Shop Manual

H285S

HYDRAULIC SHOVEL

SERIAL NUMBER H285S 78067

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Centralized lube system

Compressed air system

Legend: 7007

Compressor at the engine	(1)
Cooling coil	(2)
Air drier	(3)
Air container	(4+5)
Service unit	(6)
Box with grease barrel and grease pump	(7)
Control units	(8)

Function:

Compressed air produced by the compressor (1) flows through the cooling coil (2) to the air drier (3). The air drier is used to dehumidify the air.

From the air drier the air flows into the air containers (4+5) and further on to the service unit (6). The service unit is used to regulate the operating pressure and to add lube oil.

With the control units (8) gets the air flow to the grease pump controlled (switching on/off).

continued

Operating hydraulics: (Brief describtion of the back hoe equipment)

The H 285 includes 4 operating pumps, of the variable axial piston type. 7011

Pump I+IV supplies the following systems:

-Left travel motor
-back-hoe cylinders
-Boom cylinders
-Stick cylinders

Pump III supplies:

-Right travel motor
-Stick cylinders
-
-Boom cylinders

Pump II supplies:

The slew motors and if the slew motors is not used in addition the same systems as the pump III:

The pressure oil flows through the filters (11, 12+13) into the system.
The filters protect the hydraulic system for contamination coming from the pumps.E.g. in case of a pump failure.

The oil returning into the tank is cleaned again by return flow filters in the hydraulic tank. The oil flow rate to the various consumers is controlled in the control blocks (8, 9+10).

Assembling the under carriage 8104

1. Insert all 8 pins (01) into the outer boring (2+3) of the center section.
2. Attach carbody to the crane (travel brake valves of the carbody must be in direction of the travel motors).
3. Align carbody with the side frame; lower borings (3) first and insert pins (01).
4. Align upper borings (2) and insert pins (01).
5. Support carbody with wooden blocks (4) in a way that the free side is appr. 100mm higher than the attached side.(This makes it easier to attach the 2nd side frame).
6. Lift the 2nd side frame with the crane and align with the carbody. Lower borings first and insert pins.
7. Align upper borings and insert pins
8. Lift up the undercarriage a little and remove the wooden blocks.
9. Secure all pins with the retainer plates (02) and bolts (05) and grease all pins through the grease nipples (03) in the retainer plates.
10. Connect pipe work between brake blocks and the travel motors.

continued

Cont'd.

-Attach all hand rails, catwalks and steps etc. 8109

-Mount the cab guard.

-Connect all pipes, hoses and electr. wiring.

Note:

All connections are marked before disassembly of the excavator therefore joining the connections are not difficult.

Pre-checks for initial start-up

1. Make sure that the shut off valve between the main and suction tank is opened completely.
2. Check all oil and water levels and correct if necessary.
3. Make sure that the pipe lines for the attachment are blanked.
4. Now the engine can be started and the machine can be moved for any additional assembling.
   For the starting procedure and procedures after startiing pay attention to the hints in the operation manual!

The additional assembling is done in the following sequence:

1. Boom with its cylinders attached and the two stick cylinders as in the case with the backhoe.
2. Counterweight
3. Stick assembly with attached bucket cylinders.
4. Bucket.
   Procedure see next pages.

Cont'd.:

Mounting the stick and stick cylinder 8112a

1. Lift the stick with the attached bucket cylinders with the crane. 8112b
2. Lift the stick over to the adjoining position with the boom.
3. Lower the stick until stick and boom borings are aligned.
4. Insert the pins (119) (backhoe 1 pin) and secure with the retainers (120).
5. Unhook stick from the crane.
6. Remove the retainer (124) and push out the pin (123) towards the outside, so that the cylinder rod eye can be moved in.
7. Lift the stick cylinder with the crane and remove the transport fastening.
8. Lower the stick cylinder as required so that the cylinder rod can be aligned with the bearing boring in the stick.
9. Extend stick cylinder as required so that the rod eye can be aligned with the bearing boring. If necessary move the boom a little for easier alignement.
10. Insert pin (123) and secure with retainer (124).
11. Fix the 2nd stick cylinder in the same manner.
12. Connect the hoses to the bucket cylinders.
13. Connect the lines to the central lube system.

continued

Cont'd.

Explanation concerning the pilot control units (joy sticks): 7018

The line connections are marked by letters and numbers on the bottom of these pilot control units.

The drawing shows the position of the units as seen by the driver.

Pilot control unit 73.1, 73.2, 74

Pump line connection	P
Tank line connection	T
Control line connections	1
	2
	3
	4

Markings of electrical components in the circuit diagrams
(DIN 40719 part 2)

Indicating letter	Kind of component
A	Group of components or part of this
B	Converter for non electrical to electrical values or vice versa
C	Capacitors
D	Elements with time lag, memory elements, binary elements
E	Miscellaneouses
F	Safety devices
G	Generators voltage suppliers
H	Signal units
J	Not used
K	Relays, contactors
L	Inductances
M	Motors
N	Regulators, amplifiers
P	Instruments (gauges), checking devices
Q	High voltage switching units
R	Resistors
S	Switches, selectors
T	Transformers
U	Modulators, converter from one electrical in an other electrical value
V	Tube, semi-conductor
W	Wave-guide
X	Connections, connection rails (terminals), plugs and sockets
Y	Electrical operated mechanical units
Z	Compensating units, filters, limiters cable connection

Terminal plans sheets

The terminal plans have all been established acc. to the same pattern. 7021

On top in the center is the resp. terminal-rail-number given, e.g. X2 (1).
Below continously numbered the terminals.

A line from terminal to terminal indicates, that the terminals are bridged (2).

On the extreme left and right side of the sheet are the targets shown (3). In between are the lead-colour (4) and further terminals (5) shown.

Example:

			25			
			26			
S5b	St1.10	bl	27	bl		K51.1
switch S5	plug no. 1	bue		blue		relay K51
term. 5	pin no. 10					terminal 1

The directional wiring from component to component without a terminal strip between must be taken from the circuit diagram.

The H 285 is driven by a CUMMINS or CAT-engine. Of course, an other engine can be installed as well.

Legend: 7023

Engine	(1)
Adapter plate to flywheel	(2)
Coupling	(3)
Cardan shaft	(4)
Pump distr. gear	(5)
Engine mounts	(6 + 7)
Prime drive frame	(8)

Cont'd

Ramp Time: 7027

- With engine at low idle set engine to high idle with the resp. push buttom at the dash board and check the time the engine needs from low to high idle.
  Value: 4 - 5 seconds.

If adjustment is required:

- Loosen lock nut (3) and adjust with potentiometer (4) the time.
- Tighten lock nut (3).

Adjustment procedure EFC 7027

High idle (Run SPD):

- Start engine and run with max. speed.
- Check speed.normal value: 1900 + 30 rpm

If adjustment is required:

- Turn the potentiometer (4) till the speed is ok.
- Check the RUN SPD again and re.adj. if necessary.

Note:

a If the th above adj. isn't possible, turn Droop adj. that way that the high idle is a little higher than required and than adj. high idle with the Run SPD adj.

b Gain
If due the above check the engine rpm is not constant, turn the potentiometer (5) till the speed is constant.

continued

The pump distributor gear is a spur gear with forced lubrication. 7031
The pump distributor gear takes up all hydraulic pumps.

The gear pump (1) is intended for the forced lubrication described on the following page.

The oil level can be checked with the dip stick (2).
The drain plug (3) is located to the sump.

The gear is driven by a cardan shaft from the engine. The cardan shaft is bolted to the flange (4).

Lube oil quantity: about 180 l.

Task:

During operation, the pump regulation system ensures optimum utilization of the motor power.
I.e., the hydraulic power of the pumps (delivery x pressure) is adjusted to the motor power by regulating the flow.

In addition, the regulation system allows to control the relevant power requirement of the pumps (I,III,IV) and of the slew gear pump (II). 7035

A) If the slew circuit is not used the flow of the pump (II) flows together with the flow of pump (III) into the control block (9).
Giving this circuit the double amount of oil.

B) When using the slew circuit, the regulation for this pump (II) is interupted by the solenoid valve (19).
This will maintain max flow in pump (II) when slewing.

continued

Cont'd

Function: When using the slew circuit 6037

When using the slew circuit the pressure switch (B62) is actuatet by the pilot pressure.
This in turn results in the actuation of the solenoid valve (Y19).
Y19 operates, this interupts line X1 and the regulating line X2 gets connectet to the X1 line to the pump II.This pump stays now in max. flow position
Why?
The X2-pressure doesn't change with the engine speed therefore the control valve of the pump governor is always in position for max. flow.

Oil flow:

Pump (5) - filter (33) - load limit valve connection P - 15 bar valve - outlet X - nozzle block (27) - to the connections (X1) of the pumps (I-IV).
Simultaneously out from port Y of the load limit valve (24) -check valve (25) port A of the solenoid valve (Y19) - outlet port T - port X1 of the pump II.

continued

Measuring and setting of the beginning of regulation (PI to IV)

Note:

Regulation of the two main pumps shall begin at 15 bar, i.e., at a control pressure (X1) of 15 bar or more, the pump must still be on max. flow (at Q-max. stop).

Test without a test bolt 7043

1. Measure, and note, outer dimension (L) (normally 20 mm) of the Qmax. stop bolt (1) (for resetting lateron).

2. Connect pressure gauge for control pressure (see 6047i-01-09

3. Start motor and adjust speed* so that the pressure gauge reads a control pressure of 15 bar (normal: 1800 rpm).
   * This is possible with the adjustment "Idle Speed" of the ramp generator. See chapt. 2.2 6035i-02-05

4. Loosen lock nut (2) and check, turning it by hand, if the pump touches the Q-max. bolt.

5. If the pump has no longer contact with the stop bolt, adjustment should be as follows:

6. Loosen lock nut (3) of the bolt (4) and insert bolt, until pump has contact with the Q-max. stop bolt.

7. Tighten lock nut (2 + 4) again.

Note.

The inner lenght of the Q-max stop bolt, measured from the nut surface to the bolt end, is normally 90 mm

continued

Cont'd

Measuring and setting of the fan speed 7047

1. Set the switching unit (K26 inside X2) to a temperature below the actual temperature of the hydraulic oil. (This results in a de-energized Y6 and the relieve valve 31 is working.)

2. Start engine and run with max. speed.

3. Check fan speed. Value: 1000 rpm.

Note:
Both fans have to be checked. If there is a different more than 5 % (50 rpm) there is too much inner leakage in the fan motors.
The defective motor must be replaced!

4. If the speed is not o.k.:
Connect gauge to the check point (M6) and check the pressure. Value: 170 - 180 bar.

If adjustment is required:

5. Remove protection cap (1) from the valve (31).

6. Loosen lock nut (2) and set pressure with the adjustment screw (3).

7. Check again fan speed.
If speed is o.k.:
- Tighten lock nut (2) and fix protection cap (19).
- Set the switching unit K26 inside X2 to a value regarding to the table on the next page.

If speed is not o.k.:

continued

The hydraulic oil tanks are of welded sheet-metal construction. 7051
They are divided into main oil tank (42) and the suction tank (55).
Both tanks are connected to each other by a flexible tube (52) "compensator". The connection can be closed with the shut-off unit (53) to prevent oil flow during operations at the hydraulic pumps. This unit is controlled by the switch S31 it makes sure a engine start is not possible with a closed shut-off valve.
In the suction tank is included a safety strainer (51).
Placed to each tank bottom is a rapid closing coupling to drain the hydraulic oil.
Capacity of main oil tank = 2325 liters
suction tank = 634 "

Legend:

Main oil tank	(42)
Suction oil tank	(55)
Compensator	(52)
Shut-off valve	(53)
Drain	(54)
Safety strainer	(51)
Return oil filter	(41.1)
Case drain filter	(41.2)
Breather filter	(50)
Back pressure valve	(18+77)
Oil level indicator	(1)
Oil filling stud	(2)
Switch for min. oil level	(B4)
Pressure switch for superv. item 41.1	(B26)
Pressure switch for superv. item 41.2	(B25)
Temp. transmitter for temp. gauge	(B32)
Temp. transmit. for the switching unit to superv. the max. hydr.oil temp.	(B15)
Temp. transmit. for the switching unit for controlling the cooler fan rpm	(B40)
Switch for the shut-off valve	(S31)
Vacuum switch for superv. item 50	(B24)

Control oil flow from the 4-functions pilot control unit (74) to the control blocks 8 + 9 7056

The pilot control unit (74) determines all travelling motions.
In case of forward or backward travelling both front (3+4) or rear (1+2) control valves of the unit (74) are actuated.

This moves simultaneously the first valve spool in control blocks 8 and 9 in the same direction.

Moving the control lever to the left or to the right actuates both left (1+4) or right (2+3) control valves in the pilot control unit.

This move the valve spools in the control blocks in opposite directions, i.e. one travelling motor runs forward, the other one runs backward.

In the control lever is moved diagonally only one valve of the pilot control unit is actuated.
Consequentely only one valve spool in the control block is moved thus feeding only one travelling motor with oil.
The machine corners.

Note:

Via the double check valves (78.1-3) the pressure switch B71 gets actuated for the pump regulating system. (Flow restriction)

Travel parking brake

Task:

The parking brake (spring loaded multi disk brake) protects the exc. against a self acting travel motion.
The brakes are automatically applied as son as the engine has been switched of.

Legend: 7061

Solenoid valve	(Y16)
Pressure switch	(B48)
Pressure check point	M8)
Pilot pressure line	(5)
Brake line	(7)
Rotary distributor	(19)
Brake	(57.1+2)
Relay	(K3)
Monitor light	H60)

Function: 7061

As soon as the engine is running and the alternator is working, the relay (K3) is actuated and therefore is voltage to the solenoid valve (Y16).
The solenoid valve changes its position and connects the pilot pressure line (5) with the brake line (7).
The springs of the brake are compressed and the brake is released.
The function is controlled by the pressure switch (B48) and the monitor light (H60).

Oil flow: brake released

Pilot pressure line (5) - solenoid valve (Y16) port P - outlet B - brake line (7) - rotary distributor (19) - left and right brake (57.1+2).

Note.

The brake point of the switch B48 is 22 bar.
The brake pressure can be checked at the presure check point M8.

Cont'd

Slewing down path (delay)

The slewing down path is a phase of the rotation which occurs when the control lever is in the neutral position while the slewing brake has yet been actuated. 7065

Function:

Since no control pressure arrives at the pressure increasing vales (17), this valves are not preloaded hydraulically.

The adjustment of the slewing down path gives by means of the valve spring with a slewing angle of 90° a residual pressure of approx. 50 bars. I.e., at a pressure of 50 bars the relief valve of the respective pressure increasing valve opens.
Thus the oil can freely circulate from one side (A) of the slew motors to the other (B),(example after r.h. rotation).

After a slewing the valve spool in control block 10 is in neutral position the return filter flow to the tank is blocked and consequently a pressure builds up in the system.
Furthermore, during the slewing down path the hydraulic motors driven by the slew gears acts as a pump.
Therefore a pressure in line A to the motor is lower than the one in the line B from the motor to the control block 10.
The oil flow is as follows:
A to slew motor (20.1+2) - from slew motors port B - pressure increasing valve - back to the motors through connection A.

The description of the anticavitation circuit is given on the following page.

continued

Measurements and pressure adjustments / bucket cylinder 7075

Primary valve (P)

1. Connect pressure gauge to check point (M11/12).
2. Start diesel engine and run at full speed.
3. With control lever extend once and retract once bucket cylinder and read pressure ea. time. Desired value = 310 bars.
   The comparative measurement is necessary to avoid wrong information due to a defective or wrongly adjusted secondary valve.
   If necessary also measure pressure with boom motions.

   If re-setting is required:
4. Remove protective cap (1).
5. Loosen conternut (2).
6. Adjust pressure with adjustment screw (3).
7. Re-tighten conternut and fix protective cap.

continued

Measurings and pressure adjustments / clam cylinder 7080

Primary valves

1. Connect pressure gauge to check point (M13).
2. Start diesel engine and run at full speed.
3. Operate control pedal for clamshell cylinder opening and retract cylinder (open clamshell).
   Read pressure. Desired value = 310 bars.
   If pressure is not correct proceed to a comparative measurement with an other motion.
   These comparative measurements are necessary to avoid wrong information due to a defective or wrongly adjusted secondary valve.

   If re-setting is required:
4. Remove protective cap (1).
5. Loosen conternut (2).
6. Adjust pressure with adjustment screw (3).
7. Re-tighten conternut and fix protective cap.

continued

Stick cylinder / loader attachment

7084
7085

The feeding of the stick cylinder is done by the pumps I-IV (With pump II only when the slew circuit is not used.)
Further-more pay attention that in control block 8 three and in the conrol block 9 two other users (motions) have priority.
The stick cylinder motion can be carried out there-fore only if the spools for those motions in neutral position or in the fine controlling range.
The Pumps I + IV delivers the hydraulic oil through the filters (11.1 + 2) to control block 8 and pump II + III through the filters (12 + 13) to control block 9.
In the neutral position of the control lever in the driver's cab the hydraulic oil flows through the lines (11 + 12) back to the tank.
When operating the control lever for stick cylinder extension/-retraction the pump lines are connected in the control blocks 8 and 9 with the corresponding service lines to the stick cylinders.
The connection for the cylinder bottom side is located at the sections "F" + "H" and for the cylinder rod side at the sections "E" +"G" of the manifold (VT).
The restrictor blocks (16c + 16d) are used for controlling the oil stream due retracting the stick cylinders, to prevent a pump flow cut off.

Legend:

Pump line filter	(11-13)	Case drain filter	(41.2)
Control blocks	(8+9)	Return oil lines	(11+12)
Distr. manifold	(VT)	(from block 8+9)	
Restrictor block	(16e+16d)	return oil line	(3)
with sec. valve		(Control oil from	
Secundary valve	(14c+14d)	sekundary valves)	
(cyl. rod side)		Return oil line	(1)
Return oil filterr	(41.1)	(from sec. valv.)	

Pressure check points (M11/12/13/20+21)

Pressures:

Primary valves	310 bars
Secondary valves	350 bars

Boom cylinder / loader attachment

7089
7090

The feeding of the boom cylinder is done by the pumps I-IV (With pump II only when the slew circuit is not used.)
Further-more pay attention that in control block 8 two and in the conrol block 9 three other users (motions) have priority.
The boom cylinder motion can be carried out there-fore only if the spools for those motions in neutral position or in the fine controlling range.
The Pumps I + IV delivers the hydraulic oil through the filters (11.1 + 2) to control block 8 and pump II + III through the filters (12 + 13) to control block 9.
In the neutral position of the control lever in the driver's cab the hydraulic oil flows through the lines (11 + 12) back to the tank.
When operating the control lever for boom cylinder extension/-retraction the pump lines are connected in the control blocks 8 and 9 with the corresponding service lines to the boom cylinders.
The connection for the cylinder bottom side is located at the sections "B" + "L" and for the cylinder rod side at the sections "A" +"M" of the manifold (VT).
The restrictor blocks (16a + 16f) are used for controlling the oil stream due retracting the boom cylinders, to prevent a pump flow cut off.

Legend:

Pump line filter	(11-13)	Case drain filter	(41.2)
Control blocks	(8+9)	Return oil lines	(11+12)
Distr. manifold	(VT)	(from block 8+9)	
Restrictor block	(16a+16f)	return oil line	(3)
with sec. valve		(Control oil from	
Secundary valve	(14b+14e)	sekundary valves)	
(cyl. rod side)		Return oil line	(1)
Return oil filterr	(41.1)	(from sec. valv.)	

Pressure check points (M11/12/13/17+23)

Pressures:

Primary valves	310 bars
Secondary valves	350 bars

Bucket cylinder (back hoe attachment) 7094

The feeding of the bucket cylinders is done by pumps I + IV. 7095
Pumps delivers the hydraulic oil through the filter (11.1+2) to control block 8.
In the neutral position of the control lever in the driver's cab the hydraulic oil flows through the return line (11) back to the tank.
When positioning the control lever to extend or retract the bucket cylinder the pump line is connected in control block 8 with the respective service line of the bucket cylinders.
The cylinder bottom sides are connected to the connection "I" and the piston rod sides of the cylinder are connected to connection "D" of the distribution manifold (VT).
The restrictor block (16b) is used for controlling the oil stream due extending the bucket cylinders. To prevent a pump,flow cut off.

Legend:

Pump line filter	(11 + 12)
Control block	(8)
Distribution manifold	(VT)
Restrictor block/sec. valve (cylinder rod side)	(16b)
Sec. valve (bottom side)	(14a)
Return oil filter	(41.1)
Case drain filter	(41.2)
Return line (Control oil of sec. valves)	(3)
Return line of sec. valves	(1)
Check points	(M11, M12, M19)

Pressures:

Primary valve	310 + 5 bar
Secondary valve	350 + 5 bar

Stick cylinder / back hoe attachment 7099 8000

The feeding of the stick cylinder is done by the pumps I-IV (With pump II only when the slew circuit is not used.)
Further-more pay attention that in control block 8 three and in the conrol block 9 two other users (motions) have priority.
The stick cylinder motion can be carried out there-fore only if the spools for those motions in neutral position or in the fine controlling range.
The Pumps I + IV delivers the hydraulic oil through the filters (11.1 + 2) to control block 8 and pump II + III through the filters (12 + 13) to control block 9.
In the neutral position of the control lever in the driver's cab the hydraulic oil flows through the lines (11 + 12) back to the tank.
When operating the control lever for stick cylinder extension/-retraction the pump lines are connected in the control blocks 8 and 9 with the corresponding service lines to the stick cylinders.
The connection for the cylinder rod side is located at the sections "F" + "H" and for the cylinder bottom side at the sections "E" +"G" of the manifold (VT).
The restrictor blocks (16c + 16d) are used for controlling the oil stream due retracting the stick cylinders, to prevent a pump flow cut off.

Legend:

Pump line filter	(11-13)	Case drain filter	(41.2)
Control blocks	(8+9)	Return oil lines	(11+12)
Distr. manifold	(VT)	(from block 8+9)	
Restrictor block	(16e+16d)	return oil line	(3)
with sec. valve		(Control oil from	
Secundary valve	(14c+14d)	sekundary valves)	
(cyl. bottom side)		Return oil line	(1)
Return oil filterr	(41.1)	(from sec. valv.)	

Pressure check points (M11/12/13/20+21)

Pressures:

Primary valves	310 bars
Secondary valves	350 bars

Boom cylinder / back hoe attachment

8004
7090

The feeding of the boom cylinder is done by the pumps I-IV (With pump II only when the slew circuit is not used.)
Further-more pay attention that in control block 8 two and in the conrol block 9 three other users (motions) have priority.
The boom cylinder motion can be carried out there-fore only if the spools for those motions in neutral position or in the fine controlling range.
The Pumps I + IV delivers the hydraulic oil through the filters (11.1 + 2) to control block 8 and pump II + III through the filters (12 + 13) to control block 9.
In the neutral position of the control lever in the driver's cab the hydraulic oil flows through the lines (11 + 12) back to the tank.
When operating the control lever for boom cylinder extension/-retraction the pump lines are connected in the control blocks 8 and 9 with the corresponding service lines to the boom cylinders.
The connection for the cylinder bottom side is located at the sections "B" + "L" and for the cylinder rod side at the sections "A" +"M" of the manifold (VT).
The restrictor blocks (16a + 16f) are used for controlling the oil stream due retracting the boom cylinders, to prevent a pump flow cut off.

Legend:

Pump line filter	(11-13)	Case drain filter	(41.2)
Control blocks	(8+9)	Return oil lines	(11+12)
Distr. manifold	(VT)	(from block 8+9)	
Restrictor block	(16a+16f)	return oil line	(3)
with sec. valve		(Control oil from	
Secundary valve	(14b+14e)	sekundary valves)	
(cyl. rod side)		Return oil line	(1)
Return oil filterr	(41.1)	(from sec. valv.)	

Pressure check points (M11/12/13/17+23)

Pressures:

Primary valves	310 bars
Secondary valves	350 bars

Measurement and adjustment / air condition drive 8006

1. Run engine with max. speed.
2. Switch on air condition.
3. Check the condensor fan speed. value = 1800 - 2000 rpm.
If adjustment is required.
4. Take off protective cap (1).
5. Loosen lock nut (2).
6. Adjust the pressure with the adjustment screw (3) till the speed is o.k.

Note:

The normal pressure is approx 120 - 130 bar.

7. Tighten lock nut (2).
8. Fix protective cap (1).

Electrical function: 8014

Voltage supply via the automatic breaker F23 in 8 to the voltage converter E4 and for the entired system.E4 converts 24V DC to 24V AC. This voltage is used for the pause relay D3, secured with the automatic breaker F24 in 7 (1 amp.).

Controlling:

Relay K3 operates and its contact 12/13 in 5 is closed as soon as the engine runs and the alternator works.
There is voltage to the relay K29 in 6 via the closed contact A/B of the supply line limit switch B43 in 6.
K29 operates and its contact 6/7 in 3 closes. The pause time starts.
Its none delayed contact 33/34 in 6 closes direct and causes operating of K28. This in turn causes an extingtion of the monitor light "fault".
After the pause time has expired (D3) the none delayed contact 27/28 in 4 closes and the control time relay D4 in 3 gets voltage. Simultaneously also to the solenoid valve Y7 in 4 (air supply for the grease pump) and the cycle counter H 54 in 5. This unit counters the grease cycles. (Manual resetting any time possible.) The lubrication cycle starts.
After all bearings have been lubricated there is a pressure built up with operates the supply line limit switch B43 in 6. Its contact A/B opens thus K29 is deenergized. Its contact 6/7 opens in 6 and causes resetting of the pause relay D3.
Simultaneously now the relay D4 in 3, Y7 in 4 and H54 in 5 are deenergized, because the contact 27/28 in 4 of D3 is open now.
The lubrication cycle is finished.

continued

Slew ring toothing mist lubrication 8017

Function: Controlling of compressed air and grease supply

After an pause period the solenoid valve (Y9) opens the air supply to the grease pump (8a) and to the relief valve (9a).

This closes the relief bore (return line (10) to the grease container) and simultaneously the connection between pump and supply line (12a) is opened.

At the same time compressed air is up to the spray control valves via line (16).

The high-pressure barrel pump (8a) driven by the air motor supplies grease through the supply line (12a) and the injectors (metering valves) (21) bypassing the closed relief valve (9a).

By the injectors the grease is pushed with full pump pressure via the greas lines to the atomizing nozzles (23).

Note:

There are two injectors used for a combined dicharge

As the injector begins to discharge lubricant, the indicator stem movement permits spray control valve to open allowing air to pass the atomizing nozzle which atomizes the lubricant into a fine mist of air and lubricant.

Legend:

Solenoid valve	(Y9)
Barrel pump	(8a)
Oberflow and relief valve	(9a)
Relief line	(10)
Grease supply line	(12a)
Injectors	(21)
Spray control valve	(22)
Atomizing nozzle	(23)
End line switch	(20a)

continued

Measuring and pressure adjustment / lube system 8019

Adjust the end-line switch

1. Connect pressure gauge to check point.
2. Start a lube cycle wit the switch S26 on the dashboard.
3. Start diesel engine and run at least at half speed in order to supply in enough air.
4. Watch pressure gauge and end-line switch. At a pressure of 145 $\pm$ 0,5 bars the end-line switch must react, i.e. the greasing cycle is completed.

If re-setting is required:

5. Screw out screw (1) and take off cover (2).
6. Adjust pressure with adjustment screw (3).
7. Replace cover (2) and screw (1).

Cont'd 8008

Pressure check adjustment with electr. load

While adj. the pressure pay attention that two valves have influence to the pressure. One valve (pressure governor) at the pump and one external valve (65).
From the begin it is therefore not sure which valve adj. must be changed in case of too low pressure.

But it is very important that the adj. of the pressure governor at the pump is 20 bar higher than the external valve (65).

Note:

The function of the pressure governor is comparable with the pressure cut-off valve of the main pump.

1. Connect pressure gauge to the check point (M15).
2. Start engine and run with max. speed.
3. Switch on all electr. users in sequence.
The user with the highest power demand first.

Note:

Pay attention to the max. capacity of the generator and the higher power source due switching on a user.

4. If now the generator speed / capacity not constant, the pressure must be increased.

Note:

The pressure is appr. 200 bar for a 50 Hz-equipment.
The pressure is appr. 180 bar, for a 60 Hz-equipment, if max. power is transfered.

Monitor troubleshooting procedures

If no engine faults occur with previous test, the following voltage readings may be made to evaluate monitor performance at the electronic circuit board edge connector (D 2529).The test points are connector pins with no wires attached. Typical voltages are determined with the following configuration:

A)Battery voltage connected to A, C (+) and B (-), (Key on).
B)No pressure on sensors (engine off).
C)No coolant temperature probe connected.
D)Magnetic pick-up connected, or pins A, B of connector shorted.

All voltages are measured referenced to BATT (-). That is, the ground side of voltmeter connected to battery (-) terminals.

Note:

Voltage readings are shown for normal logic mode (loop T-P in).

If monitor is in reverse logic mode (loop T-P cut), reverse voltage values on pins 20 and 22. (Demag standart)

Pre-calibration preparation

1. Visually check monitor for any damage to fittings, wires, sensors and container. Inspect sealant between the sensors and bulkhead fittings.

2. With a sealant (i.e., liquid teflon), install adapter fittings to the bulkhead fittings of the sensors. Suitable joint sealant must be used on all pipe thread fittings.

3. Attach a magnetic pickup test cable(1) to the "Magnetic Pickup" recetacle on the container. Attach the frequency generator/-counter (2) to the cable matching the positive wire of the generator/counter to the red wire (connector Pin A) of the cable and the negative wire of the generator/counter to the black wire (connector Pin B) of the cable. 2532

4. With a digital volt/ohm meter (3) and an 5K ohm variable resistor (4) determine the resistance of the variable resistor, and adjust the resistor to a value of 2100 ohms (2.10 Kohms).

5. Attach a temperature sensor test cable (5) to the "Temperature Sensor" receptacle on the container. Attach the 5 Kohm variable resistor (4) between the red wire (connector Pin A) and black wire (connector Pin B) of the cable. (Using jumper wires, connect the red wire to Pin 1 and the black wire to Pin 2 of the variable resistor.)

Cont´d.

4. Calibration of Overspeed:

Retain 65 psi of air on the "Oil Pressure" sensor (8) and 30 psi of air on the "Coolant Pressure" (9) sensor. Adjust the frequency generator until a frequency corresponding to the overspeed set point is shown on the display. Calculation of set point frequency is as follows: 2532

$$\text{Frequency (Hz)} = \frac{\text{Engine Speed RPM} \times \text{Ring Gear Teeth}}{60}$$

Slowly adjust the "Overspeed Adjust" potentiometer (15) in a counterclockwise direction until the relay and "Overspeed" light activate.

Note:A non-adjustable 3 second time delay exist on the "Engine Overspeed" and "Open Speed Sensor" functions. When calibrating overspeed set point, compensate adjustment for time delay.

Recheck activation frequency. Typical set point is 350 RPM above rated speed (e.g. 2450 RPM for 2100 RPM rated engine).

Note:

Overspeed may be set after calculating frequency for a variety of speeds depending on the application. Refer to the suggested engine calibration set point section when calibrating for engine overspeed.
(Compusave manual)

Cont´d.

7. Calibration of crankcase overpressure alarm 2532

Remove the air from both the "Oil Pressure" sensor (8) and 2533
Pressure" sensor. Adjust the frequency generator to 100 Hz. The crankcase pressure sensor (20) is set to activate the "Crankcase Overpressure" relay and light at 8 inches WC This pressure may be exceeded for tests by physically blowing into the "Crankcase Pressure" sensor. A water manometer is used to verify set point acccuracy.

8. Open speed Sensor

The open speed sensor signal is tested by disconnecting the magnetic pickup test cable (1) from the monitor container. The relay and "Open Speed Sensor" light should activate after 3 seconds. Reconnect the cable and push the reset button.

Note: For calibration purpose, the frequency generator may take the place of the magnetic pickup, but a low output impedance generator is required. If "Open Speed Sensor" alarm occurs, a magnetic pickup must be connected also as shown in figure 2532.

Task:

The pump distributor gear distributes the engine drive torque to the individual pumps.
The speeds for the individual pumps are produced by the gear rates.

Design: 8024

Gear box	(1)
Lube oil sump	(2)
Drive shaft	(3)
Connection flange for the hydr. pumps	(4)
Lube oil pump	(5)
Dip stick	(6)
Drain plug	(7)

Fuction: 8024

The pump distributor gear is a spur gear with forced lubrication.
The pump distributor gear takes up all hydraulic pumps.
The gear pump (1) is intended for the forced lubrication described on the following page.
The oil level can be checked with the dip stick (2).
The drain plug (3) is located to the sump.
The gear is driven by a cardan shaft from the engine.
The cardan shaft is bolted to the flange (4).

Lube oil quantity: about 180 l.

Hydraulic control, pressure related HD

The hydraulic control, pressure related, permits the stepless adjustment of the pump displacement in relation to pilot pressure. Adjustment is proportional to the pilot pressure at port X1.

Function:

As soon as the engine runs at high idle there is max. pilot pressure at port X1 underneath the piston (2). The pilot pressure results from the load limit valve. The piston (2) moves with the guide rod (10) the control piston (9). Now oil pressure is on the large area (5a) of the positioning piston (5). The pump gets now moved to full flow position against the governor spring (8). 1966

The max. swivel angle is limited by the Q-max. stop screw (6).

If now under load the hydraulic force is higher than the engine hp, the engine rpm decreases.

This effects in turn a lower pilot pressure from the load limit valve. Thus that now the force of the metering spring (3) is higher. This force moves the control piston (9), the guide rod (10) and the piston (2) back. The oil flow to the large area of the control piston is reduced so that the hydraulic force acting on the large area (5a) is reduced as well. At the same time, the hydraulic force acting on the small area (5b) is higher. By means of the governor sprigs (8) the pump is moved to a smaller angle, i.e. small flow rate, until the forces are again equal.

continued

Geared pumps

For pump distributor gear lubrication	8124
For pump bearing lubrication	8125
For air condition compresssor-drive	8126

Note:

The pump for the air condition compressor-drive is connected to the pump for the pump bearing lubrication if an aircondition is installed.

Design: 8124

Pump, assy.	(01)
Radial seal ring	(02)
Housing	(03+13)
Bush	(04)
Needle bearing	(05)
O-ring with support ring	(06+07)
Plate with o-ring	(08+09)
Shim	(10)
Pair of gear	(11)
Dowel pin	(12)
PLate	(14)
O-ring with support ring	(16+15)
Cover with bolts	(17+18)

continued

Hydraulic pump A10V O

8027

Design:

Drive shaft	(1)
Radial seal ring	(2)
Tapered roller bearing	(3 + 14)
Housing	(4)
Swivel yoke	(5)
Positioning piston	(6)
Positioning piston with spring	(7)
Piston	(8)
Final flange	(9)
Pressure governor	(10)
Flow governor	(11)
Control lens	(12)
Cylinder	(13)
Case drain port	(L)
Suction port	(S)
Pressure port	(B)

Function:

The drive shaft (1) is driven.
The drive shaft (1) is supported by the two tapered roller bearings (3). One in the housing (4) one in the final flange (9).
The drive shaft rotates the cylinder (13) with the 9 pistons (8).
The cylinder rotates on the control lens (12).
The control lens is provided with oil guide opening switch connects the pistons (8) with the suction resp. pressure ports.
The position of the swivel yoke (3) causes the flow rate.
All moveable parts are lubricated by leak oil.

continued

Cont'd

Detronic EFM

Task:

The Detronic EFM (Electronic Fuel Measurement) informes via a gauge in the dash board the operator about the actual fuel level.

Design:

Indicator (gauge)	(1)	8032
Detronic EFM	(2)	
Pressure pick up	(3)	
Relay box X2	(4)	

Function:

The amount of fuel in the tank acts as pressure on the pressure pick up (3).
The pressure changes with changing of the fuel volume.
The pressure gets convert in an electr. signal for the gauge (1) by the Detronic EFM (2).
The gauge indicates visually the fuel level.
The pointer of the gauge moves between zero and fuel.

Note:

A warning light may be attacht to the terminals 9 and 10, as well as an other warning system.

Cont'd

Legend:

Suction tank	(02)	8036
Cover	(03)	
O-ring	(04)	
Bolt with	(05)	
Lock washer	(06)	
Plug	(07)	
Quick coupling (fe-male)	(08)	
Dust cap	(09)	
Gasket	(10)	
Slider	(11)	
Compensator	(12)	
Strainer	(13)	
Bolt with nut	(15+17)	
Bolt	(16)	

Breather filter on the hydraulic oil reservoir

Task:

This filters are used to clean all the air which streams into the oil reservoir.

Design:

Aeration filter, assy.	(01)
Nut	(02)
Cover	(03)
Element with nut	(04)
Socket housing	(05)
Vacuum switch	(01.1)

Function:

Due operation with the machine, moving out and in the hydraulic cylinder, the oil level in the hydraulic oil reservoir changes all the time, therefore must be an air equalization. 8041

The air streams through the filter (01) into the oil reservoir and gets cleaned.

The condition of the filter is controlled by the vacuum switch (01.1). Reaches the stream resistance 0,8 bar an electric contact operates a warning light in the operator's cab.
The filter element has to be replaced.

Cont'd

Function: 8045

The pump pressure is prevent via port P with a force F1 on the piston surface of the piston (4).
In unoperated position the pump pressure works also via the jet boring (5 + 5a) against the surface of the cone (1) and with force F2 against area B of the piston (4).

If the pump pressure increases to the adjusted value, cone (1) opens against spring power (2).

At the same time force F2 decrease. This causes that there is no more balance condition between F1 and F2. Piston (4) is moved to the right by the higher force F1. That means there is now a direct connection from port P to (T).

Cont'd

Schematic symbol / arrangement 8050

Control block assy	(10)
Primary valve	(1)
Spool	(2)
Load holding valve	(3)
Cross-line relief valve	(4)

continued

Cont'd

Function: 8052

The pump pressure is prevent via port P with a force F1 on the piston surface of the piston (4).
In unoperated position the pump pressure works also via the jet boring (5 + 5a) against the surface of the cone (1) and with force F2 against area B of the piston (4).

If the pump pressure increases to the adjusted value, cone (1) opens against spring power (2).

At the same time force F2 decrease. This causes that there is no more balance condition between F1 and F2. Piston (4) is moved to the right by the higher force F1. That means there is now a direct connection from port P to (T).

Pressure relief valve, pilot operated

Task:

The direct operated pressure relief valve cartridge fitted limits the maximum operating pressure and protects pump and consumers from overloading.

The valve has an "opening characteristic". That means, that in case of contamination after the response procedure no further pressure increase is possible and damages are avoided.

Design: 8058

Plug	(1)
Seal ring	(2)
Housing	(3)
Seal ring	(4)
Valve seat, assy.	(5)
Fixing clip	(6)
O-ring	(7)
Back-up ring	(8)
Sleeve	(9)
Compression spring	(10)
Valve adj., assy.	(11)
Adj. screw	(12)
Lock nut	(13)
Valve cone	(14)

Function:

The hydr. pressure is in front of the valve cone (14). As soon as the pressure reaches the pretension force of the spring (10) appr. the valve cone is moved upwards and opens the connection to the outlets T. The adjusting is done by the adjustment screw (12) and locked withthe lock nut (13).

Cont'd.:

Load limit valve / Pressure relief valve 8063

Design:

Spring sleeve	(1)
O-ring	(2)
Pressure spring	(3)
Disk	(4)
Valve cone	(5)
Plugscrew	(6)
O-ring	(7)
O-ring	(8)
Valve housing	(9)
Locknut	(10)
Adjustment screw	(11)

Function:

System pressure is born by surface of cone (5). If the pressure, adjusted by means of spring (3) is reached, cone opens against spring force and opens line to reservoir (T).

continued

Pilot control units

Task:

Pilot control units serve for pressure independent and sensitive actuating of valves, pumps, and motors.

Design: 4-bolt units 8068

Lever	1)
(with ball link if straight lever	
(with universal link if bended lever)	
Control piston	(2)
Control spring	(3)
Resetting spring	(4)
Plunger	(5)
Housing	(6)
Control cup	(7)
Opening	(8)
Dust protection	(9)
Pilot line ports	1-4
Pressure port	P
Return line port	T

Function:

Hydraulic pilot control units operates basically as direct controlled pressure reduction valves.
They essentially consist of operation element (1), valve body with control piston (2), control spring (3), resetting spring (4), plunger (5), and housing (6) In initial position the operating element is kept in its 0-stage by return spring (4). When operating lever (1), plunger (5) is moved against return spring (4) by the control cup (7). Simultaneously the control piston (2) is moved by control spring (3) at the beginning of the governing stroke, connection is made between port B, via opening (8) with ports 1, 2, 3, or 4, directing to the assembly (valve, pump or motor) to be governed.

continued

Pressure accumulator

Task:

The pressure accumulator serves within the hydraulic system for:

- pressure fluid reserve
- emergency assembly (if pump or engine fails)

Design: 8073

Container	(1)
Accumulator bladder	(2)
Gas valve core	(3)
Retaining nut	(4)
Cap nut	(5)
Covering cap	(6)
O-ring	(7)
Type plate	(8)
Oil valve body	(9)
Valve head	(10)
Valve bush	(11)
Elastic stop nut	(12)
Valve spring	(13)
Anti-extrution ring	(14)
Back-up ring	(15)
O-ring	(16)
Spacer ring	(17)
Grooved nut	(18)
Vent screw	(19)
Copper washer	(20)
Sectional back-up ring	(23)
Spacer ring	(24)

continued

Cont'd.:

Function: 8076

The slew gear is of compact design with a two stage planetary gear. It includes a multi disk house brake.

The torque loaded on the hydraulic motor is transmitted by a drive shaft (6) to the first planetary stage (15). The pinion (13) transmits the torque into the second stage of the planetary drive(14). By the planetary gears the output drive shaft (4) gets rotated and transmits the torque to the pinion (5).

The slew gear is also supported with the support bearing (7).
The brake housing is filled up to the level plug (79) and the gear box , above the radial seal rings (44), as well up to the level plug (77) with gear oil.
The aeration is done with the breather filter (91).
The lower bearing (37) in the axle tube is filled with grease. This grease has to be replaced only due a repair or over hauling.
The bearing (36) below the pinion has to be greased every 250 opr. hours through the grease nipple (90) until fresh grease comes out of the seal ring (47).

Design:

A slew ring (1) forms the connection between the revolving superstructure and the undercarriage. 8078
This type bearing is used in applications where heavy structural members are to be revolved about an axis and where heavy forces are being transmitted from the revolving to the stationary part of the assembly.

Axial clearance (please take out of the
Back lash (toothing) (Serv. Bul. 21.192, last edition

Legend:

Slew ring, assy.	(1)	8078
Bolt with washer (to superstructure)	(2)	
Bolt with washer (to undercarriage)	(3)	
Powel pin	(4)	
Nose ring, toothed outer ring	(02)	
Carrier ring	(03)	
Retaining ring	(04)	
Bolt and lock washer	(06 + 95)	
Rollers of axial bearing	(07 + 10)	
Plastic cage	(08 + 11)	
Rollers of radial bearing	(09)	
Lip seal	(12 + 13)	

Crawler drive, ass'y.

Task:

The crawler drive is used to move the excavator due its work.
The torque supplied by the hydraulic motor is transmitted via the travel gear to the sprocket.

Design:

Sprocket	(01)	8083
Duo cone seal	(02)	
Hollow shaft	(03)	
Drive shaft	(04)	
Bearing, assy.	(05)	
Bearing flange	(06)	
Freeze-in bush	(07)	
Bolt, nut, washer	(10, 08, 09)	
O-ring	(11)	
Bearing cover	(12)	
Bolt, lock washer	(14, 13)	
Plug, seal ring	(16, 15)	
Dip stick	(17)	
Breather	(18)	
Plug, seal ring	(19, 20)	
O-ring	(21)	
Bearing, assy.	(22)	
Bearing flange	(23)	
Bolt	(24)	
O-ring	(25)	
Travel gear	(26)	
Bolt, nut, washer	(29, 27, 28)	
Travel motor	(30)	
Bolt	(31)	

continued

Cont'd..

Replacement of the quad-rings 8089

1. Step 1 - 7 same as due replacing the disks.
2. Apply brake by releasing pressure at port (66); (engine switched off, no more pressure at port (66).
3. Screw out bolts (94) of the outer disk carrier (70).
4. Remove the disk carrier (70).
5. Remove pressure ring (73).
6. Pull out of the ring piston (77); pay attention to the springs.
7. Remove the quad-ring (83) with the back up rings(84) from ring piston (77).
8. Remove the quad-ring (81) with the back up rings (82).
9. Check the surfaces in the housing (H) and of the ring piston (77) for good condition.
10. Install the new quad-rings with back up rings.
11. Push ring piston (77) into housing (H), pay attention to the springs.
12. Put in pressure ring (73).
    Note:
    Replace o-ring (85) and back-up ring (91) if necessary.
13. Insert outer disk carrier (70) and tighten the disk carrier with the blots (94).
14. Apply aux. pressure to port (66) or start engine.
15. Proceed now as step (8) - (16) due replacement of the disks.

Cont'd

The cylinder axis is set at an angle to the drive flange axis (bent axis design). When a piston moves, as a result of rotation of the drive flange, from the lower (11) to the upper dead point (6), a piston stroke relative to the swivel angle is carried out in the cylinder bore. Oil is then sucket in via suction bore S and the control inlet. On further rotation of the cylinder, the piston moves from the upper to the lower dead point and the oil sucket in is fed to the pressure side a (B) via the control outlet. The flow of a given size is dependent on the drive speed and the swivel angle of the cylinder.

continued

Task:

Hydraulic cylinders are provided to move the individual parts of the attachment and to move them also into the right position due the work. This is done by hydraulic oil and the corresponding pressure.

Design: 8095

Cylinder assy. (02-31)	(01)
Piston barrel assy. (03-06)	(02)
Piston barrel	(03)
Freeze-in bush	(04)
Scraper ring	(05)
Grease nippel	(06)
Threaded pin	(07)
Castle nut	(08)
Piston assy. (10+11)	(09)
Piston bush	(10)
Piston	(11)
Piston guide ring	(12+13)
Piston seal ring with o-ring	(14+15)
O-ring with back-up ring	(17+16)
O-ring with back-up ring	(18+19)
Bolt	(20)
Final flange (22+23)	(21)
Flange bush	(22)
Bush	(23)
Rod seal kit	(24)
Buck-up ring	(25)
Retainer flange	(26)
Bolt	(27)
Scraper ring	(28)
Key	(29)
Piston rod (04-06+31)	(30)
Piston rod	(31)
Pre-setting ring	(32)

continued

Cont'd

- Before assembling always wet all contact surfaces and seals with oil for refrigerating machines KC 68, DIN 51503. The same refrigerating machine oil is used for the compressor lubrication and due to the mixing with refrigerant it is found everywhere in the cooling circuit.

- Before filling and subsequent evacuation of the air conditioning unit the oil level of the compressor must be checked.
  (Note: New cooling compressors are filled by the manufacturer with the maximal quantity of oil.)

- Before assembling blow nitrogen or refrigerant R 12, DIN 8960, DIN 8962 through refrigerant hoses, pipes, condenser and evaporator.

- Remove plugs just before mounting. This is specially important for the collector. The filter dryer of an open collector is saturated with moisture in a very short time and then is useless.

- Only fill the air conditioning equipment with refrigerant R 12, DIN 8960.

- If a component of the air conditioning equipment is damaged or leaky the unit must be shut off since otherwise the compressor will be damaged due to missing cooling and lubrication.

continued

Cont'd

4. Maintenance jobs and comments

4.1 Maintenance jobs at the cooling unit of the air conditioning equipment

A = Monthly, or every 250 operating hours

1 Check condenser fins for cleanness.

2 Check evaporator fins for cleanness (in very dusty air).

Comment:

In case of light contamination blow out with compressed air. If very dirty and greasy first wash with suds or other agent not corroding copper and aluminium, then blow out with compressed air.
According to the degree of pollution repeat these actions in shorter intervals.

3 Clean dust filter (optional equipment).

Comment:

Clean by batting or blowing out.

4 Check condensate discharge line for abstruction.

5 Independently of the season run equipment 10 minutes monthly.

Comment:

This is necessary for the lubrication of the shaft seal between shaft and compressor housing. If this seal dries the compressor becomes leaky - loss of refrigerant!

continued

Cont'd

Ratchet spanner with square socket of 6.5 mm in inserts for actuating the spools of the compressor service valves	commercially available	
Oil dip stick for oil level check in cooling compressor	fabricated according to illustration 1	2775

Note:

The emptying and filling (or replenishing) of refrigerant in an air conditioning equipment can be done advantageously with a complete emptying and filling device containing the admissible quantity of 2200 g. This device may be ordered from DBM.

This emptying and filling device comprises a vacuum pump, heatable filling cylinders, checking device with pressure gauges, torrmeter (vaccum gauge), refrigerant and connecting means. The integrated checking device allows all necessary tests of the cooling circuit.

5. Operating material

Refrigerant

Only refrigerant R 12 (CF_2CL_2 = difluorodichlormethane), DIN 51590.1, must be used.
Known trademarks are: Frigen 12, Freon 12, Kaltron 12.

continued

Cont'd

Operating functions:

Air intake 1270

Air is drawn into compressor from engine air intake manifold, after air cleaner or silencers. As piston moves down, a partial vacuum occurs above it.

The difference in cylinder pressure and atmospheric pressure forces inlet valve (6) down from its seat, allowing air to flow through intake port and into cylinder. When piston (12) has reached the bottom of its stroke, spring pressure is sufficient to overcome lesser pressure differential and forces valve against its seat.

Compression

When piston (12) starts its upwards stroke, the increased pressure of air in cylinder and head forces outlet valves (5) away from its seat. The compressed air then flows through outlet ports and into air tank as piston continue its upward stroke. On piston down-stroke, exhaust valve doses and intake valve (6) opens except during unloading period.

Unloading

When pressure in air tank is at a predetermined level, air pressure is applied to top of unloader cap by a compressor governor. This pressure forces cap down and seal off intake passage.

When pressure in air tank drops, the unloader cap returns to its upper position and intake compression sequences beginn once again.

Central greasing system
Air equipment-service unit

Service units are combinations of one air filter, one pressure reducing valve and one lube oil device.

Purpose:
A service unit is installed in the air pressure line for control units, thus that the compressed air is right prepared for use.

Function:
The air filter reduce the moisture content and cleans the air. The pressure reducing valve reduce the main pressure to a constant value of working pressure. For lubriation of the valves and switches in a compressed air system, the air is enriched with lube oil in the lube oil device.

Air filter
Air filters are cleaning the air and reducing the moisture.

Purpose:
Air filters are installed in the pressure lines of control units.

Function:
The air stream entering the air filter, is formed in a whirl by the twist cap (1) and the condensate of the air is thrown to the reservoir wall and colected at the bottom of the reservoir. A seperating cap (2) prevents that the eliminated condensate is whirld up again. The firmly particles of the air stream are filtered out be the filter insert (3). For draining the condensate there is a drain valve (4) on the bottom of the reservoir. 1274

Metering valve (injector)

Task:

A preadjusted (at the injector) volume of grease is pushed with the injectors to the bearings or to the progressiv distributors.

Design: (model SL1) 8097

Metring valve, assy.	(01+02)
Injector bar	(03+04)
Adjusting screw	(05)
Nut	(06)
Plug screw	(07)
Seal ring	(08)
Disk	(09)
Seal ring	(10)
Bolt with nut	(11)
Disk	(12)
Seal ring	(13)
Piston	(14)
Compression spring	(15)
Spring retainer	(16)
Seal ring	(17)
Disk	(18)
Seal ring	(19)
Disk	(20)
Piston	(21)
Seal	(22)
Adapter bolt	(23)
Valve housing	(24)
Union	(25)

continued

Forts:.

Function: 8101

The inlet passageway is connected to all piston chambers at all times with only one piston free to move at any one time. With all piston at the far right, lubricant from the inlet flows against the right end of piston 1. (illustration 1)

Lubricant flow shifts piston 1 from right to left dispensing piston 1 output through connecting passages to outlet 1. Piston 1 shift directs flow against right side of piston 2. (illustration 2)

Lubricant flow shifts piston 2 from right to left dispensing piston 2 output through valve ports of piston 1 and through outlet 2. Piston 2 shift directs flow against right side of piston 3. (illustration 3)

Lubricant flow shifts piston 3 from right to left dispensing piston 3 output through valve ports of piston 2 and through outlet 3. Piston 3 shift directs flow through connecting passageto the left side of piston 1. (illustration 4)

Lubricant flow against left side of piston 1 begins the second half-cycle which shifts pistons from left to right dispensing lubricant through outlets 4, 5 and 6 of the divider valve.

Cont'd

B) Pump does not supply

1. Lubricant barrel is empty.

2. Lubricant is to stiff.

3) Lubricant is not situated at the pump tube and air can be inspired, f. ex. through lubricant which is too stiff or air pockets are in the lubricant.

4) Lower part of the tube is damaged. Check according to the parts list, especially at the shovel-foot valve.

C) Pump does not build up pressure

1. Cause like C) 1. - 4.

2. Supply line, fittings or metering devices are leaky.

3. Air pockets in the main line.
Remove air from the total system. See also item 6.1. First open the plug at the injector which is situated next to the pump. Then start pump and let it run until the lubricant leaks out free of air at the plug. Set in plug again. The process repeats at the next injector etc. until the total system is free of air.

4. Check pump outlet.
Check check valve, safety valve and relief valve. Check especially whether there is leakage.

5. Air motor, pump pistons or bushing are difficult to operate. Dismantle, clean and check them.

6. Pump tube seals, valves or plunger rod are damaged.

7. Rods from air motor to the pump is loose, therefore the way of the stroke is cut.

continued

Engine:Rated speed	1800 1/min.	
Pump gear lubrication	5-6 bar	
Pilot pressure/pump support pressure (Y-connection)	35 bar	(+ 3 bar)
Regulating pressure X1	15 bar	(+ 0,5 bar)
Primary valve control block I + II	310 bar	(± 5 bar)
control block III	330 bar	(± 5 bar)
Pressure cut off valve (290 bar-valve)	290 bar	(+ 5 bar)
Serv. line rel. valve:boom	350 bar	(± 5 bar)
stick	350 bar	(± 5 bar)
hoe/bucket	350 bar	(± 5 bar)
bullclam "closing"	150 bar	(± 5 bar)
" "opening"	350 bar	(± 5 bar)
slew motor	280 bar	(+ 5 bar)

Speeds:

Superstructure	3,2-3,4 rpm	at 55-65 bar
Sprocket	5,6-5,8 rpm	at 110-130 bar
Fan of hydr. oil cooler	1000 rpm	
Air cond. compressor	1800-2000 rpm	

Crawler slack 200-240 mm

Leak test hydr. system :

Engine switched off, full extended attachment with emtpy bucket. — piston rod travel max 50 mm within 5 min.

Note:

All tests have to be done at operating temperature!

All pressure are measured at the built in check points.

Conversion table

Length

1 Meter	m	3,28	feet	ft	1,093 yard	yd
1 Zentimeter	cm	0,39	inch	in		
1 Millimeter	mm	0,039	inch	in		

Area

1 Quadratmeter	m^2	10,764	square feet	ft^2	1,951 square yard	yd^2
1 Quadratzentimeter	cm^2	0,155	square inch	in^2		
1 Quadratmillimeter	mm^2	0,0015	square inch	in^2		

Volume

1 Liter	l	0,291	imperial gallon	imp gal	0,264 US Gallons	US gal
1 Kubikmeter	m^3	35,31	cubic feet	ft^3	1,31 cubic yards	yd^3
1 Kubikzentimeter	cm^3	0,061	cubic inches	in^3		

Mass

1 Kilogramm	kg	kg	2,204	pounds	lb	
1 Tonne	t	t	0,984	long tons 1 ton	1,02	short tons

Temperature

Grad Celsius	°C	°F= 9/5 °C+32	°R=4/5 °C

Torque

1 Newton Meter	Nm	0,74	foot pounds force	ft lbf	
1 Meter Kilopond	mkp	7,36	foot pounds force	ft lbf	

Power

1 Kilowatt	KW	1,34	horse power	hp	

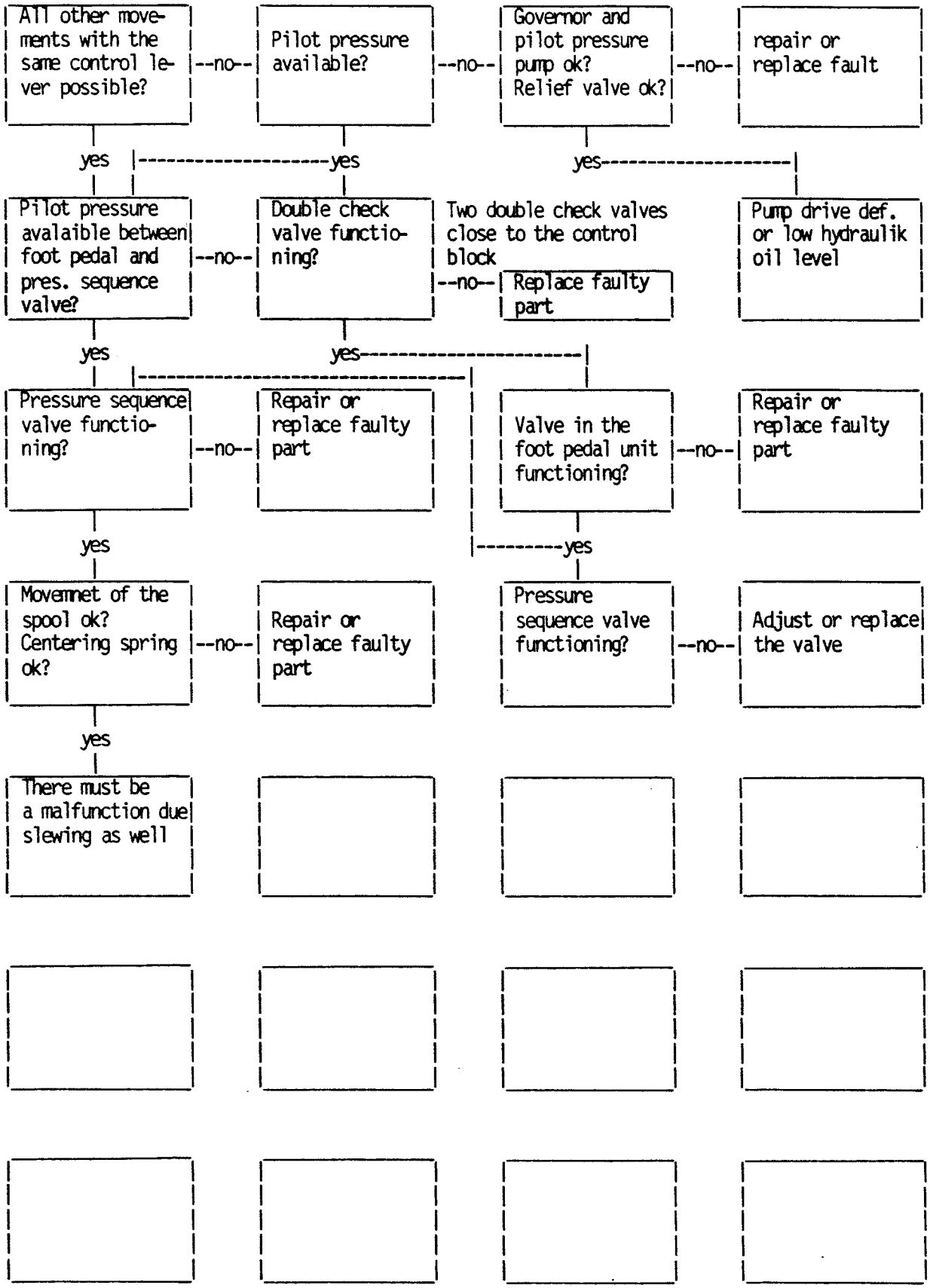
Speed

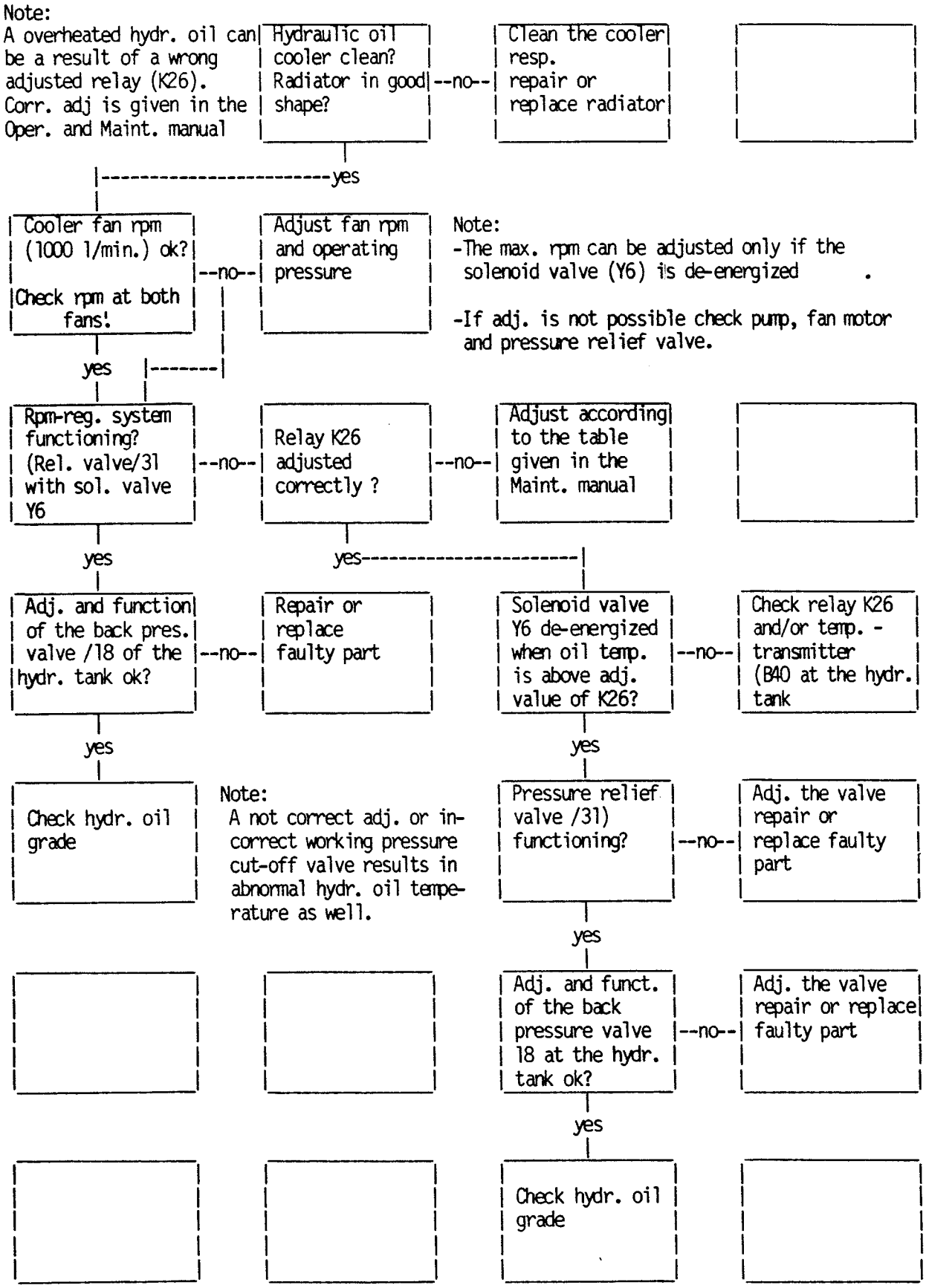
1 Kilometer/Stunde	km/h	0,621	miles per hour	mp/h	

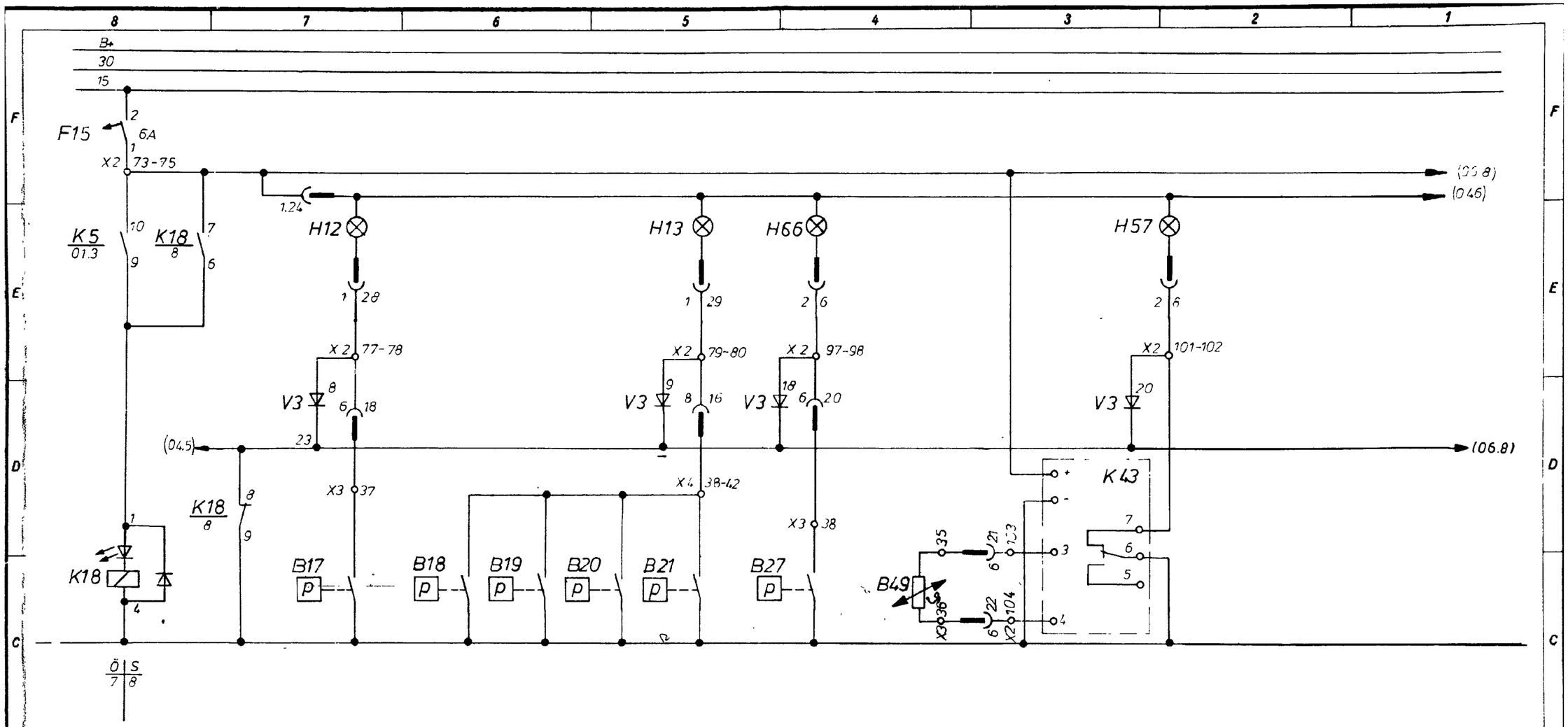
Pressure

1 Bar	bar	14,22	pounds force per square inch	lbf/in^2	

MANNESMANN DEMAG Baumaschinen	TROUBLESHOOTING SLEW BRAKE CIRCUIT	6088i-01-07 1.




Note:
A overheated hydr. oil can be a result of a wrong adjusted relay (K26). Corr. adj is given in the Oper. and Maint. manual
Hydraulic oil cooler clean? Radiator in good shape?
no
Clean the cooler resp. repair or replace radiator
yes
Cooler fan rpm (1000 l/min.) ok? Check rpm at both fans!
no
Adjust fan rpm and operating pressure
Note:
-The max. rpm can be adjusted only if the solenoid valve (Y6) is de-energized .
-If adj. is not possible check pump, fan motor and pressure relief valve.
yes
Rpm-reg. system functioning? (Rel. valve/31 with sol. valve Y6
no
Relay K26 adjusted correctly ?
no
Adjust according to the table given in the Maint. manual
yes
yes
Adj. and function of the back pres. valve /18 of the hydr. tank ok?
no
Repair or replace faulty part
Solenoid valve Y6 de-energized when oil temp. is above adj. value of K26?
no
Check relay K26 and/or temp. - transmitter (B40 at the hydr. tank
yes
yes
Check hydr. oil grade
Note:
A not correct adj. or incorrect working pressure cut-off valve results in abnormal hydr. oil temperature as well.
Pressure relief valve /31) functioning?
no
Adj. the valve repair or replace faulty part
yes
Adj. and funct. of the back pressure valve 18 at the hydr. tank ok?
no
Adj. the valve repair or replace faulty part
yes
Check hydr. oil grade



Lampen-Test	Meldeleuchte Antrieb					
	Getriebe-schmierung	Motor Luftfilter	Getriebeöl-filter	Temperatur Getriebeöl		
monitor check (bulbs only)	warning lights propulsion					
	pump distributor gear lubrication	engine aircleaner	pump distributor gear filter	temperature pump distributor gear oil		

	Datum	Name	Wiederholverwendung Typ	Ident-Nr.	F
Bearb.	26.9.86	Schulze			
Gepr.					
Abt	8122				
Norm					

Vordruck f. Schaltpläne

Elektroplan

Auftrags-Nr.:

MANNESMANN DEMAG Baumaschinen

Entstanden aus:

Erstverwendung: Typ H285 | Ident-Nr. | F

Ersatz für:

ÄM-Nr. | Name | Datum

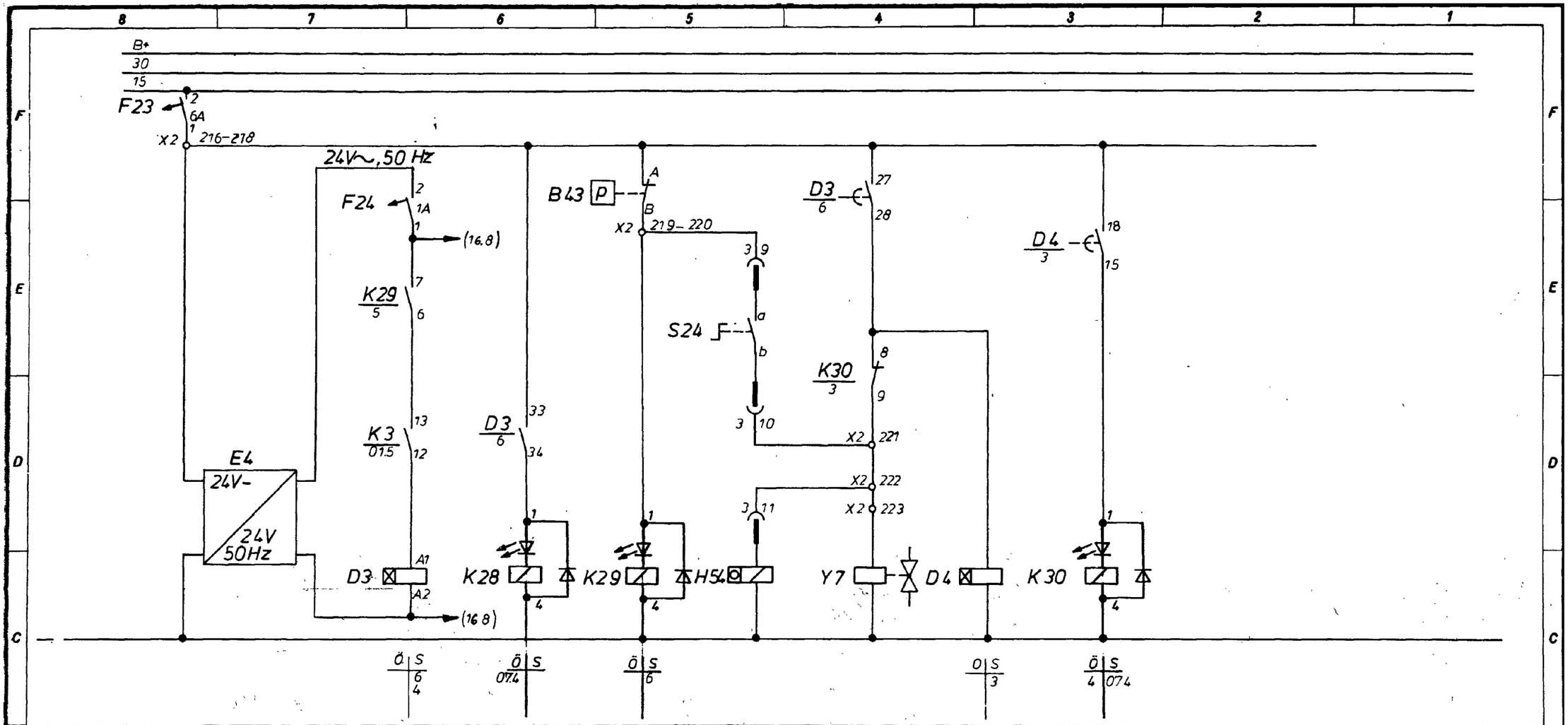
Ersetzt durch:

Ident-Nr. 3997404 0 SK ÄZ

Format A3

Blatt / Blätter 5 /

SIA | Datum | 7 | 6 | 5



Spannungswandler	Einleitungs-Zentralschmieranlage
voltage trasformer	single line central lubrication system

	Datum	Name	Wiederholverwendung Typ	Ident-Nr.	F
Bearb.	26.9.86	K.Bunk			
Gepr.					
Abt.:	8122				
Norm					

Vordruck f. Schaltpläne

Elektroplan

Auftrags-Nr.:

MANNESMANN DEMAG Baumaschinen

Entstanden aus:

Erstverwendung: Typ H285 | Ident-Nr. | F | ÄM-Nr. | Name | Datum

Ersatz für:

Ersetzt durch:

Ident-Nr. 3 9 9 7 4 0 4 0 | SK | ÄZ

Format A3 | Blatt / Blätter 15/

SIA | Datum | 7 | 6 | 5