SCANLIFT SL 240

MOBILE ELEVATING WORK PLATFORM

MAINTENANCE AND ADJUSTMENT

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CONTENTS

1. TRANSPORT DIMENSIONS

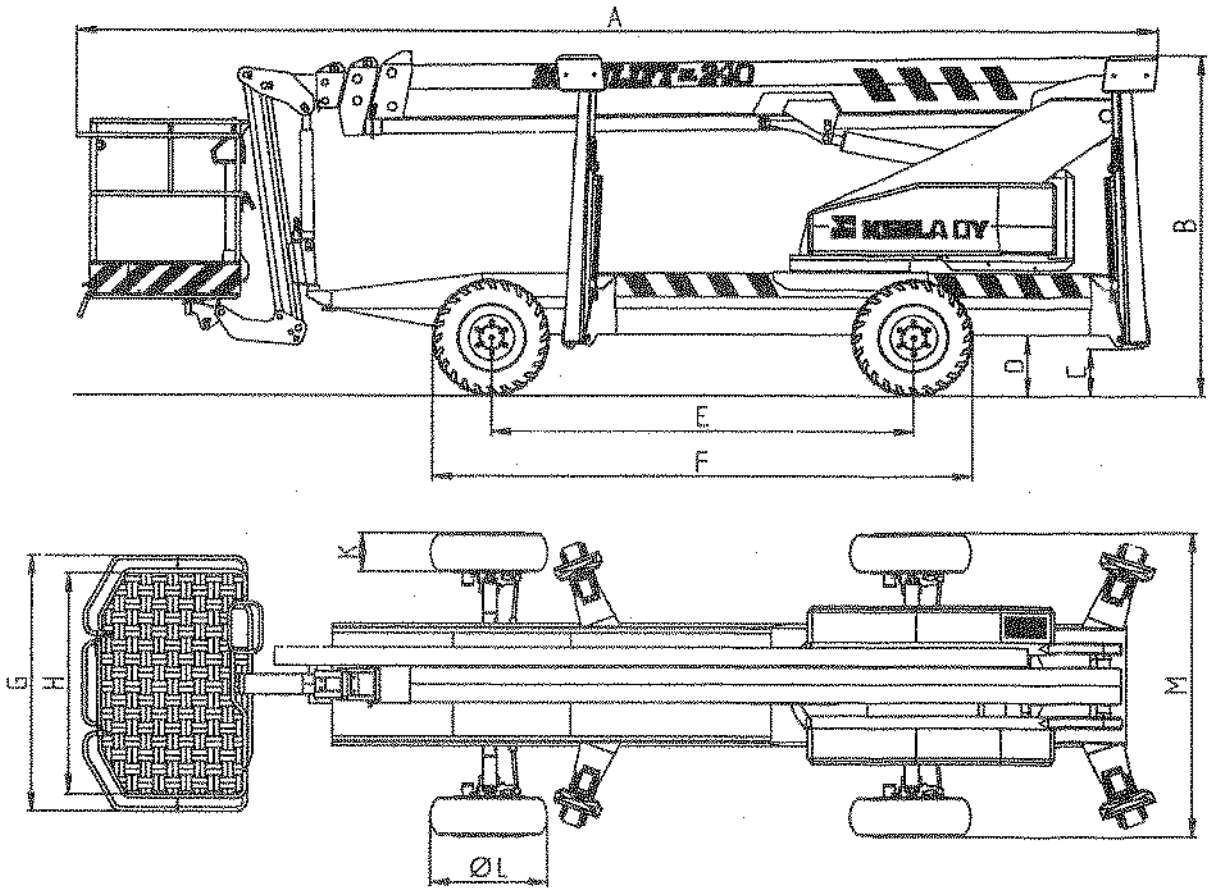


Figure 1-1. Transport dimensions

Dimension	mm	in.
A	6900	271.7
B	2250	88.6
C	365	14.4
D	420	16.5
E	2940	115.7
F	3700	145.7

Dimension	mm	in.
G	1670	65.7
H	1440	56.7
K	270	10.6
ØL	760	29.9
M	1920	75.6

2. LIFTING THE MEWP WITH LIFTING HOOK

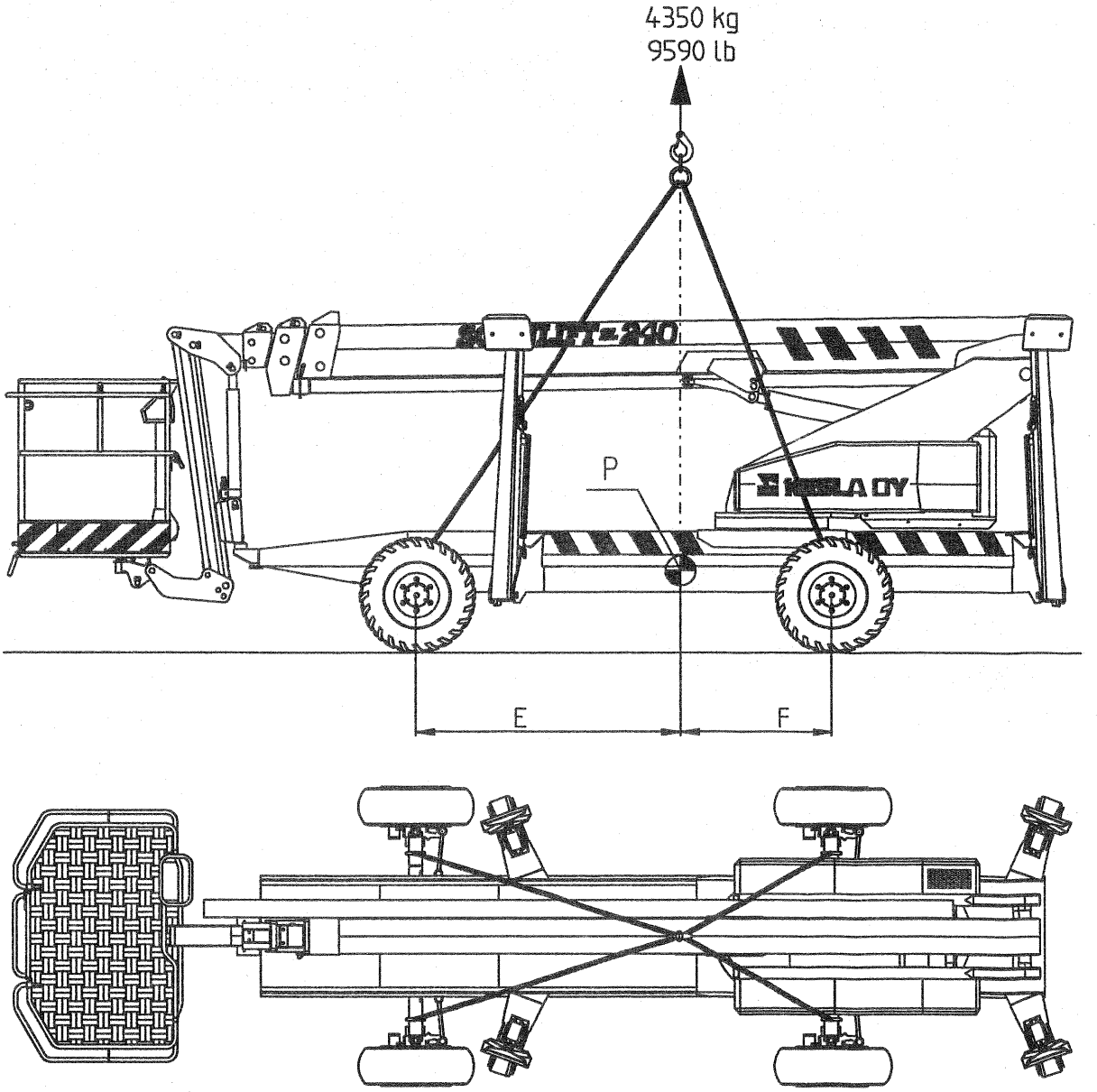


Figure 2-1. Lifting the MEWP with lifting hook

		m	ft.
E	Distance of centre of gravity	1,754	5.755
F	Distance of centre of gravity	1,185	3,9
P	Centre of gravity		

3. SPECIFICATION

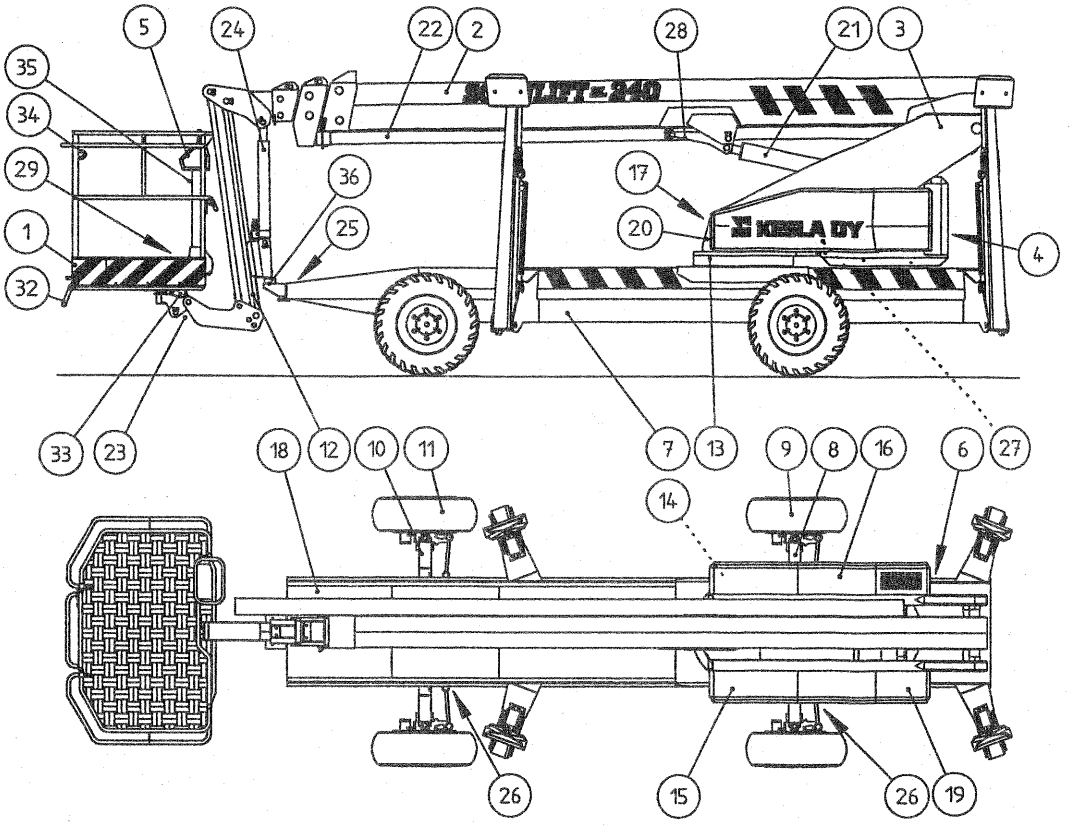
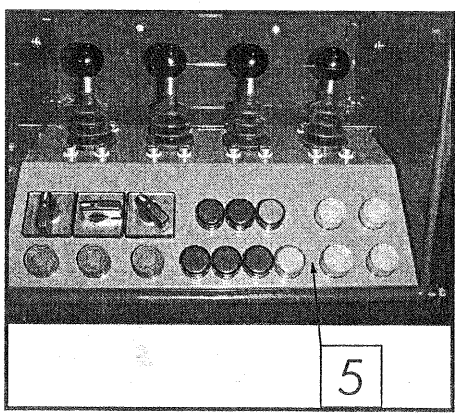
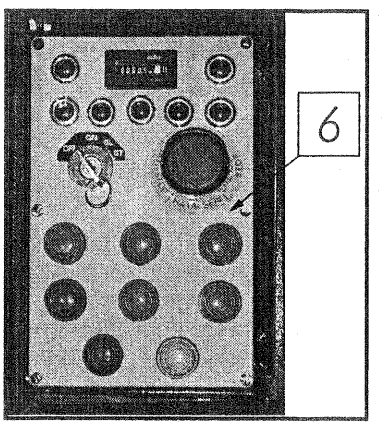
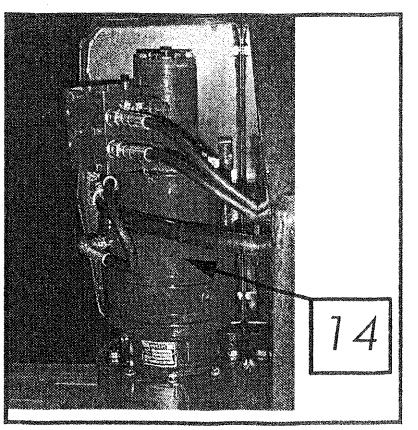
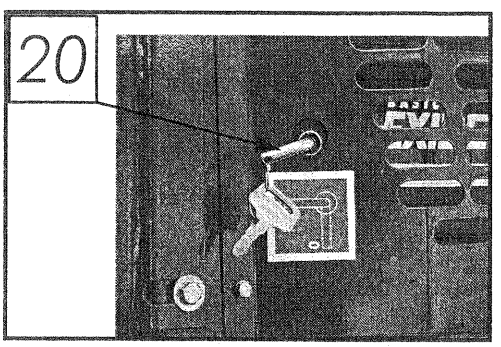


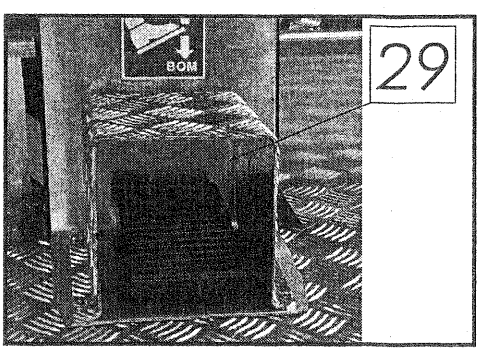
Figure 3-1. Specification











1. *Platform*
2. *Booms*
3. *Turntable*
4. *Combustion engine*
5. *Controls for platform guiding: Guiding the booms (slewing, raising/lowering, telescope in/out, raising/lowering the jib), raising/lowering the outriggers, fast/slow driving, steering, fuel selector switch (petrol/LPG), override switch, outriggers/driving and steering selector switch, selector switch for the way of steering, emergency lowering switch, emergency stop push-button, signal lights for overload/normal load, switches for inclining the platform, switches for rotating the platform and ignition lock of the combustion engine.*
6. *Controls for ground guiding: Guiding the booms (slewing, raising/lowering, telescope in/out), emergency lowering switch, emergency stop push-button, hydraulic oil fill-up switch, ignition lock of the combustion engine, charge signal light, oil pressure signal light and signal light for overheating of the coolant (only diesel).*
7. *Chassis*
8. *Front axle, oscillating*
9. *Front wheel and brakes*
10. *Rear axle, dead*
11. *Rear wheel and brakes*
12. *Jib*
13. *Pivot bearing*
14. *Slewing motor, gear and brake*
15. *Fuel tank, to the right of the MEWP*
16. *Hydraulic oil tank, to the left of the MEWP*
17. *Battery, rear edge of the turntable under a cover*
18. *Equipment case, place for manual, ground fault circuit interrupter 220V 50 Hz and horizontal level indicator equipment*
19. *Gas device, to the right of the MEWP (SL 240 B)*
20. *Main switch, at the rear edge of the turntable*
21. *Lifting cylinder*
22. *Cylinder for telescope*
23. *Stabilizer cylinder for platform*
24. *Jib cylinder*
25. *Horizontal level indicator (four red indicator lights)*
26. *Steering cylinders*
27. *Hydraulic pump*
28. *Limiter device for lifting radius*
29. *Foot pedal (down: guiding the booms)*
30. *Electric pump for the emergency lowering system*
31. *Control cylinder for stabilizer cylinder*
32. *Platform step*
33. *Cylinder for rotating the platform*
34. *Fastening hooks for safety harness*
35. *Electric outlets for power tools (220V 50 Hz).*
36. *Transport support*

4. TECHNICAL DATA

Max. height of platform bottom from ground	22,00 m
Max. working height	24,00 m
Min. lifting radius measured from outer brim of platform with Max. working height	1,4 m
Safe work platform load	230,0 kg
Safe lifting radius with 230,0 kg platform load (outer brim of platform)	8,8 m
Safe lifting radius with 120,0 kg platform load (outer brim of platform)	10,4 m
Safe lifting radius with 80,0 kg platform load (outer brim of platform)	11,00 m
Dimensions of platform bottom	1,0 x 1,5 m
Hydraulic rotating of platform	90°
Slewing angle of jib boom	120°
Support distance of outriggers (lengthwise)	4740 mm
Support distance of outriggers (widthwise)	4720 mm
Max. supporting force in sole of outrigger	25500 N
Max. allowed sloping of the ground	±7°
Max. allowed sloping of the chassis	±1°
Transport length	6,90 m
Transport width	1,92 m
Transport height	2,35 m
Ground clearance under bottom	0,38 m
Wheelbase	2,94 m
Turning radius:	
4WS, outermost wheel side	3,0 m
4WS, outermost platform part	5,0 m
2WS, outermost wheel side	5,0 m
2WS, outermost platform part	6,9 m
Oscillation angle of front axle	±10°
Total weight with filled tanks:	
diesel	4350 kg
petrol	4300 kg
Rear axle load with 80 kg platform load	1615 kg
Front axle load with 80 kg platform load:	
diesel	2835 kg
petrol	2785 kg
Driving speed:	
slow	1,5 km/h
fast	3,6 km/h
Traction force:	
Slow, oil temperature +20°C	15400 N, 1570 kg
Fast, oil temperature +20°C	7700 N, 785 kg
Hill climbing capacity (theoretical): slow speed range	19° (35%)
Terrain tires, tracting pattern	10,0/75-15,3/8pr
Max. noise level (measured 1 m from motor)	93 db

Output of hydraulic pump at 3500 rpm:
For booms ..... 9,0 l/min
For drive: diesel ..... 22 l/min
petrol ..... 20 l/min

Hydraulic pressure: turntable and booms ..... 230 bar
Driving motors and outriggers ..... 250 bar

Hydraulic pump: axial adjustable-displacement piston pump

Volume of hydraulic oil tank ..... 60 l
Volume of fuel tank ..... 60 l

Combustion engine: .....
- Petrol/LPG Kohler Command 25
- diesel Kubota D905 - E

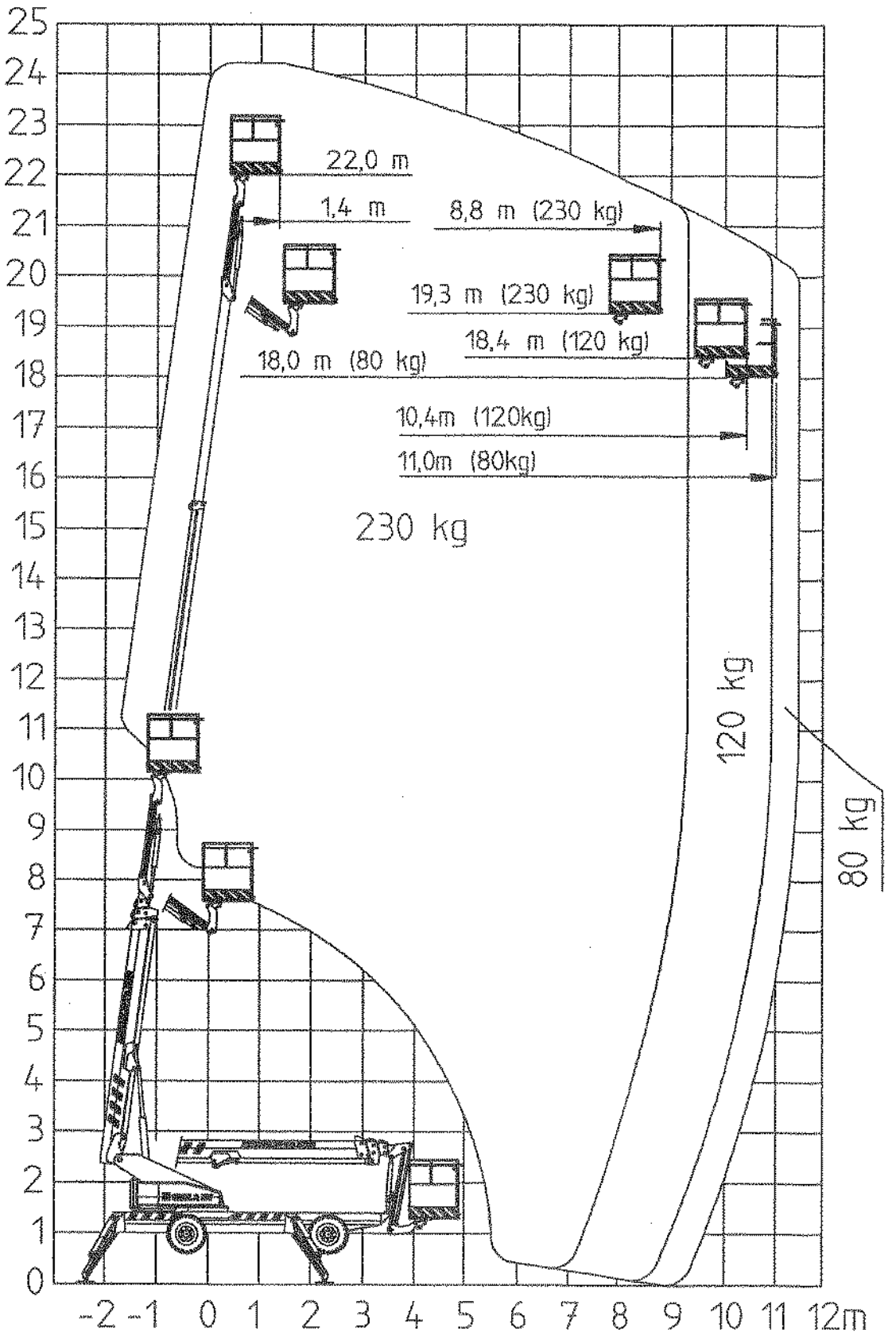
Kohler Command 25 :

Output, rotation speed of motor 3600 rpm ..... 25hv / 18,4 kW
Max. rotation speed of motor limited by the manufacturer to ..... 3500 rpm
Max. torque 2400 rpm ..... 54 Nm
Fuel: unleaded 95E or liquid petroleum gas (LPG)
Fuel consumption:
Rotation speed 3000 rpm, petrol. ..... 3,9 - 7,0 l/h
Rotation speed 3000 rpm, LPG. ..... 2,7 - 4,9 kg/h
Battery ..... 12 V 55 Ah

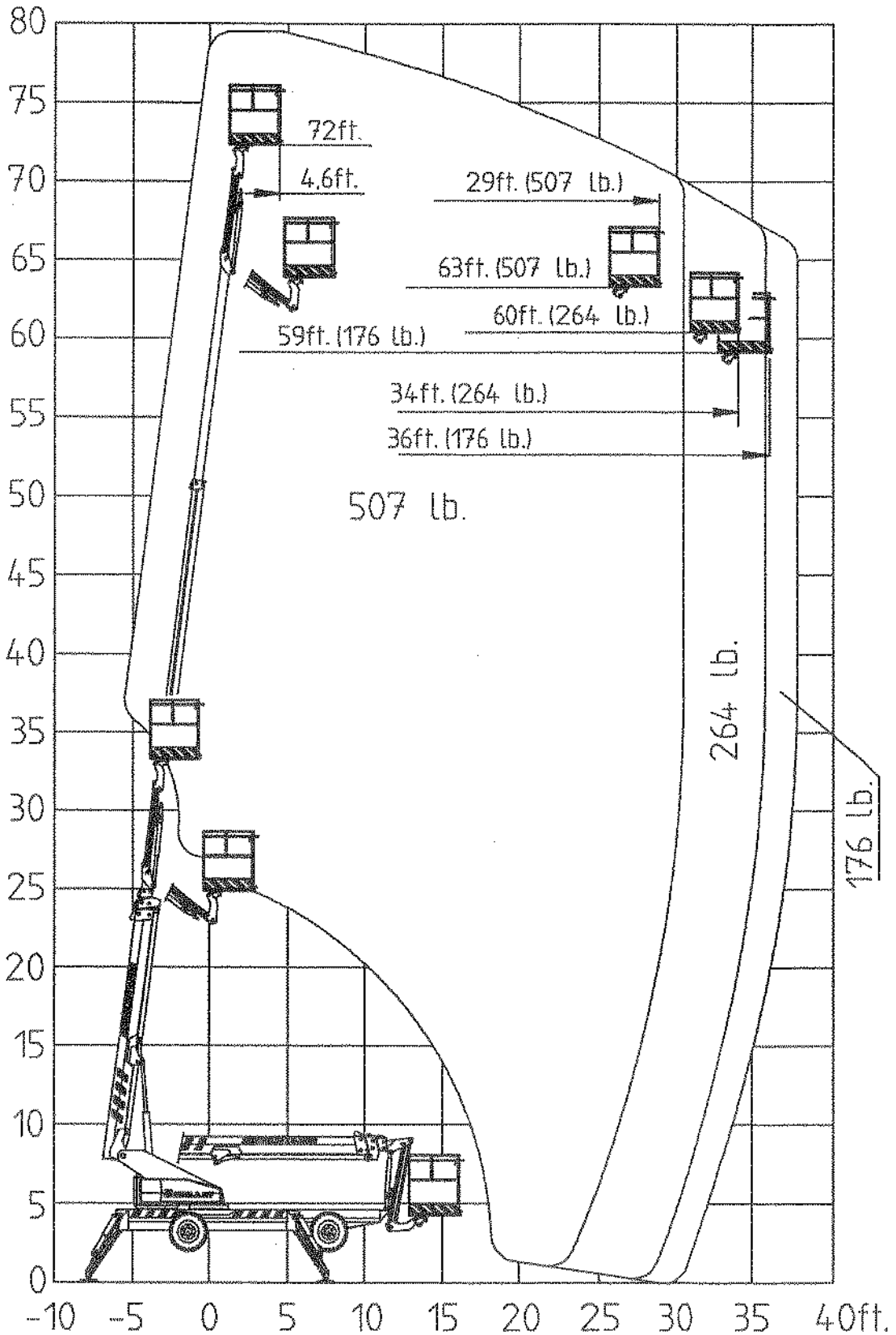
Kubota D905-E:

Output, rotation speed of motor 3600 rpm ..... 23,5 hv/ 17,5 kW
Max. torque 2400 rpm (ISO3046) 53,46Nm
Fuel: light fuel oil, diesel oil ASTM D 975-1D/2D
Fuel consumption:
Rotation speed 3000 rpm ..... 3,0 - 4,6 l/h
Battery ..... 12 V 55 Ah
Warning and indicator lights:
- Glow indicator
- Oil pressure signal light
- Charge signal light
- Signal light for overheating of the coolant
- Signal lights for blocked pressure/return filter
- Signal light for malfunction in the coolant system

5. MEWP SL 240 BOOM GEOMETRY (M / KG)



6. MEWP SL 240 BOOM GEOMETRY (FT. / LB.)



7. CONTROLS AND FUNCTIONS

7.1 Main switch

- The main switch (switch no. 1 figure 7-1) is located at the platform side of the turntable, seen from the platform on the left side of the turntable.
- The switch disconnects the battery + terminal from the electrical system of the MEWP.
- Do not switch off the main switch while the combustion motor is running; this will prevent charging of the battery.

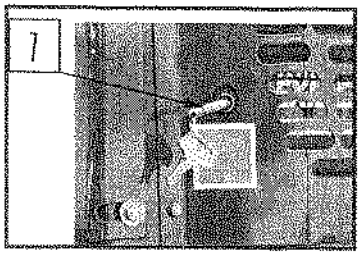


Figure 7-1. Main switch

7.2 Emergency lowering system

- The emergency lowering system consists of the pump for emergency lowering 1 (figure 7-2), control switches 2 and 3 of the emergency lowering pump (figure 7-3), and decals with instructions on operating the system.
- Besides the ordinary hydraulic pump of the hydraulic system, also the electric emergency lowering pump is continuously ready to feed oil into the system, if for some reason the ordinary hydraulic pump is out of order.
- The emergency lowering system is intended for lowering the platform in a malfunction situation. Such a situation can occur, if e.g. the combustion engine stops (e.g. the engine is out of fuel) while the platform is up and will not start again.
- Operation instructions for the emergency lowering system can be found in the instruction manual of the MEWP.

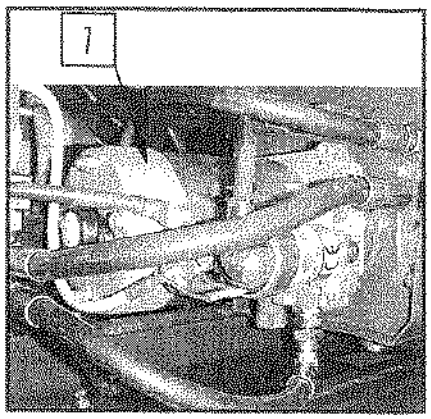


Figure 7-2. Emergency lowering pump

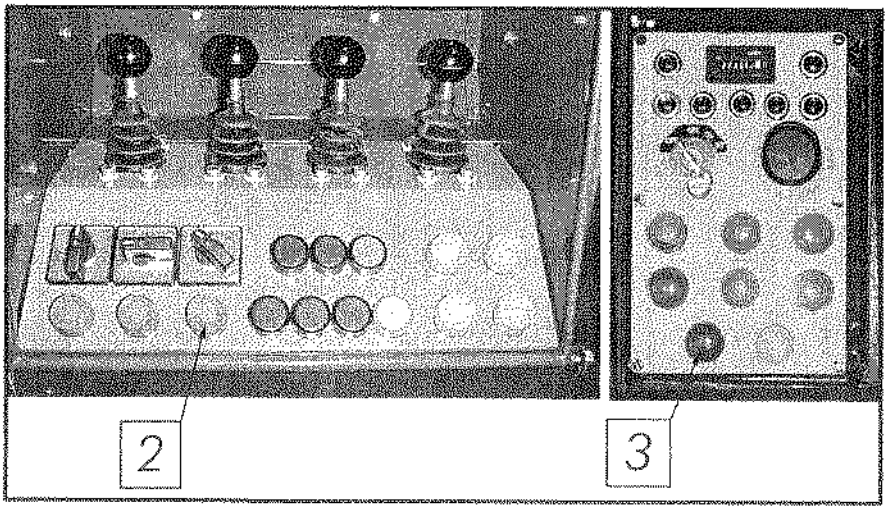


Figure 7-3. Emergency lowering push-buttons

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7.3 Controls for ground guiding

– *More detailed descriptions of the control functions can be found in the instruction manual.*

7.3.1 Push-buttons (figure 7-4)

1. *Slewing the booms clockwise*
2. *Slewing the booms counterclockwise*
3. *Raising the booms*
4. *Push-button for emergency lowering*
5. *Lowering the booms*
6. *Push-button for filling up with hydraulic oil*
7. *Telescope in*
8. *Telescope out*
9. *Emergency stop push-button*

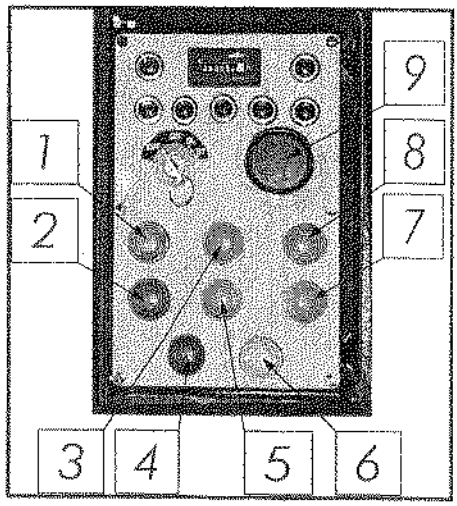


Figure 7-4. Push-buttons

7.3.2 Signal lights and hour meter (figure 7-5)

1. *Blocked pressure filter*
2. *Blocked return filter*
3. *Glow indicator*
4. *Oil pressure signal light*
5. *Signal light: malfunction in the control system*
6. *Charge signal light*
7. *Signal light for overheating of the motor coolant*

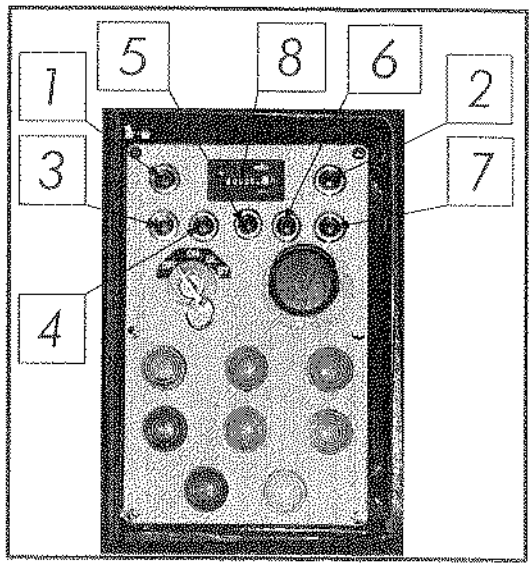


Figure 7-5. Signal lights and hour meter

7.4 Controls on platform

– *More detailed descriptions of the control functions can be found in the instruction manual.*

7.4.1 Control levers (figure 7-6)

1. *Slewing the booms, steering and raising/lowering the outrigger (left front outrigger)*
2. *Raising/lowering the booms and raising/lowering the outrigger (right front outrigger)*
3. *Telescope in/out, fast driving and raising/lowering the outrigger (left rear outrigger)*
4. *Raising/lowering the jib, slow driving and raising/lowering the outrigger (right rear outrigger)*

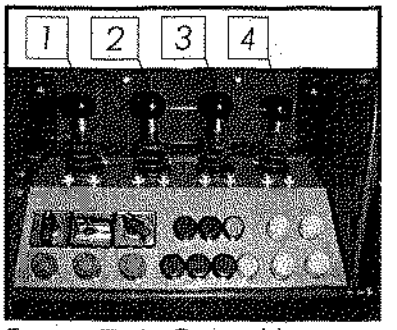


Figure 7-6. Control levers

7.4.2 Selector switches (figure 7-7)

1. *Selection of fuel: Petrol / LPG*
2. *Selector switch for outriggers / driving and steering*
3. *Selector switch for the way of steering*

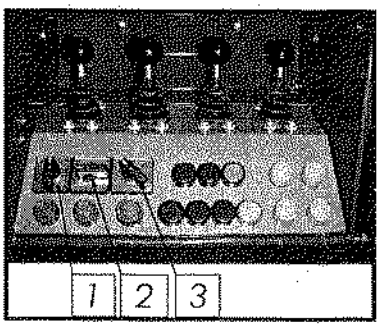


Figure 7-7. Selector switches

7.4.3 Push-buttons (figure 7-8)

1. *Override switch*
2. *Sound signal*
3. *Emergency lowering push-button*
4. *Inclining the platform*
5. *Inclining the platform*
6. *Slewing the platform*
7. *Slewing the platform*

7.4.4 Signal lights (figure 7-9)

1. *Overload*
2. *Signal light*
3. *Normal load*
4. *Oil pressure*
5. *Signal light for overheating of the coolant*
6. *Charge signal light*
7. *Glow indicator*

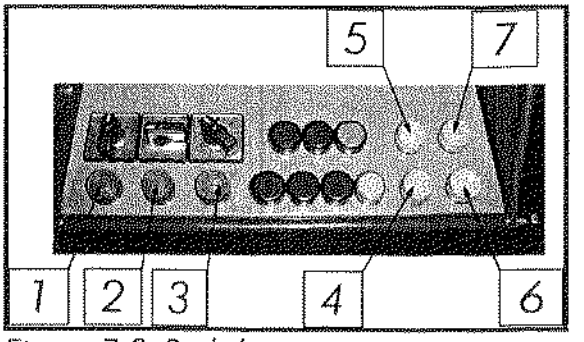


Figure 7-8. Push-buttons

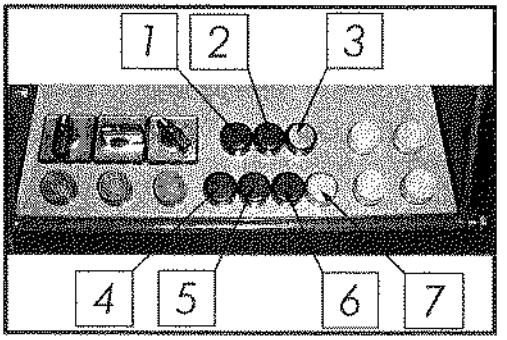


Figure 7-9. Signal lights

8. LOCATION AND FUNCTIONS OF SAFETY LIMIT SWITCHES

- *Scanlift SL 240 has altogether 15 fail-safe safety limit switches.*
- *A more detailed description of the function of each safety limit switch can be found in the instructions for adjustment and testing of the function in question.*
- *Locations of the safety limit switches are shown in the figure below.*

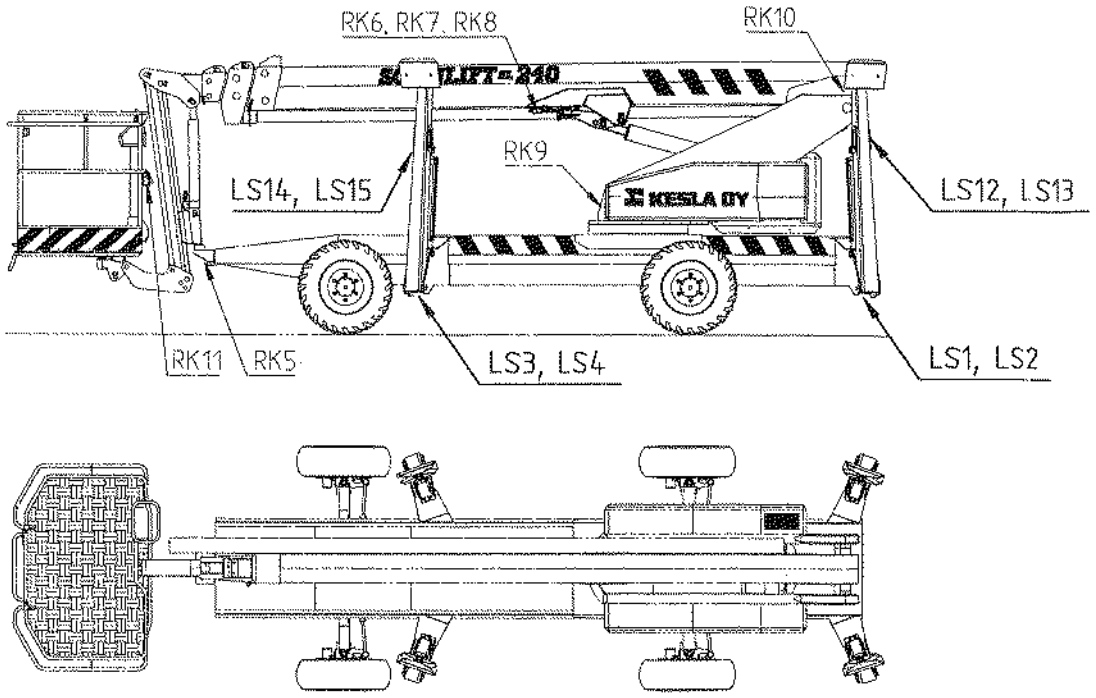


Figure 8-1. Safety limit switches

8.1 Functions of safety limit switches

Safety limit switch	*Designation*	*Functions*
LS1,2,3,4	*Safety limit switch for outrigger*	*1. Prevents use of booms, if outrigger is not in support position.* *2. Controls function of outrigger check valve*
LS12,13, 14,15	*Ground sensor limit switch*	*1.Sounds an alarm, if an outrigger is not touching the ground.* *2. Does not prevent the booms from operating.*
RK5	*Safety limit switch for transport position*	*1. Prevents driving and use of outriggers, if booms are not in transport support* *2. Prevents power consumption of outriggers, if booms are not in transport position*
RK6	*Load control safety limit switch for lowering of booms and telescope*	*1. Stops lowering of booms and extending of telescope to max. lifting radius.*
RK7	*Limit switch for overload signal light*	*1. Controls overload signal light on platform*

RK8	Standby safety limit switch for load control	1. Operates as safety limit of load control, if actual load control is for some reason out of order.
RK9	Safety limit switch for slewing of booms	1. Prevents driving, steering and use of outriggers with override switch, if booms have been slewed from transport position more than 5°. 2. Prevents slewing of booms, if outriggers are in transport position.
RK10	Safety limit switch for raising of booms	1. Prevents use of outriggers, if booms are up.
RK11	Platform safety limit switch	2. Prevents platform from bumping into jib and operator's fingers from getting caught between jib and platform rail.

9. DAILY CHECK-UPS

Before using the MEWP or at least once a day check the following.

1. Motor oil quantity, add, if needed
2. Hydraulic oil quantity, add, if needed
3. Fuel quantity, add, if needed
4. Oil leakages of hydraulics, repair, if needed
5. Condition of hydraulic hoses, replace, if needed
6. Tire pressure
7. Visual check of bolted joints and supporting structures
8. Operation of safety limits
9. Safe lifting radius

9.1 Checking the oil quantity of Kubota D905-E diesel engine and adding oil

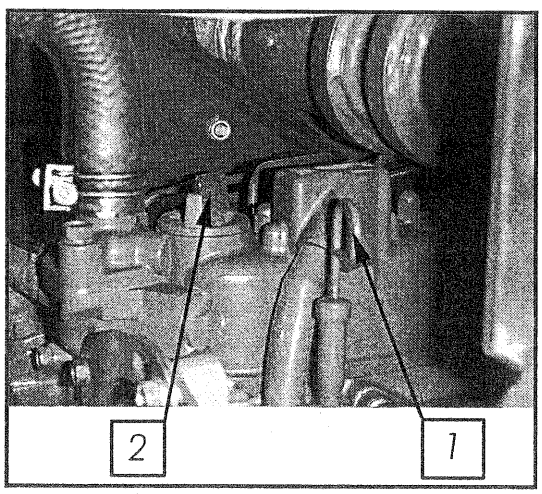


Figure 9-1. Checking the oil quantity

1. Check the oil quantity with oil dipstick 1 (figure 9-1). If oil level is below the lower mark of the dipstick, do not use the engine before adding oil.
2. Open filling cap 2 (figure 9-1) and add oil to the upper mark of the dipstick. Do not overfill.

9.2 Checking hydraulic oil quantity and adding oil

1. Check the hydraulic oil quantity with the dipstick of the breather cap1 (figure 9-2) on the tank. If oil level is below the lower mark of the dipstick, oil must be added. Always fill the hydraulic oil tank according to this instruction. IT IS ABSOLUTELY FORBIDDEN to add oil through the breather cap on the tank.

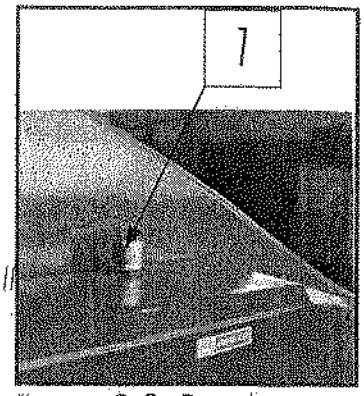


Figure 9-2. Breather cap

a) To check the amount of hydraulic oil lower the booms on the transport support. Lower the jib boom and raise the outriggers all the way up. Drive the MEWP to a level spot. When checking the amount of hydraulic oil, the MEWP must be level with the horizontal. Lengthwise deviation ±2 degrees. Cross directional deviation ±3 degrees,measured from the MEWP's chassis. If the hydraulic system of the MEWP is completely intact, the hydraulic oil should be checked when the system is filled with oil.

2. Connect the female quick coupling of the tank hose supplied with the MEWP to the male quick coupling 2 (figure 9-3) on the MEWP.
3. Put the other end of the hose into the hydraulic oil barrel from which you intend to take the oil to be added. The end of the hose must be well below the oil surface in the barrel.
4. Switch the current on from main switch.
5. Press the 'tank' push-button at the ground guiding point, and the electric pump will start to pump oil into the tank through a filter.
6. Monitor the oil quantity with the help of the dipstick.
7. Fill the tank to the upper mark of the dipstick. DO NOT OVERFILL THE TANK. It takes 7 -10 min to fill an empty tank.

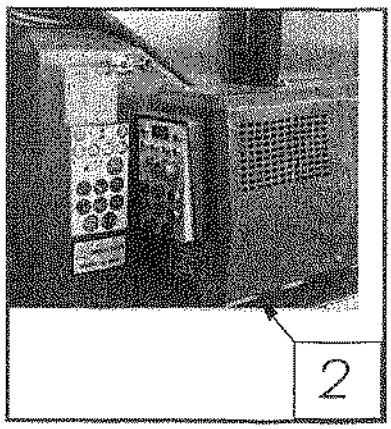
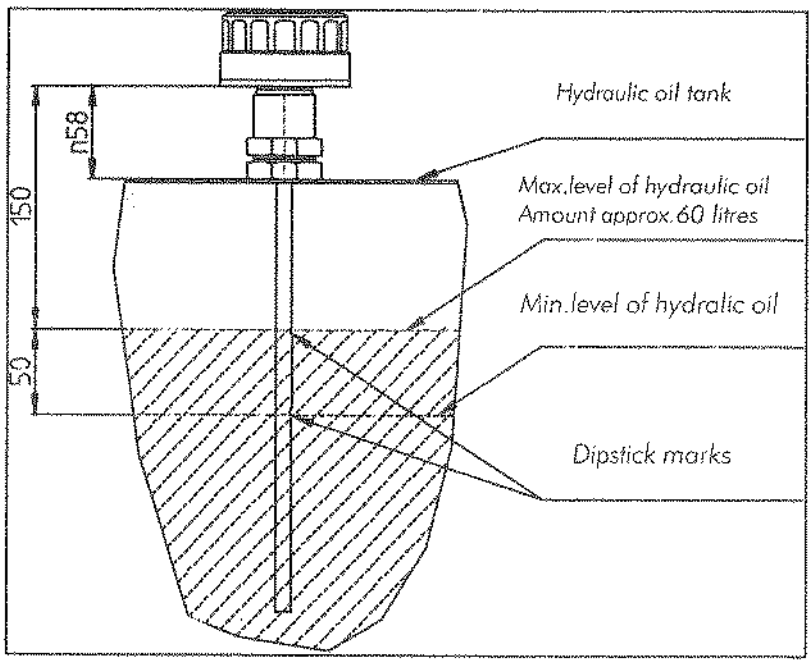
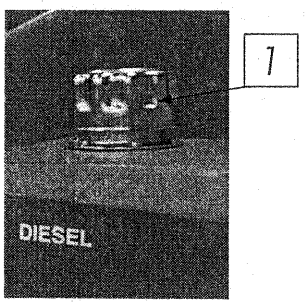


Figure 9-3. Quick coupling



9.3 Checking fuel quantity and adding fuel



1. Check fuel quantity with the dipstick of filling cap 1 (figure 9-5) on the tank.
2. If needed, add fuel through the filling opening.

Figure 9-5

9.4 Testing the safety limits

1. Check the function of the outrigger safety limits by trying to move the boom with outriggers up. The booms do not move, if the safety limits are in order. The connection point is reached, when the outrigger has exceeded the horizontal level with 4°, from above towards the support position.
   The outrigger safety limits allow using the booms only, when the outriggers are in support position. With the electric override switch of the drive/outrigger control valves, the outrigger safety limits can be by-passed for moving the booms during drive within the limits set by RK9 and RK10.

9.5 Check of safe lifting radius

The limiter of the lifting radius functions totally dependent of the platform load and is activated, if the platform load is too heavy from the very beginning, if the telescope or the jib are too far extended or if the raising movement has gone down to the limit. Compare with boom geometry.

9.5.1 Checking the reach of the telescope

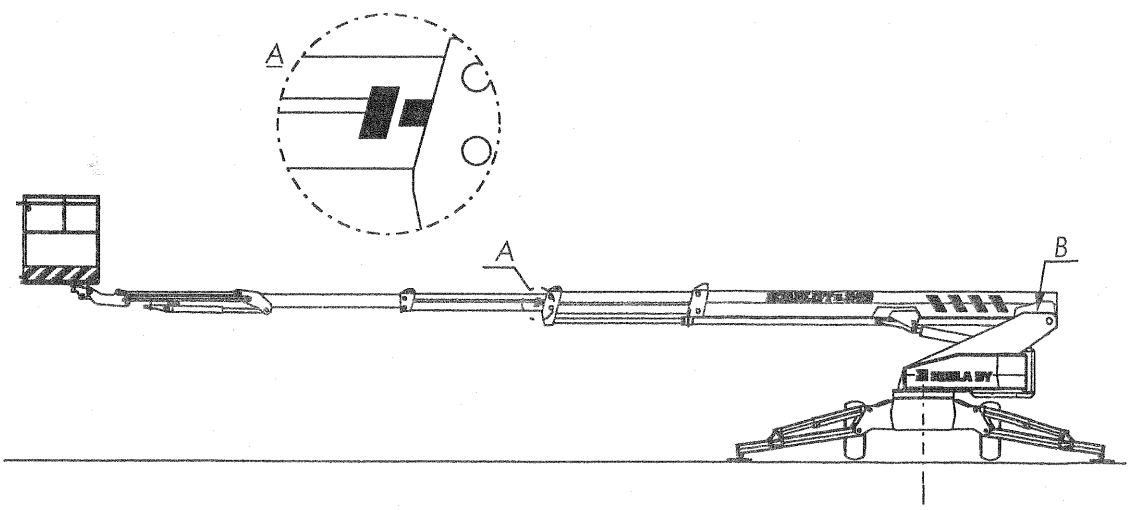


Figure 9-6. Checking the reach of the telescope

1. *Extend the jib, guiding from the platform, and then lower the platform so close to the ground, jib straight extended, that you can safely exit the platform. Empty the platform and turn off the MEWP from the platform. Remove the ignition key.*
2. *Start the MEWP from the ground guiding point and raise the boom to a horizontal position.*
3. *Drive the telescope out with the telescope out push-button in a continuous movement until the movement stops. The movement should stop when the middle painted mark of the booms can be seen (point A figure 9-6).*

9.5.2 Checking the lifting radius

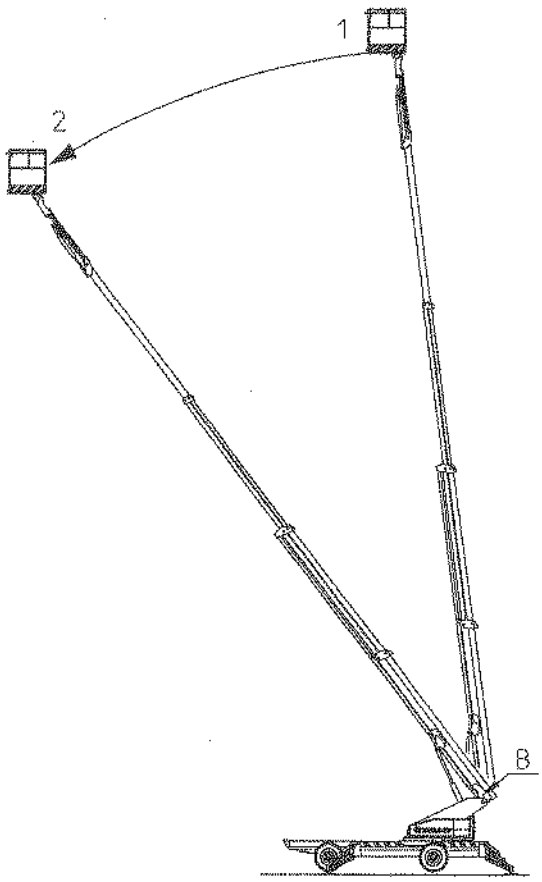


Figure 9-7. Checking the lifting radius

1. *Guiding from the ground guiding point, raise the booms with an empty platform, jib extended, all the way up.*
2. *With the booms raised all the way, extend the boom extensions fully with the telescope (figure 9-7, position 1).*
3. *Then lower the booms with the lowering push-button until the load control stops the movement (figure 9-7, position 2).*
4. *Check that the turntable indicator is between the min. and max. markings of the boom. The turntable indicator is located at point B of figure 9-8.*

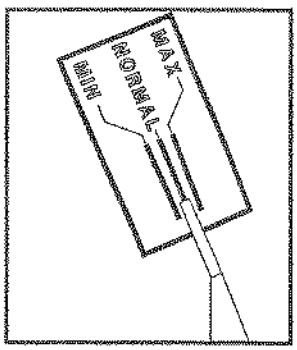


Figure 9-8. Point B, check mark

9.5.3 Checking the reach of the standby safety limit

– *Along with the actual safety limit, an electric safety limit, located to the right of the telescope cylinder seen from the platform, has been adjusted further out for a greater lifting radius. This limit breaks all movements and is activated, when the hydraulic safety limits are not correctly adjusted or are faulty. The electric safety limit is not active in normal conditions. When this safety limit has reacted, the booms must be brought back to normal operating range by starting the motor and retracting the booms. There is no risk of tipping over even within the operating range of the standby safety limit.*

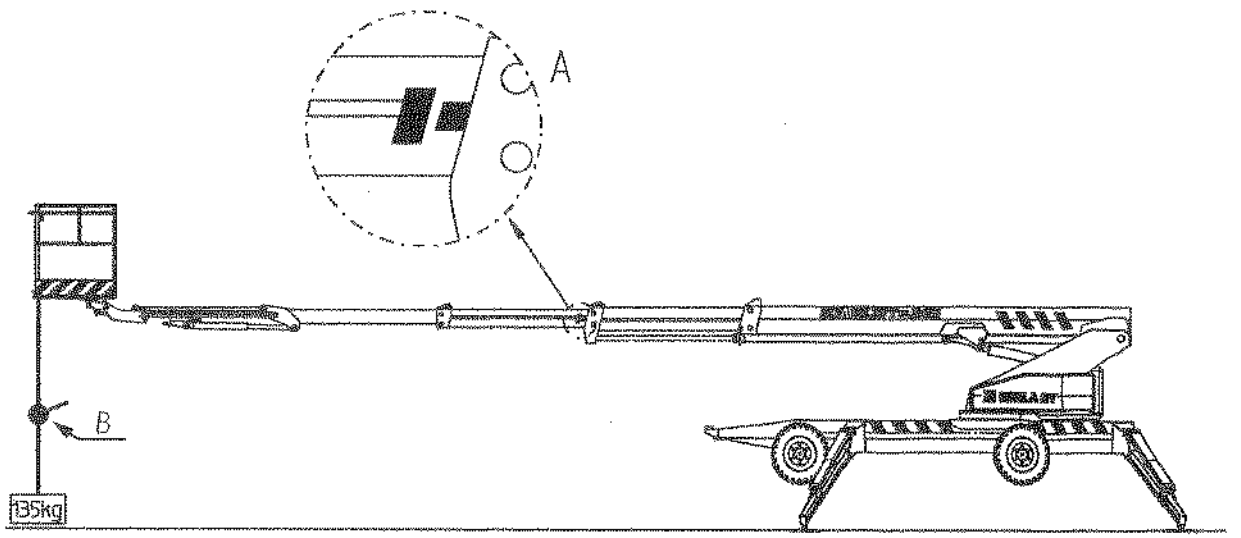
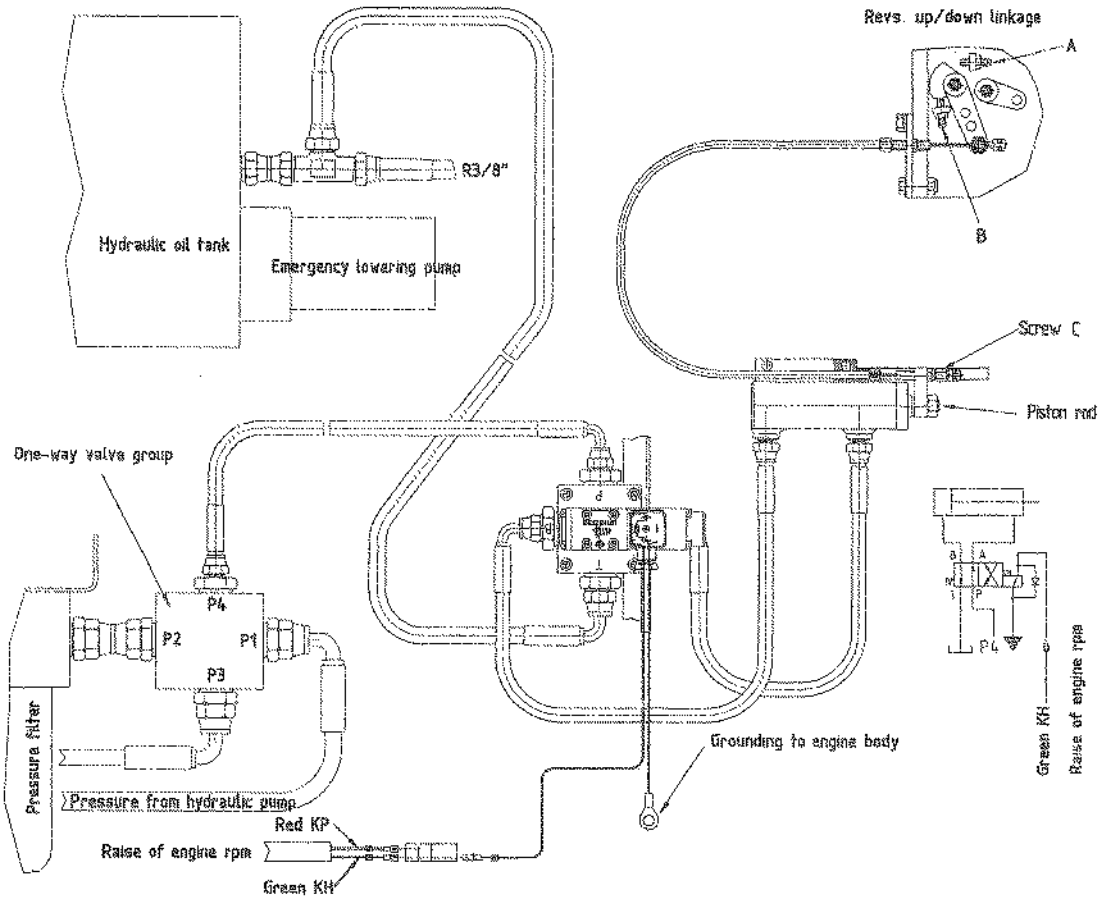


Figure 9-9. Checking the safety limit of load control

1. *Extend the jib, guiding from the platform, and then lower the platform so close to the ground, jib straight extended, that you can safely exit the platform. Empty the platform and turn off the MEWP from the platform. Remove the ignition key.*
2. *Start the MEWP from the ground guiding point and raise the boom to a horizontal position.*
3. *Drive the telescope out with the telescope out push-button in a continuous movement until the movement stops. The movement should stop when the middle painted mark of the booms can be seen (point A figure 9-9).*
4. *Attach a wire tackle (B, figure 9-9) to the lug at the platform edge under the bottom.*
5. *Use the tackle to carefully lift a 135 - 150 kg weight slightly off the ground.*
6. *The motor should stop when the weight is off the ground.*
7. *Lower the weight back to the ground and detach the tackle from the platform.*
8. *Retract the booms by starting the motor and simultaneously pressing the telescope in push-button.*

10. KUBOTA D905-E DIESEL ENGINE, ADJUSTING THE EQUIPMENT FOR INCREASING/DECREASING THE SPEED OF ROTATION



1. *Support the MEWP on the outriggers, in a horizontal position, wheels approx. 100 mm above ground. Leave the booms in transport position. Loosen the retaining screws of the wire rope clip of screw C so that the clip can be moved on the wire rope.*
2. *Start the combustion engine (Kubota). Adjust from screw A the max. speed of rotation of the engine to 3000 r/min. Seal the adjustment with sealing paint.*
3. *Adjust from screw B the idling speed of the engine to 1400 r/min. Seal the adjustment with sealing paint.*
4. *Pull the cylinder rod fully out (stroke 50 mm) using the booms lowering button, guiding from the lower point of control.*
5. *Attach and tighten the retaining screws of the screw C wire rope clips, pick up the slack of the wire rope. Note! Before tightening, check that the cylinder rod is fully out.*
6. *Operation: When using the MEWP's hydraulic functions, the speed of rotation reaches the maximum adjusted value. When the use of the hydraulics is stopped, the speed of rotation returns to idling speed after a delay.*

11. ADJUSTING THE HYDRAULIC PUMP

– REXROTH A10VS010DFR1/52RPKC64N

1. Open upper cover A of the turntable (figure 11-1). Measuring points M1 and M2 are located in valve group B beneath the turntable cover.
2. Open the turntable side cover on the fuel tank side. You can get at the adjusting screws of the adjuster of hydraulic pump C (figure 11-1) most easily through the opening between the diesel engine air filter and turntable electric box.

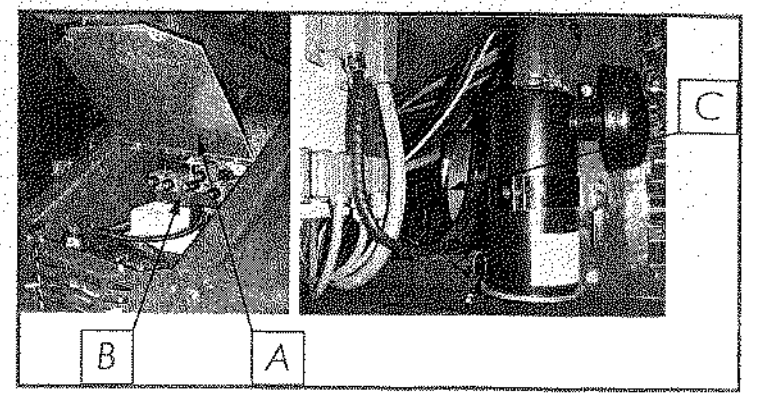


Figure 11-1

11.1 Adjusting idling pressure

1. Position the MEWP in transport position.
2. Connect a pressure gauge to measuring point M1 of the turntable valve group (figure 11-2).
3. Start the combustion engine and let it idle at approx. 1400 r/min.
4. Remove protecting cap 2 and locking nut 3 of the hydraulic pump adjusting screw 1 (figure 11-3). Adjust with adjusting screw 1 until the pressure gauge indicates 1500 ± 100 kPa (15 ± 1 bar.).
5. Lock the screw and replace the protecting cap.
6. After tightening the protecting cap, check the idling pressure from the pressure gauge 1500 ±100 kPa (15 ± 1 bar.)
7. Seal the adjusting screw, locking nut and protecting cap.

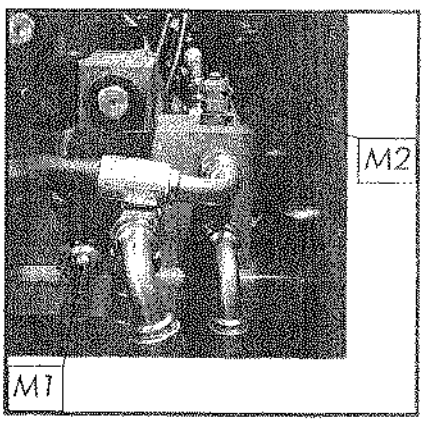


Figure 11-2. Measuring points

11.2 Adjusting main pressure

1. Connect pressure gauge to measuring point M2 of the turntable valve group (figure 11-2).
2. Position the MEWP in transport position, supported by the wheels. With the control lever, turn the wheels to extreme position, which will cause the speed of rotation of the motor to increase. Keep the lever engaged.
3. Remove protecting cap 2 and locking nut 3 of adjusting screw 4 (figure 11-3). Use adjusting screw 4 to adjust pressure to 25000 ± 500 kPa (250 ± 5 bar.).
4. Lock the screw and replace the protecting cap.
5. After tightening the protecting cap, check max. pressure to 25000 ± 500 kPa (250 ± 5 bar.).
6. Seal adjusting screw, locking nut and protecting cap.

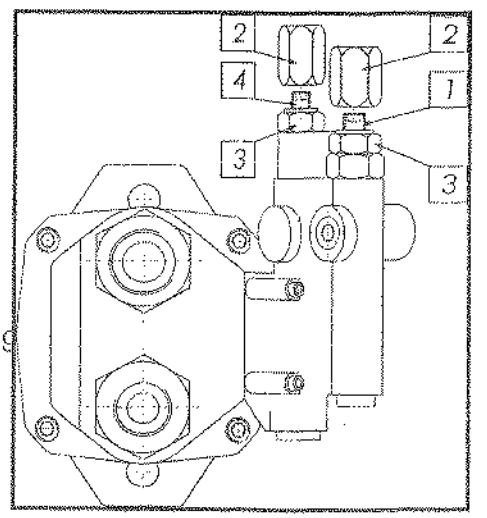


Figure 11-3. Hydraulic pump

11.3 Adjusting main pressure of booms

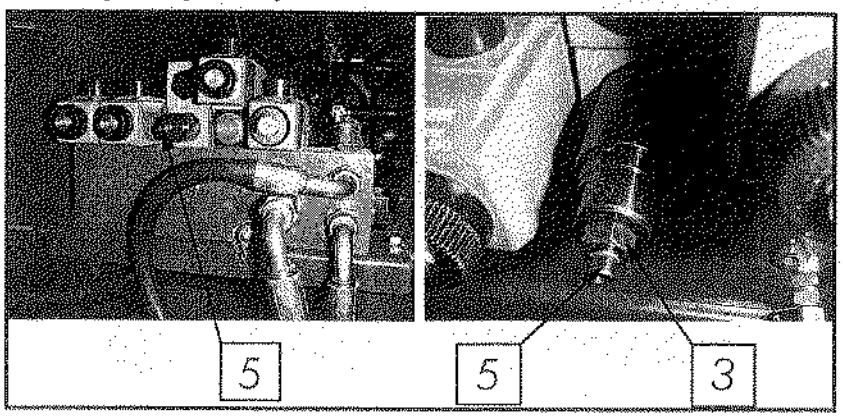


Figure 11-4. Adjusting main pressure of booms

1. Connect a pressure gauge to measuring point M2 of the turntable valve group (figure 11-2).
2. Support the MEWP on the outriggers and retract the telescope with the control lever, which causes the speed of rotation of the motor to increase. Keep the lever engaged.
3. Open locking nut 3 of adjusting screw 5 in the turntable valve group (figure 11-4). With screw 5 adjust pressure to 23000 ± 500 kPa (230 ± 5 bar.).
4. Lock the screw with locking nut.
5. After tightening the locking nut, check the pressure of the booms to 23000 ± 500 kPa (230 ± 5 bar.).
6. Seal adjusting screw 5 and locking nut 3.

12. MAINTENANCE OF DRIVING BRAKES

12.1 Construction of brakes

- Disc brake which opens by hydraulic pressure.
- When the pressure of the driving motor exceeds 30 bar, the disc brakes open. Analogously, the brakes close automatically pressed by a spring, when the pressure drops below 30 bar.
- The construction of the brake caliper is so called "floating" which means that the spring is pressing one of the brake pads, but the slide mechanism compensates the clamping pressure of the spring and both brake pads of the brake caliper are pressing against the brake disc with equal force on both sides of the disc.

12.2 Maintenance

- Verify that the brake pads are pressing against both sides of the brake disc with equal force.
- Clean, lubricate and check the function of the floating brake caliper mechanism every 6 months and in hard and dirty conditions even with shorter periods.
- If the brake pad, located on the spring side, clearly is more worn, the cleaning and lubricating of the mechanism must be better tended to.
- For example when towing, the drive brake can be released by screwing in (point 1) a R1/4" - 75 full threaded bolt or a R1/4" double nipple, with a M8 thread and a M8x60 screw, instead of the hydraulic hose nipple of the brake cylinder.

12.3 Adjustment of brakes

1. Drive the MEWP onto level and firm ground
2. Use the outriggers to raise the wheels slightly above the ground. Let the engine run.
3. Remove the wheels

4. Remove nut 2 (figure 12-1)
5. Pull the lever for fast driving to extreme position, towards the platform, so that the wheel hubs start to rotate. Hold the lever in this position.
6. Turn shank 4 (figure 12-1) to adjust the gap between brake pad and disc to 0,8 - 1,0 mm. Note that when the gap is measured the other brake pad is pressing against the brake disc. Adjust the gap between the brake pad and disc to be equal in all four brakes to ensure smooth braking action.

12.4 Changing brake pads

– The brake pad must be changed, if the friction surface of the pad is less than 1,5 mm.

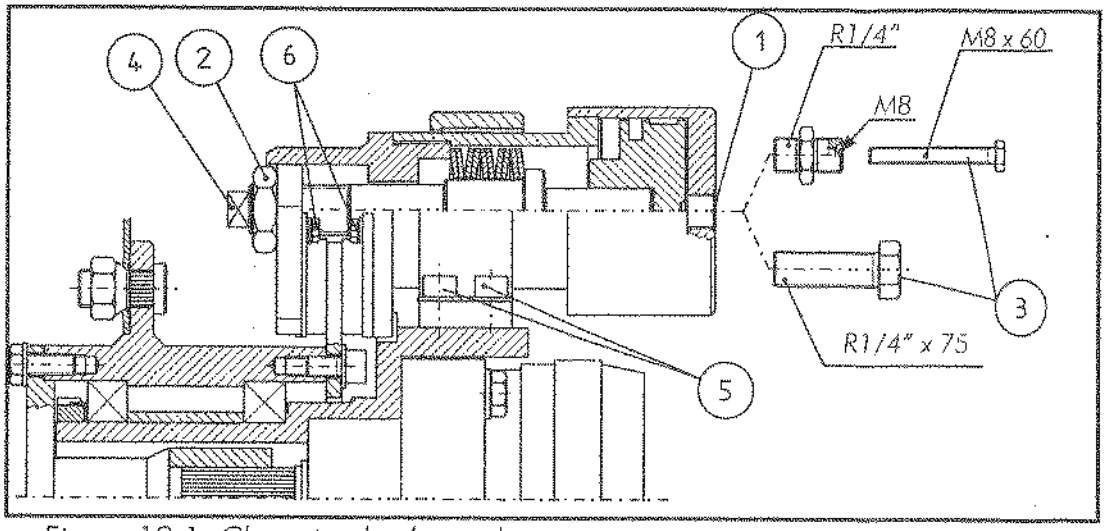


Figure 12-1. Changing brake pads

1. Drive the MEWP onto level and firm ground.
2. Use the outriggers to raise the wheels slightly above the ground and turn off the engine
3. Remove the wheels
4. Remove the brake hose from point 1 and plug the hose
5. Remove nut 2
6. Screw in a R1/4" x 75 screw or a 1/4" double nipple with a M8 thread, as well as a M8 x 60 screw to point 1
7. Tighten screw 3 so that brake pads detach themselves from the brake disc
8. Tighten from shank 4, and the brake pad will detach itself from the brake disc
9. Remove screws 5 and set the brake cylinder aside
10. Remove screws 6 and the brake pads
11. The brake caliper mechanism is installed in reverse order
12. Adjust the brakes after changing the brake pads.

12.5 Adjusting the closing time of brakes

1. Position the MEWP in transport position
2. Remove the cover of the lower chassis valve group (aluminium dogskin plate cover closest to the turntable on the lower chassis)
3. Warm up hydraulic oil to +30°C
4. Check tire pressure to 310 kPa
5. Select a hard, level surface: concrete, oil gravel, or the like.
6. Drive the MEWP at fast speed.
7. Release the drive lever quickly to the middle position.
8. Adjust the stopping distance of the MEWP to 0.2 m from valves A and B (figure 12-2).Both valves must indicate the same value, refer to valve scales.

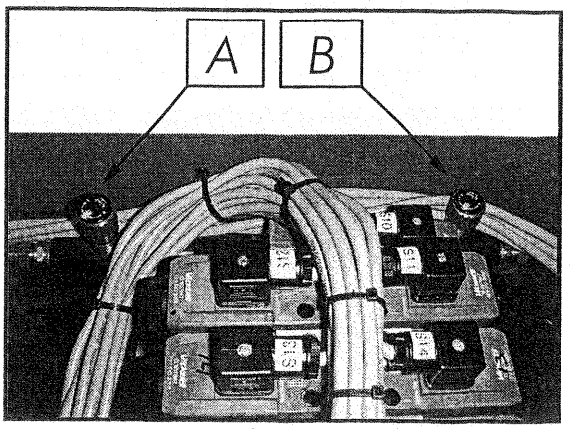


Figure 12-2. Adjusting the closing time of brakes

9. When the valve is turned to + direction the stopping distance becomes shorter. NOTE ! IF THE VALVE IS COMPLETELY CLOSED, THE BRAKES DO NOT CLOSE.

13. ADJUSTING STEERING SPEED

- The steering speed of the MEWP can be adjusted, but this is normally not required, as the speed has been adjusted by the manufacturer.
- Do not adjust the steering speed to be too fast. If the turning speed is too fast, this will make steering difficult in fast driving, and the MEWP will start to stagger.
- If you adjust the steering speed, test the turning speed by driving the MEWP at fast speed and steering at the same time.
- The adjusting screw for the steering speed is located in the lower chassis valve group, see figure 13-1. The arrow in figure A points towards the platform.

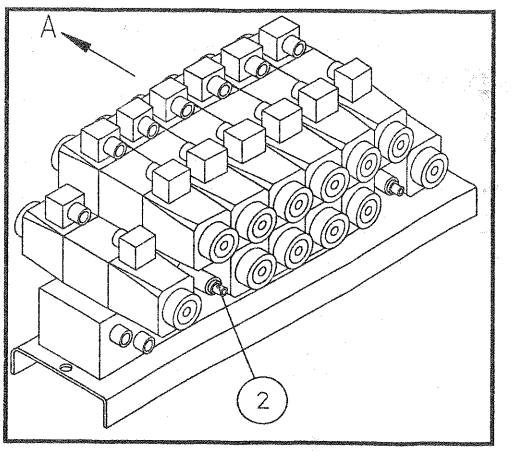


Figure 13-1. Lower valve group

13.1 Adjustment

1. Drive the MEWP at fast speed on a level surface and test the steering.
2. Adjust the turning speed by opening locking nut 1 of the steering speed adjustment screw 2 in the lower chassis valve group (figure 13-2).
3. Adjust the steering speed from adjustment screw 2. The speed becomes slower when the screw is turned clockwise.
4. After adjustment lock adjustment screw 2 with locking nut 1.

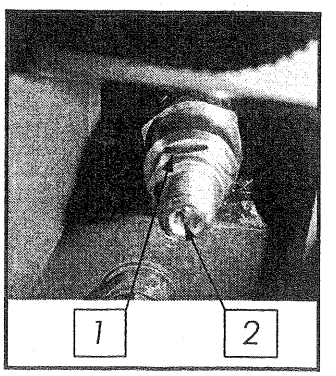


Figure 13-2. Adjusting the steering speed

14. ADJUSTMENT OF HORIZONTAL LEVEL INDICATOR

1. *Support the MEWP on the outriggers.*
2. *Place a precision spirit level at point A (figure 14-1) and bring the MEWP to a level in crosswise direction with an accuracy of ± 0,5° with the help of the outriggers.*
3. *Place a precision spirit level at point B (figure 14-1) and bring the MEWP to a level in crosswise direction with an accuracy of ± 0,5° with the help of the outriggers.*
4. *Leave the combustion engine running.*
5. *Open the equipment case cover and the cover of horizontal level indicator.*
6. *Press the reset button about five seconds. (figure 14-2).*

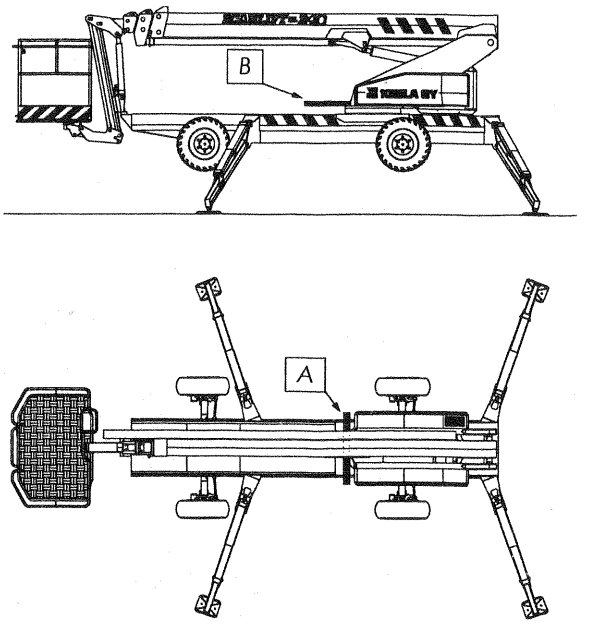


Figure 14-1

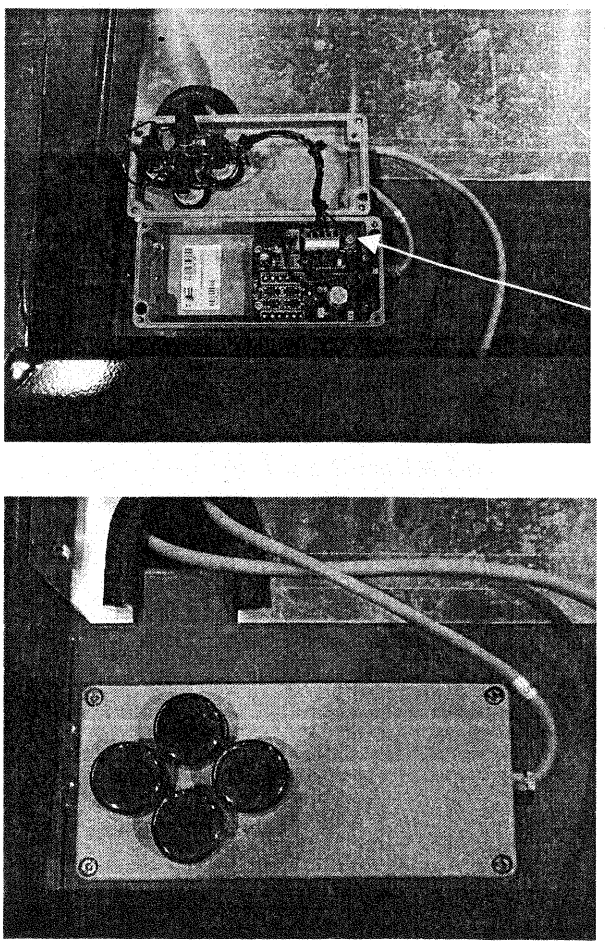


Figure 14-2

15. CHAINS OF BOOMS - ADJUSTMENT

15.1 Adjustment of minimum length of booms

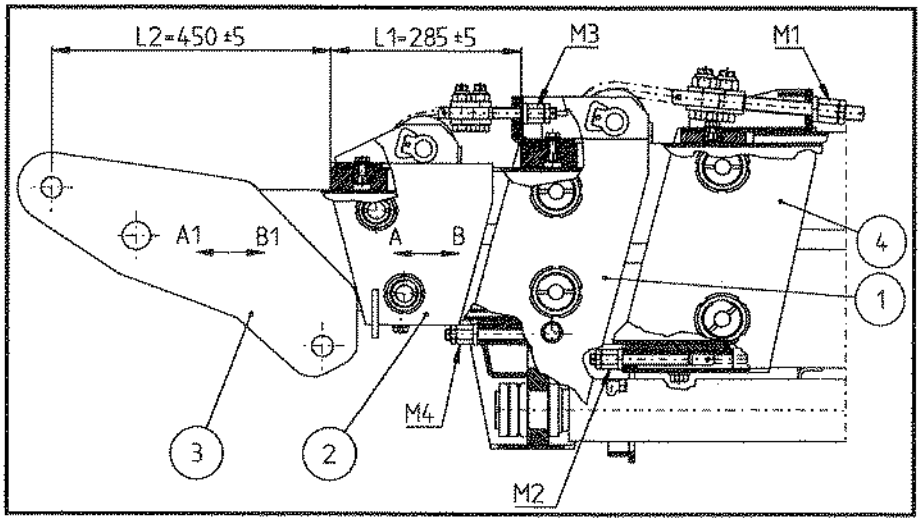


Figure 15-1 Adjustment of minimum length of booms

1	Extension 1	2	Extension 2
3	Outermost extension	3	Lifting boom

1. Retract the booms fully.
2. Check distance L1 of extension 2 from the edge of upper glide pad of extension 2 to the edge of upper glide pad of extension 1 (figure 15-1). The distance should be 285±5mm. If extension 2 needs to be moved in direction A, tighten nut M1 and loosen nut M2. If extension 2 needs to be moved in direction B, tighten nut M2 and loosen nut M1.
3. Check the distance L2 of extension 3 (figure 15-1). The distance should be 450±5mm. If extension 3 needs to be moved in direction A1, tighten nut M3 and loosen nut M4. If extension 3 needs to be moved in direction B1, tighten nut M4 and loosen nut M3.
4. Tighten locking nuts of nuts M1, M2, M3 and M4.
5. Check that each locking nut is secured with a cotter pin.
6. Extend the booms fully and retract them fully, and check the measurements.
7. Readjust, if necessary.

15.2 Adjustment of chain tension of booms

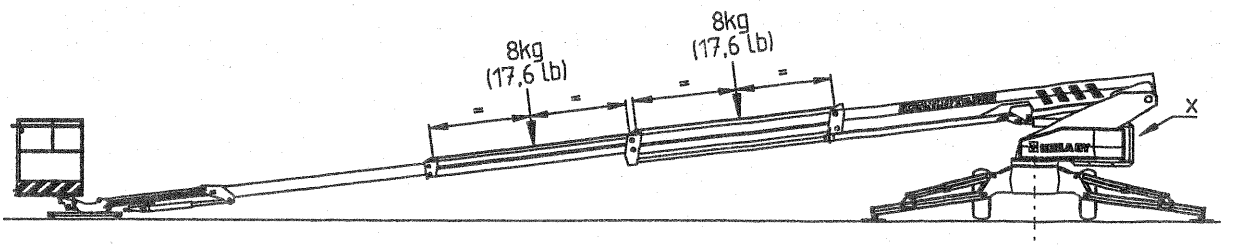


Figure 15-2. Adjustment of chain tension of booms

1. *Support the MEWP on the outriggers with the wheels slightly risen from the ground (figure 15-2).*
2. *Raise the jib boom fully up.*
3. *Lower the platform eg. on a pump carrier or other support equipped with wheels.*
4. *Turn off the combustion engine from the platform and restart it from the ground guiding point.*
5. *Drive out the booms totally, compensating with the lifting cylinder, so that the carrier under the platform rolls easily. If the platform rises from the carriage during extending, the limiter of the lifting radius will cut the extending movement of the booms. No load is allowed on the platform during the extension, and the lifting cylinder must not be used for lowering the booms.*
6. *Retract the booms about 50mm from max. reach and leave the booms in this position.*
7. *Adjust all four extend chains so that there will be 1-3 mm between the boom and the chain, measured at the middle of the chain, with a single load of 8 kg applied at the point of measuring.*
8. *Retract the booms fully after adjustment.*
9. *If the booms do not fully settle within each other, adjust the minimum length of booms in accordance with: Adjustment of minimum length of booms.*
10. *Recheck the chain tightness, if you have to adjust the minimum length of booms.*
11. *If the extend chains of booms (chains above the boom) have stretched more than 2% from their nominal length, they have to be replaced. Measure the length of 100 chain links while the chain is tight. The nominal length of 100 chain links of the thinner chain is 15,875mm x 100 = 1587,5mm, that is, the max. allowed length of 100 chain links is 1587,5mm + 31,75mm = 1619,25mm.*
    Measure the length of 100 chain links of the thicker chain in the same manner. The nominal length of 100 chain links of the thicker chain is 19,05mm x 100 = 1905,0mm, so the max. allowed length of 100 chain links of the thicker chain is 1905,0mm + 38,10mm = 1943,10mm.
    Chains must also be replaced, if they show evidence of significant wear, cracks or distortion. Also check the ends of chains.

16. ADJUSTING THE HYDRAULIC LOWERING SPEED OF THE BOOMS

1. Support the MEWP on the outriggers level with the horizontal on firm ground. Check that all four lights of the indicator of horizontal level are on. Warm up the hydraulic oil to +30°C.
2. Remove capped nut 2 of choker screw 1 in the valve block of the lifting cylinder (figure 16-1).
3. Carefully tighten choker screw 1all the way. Then unscrew the choker screw ½ a turn. Check the condition of gaskets 3 and tighten the capped nut. Note! Do not open the choker screw too much, because this will cause a strong jerk at the start of the lowering movement of the booms. Also, do not tighten the screw too much, because this will prevent the lowering of the boom.
4. Drive the booms fully up from the platform, extend the booms fully with the telescope and straighten the jib boom fully (figure 16-2). Weight of operator 80 - 90 kg, platform otherwise empty.
5. Lower the booms slightly.
6. Raise the booms so that the mouth brake of the lifting cylinder starts to function. Stop the raising movement.
7. Pull the lowering lever of the boom to extreme position. Start a stopwatch when the platform starts to move. Keep the lever in the extreme position until the load control stops the movement. Stop the watch when the movement stops (figure 16-2).
8. Check from the stopwatch the duration of the lowering. It should be 15 - 17 seconds.
9. If the time is less than 15 seconds, open locking nut 4 of adjusting screw 5 (figure 16-1) and unscrew adjusting screw 5 in which case the time becomes longer and the lowering movement becomes slower.
   If the time is more than 17 seconds, tighten adjusting screw 5, in which case the time becomes shorter and the lowering speed becomes faster.

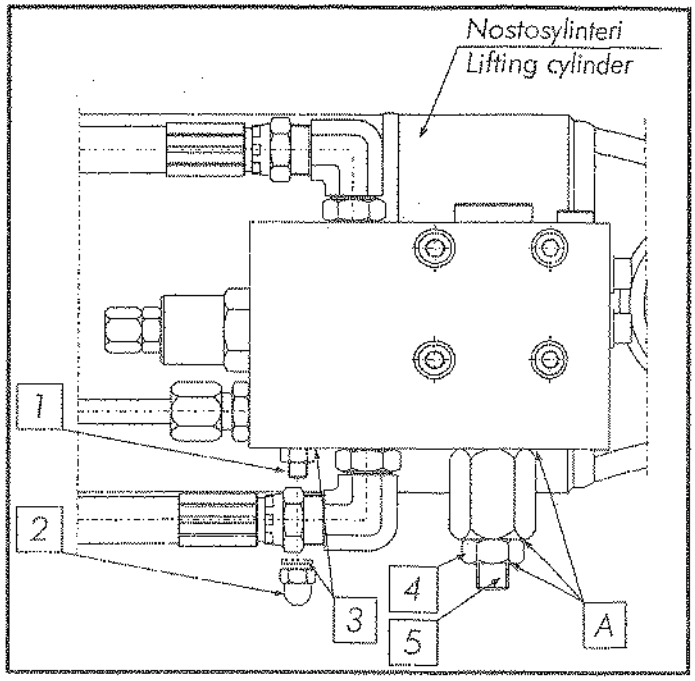


Figure 16-1

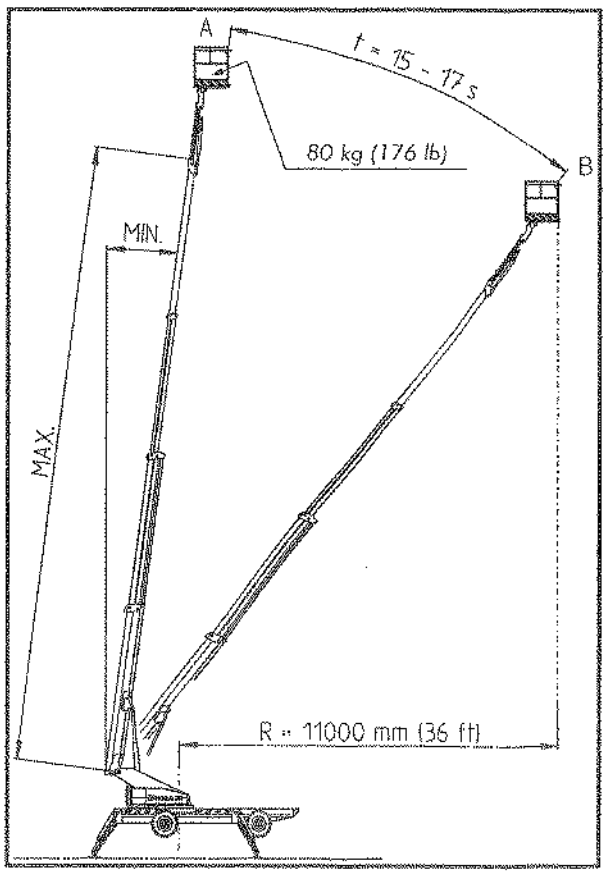


Figure 16-2

10. Lock adjusting screw 5 with locking nut 4.
11. Check the lowering speed and readjust, if necessary.
12. Seal points A after adjustment (figure 16-1).

17. ADJUSTING THE HYDRAULIC RAISING SPEED OF THE BOOMS

1. Support the MEWP on the outriggers level with the horizontal on firm ground. Check that all four lights of the indicator of horizontal level are on. Warm up the hydraulic oil to +30°C.
2. Drive the booms fully up from the platform, extend the booms fully with the telescope and straighten the jib boom fully (figure 16-2). Weight of operator 80 - 90 kg, platform otherwise empty.
3. Pull the lowering lever of the boom to extreme position. Keep the lever in the extreme position until the load control stops the movement.
4. Push the raising lever of the boom to extreme position. Start a stopwatch when the platform starts to move. Keep the lever in the extreme position until the movement starts to slow down, that is, the mouth brake of the lifting cylinder starts to function. Stop the watch.
5. Check from the stopwatch the duration of the lowering. It should be 15 - 17 seconds.
6. If the time is less than 15 seconds, open locking screw 2 (in the turntable valve group) and turn valve 1 (figure 17-1)in the minus direction in which case the time becomes longer and the raising movement becomes slower.
   If the time is more than 17 seconds, turn valve 1 in the plus direction, in which case the time becomes shorter and the raising speed becomes faster.
7. Lock the valve with locking screw 2.
8. After locking the valve check the raising speed and readjust, if necessary.
9. When you have adjusted the raising speed to the design values, seal the speed adjustment valve with sealing paint.

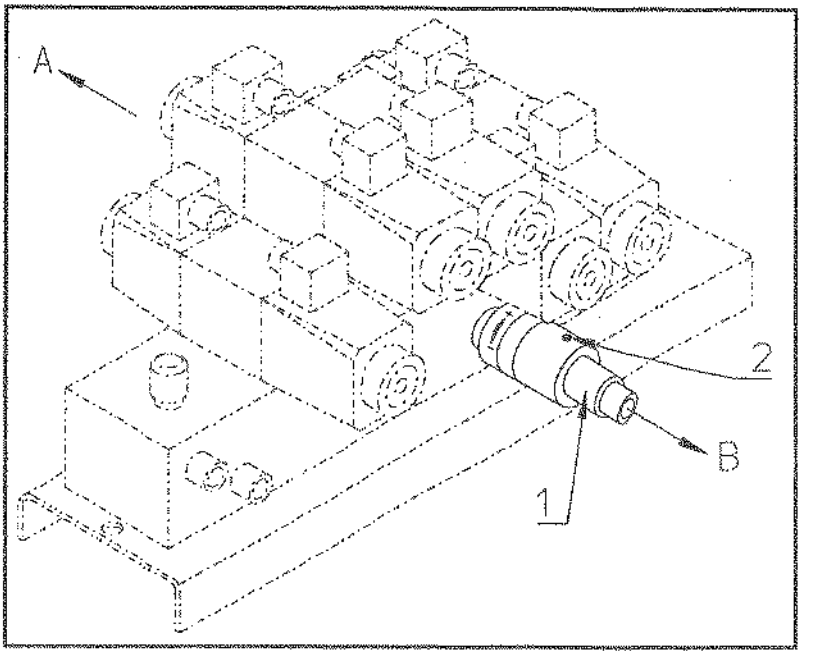


Figure 1 Turntable valve group

A	Platform direction
B	To the lifting cylinder
1.	Speed adjustment valve
2.	Locking screw

18. CHECKING AND ADJUSTMENT OF SAFETY LIMIT SWITCH RK5 OF TRANSPORT POSITION

– *Safety limit switch B of transport position is located on the lower chassis, in connection with the transport support of booms (figure 18-1). Guide pin A on the jib boom (figure 18-1) operates the safety limit switch of transport position.*

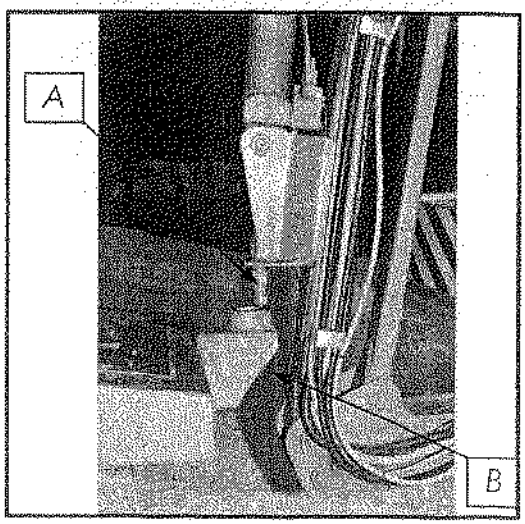


Figure 18-1

18.1 Checking the operation of the limit switch

1. *Place the MEWP in transport position. Booms on the transport support, outriggers in the upper position.*
2. *Try to use the booms. Press the foot pedal and push the raising lever of the booms in the extreme positon. Guiding of booms should not be possible.*
3. *Now try to raise the booms by using the override switch. Press down the foot pedal, press the override switch and simultaneously push the raising lever of booms; in which case the booms should rise from the transport support. Raise the booms slightly from the transport support.*
4. *Leave the booms in this position and then try to operate the outriggers, steering and driving normally, without using the override switch. The outriggers, driving and steering should not function, when the booms are not in transport position.*
5. *Use the override switch to guide the booms back onto the transport support.*

NOTE! DO NOT OPERATE THE MEWP, IF SAFETY LIMIT SWITCH RK5 IS NOT FUNCTIONING AS DESCRIBED ABOVE.

18.2 Adjusting safety limit switch RK5

1. *Drive the MEWP onto a firm, level surface, lower the outriggers and guide the booms off the transport support.*
2. *The limit switch lever should now be in position 1 (figure 18-2). In this position points 13-14 and 21-22 of the limit switch should be open. This limit switch position prevents the use of the outriggers, driving and steering when the booms are used, as well as the power consumption of the outrigger check valves.*

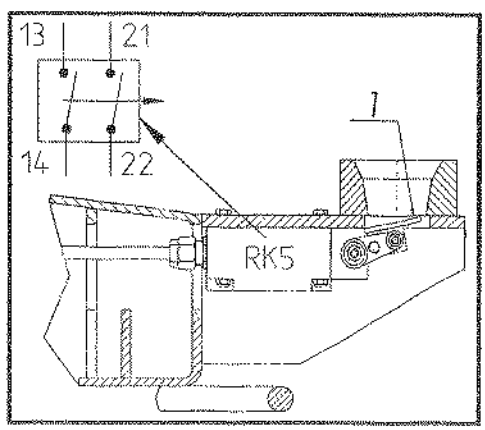


Figure 18-2

3. *Carefully press the limit switch lever to position 2 (figure 18-3, switch plate parallel to the frame). In this position points 13-14 and 21-22 of the limit switch should close. This position prevents the use of booms when the outriggers are not in support position, however, allowing the booms to be used with the override switch within the limits set by the limit switches of raising and slewing of the booms (limit switches RK10 and RK9).*

4. *If the limit switch does not function in the above described manner, open the locking nut A of the limit switch lever (figure 18-3) and adjust the limit switch by changing the position of the limit switch lever.*
5. *Always test the function of the limit switch after adjustment in accordance with instruction 18.1 .*

- Position of the limit switch when the booms are not on the transport support is shown in figure 18-4.

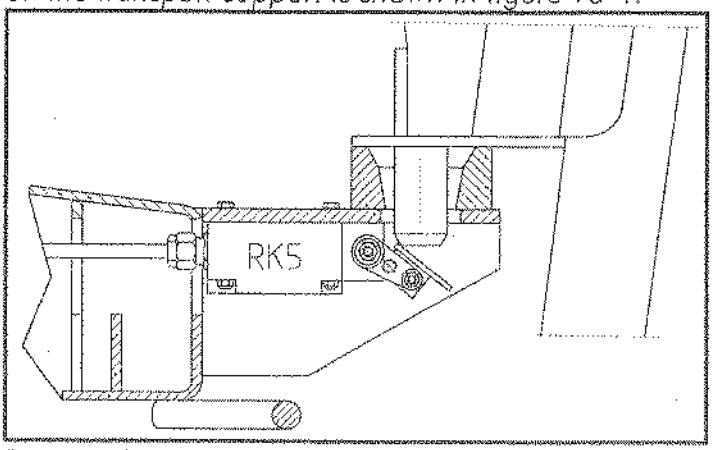


Figure 18-4

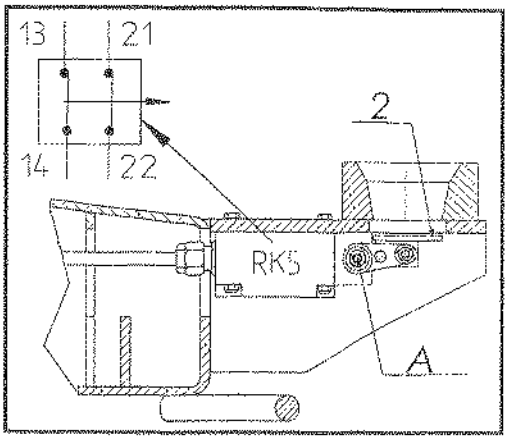


Figure 18-3

19. CHECKING AND ADJUSTMENT OF SAFETY LIMIT SWITCH RK10 FOR RAISING THE BOOMS

- *Safety limit switch RK10 for raising the booms is located at the upper edge of the turntable on the right side of the boom seen from the platform (figure 19-1).*
- *Points 13-14 of limit switch RK10 prevent the use of the override switch and points 21-22 prevent the use of turntable valve S3 when the booms are used (S3= outrigger, driving and steering).*

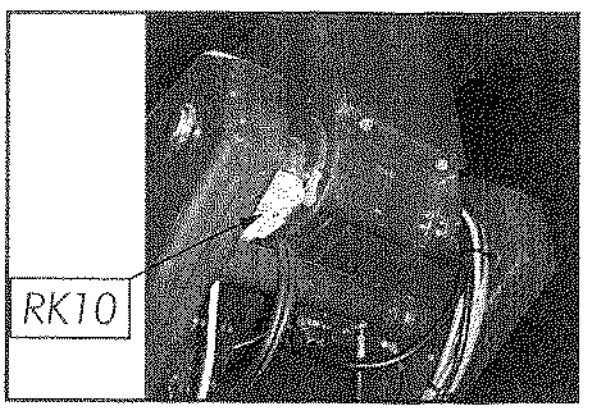


Figure 19-1

19.1 Checking the operation of the limit switch

1. *Place the MEWP in the transport position on a firm, level surface.*
2. *Raise the booms from the transport support using the override switch. Read the operation instructions of the override switch in the instruction manual.*
   NOTE! EXERCISE EXTREME CAUTION WHEN GUIDING THE BOOMS USING THE OVERRIDE SWITCH, OUTRIGGERS UP.
3. *Continue raising the booms with the raising lever, simultaneously pressing the override switch.*
4. *Limit switch RK10 should stop the movement when the bottom of the platform is about three metres from the ground. The boom angle is then 8° - 10° (figure 19-2).*
5. *Lower the booms using the override switch.*

19.2 Adjustment of limit switch RK10

- *If limit switch RK10 for raising the booms does not stop the raising movement in the above described manner, adjust limit switch RK10 in accordance with this instruction.*

1. *Guide the booms into transport position, booms on the transport support and outriggers up. Leave the engine running.*
2. *Loosen locking nut of adjusting screw 1 of limit switch RK10.*
3. *Raise the booms 8° - 10° from the horizontal level with the override switch (figure 19-2), however, so that roller 3 of lever 2 remains in the position indicated in the partial enlargement of figure 19-2.*
4. *Turn the adjusting screw 1 of the limit switch so that points 13-14 and 21-22 of the limit switch open slightly. Lock the adjusting screw.*
5. *Lower the booms with the override switch.*
6. *Test the operation of limit switch RK10 in accordance with instruction 19-1. Readjust, if necessary.*
7. *Seal objects A (figure 19-3).*

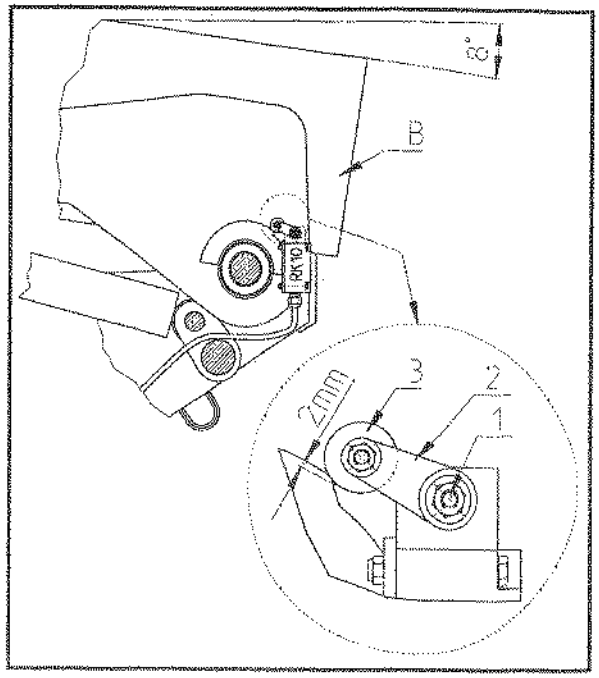


Figure 19-2

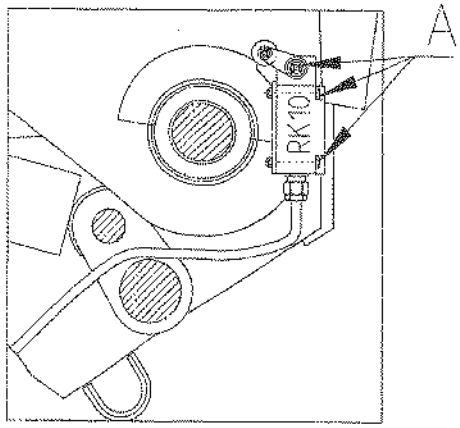


Figure 19-3

20. CHECKING AND ADJUSTMENT OF SAFETY LIMIT SWITCH RK9 FOR SLEWING THE BOOMS

- *Safety limit switch RK9 for slewing the booms is located in the turntable, point A, behind the battery, next to the rotary distributor, on the left side seen from the platform (figure 20-1)*
- *When opened, points 13-14 of limit switch RK9 prevent slewing of the booms and points 21-22 prevent the use of turntable valve S3 when the booms are used (S3= outriggers, driving and steering).*

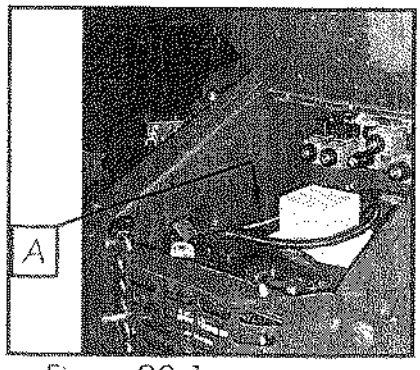


Figure 20-1

20.1 Checking the operation of the limit switch

1. Place the MEWP in the transport position on a firm, level surface. Check that the outriggers are in the upper position.
2. Raise the booms from the transport support about 200mm using the override switch. Extend the jib about 500mm. Read the operation instructions of the override switch in the instruction manual.
   NOTE! EXERCISE EXTREME CAUTION WHEN GUIDING THE BOOMS USING THE OVERRIDE SWITCH, OUTRIGGERS UP.
3. Slew the booms with the control lever for slewing the booms using the override switch until the movement stops. Limit switch RK9 stops the movement.
4. Limit switch RK9 should stop the movement when the booms have turned 7,5° from the middle position.
5. Measure the slewing angle of the booms in both directions. The slewing angle should be equal in both directions when measured from the middle position, if this is not the case, adjust the slewing angle in accordance with the adjustment instruction.

20.2 Adjustment of limit switch RK9

1. Check that the slewing is symmetrical in accordance with instruction 20.1. Adjust, if necessary.
2. Loosen fixing screws 1 (figure 20-2).
3. Turn frame plate 2 and tighten screws 1. If the booms turn more in the clockwise direction (left, seen from the platform), the frame plate needs to be turned counterclockwise.
4. Check that the slewing is symmetrical. If not, continue adjustment.

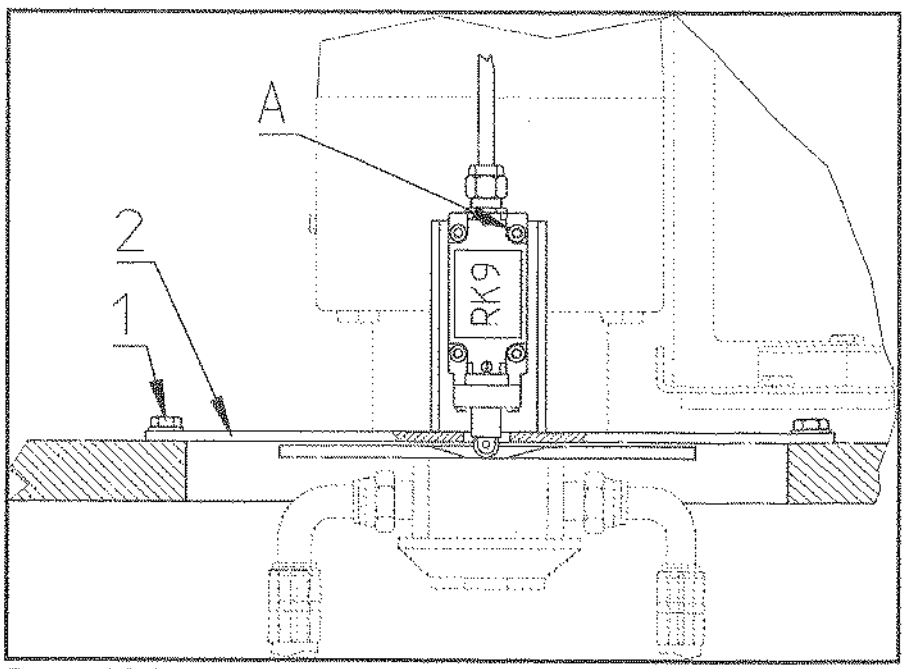


Figure 20-2

21. CHECKING THE OUTRIGGERS

Make sure the outrigger safety limits are functioning: test the outriggers in the support position (with wheels not touching the ground). After engagement, you should be able to operate the booms. The outriggers have ground and position sensors, so they require a force of at least 6 kg (13.2 lbs) and a positioning exceeding 75° from the transport position.

Check the ground sensor once a week. A sound signal will indicate, if an outrigger loses touch with the ground, e.g. due to soft ground or uneven support.

Support the MEWP with the outriggers, wheels about 100 mm above the ground.

Raise the booms about 100 mm above the transport support.

Turn off the combustion engine. Leave the ignition key in the ON position (power on).

Place a jack or other hoisting apparatus by each outrigger (see figure 21-1.). Place e.g. a board (A) etc. between the jack and the chassis. Use the jack to lift the chassis until the sole comes slightly off the ground. This should activate the sound signal. The sound signal will stop when the outrigger is lowered back to the ground.

Repeat the procedure with all outriggers.

If the sound signal is not activated with all of the outriggers, the MEWP may not be used until the fault has been repaired.

If one or all of the outrigger soles is off the ground when the power is switched on and the foot pedal is pressed down, the alarm will sound. This does not prevent the use of the MEWP.

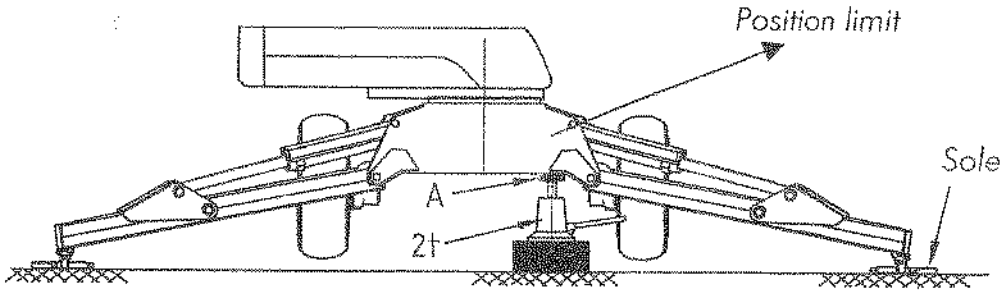
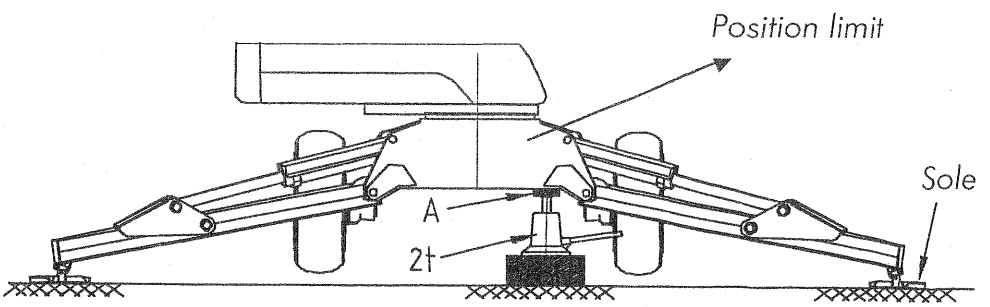


Figure 21-1

21.1. Outrigger limit switches

1. Position limit switches LS1, 2, 3, 4
2. Operation: Cam A of the outrigger guide plate opens the limit switch points 21-22, preventing the use of booms, if one or more of the outriggers is 24-26 degrees above the horizontal, refer to figure 21.2.-1. The adjustment is set by the manufacturer.
3. Ground sensor limit switches LS12, 13, 14,15
4. Operation: When the MEWP is supported on the outriggers and the sole is against the ground, plate B is pushed by the cylinder and pressed against the outrigger. At the same time guide plate C opens limit switch points 21-22 and 11-12 by means of a lever.
5. Alarm function: When one or more of the outriggers lose touch with the ground, points 11-12 and 21-22 of limit switches LS12, 13, 14, 15 engage, switching on the sound signal and notifying of the need to check the support. When the booms are lifted off the transport support, the safety limit switch RK5 bypasses the points of the ground sensor limit switches allowing the use of the booms, even if an outrigger has lost touch with the ground. The use of the booms is prevented, if the position of the outrigger exceeds the horizontal level with 24-26 degrees.
6. Adjustment of ground sensor limit switches LS12, 13, 14, 15.
7. Place a jack or other hoisting apparatus by an outrigger (see figure 21.1.-1). Place e.g. a board (A) etc. between the jack and the chassis. Use the jack to lift the chassis until the sole comes slightly off the ground. The outrigger should then sink lightly and distance D should be at least 35 mm, refer to figure 21.3.-1.



8. Raise the outrigger from the sole, in which case distance D is 27-30 mm. Adjust points 11-12 and 21-22 of limit switches LS12,13,14,15 to open in this position.
9. Raise the outrigger from the sole, in which case plate B touches the outrigger, refer to figure 21.3-1. Turn platform ignition lock to position ON (the engine does not have to be running). Lower the outrigger to position D, measure 25 mm, in which case the alarm should sound when the platform foot pedal is pressed.
10. Seal limit switches with sealing paint in accordance with figures 21.2.-1 and 21.3.-1.

21.2 Outrigger position limit switches LS1, 2, 3, 4, figure 21.2-1

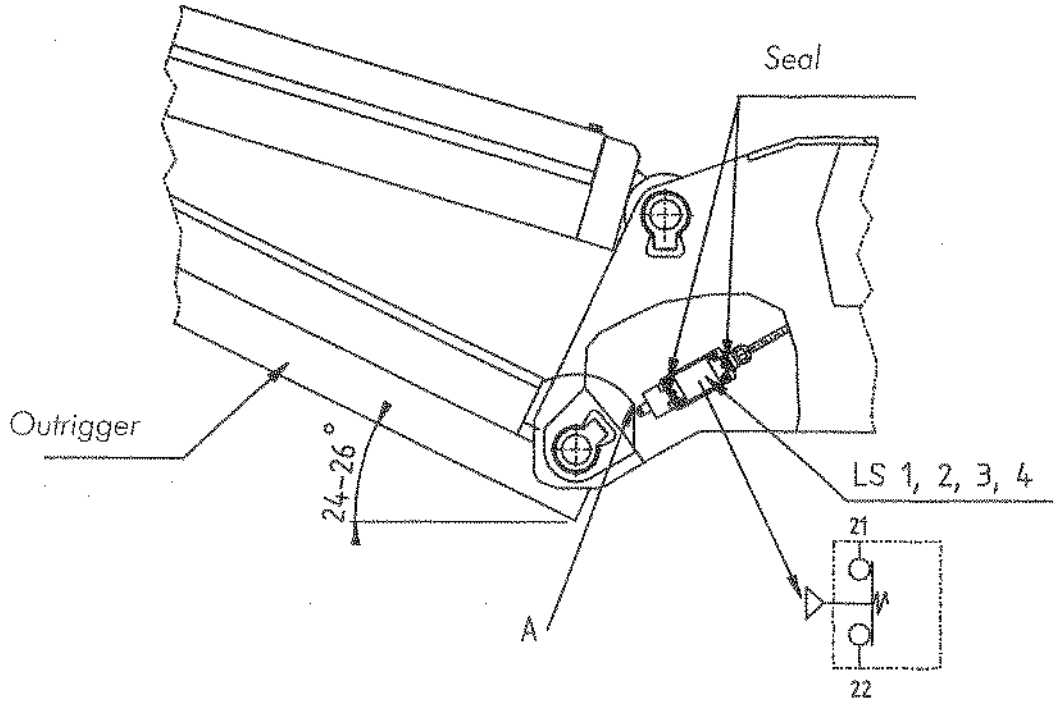


Figure 21.2-1

21.3 Outrigger ground sensor limit switches LS12, 13, 14, 15, figure 21.3-1

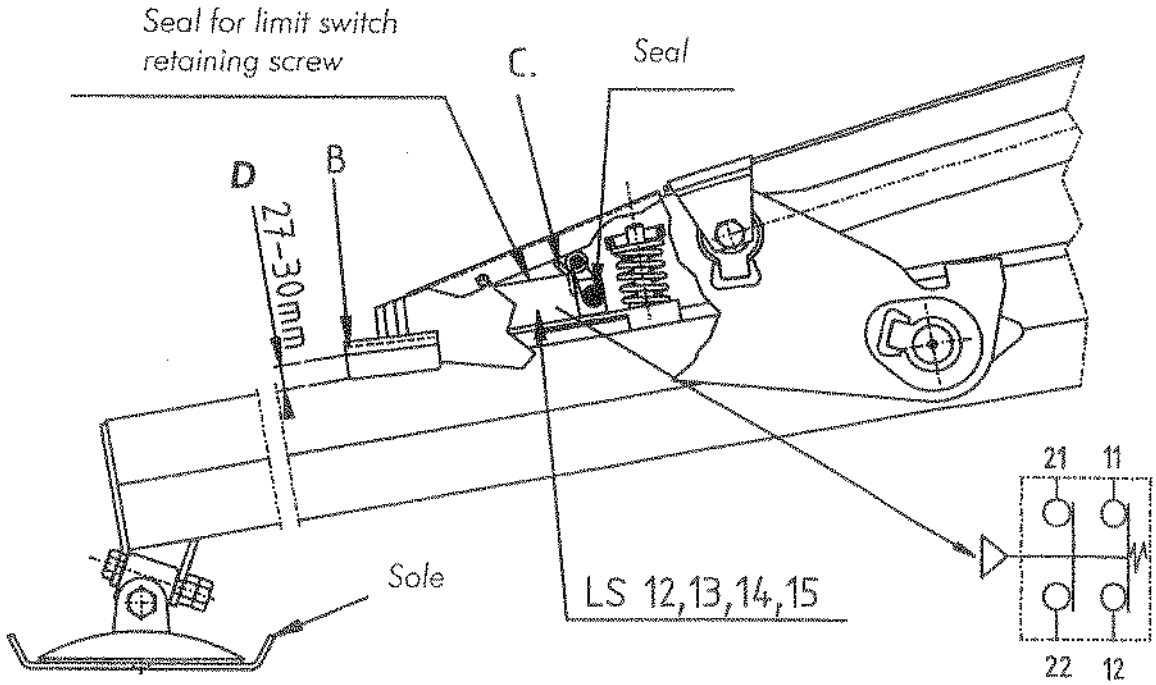


Figure 21.3-1

22. CHECKING AND ADJUSTMENT OF PLATFORM SAFETY LIMIT SWITCH RK11

- *Platform safety limit switch RK11 is located at the front part of the platform, seen from the platform behind the control panel (figure 22-1)*
- *The purpose of the platform safety limit switch is to prevent the platform from bumping into the jib boom. When the platform approaches the jib boom, it will automatically start to draw away from the jib boom, guided by limit switch RK11.*

22.1 Checking the operation of the limit switch

1. *Drive the MEWP onto a firm, level surface, lower the outriggers and guide the booms away from the transport support.*
2. *Extend the booms slightly with the telescope out lever and lower the booms, however, not all the way to the ground.*
3. *Use the jib boom control lever to turn the jib downwards. The platform should draw away from the jib boom when lever 1 of the limit switch (figure 22-1) touches the jib boom. Also try to slew the platform clockwise with the control lever for slewing the platform, in which case the platform control panel approaches the jib boom. The platform should draw away from the jib boom before any part of the control panel or platform touches the jib boom. If the platform at any time bumps into the jib boom, adjust the limit switch in accordance with the adjustment instructions.*

22.2 Adjustment of limit switch RK11

1. *Drive the booms into transport position, platform bottom parallel with the chassis.*
2. *Check that lever 1 of the limit switch (figure 22-1) touches the jib boom stabilizer.*
3. *Loosen locking nut 2 of roller lever adjusting screw.*
4. *Turn roller lever 4 to touch guide plate 3. Adjust points 21-22 with the limit switch adjustment screw so that they open slightly. Lock the adjustment screw.*
5. *Check the operation of the limit switch in accordance with instruction 22.1. and readjust, if necessary.*
6. *Seal the limit switch adjustment and the fixing screws.*

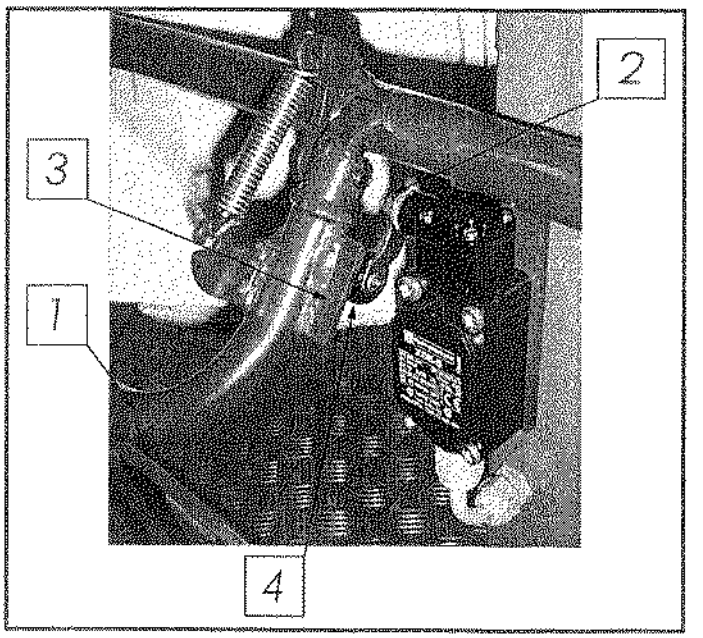


Figure 22-1

23. ADJUSTMENT OF LOAD LOWERING VALVES

23.1 Adjustment values

- *Type of load lowering valve: VICKERS CBV2-10V-C-0-50*
- *Load lowering valve of lifting, telescope and jib cylinder 34500 ± 500 kPa (345 ± 5 bar).*
- *Testing oil: SAE 0W-30*
- *Oil temperature 18°C - 30°C*

23.2 Adjustment

1. *The valve is fixed to adjustment block 4 in accordance with the drawing (figure 23-1).*
2. *Remove protecting cap 1 and loosen nut 2.*
3. *Connect 35000 kPa (350 bar) pressure, output 10 - 15 l/min, to point P.*
4. *Turn adjustment screw 3 until the pressure rises to 35000 kPa (350 bar), in which case oil flow from gate V2 stops.*
5. *Open adjusting screw 3 until pressure gauge PM indicates the desired value, and oil starts to flow from gate V2.*
6. *Check the adjustment value by dropping the pressure at point P to eg. 20000 kPa (200 bar), and then start to raise the pressure at point P while watching pressure gauge PM and gate V2. Oil flows from gate V2 when the adjusted value is reached.*
7. *Tighten nut 2 while holding adjustment screw 3. Replace protecting cap 1.*
8. *Seal points A with Kesla sealing paint after instalment in the cylinder.*
9. *Observe extreme cleanliness when handling valves.*

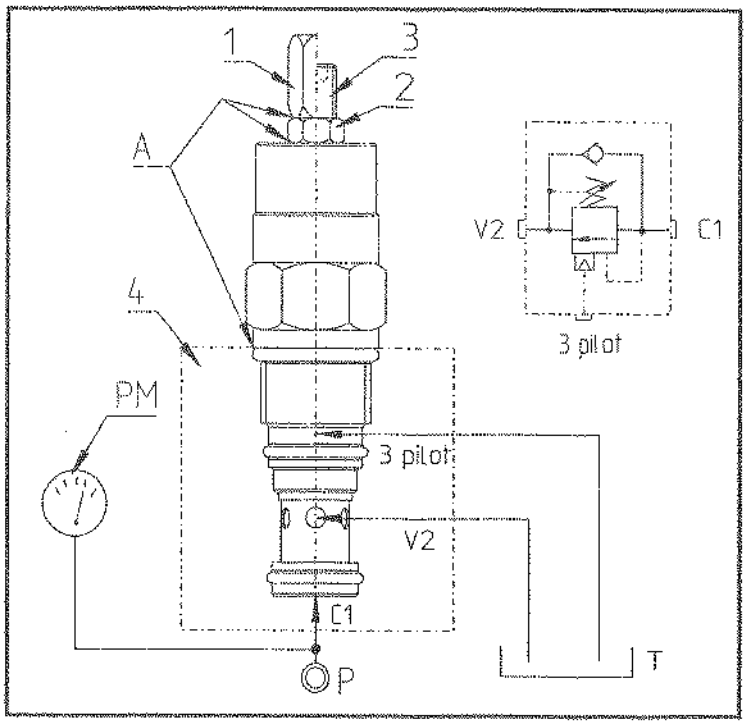


Figure 23-1

24. OPERATION OF PLATFORM GATE

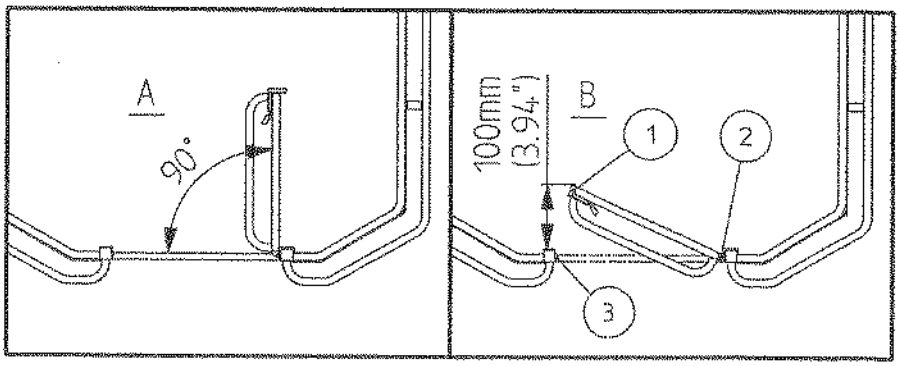


Figure 24-1

1. *Check the operation of the gate. The gate has to close and lock when it is released from position A and position B (figure 24-1).*
2. *If the gate does not lock in the above described manner, you can tighten the closing spring 2 of the gate by tightening it ½ a turn.*
3. *Check that lock pin 3 in the platform rail settles in the middle of the slot of lock 1 in the gate. The height of the pin can be adjusted in the up/down direction by loosening its fixing screws and moving the pin.*
4. *Lubricate the lock, spring and hinges with thin machine oil.*

25. TORQUE SCHEME

Wheel nuts ..... 250 Nm
Fastening bolts of slewing gear ..... 22-26 Nm
Bolts of pivot bearing, inner shell ..... 200-220 Nm
Bolts of pivot bearing, outer shell ..... 200-220 NmHolding capacity of pull eliminator in inlet of el. boxes..... 5 kg when pulling from cable
Torque of clasp nuts of outrigger axles (locking with claw ring) 50-70 Nm
Nuts of wheel naves and pivoted axles ..... 50-70 Nm
Locking of axle nuts of cylinder pins (locking with claw ring) .... 50-70 Nm

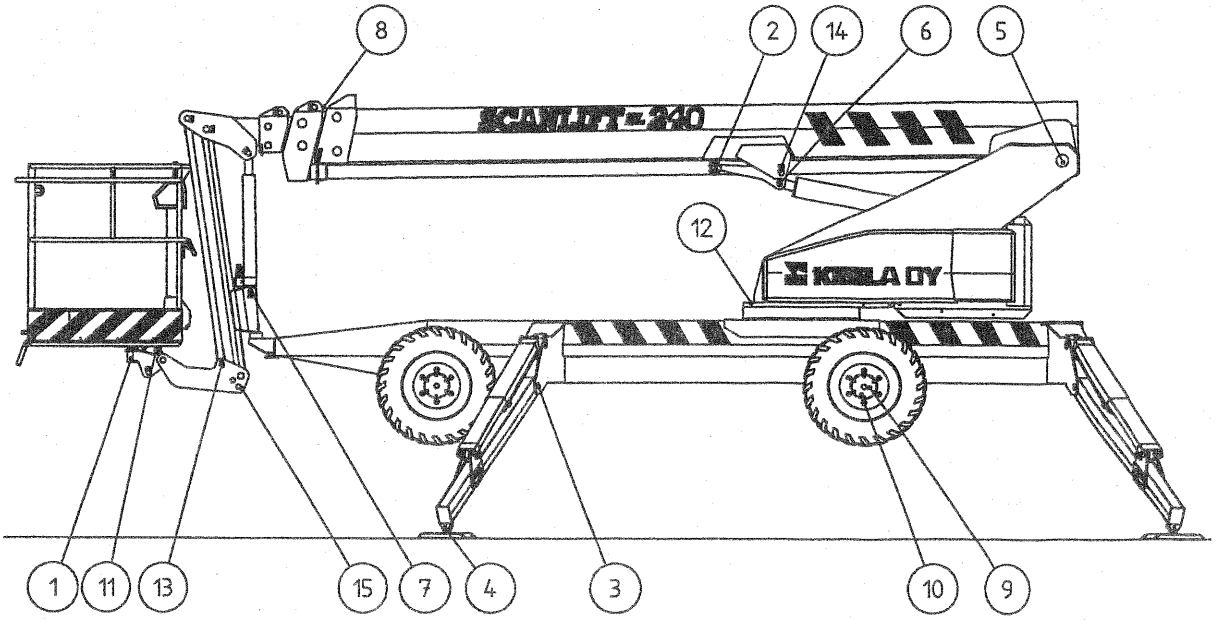
25.1 Torques, if not otherwise mentioned

Preliminary torque for screws with metric ISO thread			
	Nm		
	8.8	10.9	12.9
M4	2,8	4,0	4,9
M5	5,7	7,9	9,5
M6	9,7	13,7	16,2
M8	23,5	33,3	39,2
M10	47,1	65,7	79,4
M12	81,4	114,7	137
M14	130	181	216
M16	196	280	333
M18	270	382	461
M20	382	539	647
M22	519	730	873
M24	662	932	1118
M30	1324	1863	2236

Preliminary torque for screws with metric ISO fine thread			
	Nm		
	8.8	10.9	12.9
M8 x 1	24,5	34,3	40,2
M10 x 1,25	49	68,6	80
M12 x 1,25	85,3	118	147
M12 x 1,5	80,4	118	138
M14 x 1,5	118	167	206
M16 x 1,5	196	285	343
M18 x 1,5	295	412	491
M20 x 1,5	402	569	687
M22 x 1,5	540	765	912

1 kpm = *9,80665 Nm*
1 lbf.ft = *1,356 Nm*

26. LUBRICATION SCHEME



Lubricate the following points every (50) operating hours:

1. The spherical bearings in the platform slewing cylinder
2. Bearing surfaces of lifting radius guard
3. Outrigger links and spherical bearings of cylinders
4. Links of supporting plates
5. Spherical bearings of boom and turntable
6. Spherical bearings of lifting cylinder
7. Spherical bearings of jib cylinder
8. Sliding surfaces of booms and sprocket bearings
9. Pivoted axle bearings of wheels
10. Sliding surfaces of brake cylinders
11. Spherical bearings of platform slewing cylinder
12. Pivot bearing and tooth ring. Too much grease can break the gasket of pivot bearing. Lubricate every 950 h or at least every 6th month. There are two lubrication points in the bearing. Turn the bearing while greasing. The cover of the lubrication opening of the pivot bearing and tooth ring is attached with 2 bolts.
13. Spherical bearings of stabilizer arm
14. Spherical bearings of load control linkage
15. Spherical bearings of platform inclining cylinder

27. SELECTION TABLE OF LUBRICATION MATERIALS AND OIL VOLUME

27.1 Combustion engines:

Kohler Command 25:
Oil volume ..... 2,0 l with filter
SAE 30W SF ..... +0° ... +30° C monograde oil
SAE 20W-30 SF ..... +0° ... +30° C first filling
SAE 10W-30 SF ..... -5° ... + 30° C
5W-20 SF ..... -25° ... + 0° C
Kubota D905-E:
Oil volume ..... 5,1 l with filter
SAE 30 or SAE10W-30, SAE10W-40 ..... above +25°C
SAE 20 or SAE10W-30, SAE10W-40 ..... 0°C ... +25°C
SAE 10W or SAE10W-30, SAE10W-40 ..... below 0°C

27.2 Hydraulics

Oil volume ..... 60,0 l filling capacity
Oil type ..... SAE 0W - 30

27.3 Spherical bearings

Lithium-based all-round grease eg. Esso Beacon EP2
Lubrication instruction: oozes out a little during greasing

27.4 Open cogging of pivot bearing

Molybdenum-sulphide-based eg.
- Esso Surrent Fluid 30F
- Shell Cardium EP Fluid H
- Mobil Dorcia 30

Lubrication instruction: brushing

27.5 Sliding surfaces of booms

Lithium-based all-round grease eg. Esso Beacon EP2

27.6 Sliding bearings

Lithium-based all-round grease eg. Esso Beacon EP2
Lubrication instruction: oozes out a little during greasing

27.7 Pivot bearing

Lithium-based all-round grease eg.
- Esso Beacon EP2
- Shell Alvania EP2
- Mobil Mobilux EP2

27.8 Slewing gear

Oil volume ..... 1,5 l
ISO 3448 Vg 150
SAE 90

28. MAINTENANCE SCHEME BASED ON OPERATING HOURS

Daily	Check hydraulic oil quantity
	Check fuel quantity
	Check support constructions
	Check hydraulic hoses and pipes and tightness of hydraulic couplings
	Check the function of emergency stop and safety devices
	Test all directions of functions
Every 50h	Lubricate all bearing and sliding surfaces
	Check the condition of telescope sliding pads and surfaces, lubricate and adjust, if needed
Every 500h	Change hydraulic oil and filter
	Change oil of slew. gear, first change 100h.
	Check the condition of brakes
Every 1000h or at least 6 months	Check the condition of driving brakes, clean and lubricate
Every 12 months	Annual examination. Enclosed records to be filled, signed and dated.

Kohler Command 25

Daily	Check motor oil level and add, if needed
Every 25h	Clean the prefilter around the air cleaner element (Wash with warm water. Reinstall only after it has dried completely)
Every 100h	Change air cleaner
	Change motor oil and oil filter
	Check spark plug condition, clean plugs and adjust gap. Replace the plugs, if needed.
	Check condition of spark plug conductors and caps. Replace, if needed

28.1 Changing the hydraulic oil return filter

- The filter is changed after twenty (20) operating hours. The following changes take place every five hundred (500) operating hours.
- Filter element: Finn-Filter FC1003.F010.BS, Kesla Oyj's spare part number 3090878
- Lubricate the filter element gasket with hydraulic oil before attachment.
- Tighten the filter element to 25 Nm.

28.2 Changing the hydraulic oil pressure filter

- Change the filter element after twenty (20) hours of operation. The following changes take place every five hundred (500) operating hours.
- Filter element: Finn-Filter FC5000.F010. gasket B, Kesla Oyj's spare part number 3090877
- Lubricate the filter element gasket with hydraulic oil before attachment.
-Tighten the filter body to 70-90 Nm.

Kubota D905-E

Daily Motor off:	Check oil and fuel leakages, repair leakages before use.
	Check oil level and cleanliness. Add oil, if needed.
	Check the amount of coolant. NOTE! NEVER OPEN THE RADIATOR FILLING CAP OF A HOT MOTOR. LET THE MOTOR COOL AT LEAST 30 MINUTES AFTER USE, BEFORE OPENING THE CAP. Add coolant, if needed.
	Check for loose bolts and nuts, and tighten, if needed.
Daily Motor on:	Listen to the sound of the motor. Stop the motor if: The rpms of the motor reduce or increase suddenly (the motor does not run smoothly). There is unusual interference noise.
	Check the colour of exhaust gas. Stop the motor, if the exhaust gas suddenly turns black.
	Stop the motor, if the signal light for oil pressure or overheating of the coolant are on while the motor is running.
After first 50h	Change motor oil and oil filter.
Every 50h	Check fuel pipes and hoses, and tightness of their connections and condition of hose clamps.
Every 100h	Clean the air cleaner element.
	Check the battery electrolyte level.
	Check the fan belt tightness and condition.
Every 200h	Change motor oil and oil filter.
	Check the condition of radiator hoses and hose clamps.
Every 400h	Replace the fuel filter element
Every 500h	Clean radiator system and radiator cell and check the condition of radiator.
	Replace fan belt.
Every 800h	Adjust valve clearance.
Every 12 months	Replace air cleaner element. **
	Check for damage to el. conductors and condition of connectors.
Every24 months	Replace fuel hoses and hose clamps.
	Replace radiator hoses and hose clamps.
	Change coolant.

** Once a year or every six cleanings.

29.PROBLEMS IN OPERATING THE MEWP

Situation	Solution
Booms can not be guided from platform	1. Check that the combustion engine has been started from the platform. No keys are allowed in the ignition lock of the ground guiding point. Only use one set of keys. 2. Check that the outriggers are in support position (lower position). 3. Check that the foot pedal has been pressed down. The foot pedal has to be pressed before the control lever for the booms is used.
Booms can not be guided from ground	1. Check that the combustion engine has been started from the ground guiding point. No keys are allowed in the ignition lock of the platform. Only use one set of keys. 2. Check that the outriggers are in support position (lower position.
Booms can not be guided from ground or from platform	1. Check that the outriggers are in support position (lower position). 2. Test if the booms can be guided from the platform using the override switch (read the operation instructions for the override switch in the instruction manual). If the booms can be guided with the override switch, one of the outrigger safety limit switches RK1-RK4 is damaged or a cable to safety limit switches RK1-RK4 has come off or is damaged.
Outriggers can not be raised or lowered	3. Check that the selector switch for outriggers / driving and steering is in position OUTRIGGERS. 4. Check that the booms are on the transport support. 5. Check that the foot pedal is not pressed down.
MEWP can not be driven / steered	1. Check that the selector switch for outriggers / driving and steering is in position DRIVING AND STEERING. 2. Check that the booms are on the transport support. 3. Check that the pedal is not pressed down 4. Check if the MEWP can be driven and steered with the override switch. Raise the booms approx. 500 mm above the transport support. Press down the override switch and push or pull simultaneously the driving or steering lever. If the MEWP can be driven and steered with the override switch, limit switch RK5 for the transport position of booms is damaged or the cable to the limit switch has come off or is damaged.
Engine does not start	1. Check that current has been turned on from the main switch. 2. Check that the emergency stop push-button has not been pressed down at either of the guiding points.
Engine starts, but does not run	1. Starting a "cold" diesel engine: Turn the ignition key in the glowing position and keep it there until the glow indicator lights goes out. Start the engine. 2. Starting a "cold" petrol engine: Pull out the choke (under the engine hood) and start the engine. 3. Check that there is enough fuel in the fuel tank.

30. INSTALLING AN ENGINE HEATER IN SCANLIFT SL 240D

30.1 General

- *This instruction only applies to MEWPs equipped with a Kubota D905-E diesel engine.*
- *Technical data of engine heater to be installed:*
  - *Type: Calix MVP 223+M9*
  - *Output: 400W*
  - *Installation method: Thread*
  - *Element cable: IK 1.0*

30.2 Installation

1. *Connect a hose to drain tap B (figure 30-1) and empty the cooling liquid into a clean vessel by opening the tap. When the cooling system is empty, close the tap.*
2. *Cut the wings of tap B (figure 30-1), otherwise the engine heater will not fit in.*
3. *Remove 1" plug A between the starting motor and oil filter (figure 30-1).*
4. *Tighten threaded ring C by hand, use thread sealant. NOTE! The threads of the threaded ring are tapered. Do not overtighten.*
5. *Install heating resistor D with aluminium sealing so that the resistor plug points down (figure 30-2).*
6. *Connect the engine heater cable to the resistor plug (figure 30-2).*
7. *Drill holes for screws of the fastener of the engine heater electric plug in the side plate and attach the plug with the fastener (figure 30-3).*
8. *Mount the earth conductor of the heater eg. under the fastener screw, between the body of the MEWP and the nut.*

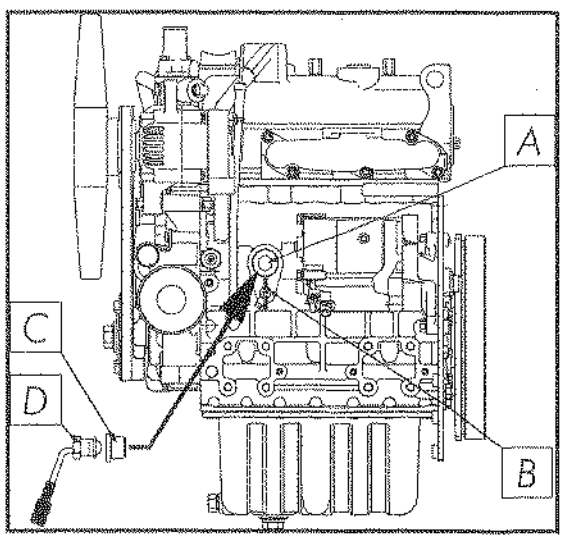


Figure 30-1

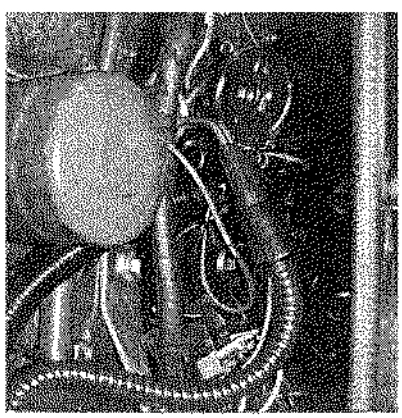


Figure 30-2

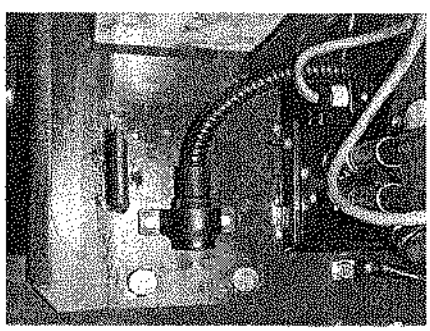


Figure 30-3

31. ADJUSTMENT OF LOAD CONTROL

31.1 Main parts of load control

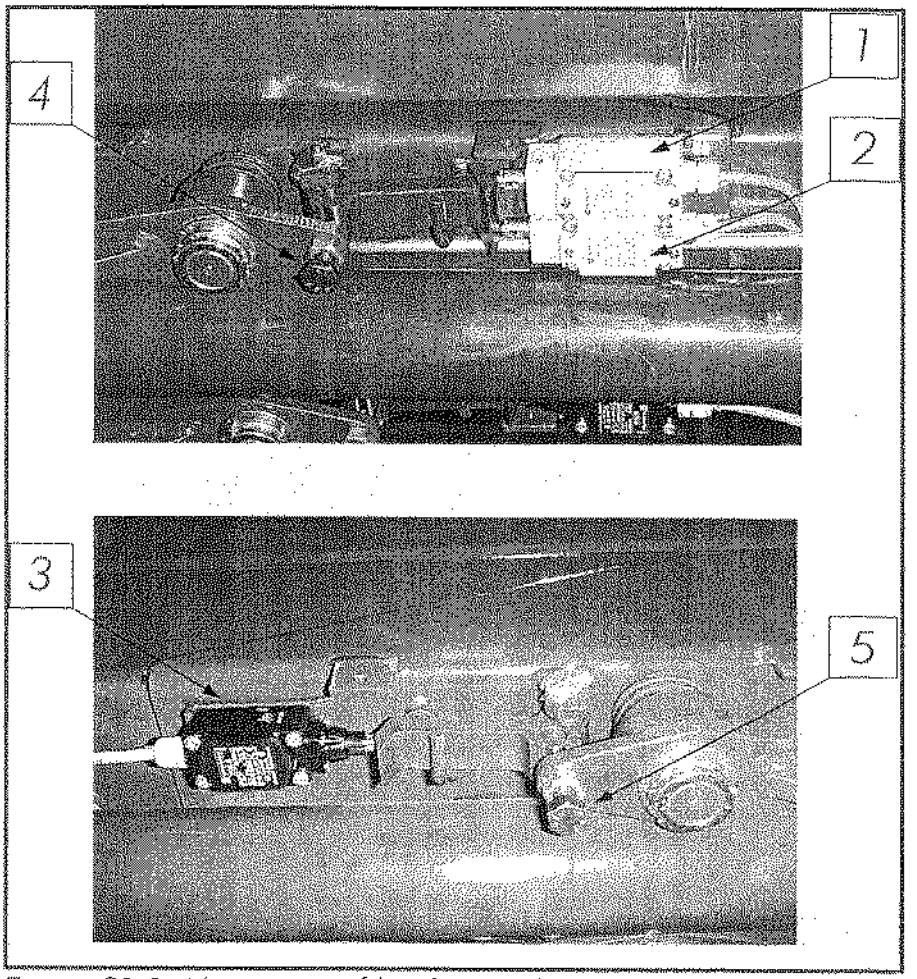


Figure 31-1. Main parts of load control

1.	*Limit switch RK6 for lowering booms and telescope load control*
2.	*Limit switch RK7 for overload signal light*
3.	*Standby safety limit switch RK8 of load control*
4.	*Adjusting screw of load control for lowering booms and telescope as well as overload signal light*
5.	*Adjusting screw of standby safety limit for load control*

Limit switch RK6 for load control stops the lowering of booms and extension of telescope when the adjusted reach has been attained.
Load control needs to be adjusted if:

- *In checking the reach of the telescope (instruction: 9.5.1) the painted mark of the booms becomes entirely visible, that is, the telescope is too far extended.*

- *In checking the lifting radius (instruction: 9.5.2) the booms descend too much, that is the turntable indicator passes the max. marking of the boom.*
- *The markings for checking the reach of the telescope are so worn that checking is not possible.*
- *The decal for checking the lifting radius has come off or is so worn that checking is not possible.*

31.2 Adjustment of load control, case 1

- *Adjust load control in accordance with this instruction, if the markings for checking both the reach of the telescope and the lowering of booms are intact and readable, but booms do not stop at the markings.*

1. *Position the MEWP on a firm surface in horizontal position supported by the outriggers. Check that all four horizontal level indicator lights are on. Raise the booms from the transport support and extend the telescope boom slightly. Extend the jib boom fully and lower the platform so close to the ground that you can safely exit it, with the jib boom extended.*
2. *Turn off the combustion engine from the platform and remove the ignition key.*
3. *Start the combustion engine from the ground guiding point.*
4. *Raise the booms to a horizontal position with the platform empty.*
5. *Drive the telescope out with the telescope out push-button until the movement stops.*
6. *Retract the telescope until the painted markings on the booms disappear out of sight.*
7. *Loosen locking nut 2 of adjusting screw 1 and tighten adjusting screw 1 slightly (figure 31-2).*
8. *Retract the telescope fully in a continuous movement.*
9. *Drive the telescope out in a continuous movement with the telescope out push-button until the movement stops.*
10. *Check the stopping point from the check mark on the booms.*
11. *If the marking is still too far out, repeat steps 6-10. If the booms remain too far in, that is, the check mark does not become visible at all, loosen adjusting screw 1.*

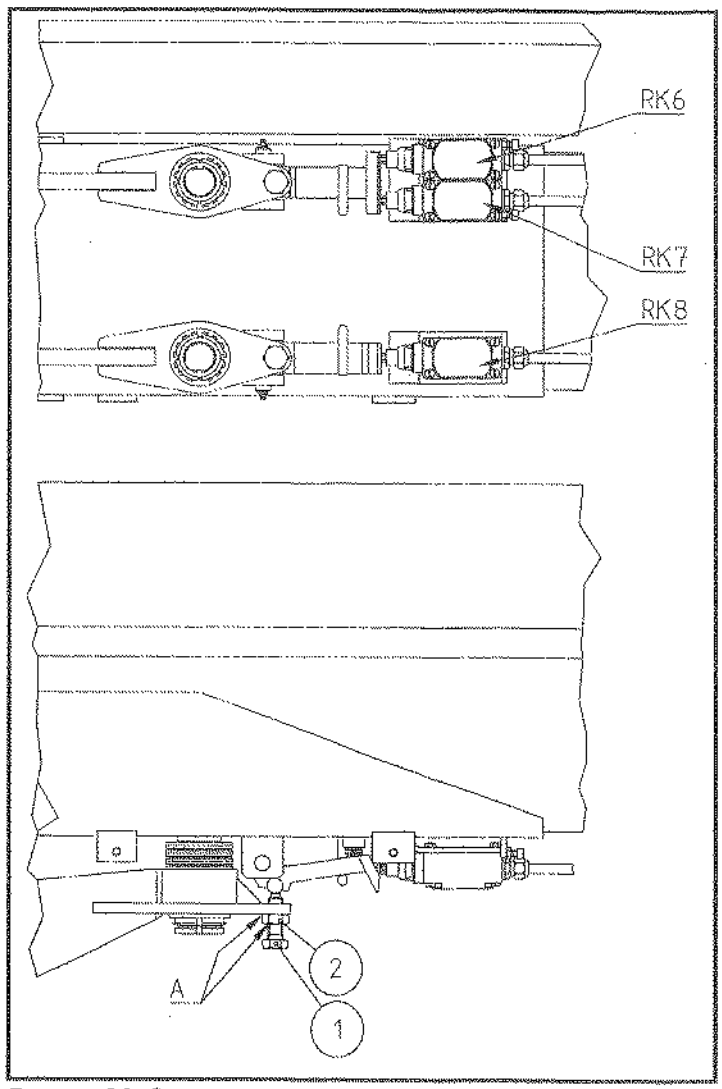


Figure 31-2

12. After adjustment, lock the adjusting screw with locking nut 2 and seal points A (figure 31-2). Check both the reach of the telescope and the lifting radius in accordance with instructions 9.5.1 and 9.5.2.

NOTE ! DO NOT USE THE MEWP IF THE TELESCOPE AND THE LOWERING OF BOOMS DO NOT STOP WITHIN THE LIMITS.

31.3 Adjustment of load control, case 2

- Adjust load control in accordance with this instruction, if the markings for checking the reach of the telescope or the lowering of booms are not readable.

1. Position the MEWP on a firm surface in a horizontal position supported by the outriggers. Check that all four horizontal level indicator lights are on. Raise the booms from the transport support and extend the telescope boom slightly. Extend the jib boom fully and lower the platform so close to the ground that you can safely exit it, with the jib boom extended.
2. Turn off the combustion engine from the platform and remove the ignition key.
3. Place a weight of 230kg ± 2,5kg about 100mm - 150mm from the gate side of the platform, in the middle of the platform in lateral direction.
4. Start the combustion engine from the ground guiding point.
5. Raise the booms to a horizontal position, jib extended.
6. Extend the booms with the telescope in a continuous movement until load control stops the movement.
7. Measure the distance from the gate side of the platform to the tipping centre. If the distance is more than 8800mm, retract the telescope fully and loosen locking nut 2 of adjusting screw 1 and tighten adjusting screw 1 (figure 31-2).
8. Repeat stages 6-7 until load control stops the movement to 8800mm.
9. Retract the telescope fully and raise the booms to an angle of 30°, and extend the telescope in a continuous movement until load control stops the movement. Then measure distance from the platform edge to the tipping centre. The measurement must be 8800mm +50mm / -100mm (figure 31-3). If the lifting radius is exceeded, tighten adjusting screw1 (figure 31-2).
10. After adjustment, check the measurement is accordance with item 9.
11. Retract the telescope fully.
12. Raise the booms all the way up and extend them fully.

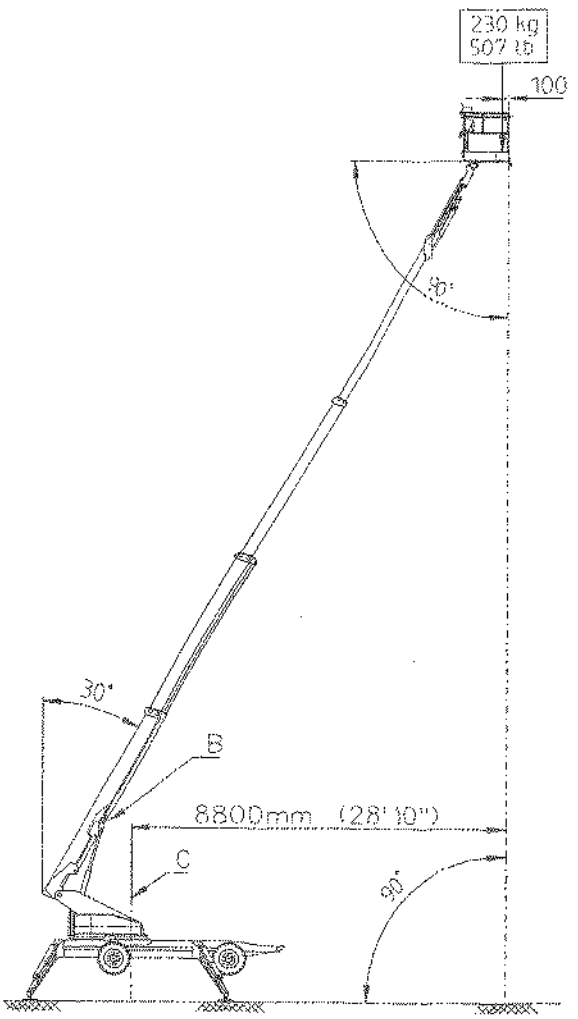


Figure 31-1

13. Lower the booms in a continuous movement with the push-button for lowering the booms until load control stops the movement.
14. Check the distance from the edge of the platform to the tipping centre. The distance must be 8800mm +50mm / -100mm.
15. Check the simultaneous functioning of the telescope and the lowering of booms as follows:
    15.1 Retract the booms 1/3 of their max. length.
    15.2 Raise the booms to an angle of approx. 65° from the horizontal.
    15.3 Extend the telescope and lower the booms simultaneously by pressing the push-buttons of both movements at the same time, until load control stops both movements.
    15.4 If the difference between the stopping points of the movements is more than ±100mm, check the connection and operation of limit switch RK6.
16. Seal points A (figure 31-2)

32. ADJUSTMENT OF OVERLOAD SIGNAL LIGHT LIMIT SWITCH RK7

– Before adjustment of overload signal light limit switch, load control has to be correctly adjusted.

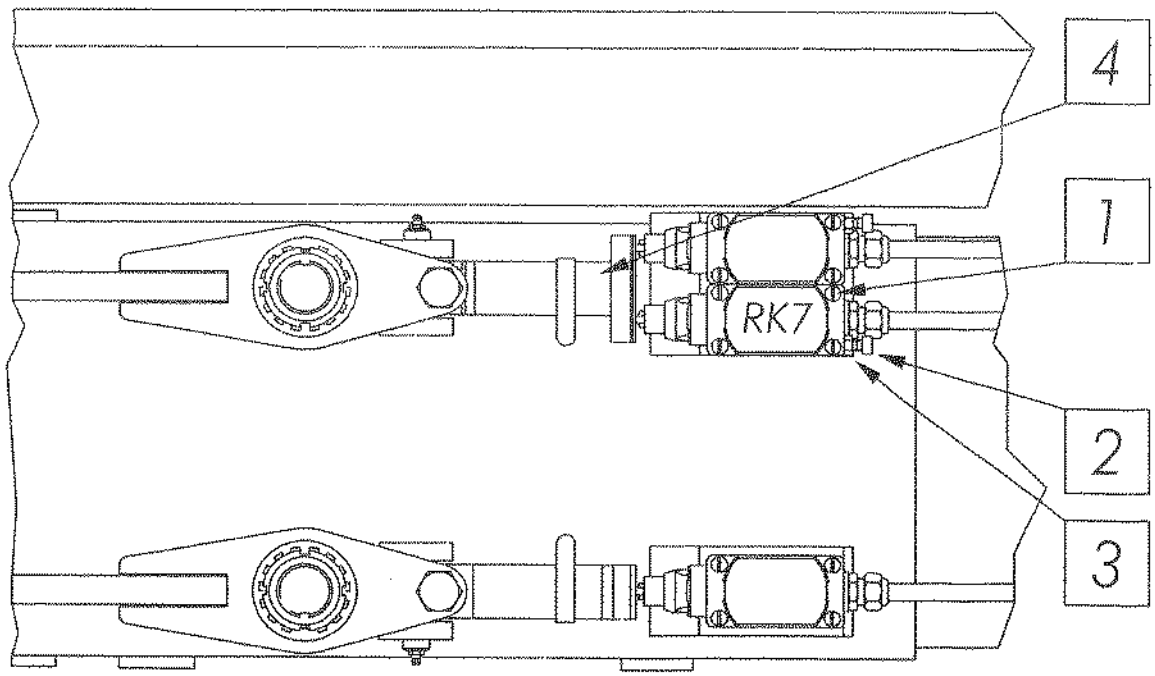


Figure 32-1

1. Position the MEWP on a firm surface in a horizontal position supported by the outriggers. Check that all four indicator lights of the horizontal level indicator are on. Guide the booms from the platform to an angle of 30° - 40° from the horizontal.
2. Extend the booms with the telescope up lever until load control stops the movement.
3. The overload signal light should go on when load control has stopped the lowering of the boom and telescoping. The overload signal light may stop about 100 mm before the movement stops.
4. If the overload signal light does not go on when the movement of the booms stops, loosen fixing screws 1 of limit switch RK7 (figure 32-1).

5. Open locking nut 3 of adjusting screw 2 and tighten adjusting screw 2, in which case the position of the limit switch moves a little closer to lever 4.
6. Tighten adjusting screws 1 and locking nut 3 of the limit switch.
7. Check the correct lighting up of overload signal light according to points 1-3 and readjust, if necessary.
8. Seal fixing screws, adjusting screw and locking nut of the limit switch.

33. SETTING THE CHECK MARKS FOR THE REACH OF THE TELESCOPE

– Before setting the check marks for the reach of the telescope, load control has to be correctly adjusted.

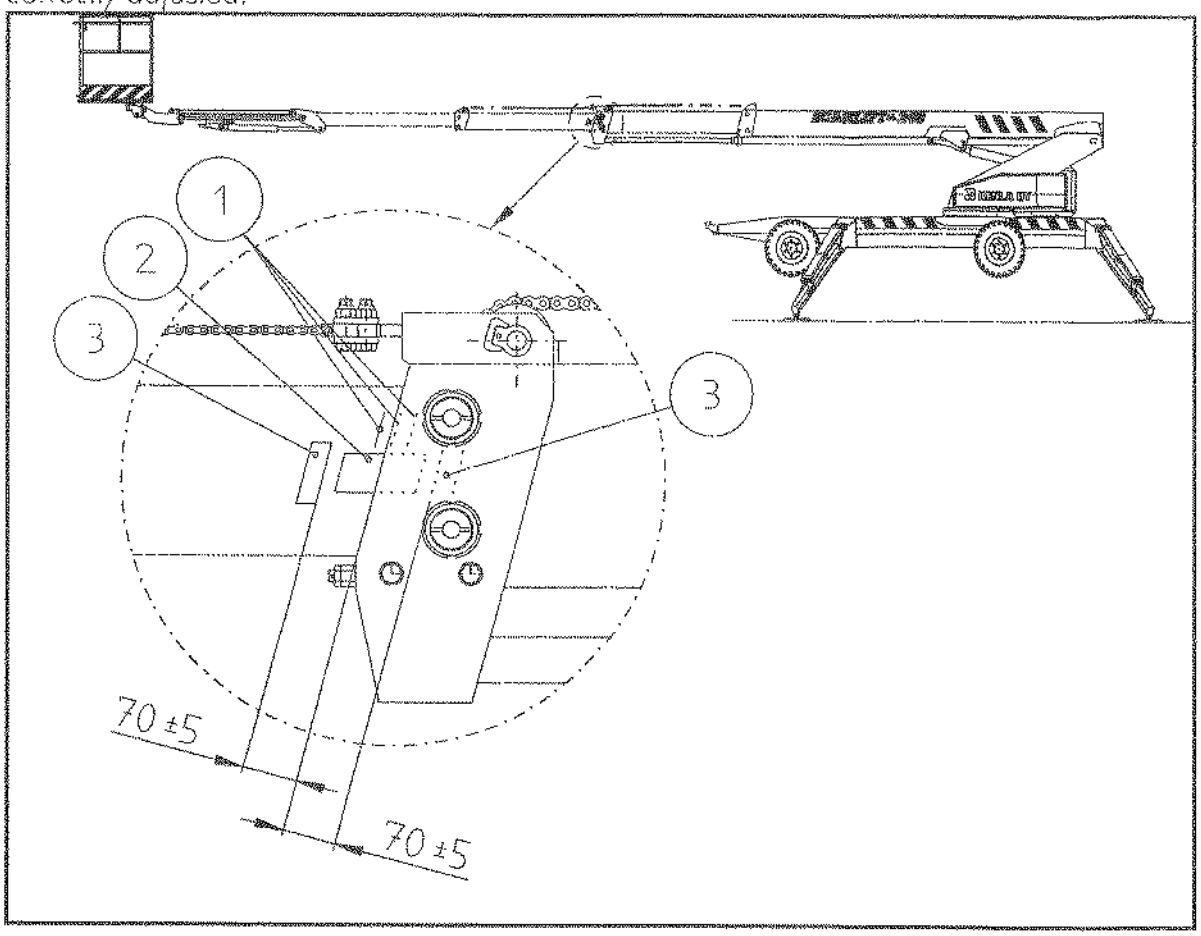


Figure 33-1

1.	Marks of stopping point
2.	Black tape 50 x 100mm
3.	Painted marking 25 x 80mm

1. Position the MEWP on a firm surface in a horizontal position supported by the outriggers. Check that all four indicator lights of the horizontal level indicator are on. Raise the booms from the transport support and extend the telescope boom slightly. Extend the jib fully and lower the platform to the ground with the jib straight extended.
2. Turn off the combustion engine from the platform and remove the ignition key.
3. Start the combustion engine from the ground guiding point. The platform has to be completely empty.

4. *Raise the booms so that they are at horizontal with the ground, with the jib straight extended.*
5. *Extend the booms with the telescope in a continuous movement until load control stops the movement.*
6. *Retract the telescope fully. Repeat item 5 three times.*
7. *Mark the stopping point of the telescope each time to the middle boom extension at the mouth of the previous boom extension (ref. 1, figure 33-1).*
8. *Retract the booms, lower the jib boom.*
9. *Extend the booms with the telescope out push-button in a continuous movement until load control stops the movement.*
10. *Take the average of the three markings and place the middle of decal 2 (figure 33-1) there. Paint markings on the booms as indicated in figure 33-1. Position decal and painted markings so that side glide pads of the booms do not rub them.*
11. *Check the reach of the telescope in accordance with instruction 9.5.1.*

34. SETTING THE CHECK MARKS FOR LOWERING THE BOOMS

– *Before setting the check marks for lowering the booms, load control has to be correctly adjusted.*

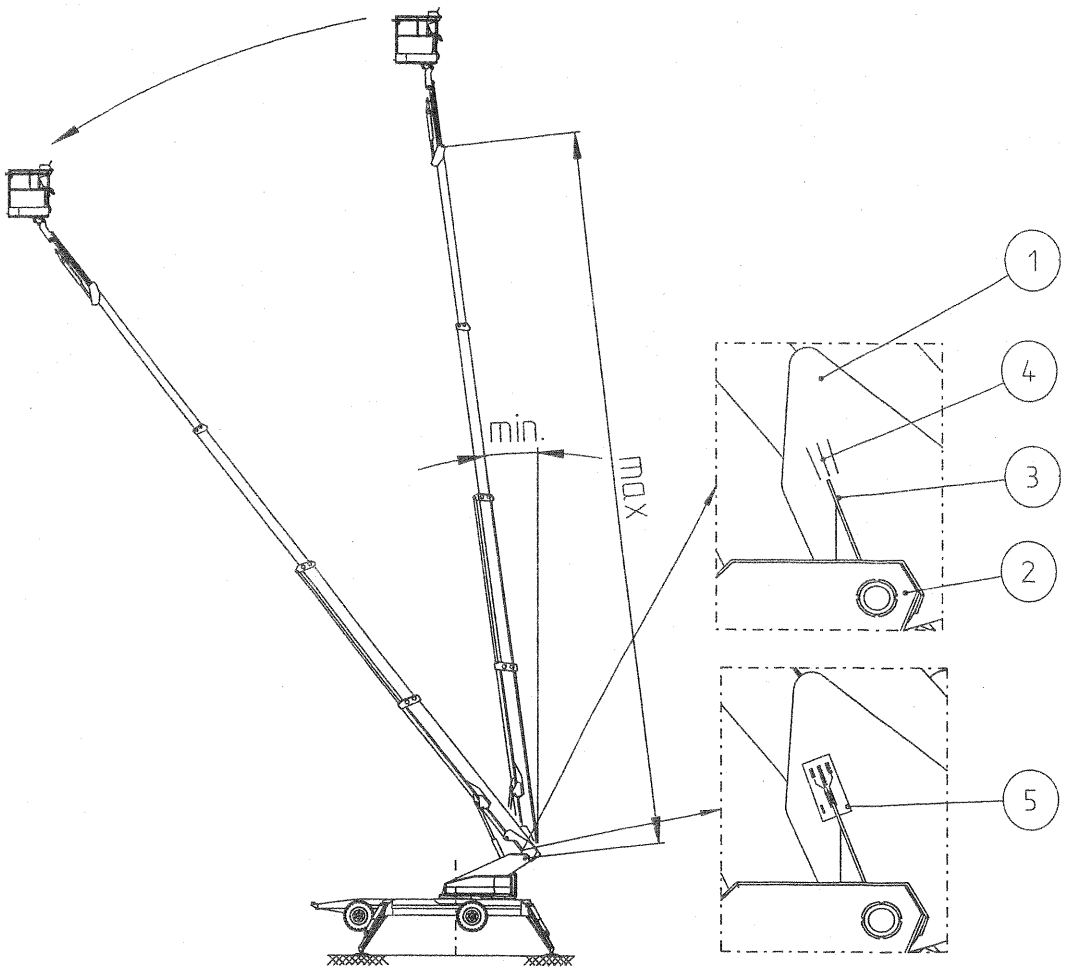


Figure 34-1

1.	*Lifting boom lug*
2.	*Turntable*
3.	*Turntable indicator*
4.	*Marks of stopping point*
5.	*Decal for checking the stopping point (spare part no: 3280521)*

1. *Position the MEWP on a firm surface in a horizontal position supported by the outriggers horizontal to the ground. Check that all four indicator lights of the horizontal level indicator are on. Raise the booms from the transport support and extend the telescope boom slightly. Extend the jib fully and lower the platform to the ground with the jib straight extended.*
2. *Turn off the combustion engine from the platform and remove the ignition key.*
3. *Start the combustion engine from the ground guiding point. The platform has to be completely empty.*

4. Raise the booms all the way up with the jib extended.
5. Extend the booms fully with the telescope in a continuous movement (figure 34-1).
6. Lower the booms with the lowering of booms push-button in a continuous movement until load control stops the movement. Mark the stopping point of the booms on the lifting boom lug at the point indicated by the turntable indicator.
7. Raise and lower the booms again. Repeat stages 6-7 three times.
8. Mark the stopping point on the lifting boom lug each time (ref. 4, figure 34-1).
9. Take the average of the three marks and attach decal 5 (figure 34-1) so that the line NORMAL is on the average point .
10. Check the reach of the telescope in accordance with instruction 9.5.2.

35. ADJUSTMENT OF STANDBY SAFETY LIMIT RK8 OF LOAD CONTROL

– Check the operation of the standby safety limit of load control in accordance with instruction 9.5.3. If the standby limit does not function according to the checking instruction, adjust it in accordance with this instruction.

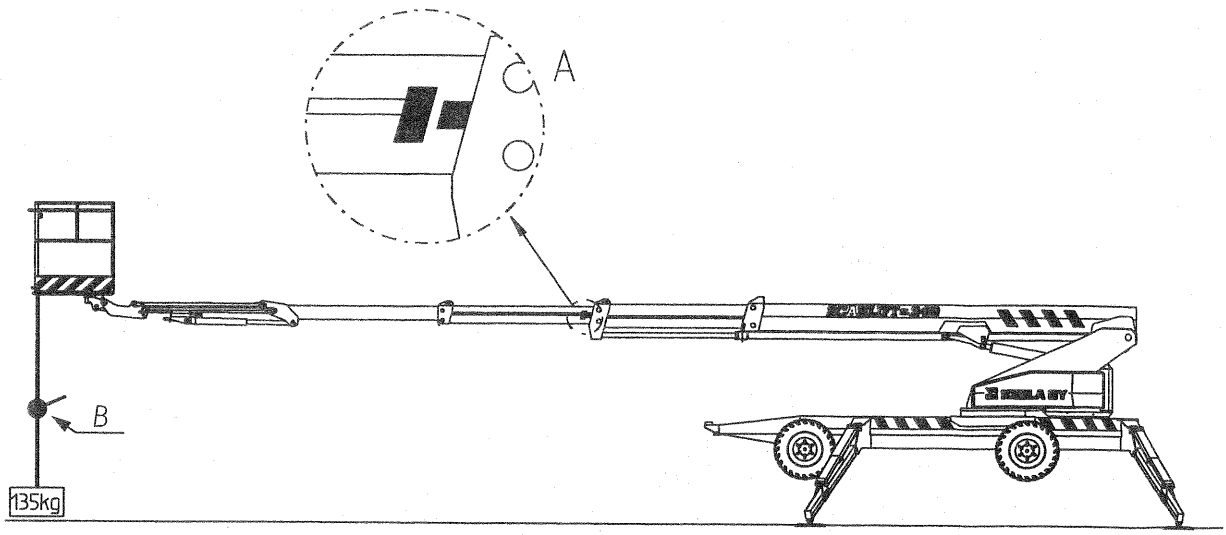


Figure 35-1

1. Extend the jib fully from the platform and lower the platform, with the jib still extended, so close to the ground that you can safely exit the platform. Empty the platform and turn off the MEWP from the platform. Remove the ignition key.
2. Start the engine from the ground guiding point and raise the booms to a horizontal position.

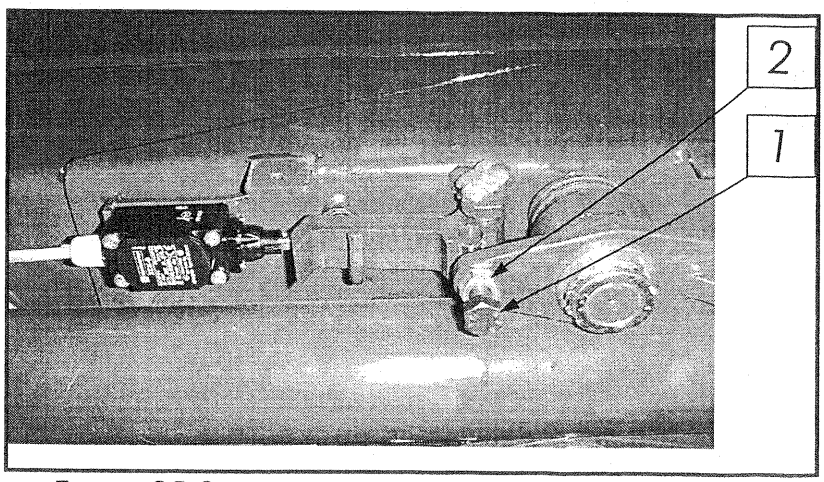


Figure 35-2

3. Extend the telescope with the telescope out push-button in a continuous movement until the movement stops. The movement has to stop when the middle painted mark on the booms becomes visible (point A figure 35-1).

4. *Attach a wire tackle (B, figure 35-1) to the lug under the edge of the platform.*
5. *Carefully lift a 135 - 150 kg weight slightly off the ground with the tackle.*
6. *Loosen locking nut 2 of adjusting screw 1 (figure 35-2).*
7. *Tighten adjusting screw 1 slowly until the combustion engine stops.*
8. *Tighten locking nut 2.*
9. *Use the tackle to lower the weight to the ground.*
10. *Retract the telescope by starting the combustion engine and simultaneously pressing the telescope in push-button.*
11. *Start the combustion engine and check the operation of the standby safety limit in accordance with instruction 9.5.3.*
12. *Readjust, if necessary*
13. *Seal the adjusting screw and locking nut.*

User Guide for the Kesla SL 240 Program Module

GENERAL

The program module functions can be accessed from menus. You can select the desired function by pressing

a number key or by browsing using the keys SHIFT ⬆ 8 *or* SHIFT + ⬇ 2

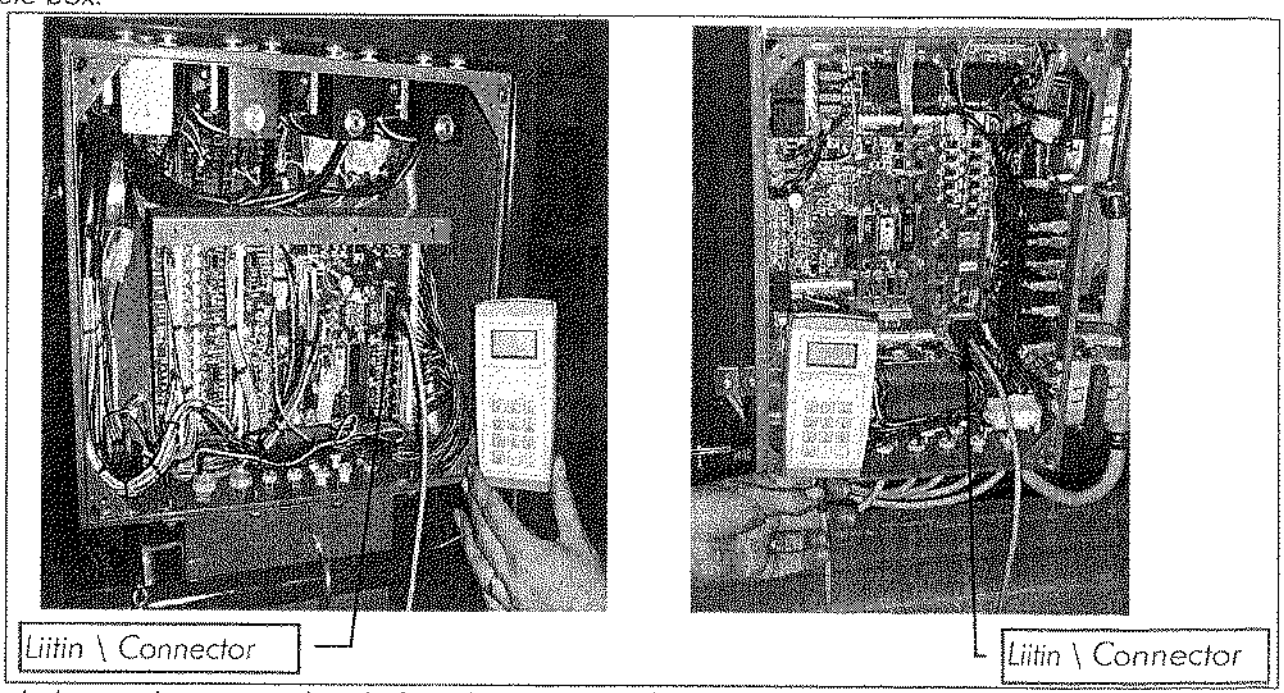
The name of the function selected will appear on the screen.

You can confirm all selections by pressing the Clear Enter *key.*

You can move back in the menus by pressing SHIFT + F2 9

START-UP

1. Connect the program module to the 9-pin D-connector on the circuit card of the platform box or turntable box.



2. Switch the machine on at the platform box. You need not start the motor.

*3. The words **"KESLA"** (top row) and **"SL240 "** (bottom row) will appear on the program module display screen.*

4. When connection with the program module and the control system has been made, the screen momentarily displays the program versions of the platform and turntable boxes.

5. Next, ***"1: FINNISH"*** *(default) or* ***"2: ENGLISH"*** *will appear on the screen. This refers to choice of language. Press 1 for Finnish or 2 for English.*

Main Menu

"1: Settings" *Set base values or new values.*

"2: Calib." *Center or calibrate control rods.*
(Starting with system circuit version 3.1)

"3: Testing" *Test operations.*
(Starting with system circuit version 5.0)

SETTINGS MENU

"1: Base values" *(Starting with system circuit version 3.1)*
"2: New values"

Base values

If you select the base values option, the system adopts the permanently programmed default values for all adjustable operations. A message reporting the success or failure of the data storage appears on the screen.

New values

If you select the new values option, you are able to set new values one by one for all of the adjustable operations. You can exit the menu for setting new values by saving the values.

Values can be changed using the number keys. The cursor shows which digit in the series can be changed at a given time. When you change the digit where the cursor is, the cursor automatically shifts one place to the right.

You can also move the cursor using the keys SHIFT + 6 or SHIFT + 4

SHIFT + Clear Enter *keys will delete digit at the cursor.*

The available functions are:

"1: Outrigger" *(Only used in system circuit version 5.10)*

"PWM" *= The constant for regulating the PWM of the outriggers' proportional valve S3. Default is 80%.*

"2: Boom"

"1: PWM min"

= Minimum values for the platform box boom control, i.e. when the control rods are positioned at approximately a ± 2 degree angle, at the microswitch clutch point, that is. The settings are arranged in the following order with these default values:

- **"Left"**, default 24%.
- **"Right"**, default 24%.
- **"Up"**, default 22%.
- **"Down"**, default 23%.
- **"In"**, default 20%.
- **"Out"**, default 15%.

The value must lie between 0 and 100% and be less than the corresponding maximum value.

"2: PWM max"

= Maximum values for the platform box boom control, i.e. those at which the control rods are at their maximum positions. The settings are arranged in the following order with these default values:

- **"Left"**, default 45%.
- **"Right"**, default 45%.
- **"Up"**, default 35%.
- **"Down"**, default 40%.
- **"In"**, default 65%.
- **"Out"**, default 65%.

All value settings must lie between 0 and 100%.

"3: PWM ground" (Starting with system circuit version 4.0)

= Turntable push-button box boom control constants.
The settings are arranged in the following order with these default values:

- **"Left"**, default 45%.
- **"Right"**, default 45%.
- **"Up"**, default 45%.
- **"Down"**, default 45%.
- **"In"**, default 45%.
- **"Out"**, default 45%.

"4: Ctrl X1" (Starting with system circuit version 4.0).

= Control point x1 adjusts the linearity of the boom control (the x axis value of the point determining the curvature of the guide curve) when the control rods are used to move the boom from the minimum to the maximum. The settings are arranged in the following order with these default values:

- *"Left", default 60%.*
- *"Right", default 60%.*
- *"Up", default 60%.*
- *"Down", default 60%.*

The values must lie between 0 and 100%.

"4: Ctrl Y1" *(Starting with system circuit version 4.0)*

= Control point x1 adjusts the linearity of the boom control (the y axis value of the point determining the curvature of the guide curve) when the control rods are used to move the boom from the minimum to the maximum.
The settings are arranged in the following order with these default values:

- *"Left", default 30%.*
- *"Right", default 30%.*
- *"Up", default 30%.*
- *"Down", default 30%.*

The values must lie between 0 and 100% and be at least as high as the corresponding boom movement's minimum value (PWM min).

"3: Delay"

"1: PWM freq." *(Starting with system circuit version 3.7)*

= PWM frequency regulator for the valve axle electric control signal. Value range 0 – 200 Hz. Low frequencies may cause vibration. At high frequencies, control may feel smoother. Default is set at 175 Hz.

"2: ms/step"

= regulates boom and drive control acceleration. When set at 0, control becomes totally regulated by the control rod, and jumps directly from minimum to maximum when the control rod is turned quickly from the center position to an outer extreme. Increasing the ms/step value slows down the movement of such change. This, therefore, is how to eliminate abrupt jerking if the control rod is handled roughly. The default is 8 and the value range 0 - 100.

"3: Motor slowdown"

= the time in which the motor continues at full cycle after some control movement. The default is 5, the value range 0 - 9999 and the unit of measurement s (seconds).

"4: Motor revs up"

= the lag time it takes to regulate pressure valve S1 while maneuvering some boom movement when the motor is idling. The default is 400, the value range 0 - 9999 and the unit of measurement ms (milliseconds).

"5: S1"

= *the lag time it takes to regulate pressure valve S1 while maneuvering some boom movement when the motor is idling. The default is 0, the value range 0 - 9999 and the unit of measurement ms (milliseconds).*

"4: Drive"

The maximum and minimum values of the drive controls. The same value affects both turning and slow and fast drive. The values appear in the following way:

- ***"max fwd."*** = *Max v forwards, default 80%.*
- ***"max rew."*** = *Max v backwards, default 80%.*
- ***"min fwd."*** = *Min v forwards, default 13%.*
- ***"min rew."*** = *Min v backwards, default 13%.*

The values must lie between 0 and 100%. The minimum value must be smaller than the corresponding maximum value.

"5: Save"

Must always be selected after setting the values. You cannot exit the menu for setting new values without saving the values.

CALIBRATION MENU

"1: Centering" = *Centering the control rods.*
The system retrieves the center positions of the control rods and saves them. During the centering, the control rods must be left freely in the center position in order to get the correct values.

"2: Calib." *(Starting with system circuit version 3.1)*

"1st Joystick "
"2nd Joystick "
"3rd Joystick "
"4th Joystick "

The numbers correspond to the control rods in the following way:

1 = control rod for turning the boom (the rod farthest to the left, or the joystick plus direction).
2 = control rod for raising and lowering the boom (second from the left, or the up/down directions on the joystick).
3 = control rod for raising and lowering the boom (second from the right).
4 = control rod for moving the jib up and down (furthest right).

Once you select a control rod you can begin its calibration. From this point on, follow the directions on the screen as explained here:

*The message **"Turn Rod 1 left to min."** appears on the screen. You must turn the joystick to the left to the control's starting point MIN + (the spot where the microswitch clicks into minimum). The message stays on the screen for about two seconds. Then "MIN +: 0" appears, which means that the system has begun to read the control rod position. When the microswitch clicks as the user is pushing the control rod, the AD conversion result corresponding to the rod's location appears as a decimal number on the screen (base 10 numeral). If the microswitch clutch point is the desired control starting point, gently push the control rod to that spot. The control rod can also be pulled backwards, which causes value 0 to appear on the screen when the switch is turned off. The microswitch clutch point can be ascertained when some value other than 0 appears on the screen. The calibration value is accepted only when its reading has not changed for one (1) second.*

*The message **"Turn Rod 1 to max"** appears on the screen next. You must turn the joystick to the maximum position (the control's maximum position, usually the extreme limit of the control rod's reach). The message is only displayed for about two (2) seconds, during which period you should begin pushing the control rod to its most extreme position. You should push the control rod directly into its calibration position, because if the value is not increased within one (1) second, the largest number observed is selected. **"MAX+: (some number)"** appears on the screen.*

*Next, a message will appear telling you to turn the control rod to the right to minimum: **"Turn Rod 1 right to min"**. This command stays for about 2 seconds, after which **"MIN-: 0"** appears on the screen. You can set the minimum point the same way as in the other direction.*

*Now the display tells you to turn the rod to its maximum point: **"Turn Rod 1 to max"**. The smallest AD conversion result is measured and if the result does not decrease within one (1) second, the value is accepted.*

*When all (4) values have been stored, the message **"VALUES SAVED"** appears, and the program moves back to rod selection. You can select the next control rod to be calibrated from the menu.*

Testing menu

You can only exit the testing mode by switching the power off.

*From the main menu, choose option 3 for operation testing. If the connections work, the system will shift to test mode at this point. If the connections do not work, the program terminal will show a possible error message, or the words **"connection inoperable"**, if the program module cannot make any connection with the system.*
When the system has shifted into test mode, you can select the desired test:

"1: Data transmission"
"2: Boom functions"
"3: Jib functions"
"4: Driving functions"
"5: Outrigger functions"

Data transmission

This tests data transmission between the platform, turntable and chassis boxes. If no error is noted during data transmission, the message ***"No errors during data transmission"*** *appears. If errors are noted, the error code appears on the display. All error codes are listed and explained in the attachment. The error code remains on the screen until any key is pressed.*

Boom functions

In this test, all valve controls affecting the boom movements, and the S2 valve control, are checked first. Then, limits affecting the boom movements are read.
The valve control test indicates whether the circuit card has a short circuit or interruption and whether there is a short circuit in the valve wiring. However, the test does not determine whether wiring is unattached or broken. Faults that are discovered are listed by code. If no errors are detected in valve control, a message appears on the screen saying ***"Faultless valve control"****, and if no errors are detected in the status of the limit switches, the message* ***"Faultless limit status"*** *will appear. . After this, the test selection menu returns.*

Jib functions

The jib test is like the boom test, except that in this test it is the platform valve controls which are checked. The limit switches are the same. In addition, in this test, after the valve controls are monitored, the platform lights are also checked, one after the other for approximately 1/2 second. In this way, it can be visually ascertained whether the control for the lights is functioning.

Driving functions

This test checks the conditions affecting the driving operation: the condition of the limit switch RK5, the condition of the support / drive switch and the condition of the pedal. An error code reports any incorrect conditions noted.

Outrigger functions

In a similar manner as the driving functions.

Control points x1 and y1

(Starting with system circuit version 4.0)

These control points are used to regulate how changes in the control rod position affect the boom movement speed. When x1 = 0 and y1 = the boom control minimum value, the boom movement speed increases smoothly from the designated minimum value to maximum value as the control rod is moved from its center position to the extreme position (diagram 1, where the control's minimum value is 20 and maximum value 80).

Increasing control point x1 makes the movement speed increase more gently at the beginning and more sharply at the end. Increasing control point y1 has the opposite effect. By adjusting control points x1 and y1, you can adjust the relation between boom speed and control rod position to be exactly as you want it. Diagram 2 shows the control arc for boom turns (left, right) at default settings, and diagrams 3 and 4 illustrate the extreme options for all values.

The settings are arranged in the following order with these default values:

Control point x1:

Boom left, default 60%.
Boom right, default 60%.
Boom up, default 60%.
Boom down, default 60%.

Control point y1:

Boom left, default 30%.
Boom right, default 30%.
Boom up, default 30%.
Boom down, default 30%.

Values for control point x1 must lie between 0 and 100%.
Values for control point y1 must lie between 0 and 100%. The minimum value, however, must be at least as great as the corresponding boom movement's minimum value (PWM min).

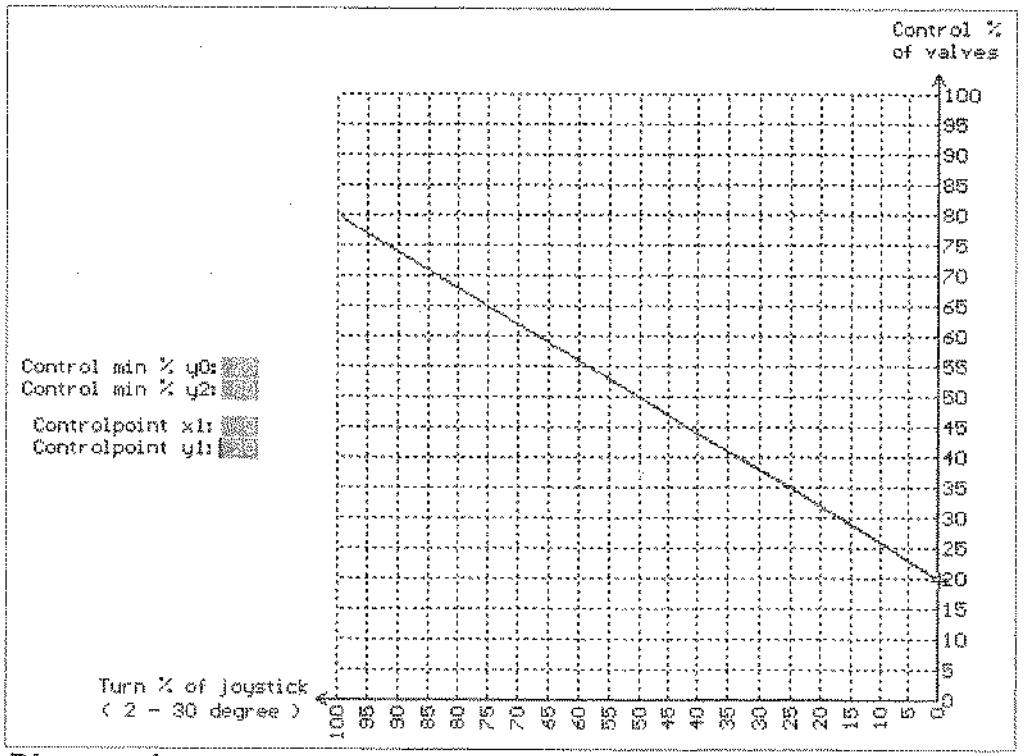


Diagram 1

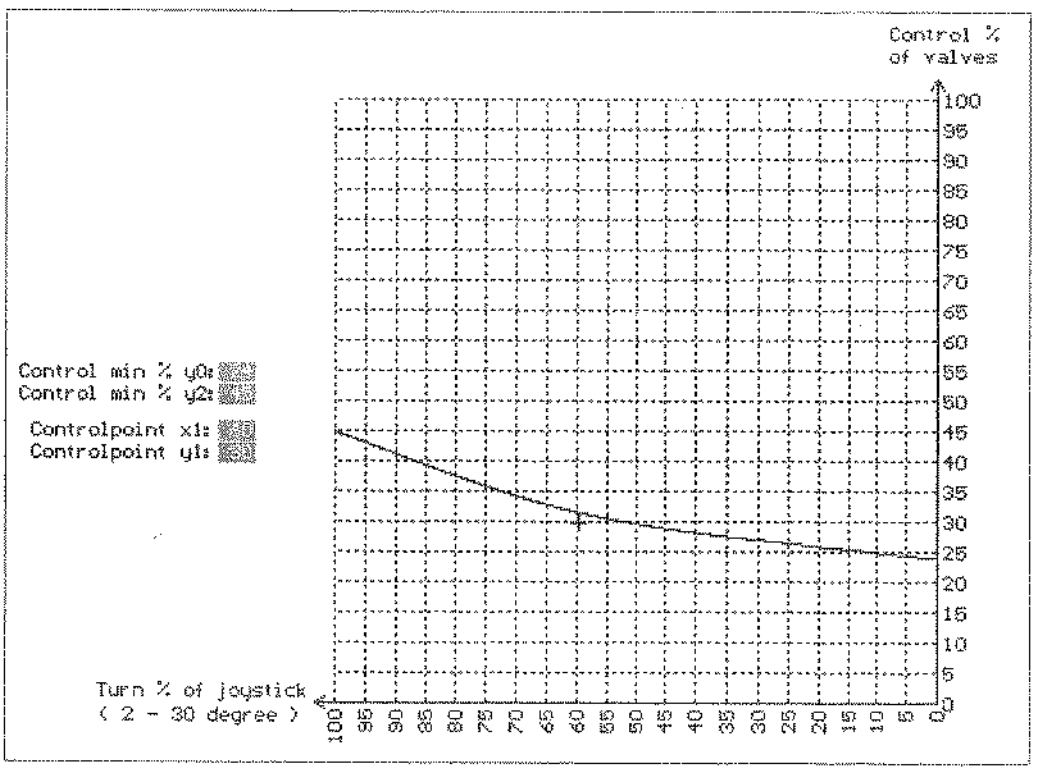


Diagram 2

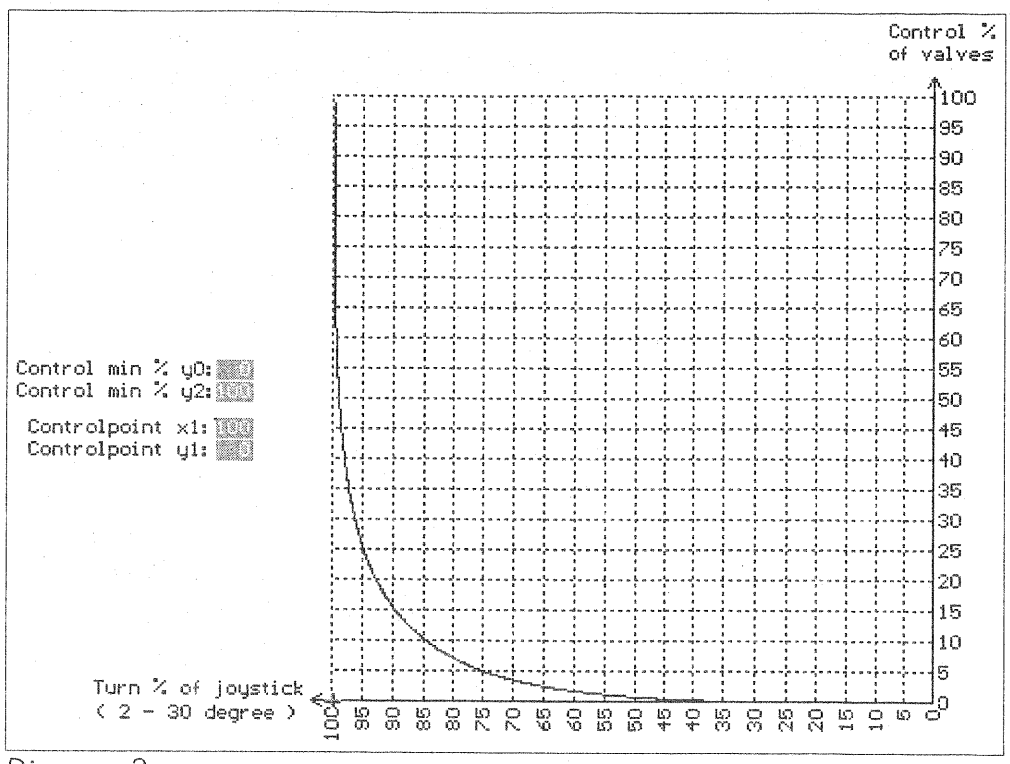


Diagram 3

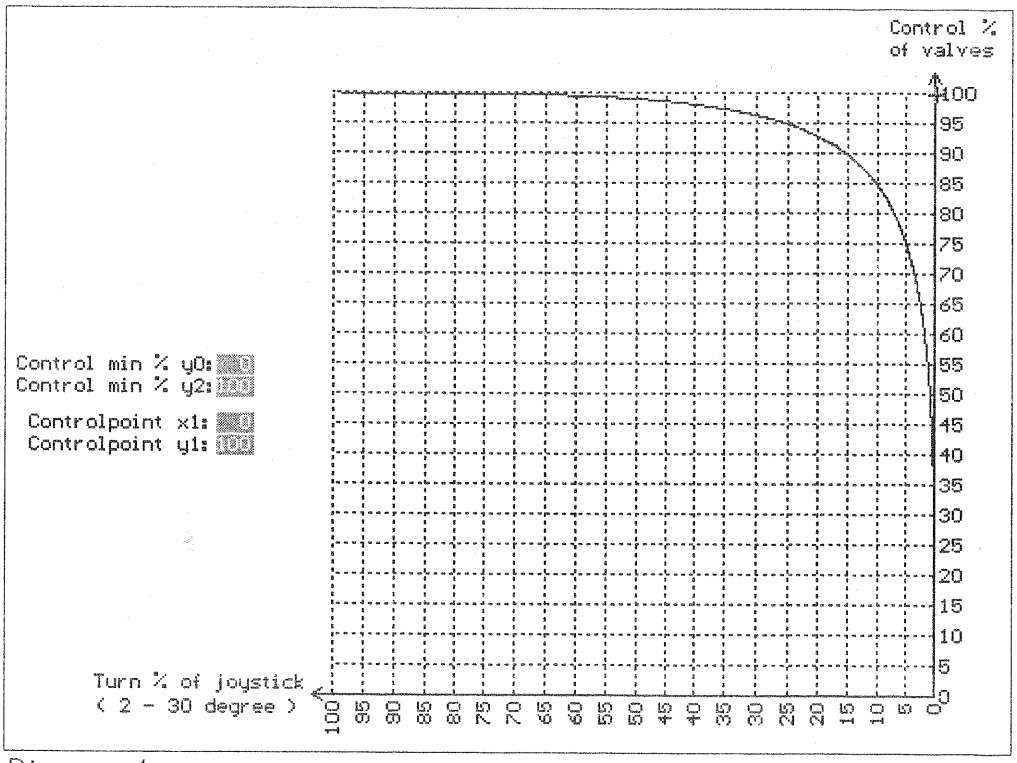


Diagram 4

ERROR CODES IN TESTING SL 240

#LS1 Outriggers above the ground, prevents boom movements unless the override switch is used.

#LS5 Boom on the chassis, prevents other boom movements except raising/lowering and inwards.

#!LS5 Boom off the chassis, prevents driving and control of outriggers unless the override switch is used.

#LS6 Switches of overload limits RK6 and 7 have tripped and cut the motor.
#LS8 Switch of standby overload limit RK8 has tripped and cut the motor.

#!S16 Foot pedal is engaged, prevents driving and control of outriggers.

#S17 Outriggers/driving switch in position outriggers, prevents control of driving.

#!S17 Outriggers/driving switch in position driving, prevents control of outriggers.

#CE1 Disturbance in data transmission between Ground guiding box and Platform box. May be caused by an external disturbance or temporary synchronization error of the transmitter circuit. The disturbance is temporary and very unlikely.

#CE2 Data transmission failure between Ground guiding box and Platform box. Caused by cable break or failure of transmitter circuit. This also happens when new parameters are programmed with the programming device, in which case it can be ignored.

#CE3 Disturbance in data transmission between Platform box and Ground guiding box.

#CE4 Data transmission failure between Platform box and Ground guiding box.

#CE5 Disturbance in data transmission between Ground guiding box and Chassis box.

#CE6 Data transmission failure between Ground guiding box and Chassis box.

#CE7 Disturbance in data transmission between Chassis box and Ground guiding box.

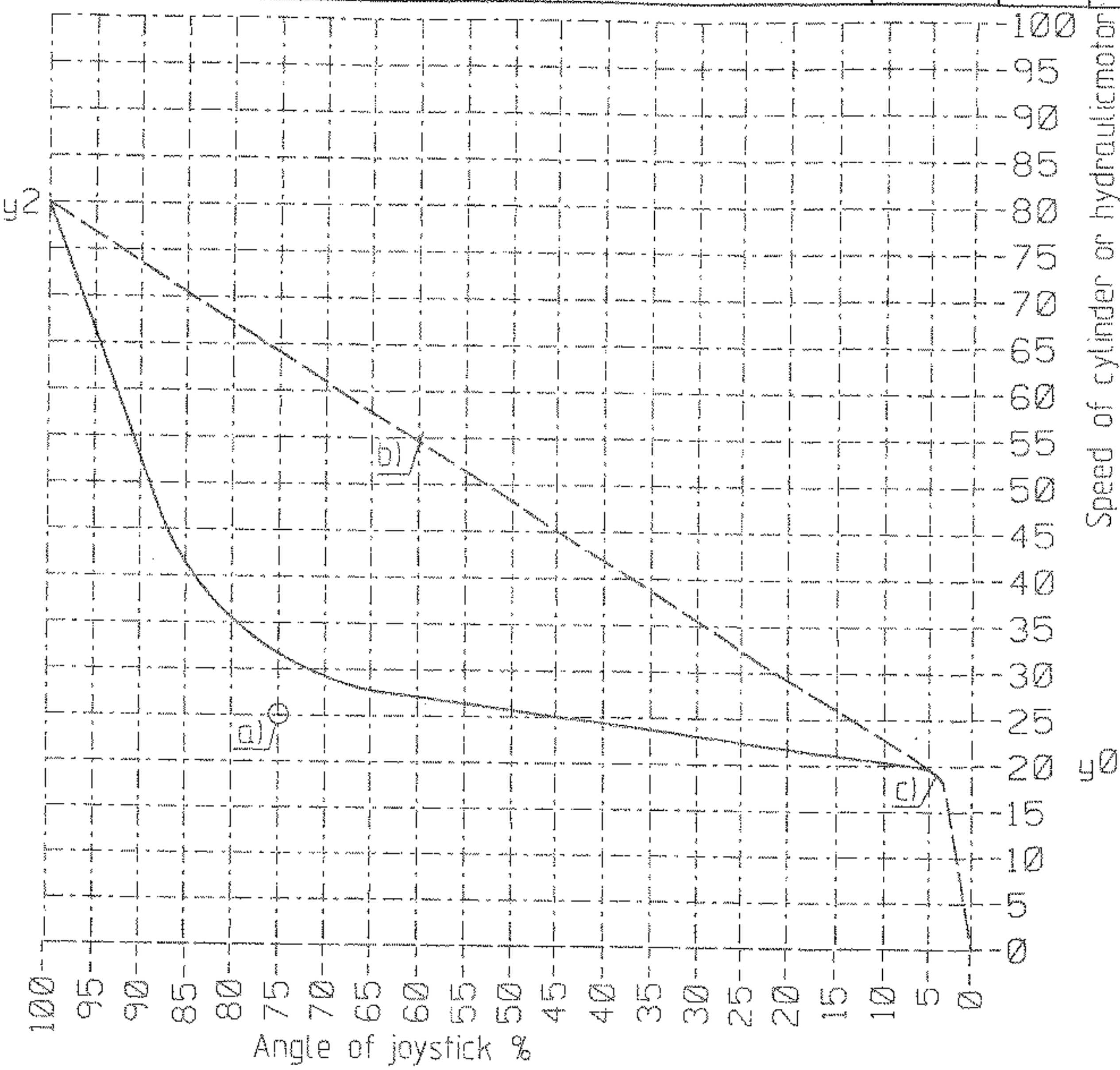
#CE8 Data transmission failure between Chassis box and Ground guiding box.

#OE1 – OE30 Short circuit in the valve output corresponding to the number (S1 – S30).

#OE31 Short circuit in starting line output.

#OE1#SCx – OE30SCx
Another valve is moved when controlling the valve corresponding to the number, i.e. there is a short circuit between the valve controls.

Pvm	Nimi	Muutos	Merkki	Vaihtokelp. säilyy Kyllä	Ei

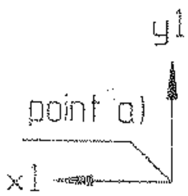


e.g.: y2 = 80% y2.= Max. speed of cylinder or hydraulicmotor.

y0 = 20% y0.= Movements smoothness in start

x1 = 75% y1.= Point a) vertical adjustment.

y1 = 25% x1. = Point a) horizontal adjustment



a). Adapted funktion

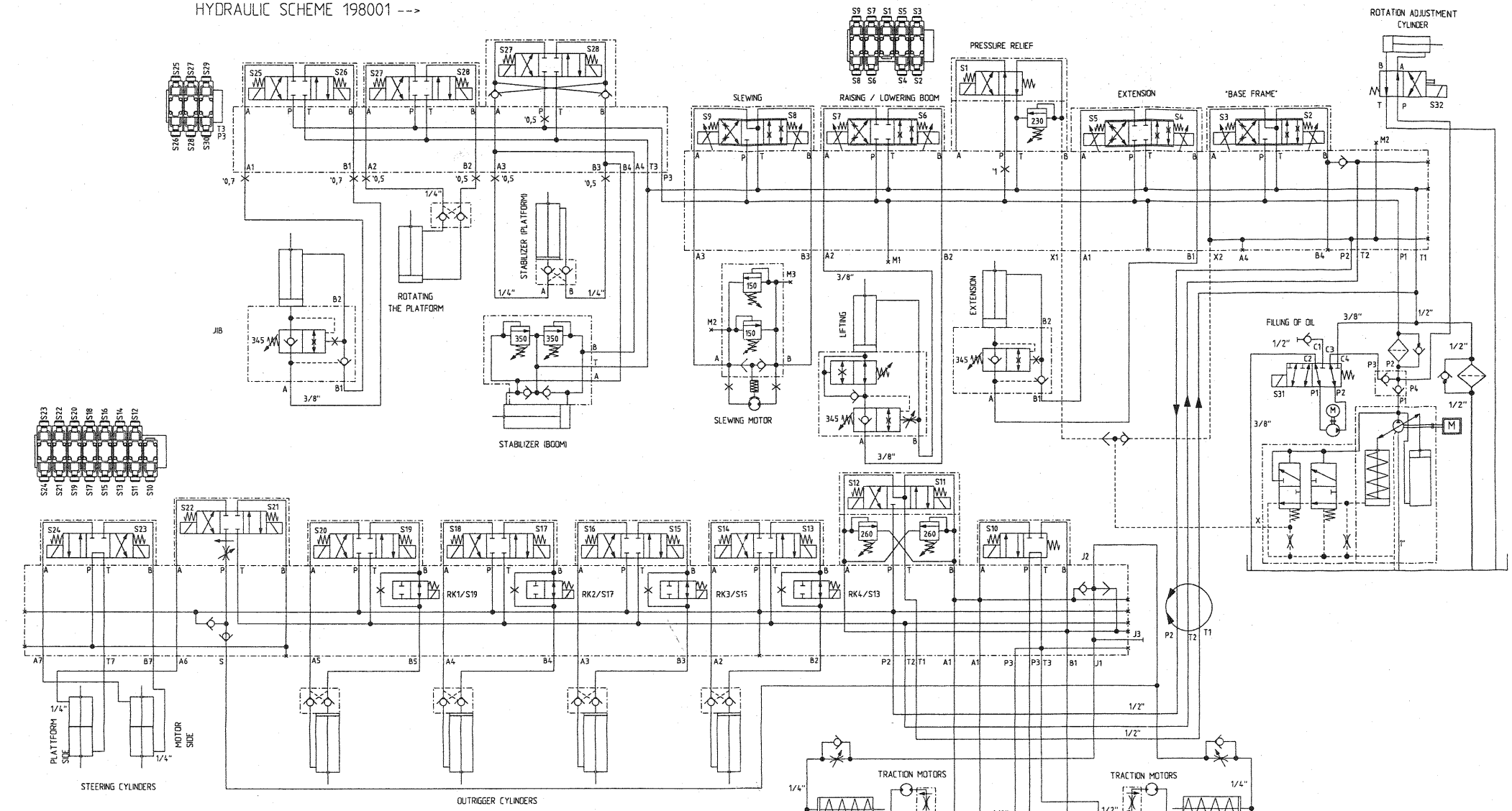
b) Normal funktion

c) Opening point of cylinder outlet (spool of hydraulicvalve)

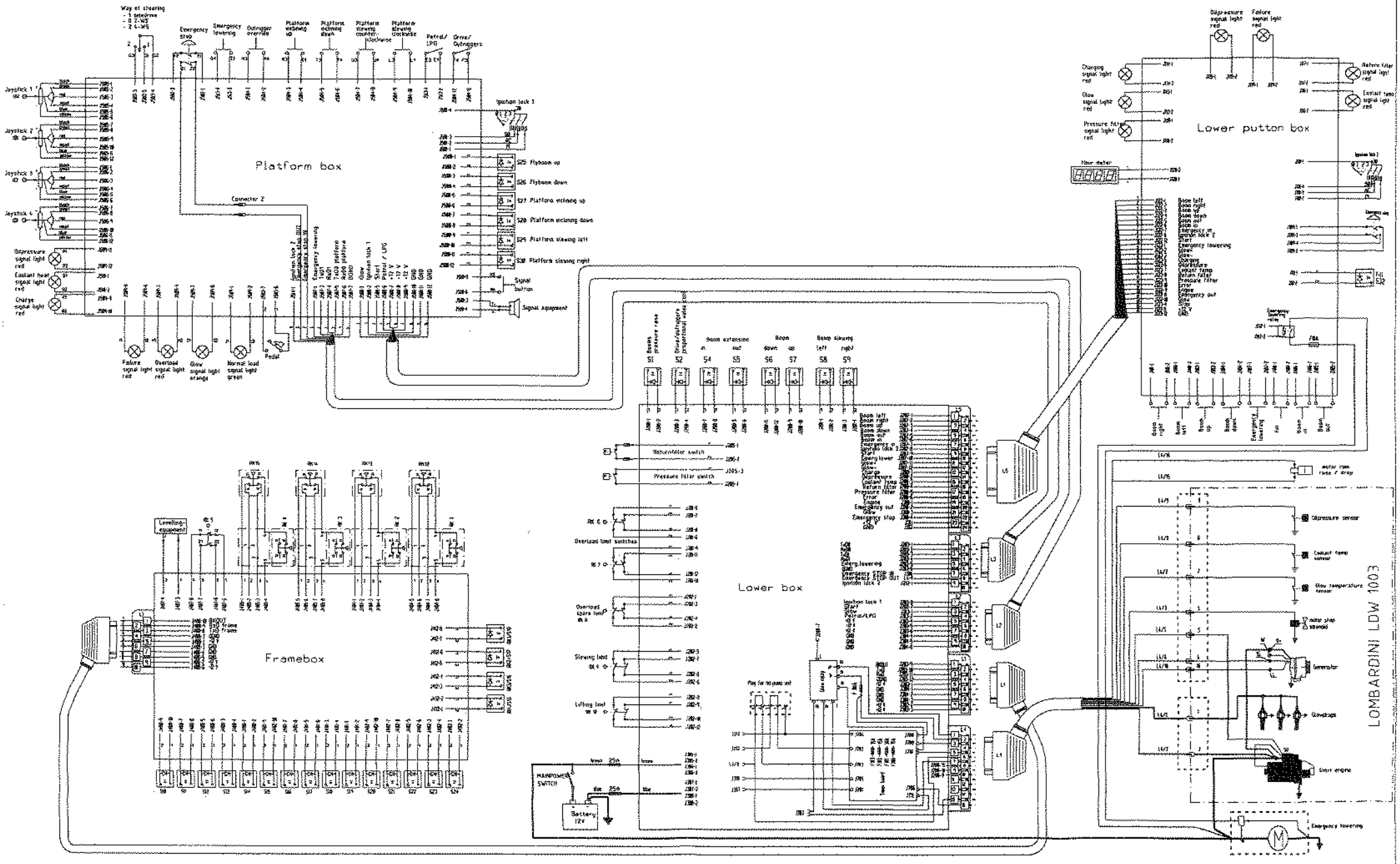
ATTENTION! Values of graph are indicative. Every cylinder and hydraulicmotor must program separately, when values will be different

Pos	Laatu			Muoto,mitat,stand.	Kpl	Nr
Suun.	17.11-98	RA	Suhde	Laite SL 240 D/B		Aihion koko
Piirt.	17.11-98	RA				Kpl/aihio
Hyv			( )	Kok.pano ADJUSTMENTS		
Rah. merkki R=			( )	WITH PROGRAM MODULE		Vanha piir.no
KESLA OYJ				Osa 0= PROGRAMMING GRAPH SIDE (1)		Piir.no GRAPH

HYDRAULIC SCHEME 198001 -->



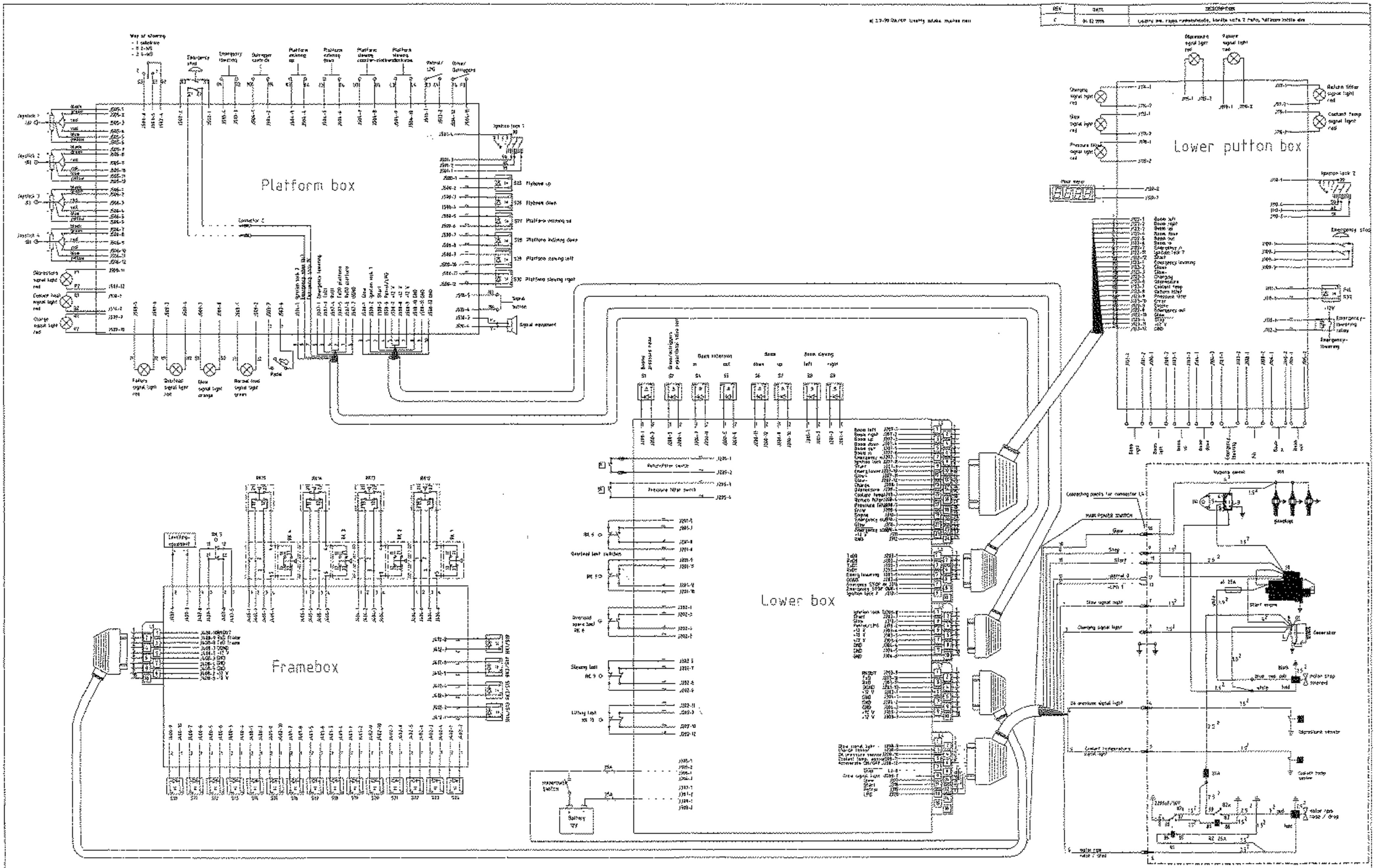
Solenoid energized	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30	RK4/S13	RK3/S15	RK2/S17	RK1/S19
Extension out	X				X																													
Extension in	X			X																														
Boom raising	X					X																												
Boom lowering	X						X																											
Slewing to the left	X							X																										
Slewing to the right	X								X																									
Jib up	X																							X										
Jib down	X																								X									
Platform rotation to the left	X																									X								
Platform rotation to the right	X																										X							
Platform up with stabilizer cylinder	X																											X						
Platform down with stabilizer cylinder	X																												X					
Slow driving forwards		X								X	X																							
Slow driving backwards		X								X		X																						
Fast driving forwards		X									X																							
Fast driving backwards		X										X																						
Wheel steering alternatives		X																			X													
		X																				X												
		X																			X	X												
		X																				X		X										
		X																			X			X										
Outriggers down together or separately		X												X		X		X		X											X	X	X	X
Outriggers up together or separately		X											X		X		X		X																



MOBILE ELEVATING WORK PLATFORM SL 240D

ELECTRICITY SCHEME PIKOTEC/LOMBARDINI LDW 1003

Päivitetty 9.10-02 RA



ELECTRICITY SCHEME
SL 240 D/B
KESLA OY J

10.10-01 RA Ground sensor limit switches RK 12,13,14,15 have been added.