

(17) Switch, manual actuation of swing ring lubrication system

(18) Switch for upper and lower windshield wiper
0 - Off
1 - Interval stage
2 - Slow stage
3 - Fast stage

(19) Toggle switch, swing parking brake

- 0 - Parking brake released - UP
- 1 - Parking brake applied - DOWN.

⚠ CAUTION

The parking brake should only be applied with superstructure at complete standstill, except in case of emergency. Refer to page 242 for more information.

(20) Switch, main working lights, 2.

(21) Switch, manual actuation of central lubrication system

(22) Switch, windshield washer

(23) Key operated main switch

(24) Acoustic warning signal

This signal sounds for approximately 1 second when a fault message appears on the ECS screen.

⚠ CAUTION

In case of too low hydraulic oil level this signal sounds continuously. Shut down the Shovel, locate and correct the cause immediately. Fill up hydraulic oil to the correct level. For the correct checking procedure → See "CHECKS BEFORE STARTING THE MAIN DRIVE MOTORS" on page 226.

SERVICE FUNCTIONS operated with KEY GROUP (D) and KEY SWITCH (C), illustration Z25526, continued

Display of ”INPUTS-OUTPUTS”.
This section is basically used for Testing procedures through authorized service staff and therefore locked during normal operation by the software program. Access to this section can be obtained in the Service section ”INPUTS-OUTPUTS ON/OFF” through actuation of key switch (C).

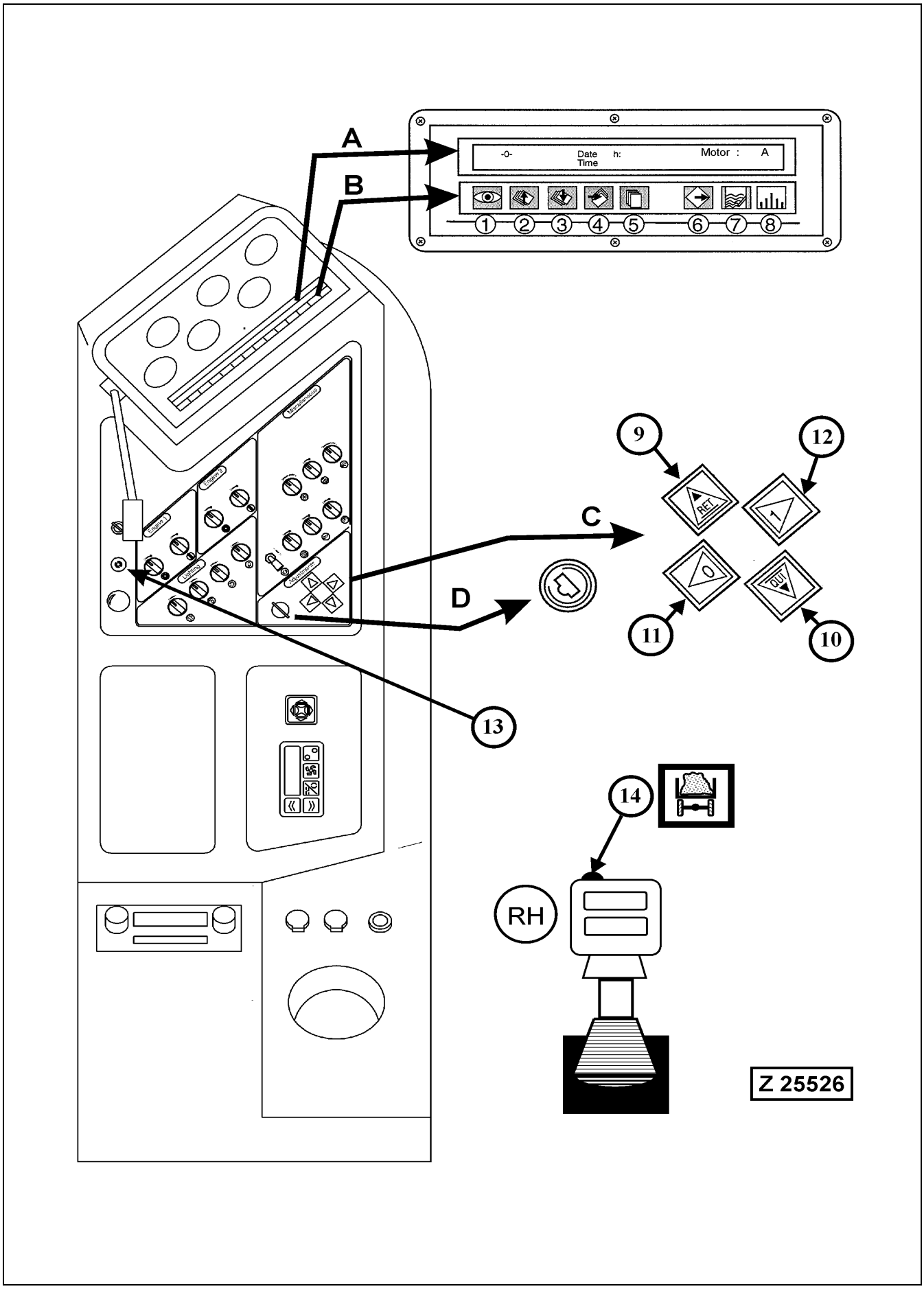
Messages ON/OFF
The creation of Messages can be switched off, when for example, tests in the INPUT / OUTPUT levels are carried out with the ECS control functions operative (motors running) and test conditioned messages shall not be displayed (stored), i.e. Protocol and Statistics memory will not be filled with messages caused by testing operations.

Evaluation ON/OFF.
When commissioning or servicing the Shovel the data evaluation in the respective service function can be switched off with key switch (C). This prevents an overwriting of the selected function (Standard display, Inputs-Outputs or Service) by occurring messages, caused by repairs on the ECS system.

⚠ CAUTION

The function EVALUATION must only be switched OFF through authorized Service Staff. The instructions in the ECS Service Manual have to be observed. With the Evaluation switched OFF all monitoring and control functions of the ECS are inoperative.

Refer to Section ”SERVICE FUNCTIONS” and ”MENU CONTROL” on page 125 for more information.


A
B
-0-
Date
Time
h:
Motor :
A
1
2
3
4
5
6
7
8
C
D
9
12
11
10
13
14
RH
Z 25526

Number of present messages (flashing)

These present messages can be called up with key (1) (MESSAGE). Press key 2 (UP) or 3 (DOWN) for the display of the present messages.

Call up of ”HELP” Information (HELP Texts) to a displayed message.

If additional ”HELP” information (HELP Texts) to a displayed fault message are desired, press key (4) to enter the Text mode. Then press key (3), to display the ”HELP” text.

Example fault message 512:

Fault No. 512: (515)	$h: Shutdown of motor 1 by motor protection relay 0F4-1
Help:	- Watch main motor temperature and let motor cool down. - Check motor protection relay 0F4.

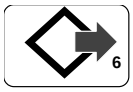
Messages and Help texts are displayed each time in two text lines. The two next text lines can be called up by pressing key (3) ”DOWN”.
The fault messages including the Help text consist of maximum 8 text lines. For return to the fault message press key (2) ”UP” until the message is displayed again.
Resetting Fault Messages of the Lubrication Systems after Repairs which have been carried out with the motor(s) running or with the motor(s) OFF and Main Switch Key in ON position. After repairs under the above conditions it is necessary to reset the control circuit of the concerned lubrication system by actuating the rotary switch on the instrument panel for a full lube cycle. If this manually actuated lube cycle is not being carried out, the fault message ”LUBE SYSTEM FAILURE” will remain on the ECS display. Resetting of the lube system control circuit can also be done by shutting down the motor(s) and switching OFF the main switch key.

2nd. Possibility - The last (X) Entries of a certain Message

(X) = desired number of the last entries e.g. **10**.

This print shows, whether the desired message appeared within the last 10 entries.

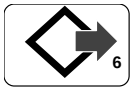
PRO



DATA OUT

DOWN

Press until the desired nos. of entries are reached,e.g. 10.

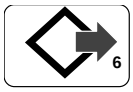


DATA OUT

The position of the brackets **>** **<** is now being changed from the entries to the message texts.

UP

Select message (page) e.g. 524.



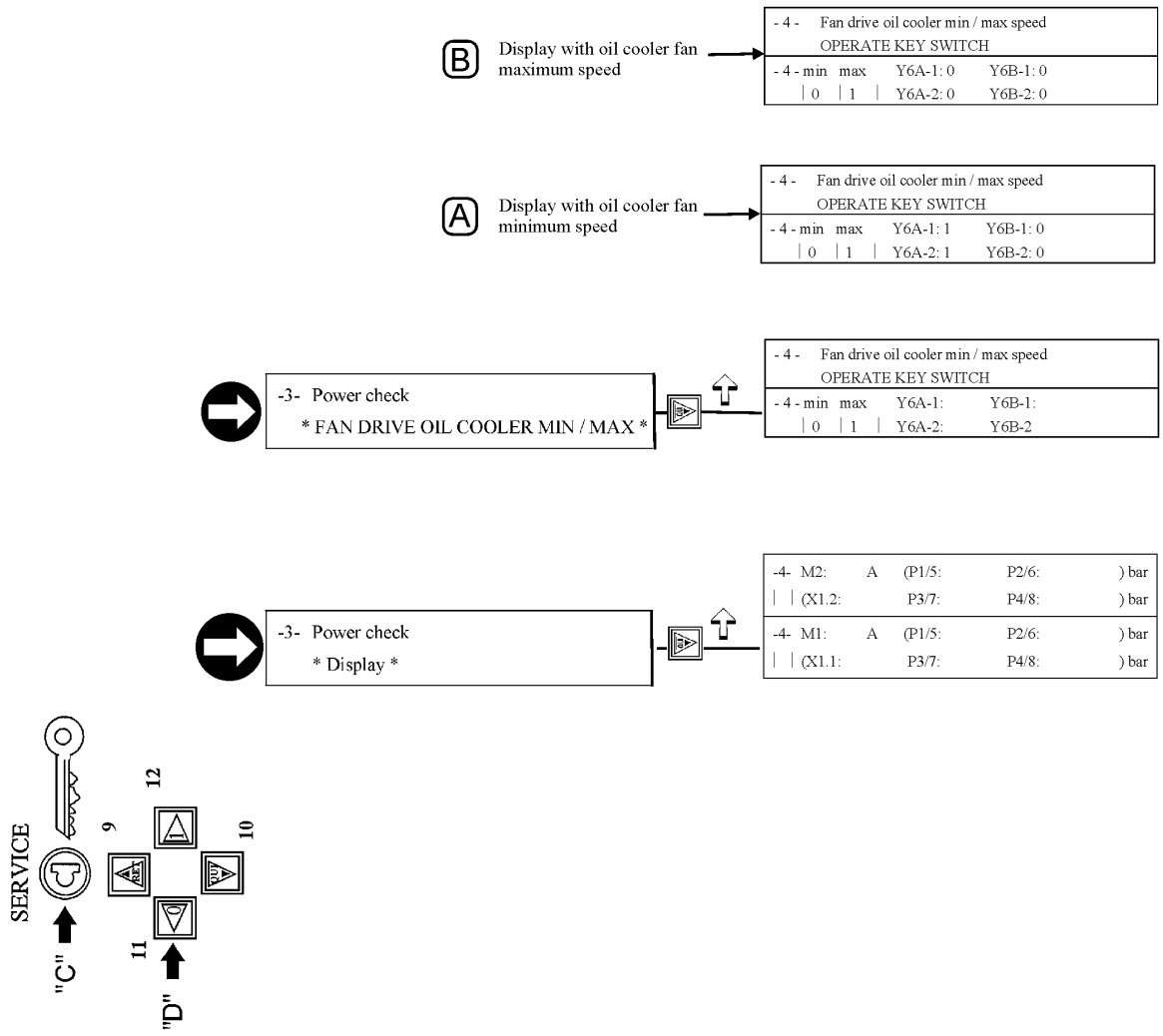
DATA OUT

The records of message 524 of the last 10 entries are printed out..

Print from the last	10 PRO entries
page no **>** 524**<**PRO has	39 entries *P*

Menu Control of the ECS Chart II

Service / Power Check



Z 25257E

-2-	-3-	-4-
System Levels ➡	➡	➡

Menu Control of the ECS Chart IV

NOTE:
The designation codes of the units listed in the DIGITAL INPUTS table appear in numerical and then in alphabetical order and are of exemplary nature only. The unit designation and their sequence within the system levels may vary according to the implemented software. For the applying unit designations and their sequence within the system levels, refer to the separate Menu Control List in this section.

Inputs - Outputs / DIGITAL INPUTS

9K3	(E14.4):	9K4	(E14.5):
8S344	(E13.8):	9K1	(E14.1):
9K1ff	(E14.2):	9K2	(E14.3):
8S82	(E13.4):	8S87	(E13.5):
8S90	(E13.6):	8S324	(E13.7):
8S31	(E12.8):	8S34	(E13.5):
8S44	(E13.2):	8S46	(E13.3):
8S24	(E12.4):	8S26	(E12.5):
8S27	(E12.6):	8S28	(E12.7):
8S7/8S8	(E12.2):	8S23	(E12.3:
8K89	(E8.7):	8K125	(E8.8):
8K200	(E12.1):		
8K74a	(E8.3):	8K83	(E8.4):
8K84	(E8.5):	8K88	(E8.6):
8E31	(E7.7):	8F12	(E7.8):
8K70	(E8.1):	8K71ff	(E8.2):
8D32/8K125	(E7.5):	8E30	(E7.6):
8B97.2	(E7.3):	8B343	(E7.4):
8B46	(E11.7):	8B48	(E11.8):
8B50	(E7.1):	8B97.1	(E7.2):
8B28.2	(E11.5):	8B43	(E11.6):
8B27.2	(E11.3):	8B28.1	(E11.4):
8B26	(E11.1):	8B27.1	(E11.2):
8B23.1	(E6.5):	8B23.2	(E6.6):
8B24	(E6.7):	8B25	(E6.8):
8B16	(E6.1):	8B17.1	(E6.2):
8B17.2	(E6.3):	8B22	(E6.4):
8B9	(E5.5):	8B10	(E5.6)
8B11	(E5.7):	8B12	(E5.8):
8B5	(E5.1):	8B6	(E5.2):
8B7	(E5.3):	8B8	(E5.4):
5K1	(E10.5):	6B1	(E10.6):
6B2	(E10.7):	8B4	(E10.8):
1U1	(E10.1):	4F16	(E10.2):
4F17	(E10.3):	4F18	(E10.4):
1S2.2	(E4.5):	1S3.1	(E4.6):
1S3.2	(E4.7):	1S5	(E4.8):
1K27	(E4.1):	1K30	(E4.2):
1S1	(E4.3):	1S2.1	(E4.4):
1K14.2	(E3.5):	1K15	(E3.6):
1K17	(E3.7):	1K18	(E3.8):
1K8.2	(E3.1):	1K10	(E3.2):
1K12	(E3.3):	1K14.1	(E3.4):
1K5.2	(E9.5):	1K6.1	(E9.6):
1K6.2	(E9.7):	1K8.1	(E9.8)
1K3.1	(E9.1):	1K3.2	(E9.2):
1K4	(E9.3):	1K5.1	(E9.4):
OS15	(E2.5):	1K1	(E2.6):
1K2.1	(E2.7):	1K2.2	(E2.8):
OS6	(E2.1):	OS7	(E2.2):
OS8	(E2.3.6):	OS12	(E2.4):

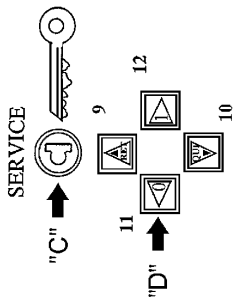
Inputs - Outputs ON

- 2 -	Inputs - Outputs * DIGITAL- OUTPUTS *
- 2 -	Inputs - Outputs * DIGITAL- INPUTS *
- 2 -	Inputs - Outputs * ANALOG-INPUTS *

V

Inputs - Outputs / ANALOG INPUTS

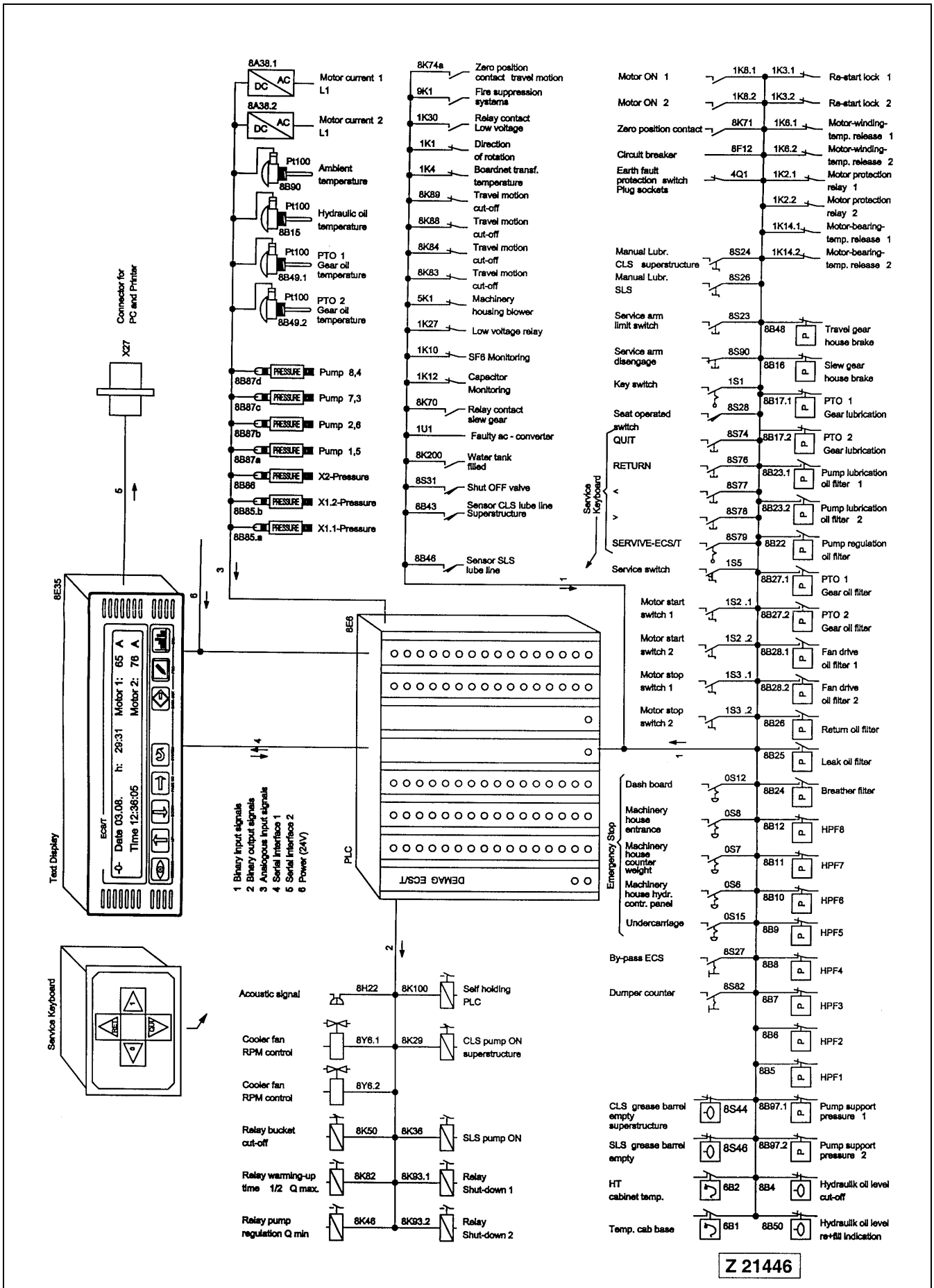
B109	SLS Grease level	(EW3.2):	%
B108	CLS Grease level	(EW3.1):	%
B90	Ambient temp.	(EW1.4):	°C
B87C	Pump 3/7	(EW2.4):	bar
B87D	Pump 4/8	(EW14.1):	bar
B87A	Pump 1/5	(EW2.2):	bar
B87B	Pump 2/6	(EW2.3):	bar
B86	X2-Pressure	(EW2.1):	bar
B85-1	X1.1-Pressure	(EW13.3):	bar
B85-2	X1.2-Pressure	(EW13.4):	bar
B49.2	PTO - gear oil temperature M2	(EW1.3):	°C
B49.1	PTO - gear oil temperature M1	(EW1.2):	°C
B15	Hydraulic oil temperature	(EW1.1):	°C
A38.2	Motor current L1 M2	(EW13.2):	A
A38.1	Motor current L1 M1	(EW13.1):	A



Z 25271E

-2- -3-

System Levels


8A38.1
DC AC
Motor current 1
L1
8A38.2
DC AC
Motor current 2
L1
Pt100
8B90
Ambient temperature
Pt100
8B15
Hydraulic oil temperature
Pt100
8B49.1
PTO 1 Gear oil temperature
Pt100
8B49.2
PTO 2 Gear oil temperature
PRESSURE
8B87d
Pump 8,4
8B87c
Pump 7,3
8B87b
Pump 2,6
8B87a
Pump 1,5
8B86
X2-Pressure
8B85.b
X1.2-Pressure
8B85.a
X1.1-Pressure
8K74a
Zero position contact travel motion
9K1
Fire suppression systems
1K30
Relay contact Low voltage
1K1
Direction of rotation
1K4
Boardnet transf. temperature
8K89
Travel motion cut-off
8K88
Travel motion cut-off
8K84
Travel motion cut-off
8K83
Travel motion cut-off
5K1
Machinery housing blower
1K27
Low voltage relay
1K10
SF6 Monitoring
1K12
Capacitor Monitoring
8K70
Relay contact slew gear
1U1
Faulty ac - converter
8K200
Water tank filled
8S31
Shut OFF valve
8B43
Sensor CLS lube line Superstructure
8B46
Sensor SLS lube line
Connector for PC and Printer
X27
6
3
8E35
Text Display
ECAT
Date 03.08.
Time 12:36:05
h: 29:31
Motor 1: 65 A
Motor 2: 76 A
8E6
PLC
DEMAG ECS/T
1 Binary input signals
2 Binary output signals
3 Analogous input signals
4 Serial interface 1
5 Serial interface 2
6 Power (24V)
Service Keyboard
ESC
ENT
Motor ON 1
Motor ON 2
Zero position contact
Circuit breaker
Earth fault protection switch Plug sockets
1K8.1
1K8.2
8K71
8F12
4Q1
1K3.1
1K3.2
1K8.1
1K6.2
1K2.1
1K2.2
1K14.1
1K14.2
Re-start lock 1
Re-start lock 2
Motor-winding-temp. release 1
Motor-winding-temp. release 2
Motor protection relay 1
Motor protection relay 2
Motor-bearing-temp. release 1
Motor-bearing-temp. release 2
Manual Lubr. CLS superstructure
Manual Lubr. SLS
8S24
8S26
Service arm limit switch
Service arm disengage
Key switch
Seat operated switch
QUIT
RETURN
SERVIVE-ECS/T
Service switch
Motor start switch 1
Motor start switch 2
Motor stop switch 1
Motor stop switch 2
8S23
8S90
1S1
8S28
8S74
8S76
8S77
8S78
8S79
1S5
1S2 .1
1S2 .2
1S3 .1
1S3 .2
8B48
8B16
8B17.1
8B17.2
8B23.1
8B23.2
8B22
8B27.1
8B27.2
8B28.1
8B28.2
8B26
8B25
8B24
8B12
8B11
8B10
8B9
8B8
8B7
8B6
8B5
Travel gear house brake
Slew gear house brake
PTO 1 Gear lubrication
PTO 2 Gear lubrication
Pump lubrication oil filter 1
Pump lubrication oil filter 2
Pump regulation oil filter
PTO 1 Gear oil filter
PTO 2 Gear oil filter
Fan drive oil filter 1
Fan drive oil filter 2
Return oil filter
Leak oil filter
Breather filter
HPF8
HPF7
HPF6
HPF5
HPF4
HPF3
HPF2
HPF1
Emergency Stop
Dash board
Machinery house entrance
Machinery house counter weight
Machinery house hydr. contr. panel
Undercarriage
By-pass ECS
Dumper counter
0S12
0S8
0S7
0S6
0S15
8S27
8S82
CLS grease barrel empty superstructure
SLS grease barrel empty
HT cabinet temp.
Temp. cab base
8S44
8S46
6B2
6B1
8B97.1
8B97.2
8B4
8B50
Pump support pressure 1
Pump support pressure 2
Hydraulik oil level cut-off
Hydraulik oil level re+fill indication
Acoustic signal
Cooler fan RPM control
Cooler fan RPM control
Relay bucket cut-off
Relay warming-up time 1/2 Q max.
Relay pump regulation Q min
8H22
8Y6.1
8Y6.2
8K50
8K82
8K46
8K100
8K29
8K36
8K93.1
8K93.2
Self holding PLC
CLS pump ON superstructure
SLS pump ON
Relay Shut-down 1
Relay Shut-down 2
Z 21446

Level 3: Inputs - Outputs / ANALOG-INPUTS

A38-1 Motor current L1 M1 (EW13.1): A
A38-2 Motor current L1 M2 (EW13.2): A
B15 Hydraulic oil temperature (EW1.1): °C
B49-1 PTO - gear oil temperature M1 (EW1.2): °C
B49-2 PTO - gear oil temperature M2 | (EW1.3): °C
B85-1 X1.1-Pressure (EW13.3): bar
B85-2 X1.2-Pressure (EW13.4): bar B86 X2 -Pressure (EW2.1): bar
B87A Pump 1/6 (EW2.2): bar| B87B Pump 2/5 (EW2.3): bar
B87C Pump 3 (EW2.4): bar B87D Pump 4 (EW14.1): bar
B90 Ambient temperature (EW1.4): °C
B108 CLS grease level (EW3.1): % B109 SLS grease level (EW3.2): %

Fault and Information Message List

GROUP 1
Fault Message Texts of message pages No. 500 - 733

Fault No. 500: (503) *1)	$h: Start blocked through main Shut-Off (gate) valve
Help:	Limit switch S31 not closed. - Check for broken cables to switch S31.
Fault No. 506: (509)	$h: Start of motor 1 blocked by high pressure filter #1
Help:	Differential pressure switch B5-1 not closed - Check cables to differential pressure switch B5-1 .
Fault No. 512: (515)	$h: Shutdown motor 1 by motor protection relay 0F4-1
Help:	- Watch main motor temperature, let motor cool down. - Check motor protection relay 0F4-1..
Fault No. 518: (521)	$h: Shutdown motor 2 by motor protection relay 0F4-2
Help:	- Watch main motor temperature, let motor cool down. - Check motor protection relay 0F4-2..
Fault No. 524: (527)	$h: High pressure filter #1 restricted. Stop the motor 1
Help:	Differential pressure switch B5-1 not closed - Clean or replace filter element. - Check pump

*1) Numbers in brackets are the message page numbers of the second language.

Fault No. 926: (929)

$h: Oil temperature of PTO gear 2 too high

Help:

- Check gear oil cooling circuit.
- Clean gear oil cooler. (indicated by B49-2)

Fault No. 932: (935)

$h:

Help:

Fault No. 938: (941)

$h: Hydraulic oil temperature too high.
Bucket motion switched off.

Help:

Cool off the oil by moving attachment w/o load.
- Check hydraulic oil cooling system.
- Clean oil cooler. (indicated by B15)

Fault No. 944: (947)

$h: Faulty monitor channel for oil temperature of PTO gear 1

Help:

Temperature sensor B49-1 for PTO gear oil shows inadmissible values.
- Check sensor and cables.

Fault No. 950: (953)

$h: Oil temperature of PTO gear 1 too high

Help:

- Check gear oil cooling circuit.
- Clean gear oil cooler. (indicated by B49-1)

Fault No. 956: (959)

$h: Faulty monitor channel for ambient temperature

Help:

Temperature sensor B90 for ambient temperature shows inadmissible values.
- Check sensor and cables.

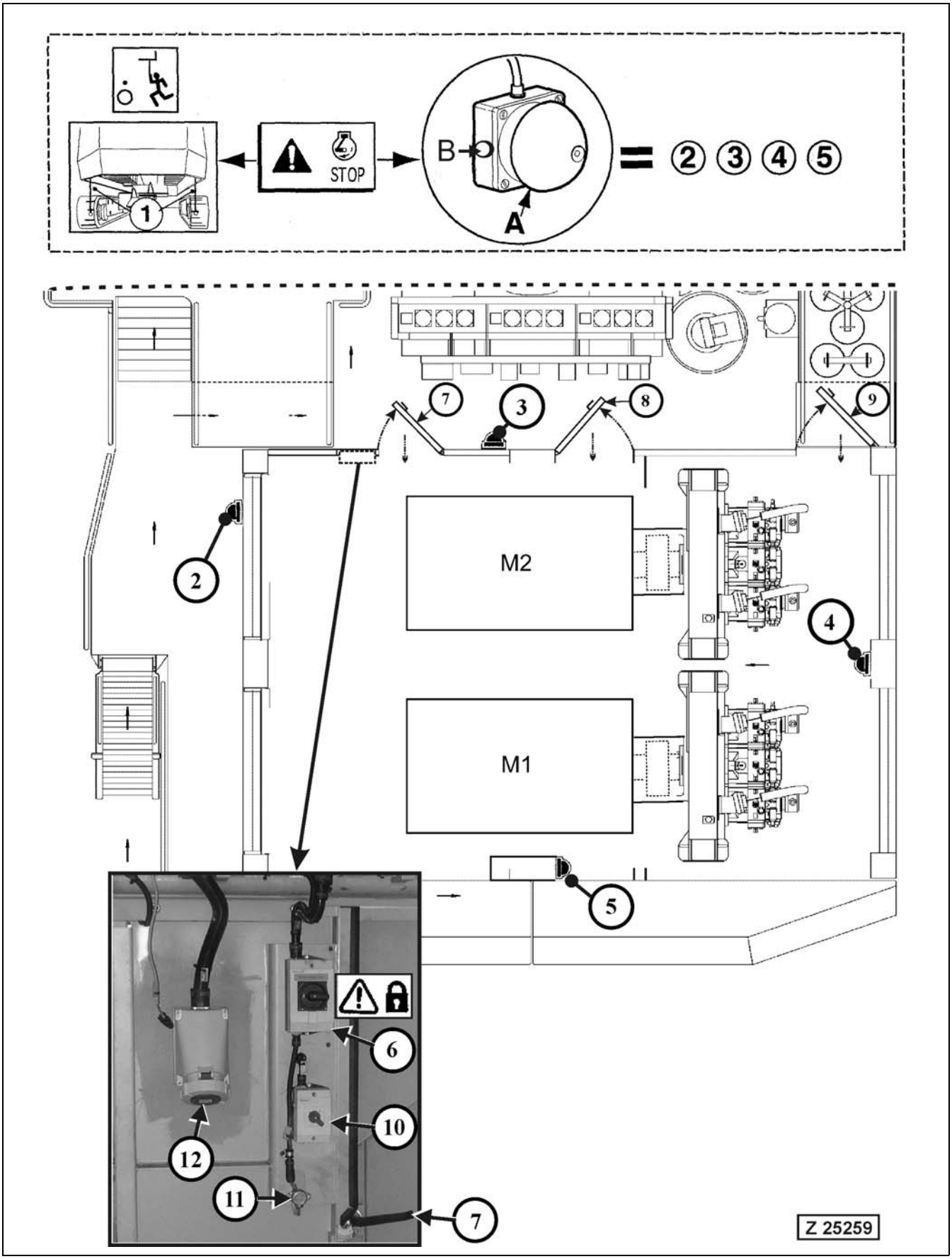
Fault No. 962: (965)

$h: Control pressure X1.1 for the main pumps too high

Help:

- Check / adjust electronic pump regulation.
- Check / adjust pressure reduction valve. (indicated by B85-1)

Information No. 1344: (1345)	# Messages switched OFF
Information No. 1346: (1347)	# Motor shutdown has been actuated from ground man
Information No. 1348: (1349)	# Trucks : @ C05
Information No. 1350: (1352)	# Pilot control switched OFF. Safety lever in locked position or ladder down (indicated by S28)
Information No. 1354: (1356)	# Switch off wiper Remove lower wiper Push >QUI< button
Information No. 1358: (1360)	# Emergency shut-down switch 0S33D in the power house was actuated. Unlock before restarting.
Information No. 1362: (1364)	# Emergency shut-down switch 0S33B at the main control valves was actuated. Unlock before restarting.
Information No. 1366: (1368)	# Emergency shut-down switch 0S36 in the cab was actuated. Unlock before restarting.
Information No. 1370: (1372)	# Maintenance safety switch 1S58 in the machinery house was actuated. Unlock before restarting.
Information No. 1374: (1376)	# Start lock, Motor 1 temperature too high. Motor must not be started. - Allow motor to cool down. - Check motor protection relay 0F4-1.
Information No. 1378: (1380)	# Swing ring gear lube system grease container on reserve. - Replace or fill grease container.


STOP
B
A
= ② ③ ④ ⑤
1
2
3
4
5
6
7
8
9
10
11
12
M2
M1
Z 25259

***) LED with a flashing diagnostic code**

The LED ”H31” monitors all six high pressure filters. LED ”H116” monitors all five Emergency shutdown switches and H136 monitors the lubrication system of both PTO gear boxes. If a failure condition occurs, the respective LED will begin flashing out a diagnostic code for identification of the concerned filter, emergency switch or PTO gear box. If more than one filter, switch or gear box, send a failure signal at the same time, the respective LED will always show the diagnostic code of that unit with the lowest number. Refer to page 209 for description of the diagnostic codes flashed out by LED ”H31”,”H116” and ”H136”.

3.7.4 SWITCH BOARD - MEDIUM VOLTAGE

Legend for illustration Z25823

(1)	Switch board
(OF4-1)	Motor protection relay for main drive motor 1
(OF4-2)	Motor protection relay for main drive motor 2 Refer to the separate Instruction Manual *Motor Protection Relay SPAM 150 C* in volume no 2 binder for operation and maintenance instructions.
1Q1A	Power switch medium voltage feeding, setting 79A
1Q1B	Power switch medium voltage feeding, setting 79A

⚠ CAUTION

Before starting the motors, make sure that no one will be endangered when starting the motors.

Walk-around Inspection

Check for leakage, loose parts and overall security.

Refer to the maintenance section 4. for the daily inspection items.

Power Supply

Make sure the correct power supply (6.9 kV, 50 Hz, 3-Phase) is applied.

Main Drive Electric Motor

Read the separate Operation- and Maintenance Manual for the main drive electric motor. Observe the starting and operating instructions.

The Motor Manual is part of Volume no. 2 Binder.

Start Transformer (if so equipped)

Read the separate Operation- and Maintenance Manual delivered from the manufacturer of the Start Transformer.

Observe the starting instructions.

Load Cut-Off Switch (3), illust. (Z 22659)

Set this switch to operating position, using key (4).

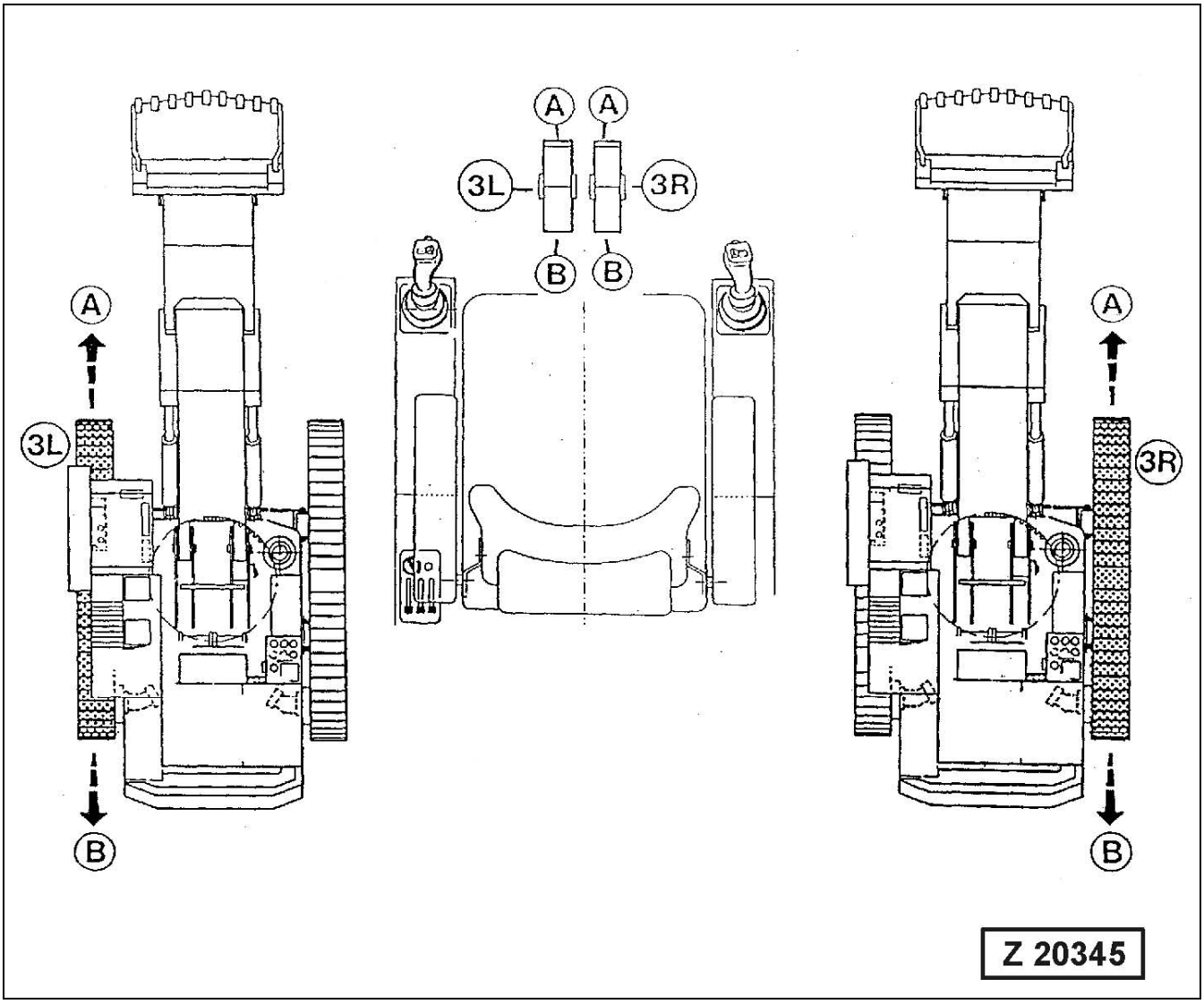
Close flap (1) and lock-up with padlock (2). Store the key (4) in the switch cabinet.

Make sure the doors of the high voltage switch cabinet and of the cab base are closed and all emergency motor shut-off switches are in released position.
Lock up switch cabinet door with padlock (5).

3.12 MOVING THE SHOVEL

3.12.1 TRAVEL CONTROL WITH FOOT PEDALS

NOTICE
Travelling directions with cab in normal working and travel position i.e. cab above idler wheel. Counter weight above drive sprockets.



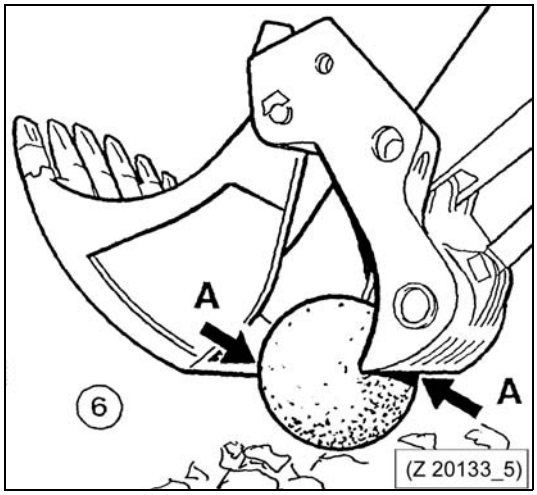
Legend for illustration Z 20345

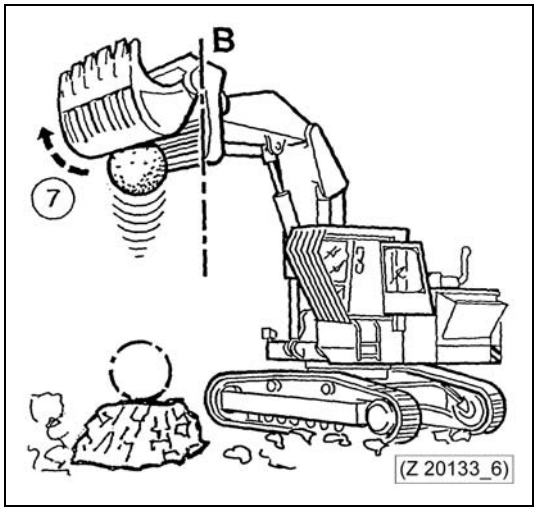
(3L)	Left pedal, inside	(3R)	Right pedal, inside
A	Left track forward	A	Right track forward
B	Left track reverse	B	Right track reverse

3.14.4 DROP BALL OPERATION

⚠ WARNING

- **Make sure all safety devices are correctly installed on your machine.**
- **Always walk-around and look for hazards before you operate your machine in the work area.**
- **Consult the supervisor of the job site for instructions concerning safe operation in the work area.**
- **Know the rules for movement of people and machines on the job site. Follow the instructions of the supervisor.**
- **Before starting drop ball operation, clear area of other persons and sound the signal horn. Stop drop ball operation when other persons approaching to the work area.**
- **The drop ball must never be placed loosely in the bucket. Always pick-up the drop ball at its greatest circumference, see detail (A) in the illustration number (6).**
- **When lifting the drop ball, make sure the back wall of the bucket remains in a vertical position, see detail (B) in illustration no. (7). The ball drop height is reached, when the bucket is on a level with the cab roof.**
- **With the drop ball lifted, never tilt back the bucket beyond the vertical position (B), otherwise the drop ball could roll over and fall on the Shovel.**
- **Before leaving the Shovel locate the drop ball on a safe place. DO NOT leave the drop ball in the bucket.**





⚠ CAUTION

For EMERGENCY SHUTDOWN of BOTH MOOTORS, use STRIKE BUTTON (8).
Additional emergency shut-down switches are located on the machinery house. For more information → See "MACHINERY HOUSE" on page 196.

Stopping procedure, see illustration Z25528.

1. Park the Shovel at a safe place on level and solid ground.

   For more information → See "PARKING THE SHOVEL" on page 255.

2. Deposit the working attachment onto the ground, proceed as follows:

   - **A - Backhoe Attachment**
     Lower the backhoe attachment fully extended onto the ground in a position as shown on the oil level plate.

   - **B - Bottom Dump Bucket Attachment**
     Lower the bottom dump bucket attachment onto the ground in a position as shown on the oil level plate.

   The positions A or B are necessary to prevent unintentional movement of the working attachment when the pressure in the hydraulic system is relieved and for correct checking of the hydraulic oil level.

3. Move all controls into neutral position.

4. Turn switches (5 and 3) clockwise to stop position. After the motors have come to standstill, relieve the pressure in the hydraulic system.

⚠ CAUTION

Before operating the Excavator make sure the Fire Detection, Actuation and Suppression systems are operative.
Carry out inspection and maintenance according to the separate Manual >CHECKFIRE SC-N ELECTRIC DETECTION AND ACTUATION SYSTEM<. This manual is filed in volume 2 binder.

NOTICE
This section covers only such information necessary for the operator to understand operation of the fire detection and actuation system. All other information i.e. placing the system in service, daily inspection, functional tests, maintenance and trouble shooting are covered in the separate manual.

Legend for illustration Z25267

(A) Strike button of the manual actuator, located next to the cab base door, for manual actuation of the Carbon Dioxide fire suppression system -I-.

(B) Strike button of the manual actuator in the operator's cab for manual actuation of the Carbon Dioxide fire suppression system -I-.

(3) Expellant gas cartridges, must be replaced after actuation.

(4) Automatic actuator (gas motor) of the Carbon Dioxide fire suppression system -I-. If there is an automatic actuation of the fire suppression system, pressurized gas will shutdown the main drive motors via pressure switch (8) immediately and opens the extinguishing gas cylinder (10) after the pre-adjusted discharge delay.

(5) Control module of the CHECKFIRE **SC-N** electric detection and actuation system. Refer to the separate Manual >CHECKFIRE **SC-N** ELECTRIC DETECTION AND ACTUATION SYSTEM< for all information concerning - Operational Modes, Daily Inspection, Maintenance and System Conditions. This manual is filed in volume 2 binder.

(6) Control module of the CHECKFIRE **SC-N** electric detection and warning system -II-. Refer to the separate Manual >CHECKFIRE **SC-N** ELECTRIC DETECTION AND ACTUATION SYSTEM< for all information concerning - Operational Modes, Daily Inspection, Maintenance and System Conditions. This manual is filed in volume 2 binder.

(7) Remote high level alarm located outside on the Operator's cab, this alarm will sound when the system detects a fire.

(8) Explosion-proof pressure switch – DPST located in the cab base. This switch shuts off the motors immediately when the fire detection system has a fire detected. The reset plunger (9) moves out into its upper position. When the fire suppression system has been recharged, push in the reset plunger.

(9) Reset plunger, be sure to push in this plunger as soon as the fire suppression system has been recharged after actuation of the system.

(10) Steel cylinder filled with extinguishing gas Carbon Dioxide, located inside the cab base.

(11) Linear detection wire routed in the machinery house

A - Pumping the oil from the Suction Oil Reservoir (12) into the Main Oil Reservoir (continued)

7. The suction oil reservoir and the suction hoses are filled, when bubble free oil flows out at the vent plug openings on each main pump. Install vent plugs and tighten securely.

8. Check oil level in all main pump housings and vent the hydraulic pumps according to page 417 in the Maintenance Section 4.

9. Check oil level in the main reservoir. Fill up with new hydraulic oil as necessary and install filler plug.

10. Start the motors and run without load to allow trapped air to be removed from the hydraulic system.

⚠ CAUTION

DO NOT start the motors when the suction oil reservoir is empty.

B - Pumping the Oil from the Return Oil Collector Pipe (13) and back-pressure valve pipe (15) into the Main Reservoir

1. To empty the collector pipe (13), open cock (2).

2. Aerate the return oil filter chamber by opening the filler plug on top of the main reservoir.

3. Switch on pump with switch (6).

4. Observe oil level sight gauge at the main oil reservoir. As soon as the oil level remains constant the return oil collector pipe is empty. Now switch off the transfer pump (4) and close cock (2).

5. To empty the back-pressure valve pipe (15), open cock (3).

6. Switch on pump with switch (6).

7. Observe oil level sight gauge at the main oil reservoir. As soon as the oil level remains constant the back-pressure valve pipe is empty. Now switch off the transfer pump (4) and close cock (3).

8. Install filler plug on top of main reservoir.

⚠ CAUTION

DO NOT start the motors during servicing.

Operating the Service Crane (continued)

⚠ WARNING

- **Make sure everyone is in the clear before lifting or lowering a load with the crane. Never swing or position a load over personnel.**
  DO NOT exceed the maximum permissible lifting load of 1000 kg.
- **Be sure to secure the crane in rest position by lowering the lift boom (4), illustration (Z 22979) onto support (8) and fastening load hook (7) to eye (9).**

For more information of correct crane operation and maintenance refer to the separate Instruction Manual ”CRANE TYPE HMK 60 Ta1”. The Crane Instruction Manual is filed in volume 2 Binder.

3.25 TRANSPORTATION AND LIFTING OF THE SHOVEL

⚠ WARNING

Before Disassembling, Lifting or Transporting this Shovel contact your local Komatsu Service Station for all the necessary instructions for safe and economic disassembling, lifting and transportation procedures of your Shovel.

3.25.1 DISASSEMBLING OF THE SHOVEL

The Shovel is being transported disassembled into its main components.

⚠ WARNING

Disassembling of the Shovel must be carried out only by personnel with special knowledge of the Shovel. Improper disassembling procedures can cause severe accidents with personal injury.

The sequence of disassembly can be derived from the Assembly Procedure Manual in volume 2 Binder. Disassembling is basically the reverse order of the assembling procedure.

3.25.2 TRANSPORTATION AND LIFTING

The transport dimensions and weights of the Shovel's components are listed in the separate Assemby Procedure Manual filed in volume 2 binder.

Observe the operating permits of the low loader used for transportation. They contain the permissible load, loading width and height.

⚠ WARNING

- **Observe the federal, state and local laws and regulations for transportation of heavy units. Know the safety rules and laws before you transport this Shovel.**
- **Make sure the low loader and the components of the Shovel are equipped with the correct safety devices.**
- **Secure the Shovel and all components transported on the low loader against movement.**

4.2 PRECAUTIONS FOR MAINTENANCE

- Before starting any lubrication or maintenance work read the Fundamental Safety Instructions on page 16.
- Park the Excavator at a safe place on level ground. Proceed according to the instructions on page 255 ”Parking the Excavator”. Lower the attachment flat onto the ground. Move all control levers to neutral position.
- Stop the motors and move all control levers through their shift positions to relieve the pressure in the hydraulic system. Refer to page 256 ”Stopping the Motors” for detailed description of the stopping procedure.
- Before any maintenance work is started, set the maintenance safety switch to 0 position. Refer to page 199 for location of the maintenance safety switch. In the 0 position the motors can not be started. Secure this position by inserting a padlock into the holes of the switch. Up to three padlocks can be attached to the holes provided.
- A warning plate ”CAUTION MACHINE MAINTENANCE” must be fixed in the Operator’s cab before any lubrication or maintenance work is started.

NOTICE
Some checks and adjustments can only be done with the motor running. For such jobs two men are necessary. Thereby, the controls must not be left unattended, while the other man carries out checks and adjustments.
The man in the operator’s seat must keep constant visual contact with the other one and they must agree on suitable communication signals before they start their work.

- Block the machine to prevent machine movement
- Always use safety devices to block hydraulic cylinders. Never rely on the machine hydraulic system to hold when working on the loader attachment. A hydraulic line or cylinder could fail or someone could accidently strike the control levers causing the loader to fall.
- Relieve all pressure in the hydraulic system before servicing the hydraulic system.
- Oily cloth and inflammable material must be removed from the machine. Clean the excavator before starting maintenance work.
- Switch-off battery main switch and remove key, before working on the electrical system.
- Wear safety clothing, goggles, respirator and other safety devices, whenever working conditions make this necessary. Observe the local safety rules.
- Never allow unauthorized persons access to the machine during lubrication and maintenance work.

4.6.3 PERIODIC SERVICING SCHEDULE

Service Intervals	Service Point	Service	See
When necessary	Swing circle toothing	Immediately apply grease if bare spots are visible	page 327
	Automatic lubrication systems	Fill grease containers Clean or replace filter elements	page 329
	Track rollers	If leakage occurs replace floating seals and fill with GL ISO VG CLP 220	page 333
	Carrier rollers		
	Guide wheels		
Every 10 operating hours or daily	Shovel	Walk-around inspection	page 335
	Working attachment	Check grease injectors of automatic lubrication system. Check for proper lubrication.	page 339
	Swing circle	Check grease injectors of automatic lubrication system. Check for proper lubrication.	page 343
	Track groups	Clean, esp. in winter	page 345
	Main drive motors	Checks	(1)
	Fire detection and actuation system (if so equipped)	Inspection	(2)
	Service crane	Inspection	(4)
Every 50 operating hours or weekly	Swing gears and Motor adapter housings	Check oil levels	page 347
	Travel gears, Motor adapter housings and Final drives	Check oil levels	page 351
	PTO's (Pump distributor gears)	Check oil level	page 357
	Hydraulic access ladder	Check safety sensor	page 361
	Hydraulic oil cooler	Check and clean as necessary	page 363

(1) Perform maintenance according to separate Motor Operation an Maintenance Manual filed in volume 2 binder.

(2) Perform inspections according to the separate Manual "FIRE DETECTION AND ACTUATION SYSTEM" filed in volume 2 binder.

(4) Perform inspection, cleaning and lubrication according to the separate Instruction Manual "CRANE HMK 60 Ta1" filed in volume 2 binder.

4.7.1 SWING CIRCLE TOOTHING LUBRICATION

See illustration Z 20850

All teeth of the ring gear (3) must be completely covered with grease.

If teeth are not completely covered with grease, they have to be lubricated immediately with special adhesive spray grease, illust. (Z 0148) or spread type adhesive grease as specified in the Parts Catalog. The spread type grease can be applied, for example, with a brush.

Observe the instructions on the grease container for correct use of the lubricant.

NOTICE

- **If the machine is equipped with gear ring guard (6), remove covers (7) for swing circle teeth inspection.**
- **If the automatic lubrication system of the swing circle-teeth, is out of function for more than one shift, lubricate manually (using spray grease) and remove the lube pinion (5), to prevent serious damages.**
- **In order to ensure proper adherence of the lubricant, clean and dry the ring gear prior lubrication.**
  In most cases it is sufficient to rotate the superstructure several times for removing moisture from the gear teeth.
- **Make sure that the multi-purpose grease of the swing circle bearing does not come in contact with the teeth of the swing circle because this will diminish lubrication capability of the swing circle teeth lubricant.**
  If necessary remove excessive multi-purpose grease from the swing circle above the dust seal ring.

Legend for illustration Z22664 (continued)

(16) Check condition, fastening and security of emergency escape ladder

(17) Check condition of the main drive motors. See separate motor manual for more information

(18) Check condition and fastening of pump distributor gears and hydraulic pumps

(19) Check hydraulic oil level

(20) Check condition and fastening of swing gears

(21) Check condition and fastening of hydraulic oil coolers

(22) Check condition and fastening of main control valves

(23) Check to make sure that the high voltage switch cabinet door is locked

(24) Check function of controls and monitors in the operator’s cab

NOTICE
If any damages, failures or wrong condition, have been found during the inspection, corrective action must be taken.

4.9.1 SWING GEARS AND MOTOR ADAPTER HOUSINGS - CHECK OIL LEVELS

REMARK

The machine can be equipped either with a swing gear of manufacturer "L&S" or of manufacturer "Siebenhaar". Refer to the data plate on each swing gear housing to find out the manufacturer of the swing gear.

Swing Gear manufactured by "L&S"

I Front Swing gear

II Rear Swing gear

Legend for illustration Z22882

Swing gears

(A) Position of oil level gauge for checking the oil levels

(1) Oil level gauge

(2) Oil filler plug

(3) Breather filter

(10) Drain coupling or evacuation nozzles for Wiggins system

Motor Adapter Housing

(4) Oil level gauge and filler opening. This opening can also be used for connecting a suction pump when changing the oil.

(5) Breather filter

(6) Oil drain plug

CHECK SWING GEAR OIL LEVEL

Remove oil level gauge (1), illustration Z22882 and wipe it clean. Insert the gauge but DO NOT screw in, see detail ”A”. Remove the gauge. The oil level should be at the upper mark of gauge (1). If necessary add the specified gear oil through filler opening (2).
Remove breather filter (3). Blow out with compressed air from inside to outside and reinstall.

CHECK MOTOR ADAPTER HOUSING OIL LEVEL

Remove oil level gauge (4) and wipe it clean. Insert the gauge but DO NOT screw in, see detail ”A”. Remove the gauge. The oil level should be at the upper mark of gauge (4). If necessary add the specified oil through filler opening (4).
Remove breather filter (5). Blow out with compressed air from inside to outside and reinstall.

4.9.3 PTO’s (PUMP DISTRIBUTOR GEARS) AND OIL RESERVOIR - CHECK OIL LEVEL

Legend for illustration Z 20696

(1) Oil level gauge

(2) Oil filler plug

(3) Breather filter

(4) Oil drain plug

(7) Oil collector reservoir for adapter housings of hydraulic pumps for fan drives

(8) Breather filter with oil level gauge

(9) Adapter housings for main hydraulic pumps

(10) Oil level plugs

(11) Oil filler plug with breather pipe

(12) Oil drain plug

PUMP DISTRIBUTOR GEARS, CHECK OIL LEVEL:

1. Unscrew level gauge (1) and wipe it clean.
2. Insert gauge (1), but DO NOT screw in, see detail (A).
3. Remove level gauge and read the oil level. The oil level should be between the “MIN” and “MAX” mark. If necessary, add oil through filler opening (2) up to the “MAX” mark on gauge (1).

NOTICE
If the oil level is above the “MAX” mark, drain the oil down until the oil level is at the “MAX” mark. Too much oil in the pump distributor gear will cause aeration of the oil.

4. Insert gauge (1) and tighten securely. Remove breather filter (3). Blow out with compressed air from inside to outside and reinstall.

4.10.1 SIGNAL HORN COMPRESSOR - LUBRICATE

See illustration Z 10689

The compressor (2) is located in the cab base.
Fill several drops of thin oil into the lubricator (1).
The oil must be free from resin and acid and must have the lowest solidifying-point possible (below - 40° C).

REMARK

If the Excavator is equipped with a second signal horn there is also a second compressor which has to be lubricated in the same way as the first one.

4.10.2 HYDRAULIC OIL COOLER FAN BEARINGS - CHECK FOR LEAKAGE AND CLEAN BREATHER FILTER

See illustration Z 21659

Check housing (1) for leakage. If leakage is found, check the oil level in the bearing housing. Remove oil level plug (2). The oil level should be at lower edge of the opening. If necessary add oil through the breather filter adapter pipe. Clean breather filter (3) with compressed air from inside to outside and install plug (2) and breather filter (3). Oil loss of the bearing housing indicates worn or damaged seal rings. To prevent damage to the fan bearings, install new seal rings.

4.10.3 RADIATOR FAN BEARINGS - CHECK FOR LEAKAGE AND CLEAN BREATHER FILTER (DIESEL VERSION ONLY)

See illustration Z 21660

Check housing (1) for leakage. If leakage is found, check the oil level in the bearing housing. Remove oil level plug (2). The oil level should be at lower edge of the opening. If necessary add oil through the breather filter adapter pipe. Clean breather filter (3) with compressed air from inside to outside and install plug (2) and breather filter (3). Oil loss of the bearing housing indicates worn or damaged seal rings. To prevent damage to the fan bearings, install new seal rings.

Air Conditioning for medium and high Voltage Switch Cabinets

Legend for illustration Z 22670

(1) Refrigerant compressor

(2) Control and Evaporator unit

(3) Condenser unit

(4) Dryer cartridge

(5) Sight glass for checking refrigerant filling. The sight glass can be seen through an opening on the front panel of the air conditioner housing.

(6) Collector reservoir

Checking the refrigerant level

Switch on air conditioning equipment and run at maximum capacity for approx. 5 minutes.

Observe inspection glass (5) at refrigerant tank. A refrigerant flow loaded with bubbles or foam indicates a lack of refrigerant. In this case well equipped refrigeration specialists must check the circuit for tightness and must add the missing quantity or refrigerant. If more than 200 grams per year are lost, the oil level of the refrigerant compressor (1) must also be checked. This is a special procedure and must be carried out by refrigeration specialists only. Isolated small bubbles in the inspection glass may be neglected.

Even with an absolutely tight equipment a certain amount of refrigerant is lost through the walls of the hoses.

Therefore a small annual replenishment of the refrigerant quantity is normal.

The dryer cartridge (6) must be replaced after every 1000 operating hours or once a year by refrigeration specialists.

⚠ CAUTION

Servicing of the air conditioning systems is restricted to workshops especially equipped for this purpose. Refer to the separate booklet ”AIR CONDITIONING” in Service Literature Binder – Volume 2 for more information.

CHECK ADJUSTING RANGE FOR GUIDE WHEELS

NOTICE
The cocks (9), illust. Z 20371 must always be in OPEN position. Close only in such cases, when the adjusting cylinders (10 and 11) must remain under pressure while servicing other components of the system.

Bleeding the System

1. Make sure pressure relief cock (5) illust. Z 20371 is in closed position “C”; and shutoff cocks (6 and 9) are in open position “O”.
2. Start the engine/motor.
3. Slowly open vent valves (12) on all four adjusting cylinders until bubble free oil flows out. Close the vent valves (12).
4. Move the machine forward and reverse to distribute tension.
5. Check adjusting range “X” according to Illust. (Z 20015) on previous page.
6. Check the complete system for leakages.

NOTICE
Further track group inspection and wear measurement procedures should be carried out according to Parts and Service News Bulletin No. AH02521 filed in volume 2 binder.

High-Strength Bolt Connections (continued)

Check fastening and condition of high voltage switch cabinet, illust. Z 21672

Reference No.:	Bolt size mm	Grade	SW * mm	Tightening torque Nm	Qty.
(1)	M30	10.9	46	1770	4
(2)	M30	10.9	46	1770	4

* SW = Wrench size* SW = Wrench size

- Re-tighten mounting bolts to their correct torque and replace missing or damaged bolts.

High-Strength Bolt Connections (continued)

Power House Doors, illust. Z 20707

- Check fastening and condition of power house doors (24 - 25) and door hinges (26).
- Check fastening and condition of safety rods (41).
- Check upper pump compartment door locks (35 - 36) for correct mounting.
- Check lower pump compartment door locks and radiator door locks (37 - 40) for correct mounting.
- Lubricate door hinges (26) at grease fittings (27).

High-Strength Bolt Connections (continued)

Check condition and fastening of both swing gears (01) and swing motors (02), illust. Z 22514

Reference No.:	Bolt size mm	Grade	SW * mm	Tightening torque Nm	Qty.
(8)	M 16	10.9	24	265	16
(25)	M 24	12.9	19	1030	34

* SW = Wrench size

- Re-tighten mounting bolts to their correct torque and replace missing or damaged bolts.

REMARK

After checking and retightening of swing gear mounting bolts (25), attach protection caps (26) onto the bolt heads.

High-Strength Bolt Connections (continued)

Check condition and fastening of travel gears, sprockets and travel motors

Legend for illustration Z 25249

- A - View of the RH Final drive. The configuration of the LH Final drive is the same.
(1) Travel gear
(2) Sprocket
(3) Travel motors
(4) Outer sprocket bearing
(5) Inner sprocket bearing
(6) Mounting bolts for travel gear to crawler carrier
(7) Mounting bolts for sprocket to hub
(8) Mounting bolts for travel motors
(9) Mounting bolts for outer bearing to crawler carrier
(10) Mounting bolts for inner bearing to crawler carrier

Reference No.:	Bolt size mm	Grade	SW *1) mm	Tightening torque Nm	Qty. *2)
(6)	M36	10.9	55	3100	80
(7)	M36	10.9	55	3100	72
(8)	M16	10.9	24	265	32
(9)	M30	10.9	46	1770	24
(10)	M30	10.9	46	1770	24

***1)** SW = Wrench size

***2)** Quantity for both final drives

- Re-tighten mounting bolts to their correct torque and replace missing or damaged bolts.

NOTICE
If the outer bolts (9) have been found loose, it is necessary to check also the inner bolts (10) for looseness.
For this purpose the travel gear assy has to be removed.
Contact your Komatsu Dealer for support.

High-Strength Bolt Connections (continued)

Check condition and fastening of railings (01/02) and of steps (03, 04, 05 and 23).
See details (A - D) for mounting parts arrangement.

Legend for illust. Z 20619

(A)	Mounting assembly for steps (03) to steel pipe, version I
(B)	Mounting assembly for railing posts to steps (03)
(C)	Mounting assembly for steps (03) to boom welded brackets
(D)	Mounting assembly for steps (03) to steel pipe, version II

FILTER SERVICE

- Replace return oil filter elements
- Replace leakage oil filter element
- Check filter screens

Follow the steps shown in illust. Z 19336:

1. Loosen bolt (1).
2. Turn retainer (2).
3. Remove cover assy (3). Inspect O-ring (4) and replace if necessary.
4. Lift out element assy (5).
5. Disassemble filter assy (5) in sequence of ref. nos. (6 to 12)
6. Discard element (8)
7. Inspect screen (11) and clean if necessary.

NOTICE
Take care not to contaminate the clean inside of the screen when flushing.

8. Inspect screen (11) and O-ring (12) for damage replace if necessary.
   Install screen (11) use new sealing washer (10) and self locking nut (9).
9. Reassemble filter assy (5) with new element (8) according to step 5.
   Use new self locking nuts (6).
10. Install filter assy use new gasket (7).
    Torque bolt (1) to 850 Nm.

NOTICE
- **After each repair of the hydraulic system the elements (8) should be replaced after about 50 operating hours.**
- **The filter elements must also be replaced when the fault message "Filter restriction" is displayd on the ECS screen.**
- **Replace screens (11) every 5000 operating hours at the latest.**

FILTER SERVICE

Replace pressure filter elements, illust. Z 22666, as follows:

1. Place working equipment on the ground and shut-off the motors.
   Relieve pressure in the hydraulic system according to page 256 in the operation section.
2. Place a suitable container below the filter in order to collect outflowing oil.
3. Remove plug (A) and drain the oil.
4. Unscrew case (C) of the respective filter and clean the filter case.
5. Discard element (F) with O-ring (G).
6. Inspect O-ring (D) and back-up ring (E), replace if necessary.
7. Install drain plug (A) with new packing ring (B).
8. Lubricate the thread at the filter head and at filter case (C) with multi-purpose grease K2K.
9. Insert a new element (F) with new O-ring (G).
10. Fill the case (C) half way up with clean hydraulic oil.
11. Screw the case (C) into the head and tighten.
12. After short operating period check filter for leakage.
13. Check restriction indicator (H) for proper mounting and good condition.

4.12.7 HYDRAULIC OIL COOLER - INSPECT AND LUBRICATE DOOR HINGES

⚠ WARNING

- **Provide adequate working platform for safe access to the hydraulic oil cooler.**
- **Check all door hinges (2) for good condition and proper fastening to their carrier frames. If cracks or distortion at the weld area of the hinges are found corrective action must be taken. DO NOT try to open the cooler doors before the damage has been repaired otherwise the cooler door may become detached and fall off. Danger of accidents.**

Legend for illust. Z25095

(1) Hydraulic oil cooler

(2) Cooler hinges

(3) Grease fitting

(4) Cotter pin

- Lubricate all cooler hinges (2) at grease fittings (3).
- Check to make sure that the hinge pins are properly secured with cotter pins (4).

HYDRAULIC SYSTEM - CHANGE OIL, REPLACE SUCTION STRAINERS AND PULSATION DAMPER

Legend for illust. Z 21787

(6) Hand wheel of main shut off valve between main oil reservoir and suction oil reservoir

- To open the valve, turn hand wheel (6) CCW to the stop
- To close the valve, turn hand wheel (6) CW to the stop

NOTICE
Before starting the motors, make sure the shut off valve is completely open by turning the hand wheel (6) fully to the left (CCW).

(11) Compensator

(12) Intermediate pipe

(13) Gaskets

(14) Suction oil strainer

(15) Suction oil reservoir

(16) Drain coupling

Attach drain hose (part of tool set) to coupling (16) and drain oil from suction oil reservoir. Remove intermediate pipe (12) and strainer (14). Install new strainer (14) with new gaskets (13).

REMARK
There are six further strainers installed in the suction oil reservoir (15). Refer to page 479 for replacement instructions.

4.14.1 SWING GEARS AND MOTOR ADAPTER HOUSING - CHANGE OIL

REMARK

The machine can be equipped either with a swing gear of manufacturer "L&S" or of manufacturer "Siebenhaar". Refer to the data plate on each swing gear housing to find out the manufacturer of the swing gear.

Swing gear manufactured by "L&S"

Legend for illustration Z22882

Swing gears

(A) Position of oil level gauge for checking the oil levels

(1) Oil level gauge

(2) Oil filler plug

(3) Breather filter

(10) Drain couplings or evacuation nozzles for Wiggins system

Motor Adapter Housing

(4) Oil level gauge and filler opening. This opening can also be used for connecting a suction pump when changing the oil.

(5) Breather filter

(6) Oil drain plug

Swing Gears, change oil:

1. Use adequate working platform for draining the oil. Place receptacles of sufficient capacity (approx. 100 liter) below drain couplings (10). Attach drain hose (part of tool set) to drain coupling (10). Remove parts (1, 2 and 3) to speed up draining. On swing gears with evacuation nozzle (10), use the Wiggins system for changing the oil.

2. Clean breather filter (3) with compressed air from inside to outside and re-install.

3. After the oil is completely drained, flush the gear with the regular gear oil.

4. Remove drain hose from coupling (10) and attach the protection cap onto the drain coupling.

5. Fill gear housing through filler opening (2) up to the "MAX" mark on level gauge (1) with fresh oil and re-install plug (2).

NOTICE
For checking the oil level insert the level gauge (1) but DO NOT screw in, see detail (A).

6. After short operating period check oil level and housings for leaks.

TRAVEL GEARS - CHANGE OIL

Illustration Z25244:

REMARK

The breather filters for the travel gears are mounted inside the center frame and connected with extension hoses.

1. Remove drain plugs (4), filler plug (3) and oil level gauge (2). Check breather filter, mounted inside center frame, and clean as necessary.
2. After the oil is completely drained, flush the gear with the regular gear oil and reinstall drain plugs (4).
3. Fill the gear with fresh oil through filler opening (3) up to the Max mark on oil level gauge (2).
4. Install filler plug (3) and gauge (2).
5. After short operating period check gears for leakage.

MOTOR ADAPTER HOUSINGS - CHANGE OIL

1. Remove parts (8, 9 and 10) and drain the oil completely.
2. Check breather filter, mounted inside center frame, and clean as necessary.
3. Install drain plug (10) and fill-up oil to level opening (8). Reconnect breather filter hose line to filler opening (9).

FINAL DRIVE HOUSINGS - CHANGE OIL

1. Remove drain plug (15), filler plug (14) and oil level gauge (13) and drain the lubricating oil.
2. Check breather filter mounted inside center frame, and clean as necessary.
3. After the oil is completely drained, install the cleaned drain plug (15) and tighten securely.
4. Fill in new oil up to the “MAX” marking on oil level gauge (13).
5. Clean filler plug (14) and reinstall.
6. Insert oil level gauge (13) and tighten securely.
7. After short operating period check oil level and gear for leakage.

4.16.1 PROTECTIVE MEASURES BEFORE STARTING WELD REPAIRS ON THE UNDERCARRIAGE

See illustration Z 20674

On standard Excavators there are no special protective measures necessary.
However, the general protective measures (A and B) must be observed.
On Excavators with a power unit (generator set) mounted to the undercarriage, all electrical connections between the Excavator and the power unit have to be disconnected.