SCANLIFT SL 190

MOBILE ELEVATING WORK PLATFORM (MEVP)

MAINTENANCE AND ADJUSTMENT

SL 190 D/B

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CONTENTS

Maintenance instructions for the internal combustion engine are attached to the Operating Manual

1.0 GENERAL SAFETY INSTRUCTIONS

1. *Study this operating manual carefully before using the mobile elevating work platform. The MEWP should never be driven by an operator not familiar with the handling and safety instructions. The operating manual should be kept in the operating manual case. ALWAYS keep the operating manual with the MEWP.*

2. *Anyone operating the MEWP must be at least 18 years old and must have undertaken training in its use.*

3. *The emergency lowering system consists of the electric pump on the turntable, the boom control valve and control switches on the turntable and platform. For detailed operating instructions refer to chapter 20.0 How to operate the emergency lowering system in the Operating Manual.*

4. *Avoid elevating near live electrical conductors. A label on the platform specifies the minimum clearance distance necessary for cables of different types.*

5. *Always drive the MEWP with the platform supported in transport position. Use the override switch only when it is necessary for climbing a steep hill or traversing difficult terrain on which the platform might otherwise bump the ground or some obstacle.*

6. *No more than two (2) people with tools and equipment may be on the platform at any one time, and the total load must never exceed 230 kg (506 lbs). When moving the MEWP, it is advised that only one person be on the platform, for better tractive force.*

7. *When using the MEWP, ensure that the outriggers are always well supported. Use extra plates under the outriggers, if necessary. Make sure that the outrigger does not slip on the surface of the extra plate and that the plate can hold the weight of the outrigger. On an icy surface, attach additional calks or bolts to the outrigger plates. The sole plates are provided with holes for that purpose. For load-bearing capacities of different soil types refer to chapter 17.0.*
   Be aware that even asphalt can yield.

8. *Take into consideration the hazardous effect of wind, rain, temperature, thunderstorms, poor visibility, and accumulated snow and ice on MEWP operation.*

9. *Do not take on additional loads while lifting.* ***RISK OF TIPPING OVER !***

10. *Be aware that hot or cold working environments may be harmful to your health.*

11. *Do not add to the MEWP's wind load with extra cover boards or additional load that increases the wind plane.*

12. *Do not increase the reach or working height of the platform by using ladders, additional platforms, or any other devices on the work platform. Do not jump on or swing with the work platform.*

13. *Do not throw any objects from the platform. Make sure nothing can fall from the platform.*

14. *Use ear protection when operating the MEWP from the lower control position, because the sound level exceeds 84 db (A). When you operate the MEWP from the platform, the sound level is less than 84 db (A), so wearing ear protectors is not obligatory.*

15. *When you use the MEWP indoors or in places with poor ventilation, use the engine only to move the MEWP. Try to improve the air circulation. Risk of poisoning! An auxiliary electric motor (240 V / 50 Hz) is available.*

16. *Do not use the MEWP as a lift for transferring goods or persons from one level or floor to another.*

17. *Do not deactivate the security devices. Repair them or have them repaired by a competent maintenance facility before using them again.*

18. *Always make sure no persons or objects are beneath the platform before lowering it.*

19. *To ensure safe and trouble-free operation of the MEWP, keep it free of snow, ice, and other potential hazards.*

20. *Use caution when handling the MEWP's fuels, lubrication and hydraulic oils, and lubricating greases. Avoid contact with skin. Danger of exposure!*

21. *Always turn off the MEWP's engine before filling the fuel tank. Beware of splashing. Danger of fire!*

22. *Never open the cooling system's filler while the engine is hot. Risk of accident!*

23. *Do not make or let anyone make any structural alterations to the MEWP without the manufacturer's permission and instructions.*

24. *Never replace screws, nuts, hydraulic hoses or other components with those of inferior quality. Refer to the spare part book for the type and strength of the required component. Contact the manufacturer.*

25. *Never weld or make holes into the MEWP's supporting structures without the manufacturer's permission.*

26. *Do not replace electric limit switches with other types of switches or functions.*

27. *If supporting structures are repaired or renewed, e.g. cylinders, spindles, parts of the booms, jib, platform, outriggers, turntable, chassis etc., perform a test loading with overload and an inspection. Make a note of the repair or replacement in the inspection record.*

28. *The service and repair work must be carried out by a person well familiar with MEWPs.*

29. *Electrical equipment may only be repaired by a licensed electrician.*

30. *SAFETY INSTRUCTIONS FOR A LEAD-ACID BATTERY*

1. *The liquid in the lead-acid battery is sulphuric acid solution. It corrodes many metals and organic substances. Always use protective goggles, gloves and clothing when working on batteries. In the event of contact with the skin, rinse immediately with plenty of water. In the event of contact with the eyes, rinse with water for at least ten minutes and seek medical assistance.*
2. *Hydrogen and oxygen are generated in the batteries during normal use. Together they form an explosive compound. All storage batteries containing more than 15 kWh of energy should be located in a separate, well ventilated room. The battery room should be equipped with materials that prevent static electricity and the resulting sparking. Ceramic shield plugs in the batteries prevent explosions and improve the safety of the battery room.*
3. *When connecting batteries, use insulated voltage tools to prevent short circuits. Protect battery terminals during transportation.*
4. *The battery terminals and other lead components contain toxic lead compounds. Always wash your hands carefully after handling batteries.*
   Used lead-acid batteries are hazardous waste. They must be taken to an appropriate waste collection site. Service stations collect used starting batteries.

ALWAYS TAKE OLD BATTERIES TO A WASTE COLLECTION SITE!

31. *Never operate or drive the MEWP when under the influence of alcohol or drugs.*

32. *Manufacturer's contact information:*

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2.0 TRANSPORT DIMENSIONS

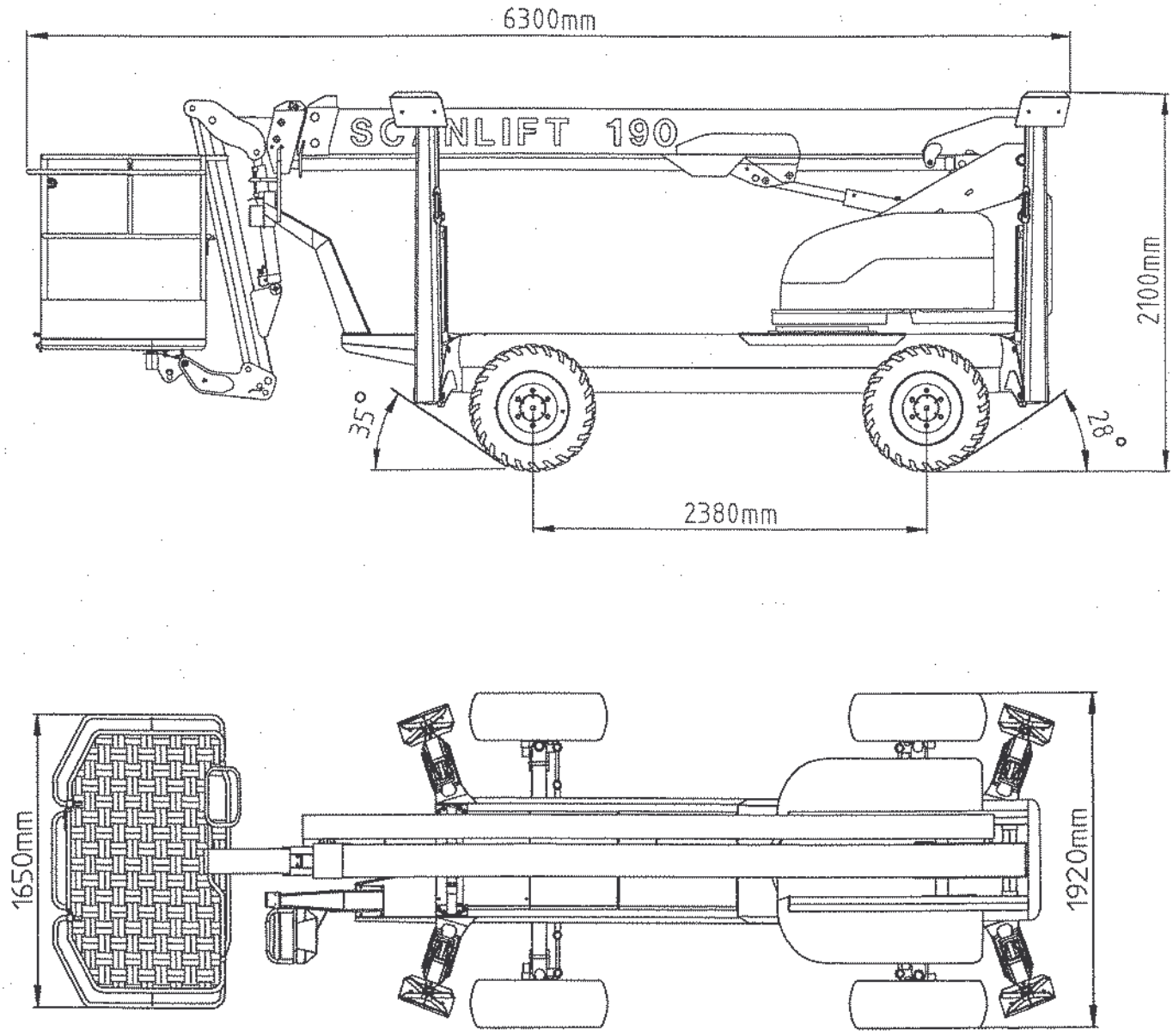

Figure 2.-1 Transport dimensions

3.0 LIFTING THE MEWP WITH A LIFTING HOOK

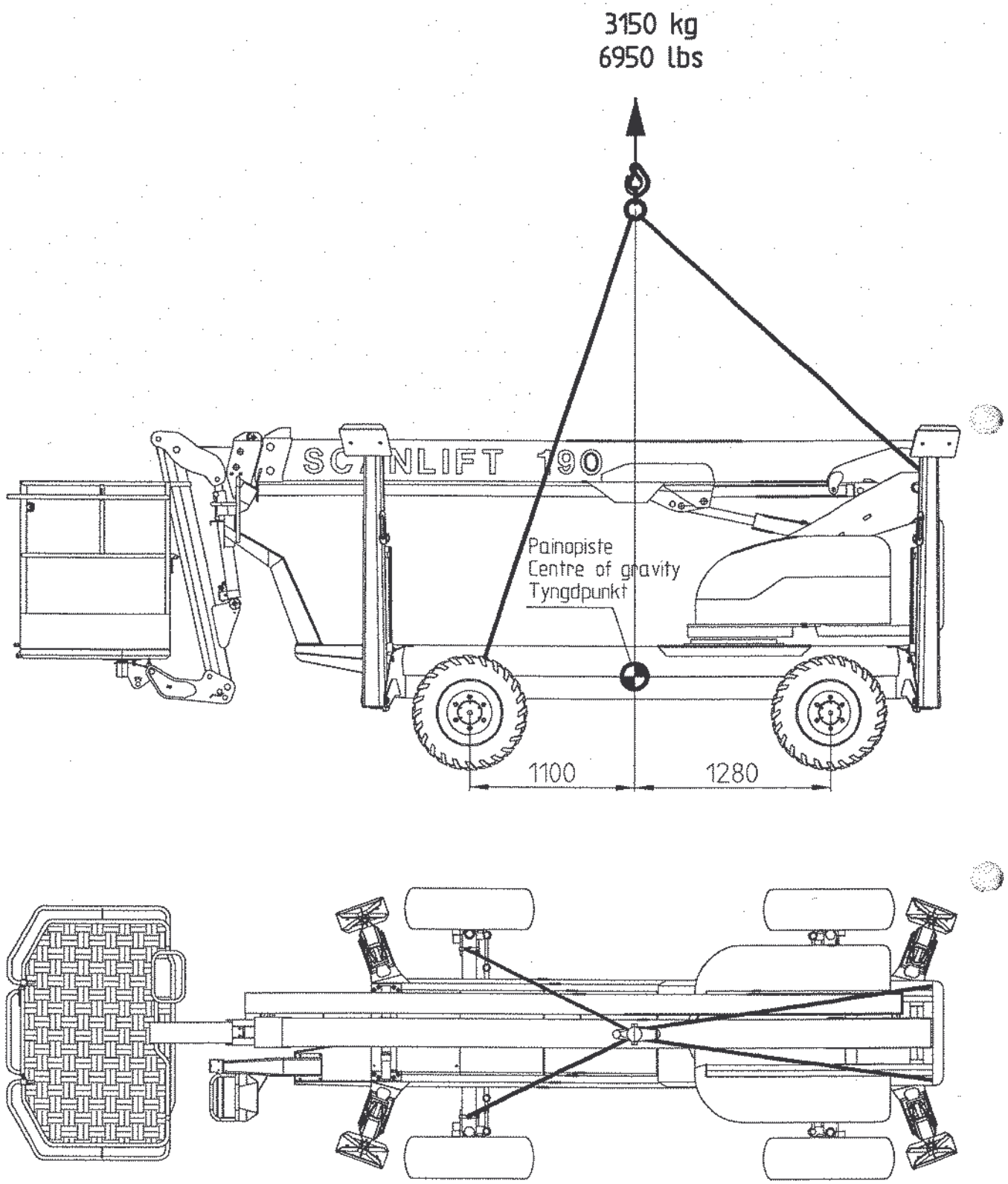

Figure 3.-2 Lifting the MEWP with a lifting hook

4.0 SPECIFICATION

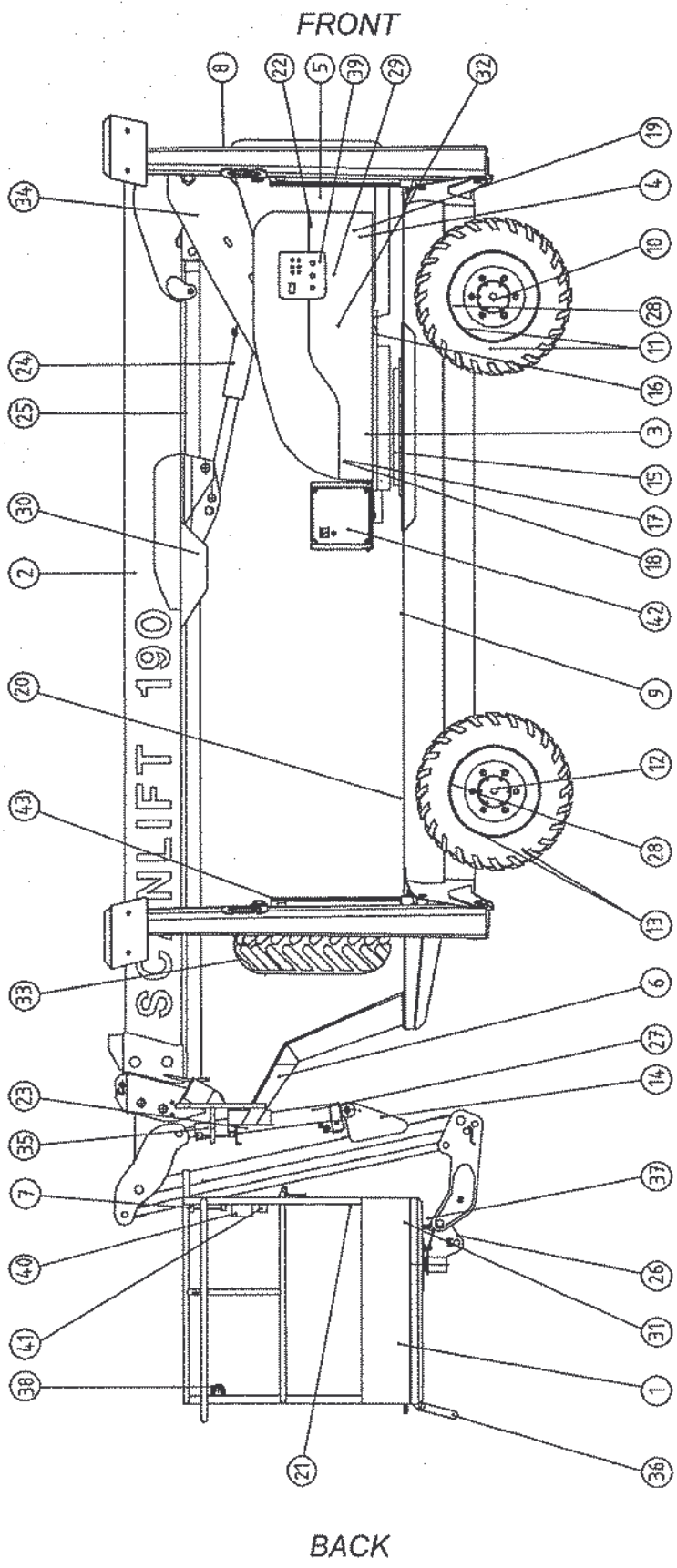

Figure 4.-1 Specification

4.1 SPECIFICATION

1 Platform
2 Booms
3 Turntable
4 Turntable guard
5 Internal combustion engine
6 Valve for drive / outrigger and lifting arms
7 Control valve for booms, platform guiding
8 Control valve for booms, ground guiding
9 Chassis
10 Front axle, oscillating
11 Front wheel and brakes
12 Rear axle, fixed
13 Rear wheel and brakes
14 Jib
15 Pivot bearing
16 Slewing motor and worm gear reducer
17 Fuel tank, on right side of MEWP
18 Hydraulic oil tank, on left side of MEWP
19 Battery, on left side of MEWP
20 Tool box
21 Storage for operating manual
22 Main power switch, on left side of MEWP
23 Override switch, for raising and lowering boom without outriggers
24 Lifting cylinder
25 Telescope cylinder
26 Stabiliser cylinder for platform
27 Jib cylinder
28 Steering cylinders
29 Hydraulic pump
30 Limiter device for lifting radius

31 *Foot pedal / change-over switch (in down position: boom operation)*

32 *Electric pump for emergency lowering system (on the left side)*

33 *Storage space for spare wheel (optional accessory)*

34 *Control cylinder for stabiliser cylinder*

35 *Drive selector, driving speed selector, horizontal level indicator*

36 *Platform step*

37 *Slewing cylinder of platform*

38 *Fastening hooks (2) for safety harness*

39 *Operating switch for emergency lowering system, EMERGENCY STOP switch, ignition lock for combustion engine, electric meter for hours of operation and indicator lights for engine charging, oil pressure, glow plug (diesel) and coolant overheating (operating switches at ground level)*

40 *Push button for sound signal, EMERGENCY STOP switch, operating switch for emergency lowering system and overload, glow and oil pressure indicator lights (operating switches on platform)*

41 *Electrical outlets for power tools (220V)*

42 *Electric motor unit 240 V / 50 Hz for indoor use (accessory)*

43 *Boom transport support*

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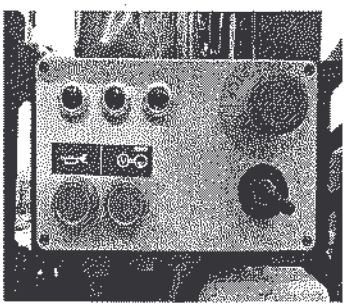

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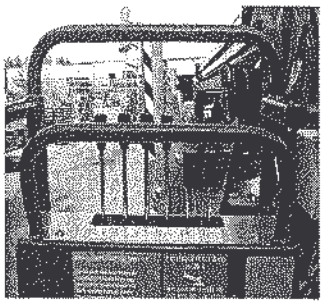

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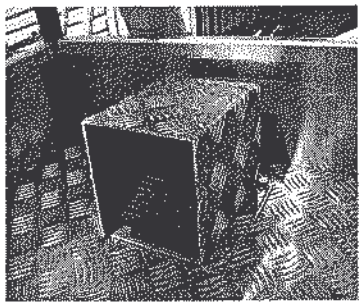

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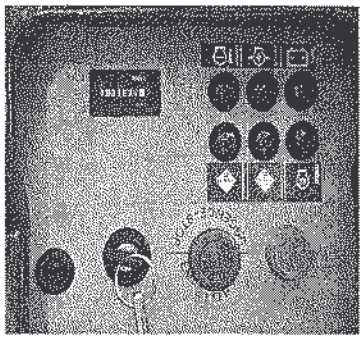

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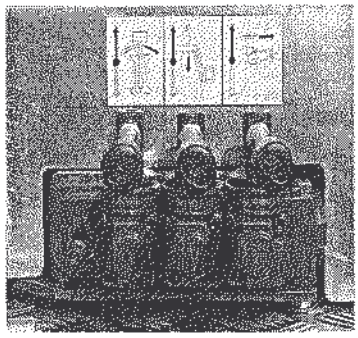


5.0 TECHNICAL DATA

Maximum height of platform bottom from ground	16.45 m 54 ft.
Maximum working height	18.45 m 60.5 ft.
Min. lifting radius measured from outer edge of platform at max. working height	1.90 m 6.2 ft.
Maximum safe platform load	230.0 kg 506 lbs.
Maximum safe lifting radius with 230.0 kg (507 lbs.) platform load	7.6 m + 0.15 m 24.9 ft. +0.49 ft.
Maximum lifting radius per CE specification for 120 kg (264.55 lbs.) platform load	9 m 29.5 ft.
Dimensions of platform bottom	1.0 x 1.5m 3.3 x 4.9 ft
Support distance of outriggers lengthwise	3920 mm 12.9 ft.
Support distance of outriggers widthwise	4000 mm 13.1 ft.
Maximum supporting force in sole of outrigger	25500 N 5620 lbs.
Maximum permissible slope of the ground	±12°
Maximum permissible slope of the chassis	±1°
Transport length	6.30 m 20.6 ft.
Transport width	1.92 m 6.3 ft.
Transport height	2.10m 6.9 ft.
Ground clearance under bottom	0.38 m 1.2 ft.
Wheelbase	2.38 m 7.8 ft.
Turning radius:	
4WS, outermost wheel side	3.0 m 9.8 ft.
4WS, outermost platform part	5.0 m 16.4 ft.
2WS, outermost wheel side	5.0 m 16.4 ft.
2WS, outermost platform part	6.9 m 22.6 ft.
Oscillation angle of front axle	±10°
Total weight with tanks full:	
Diesel	3150 kg 6930 lbs.
Rear axle load with 80 kg (176 lbs.) platform load	1900 kg 4180 lbs.
Front axle load with 80 kg (176 lbs.) platform load:	
Diesel	1300 kg 2860 lbs.
Driving speed:	
slow	1.8 km/h 1.1 mph
fast	3.6 km/h 2.2 mph
Tractive force:	
slow, oil temperature +20° C (68° F)	15400 N, 1570 kg, 3461 lbs.
fast, oil temperature +20° C (68° F)	7700 N, 785 kg, 1730 lbs.
Hill climbing capacity (theoretical): slow speed range	35%/16°
All-terrain tires, traction pattern	10.0/75-15.3/8 pr

Max. noise level (measured 1 meter from the motor)..... 93 db

Output of hydraulic pump at 3000 rpm:
for booms..... 9.0 l / min 2.4 US.gpm
for drive:
diesel.....26 l / min 5.8 US.gpm

Hydraulic pressure:
turntable and booms.....230 bar 3336 psi
driving motors and outriggers .....250 bar 3626 psi

Hydraulic pump: adjustable displacement axial piston pump

Hydraulic oil tank capacity.....60 l 16 US. gal.
Fuel tank capacity .....60 l 16 US. gal.

Internal combustion engine
diesel .....Lombardini 1003
petrol (gasoline) or liquid gas .....Kohler M25

6.0 MEWP SL 190 BOOM GEOMETRY

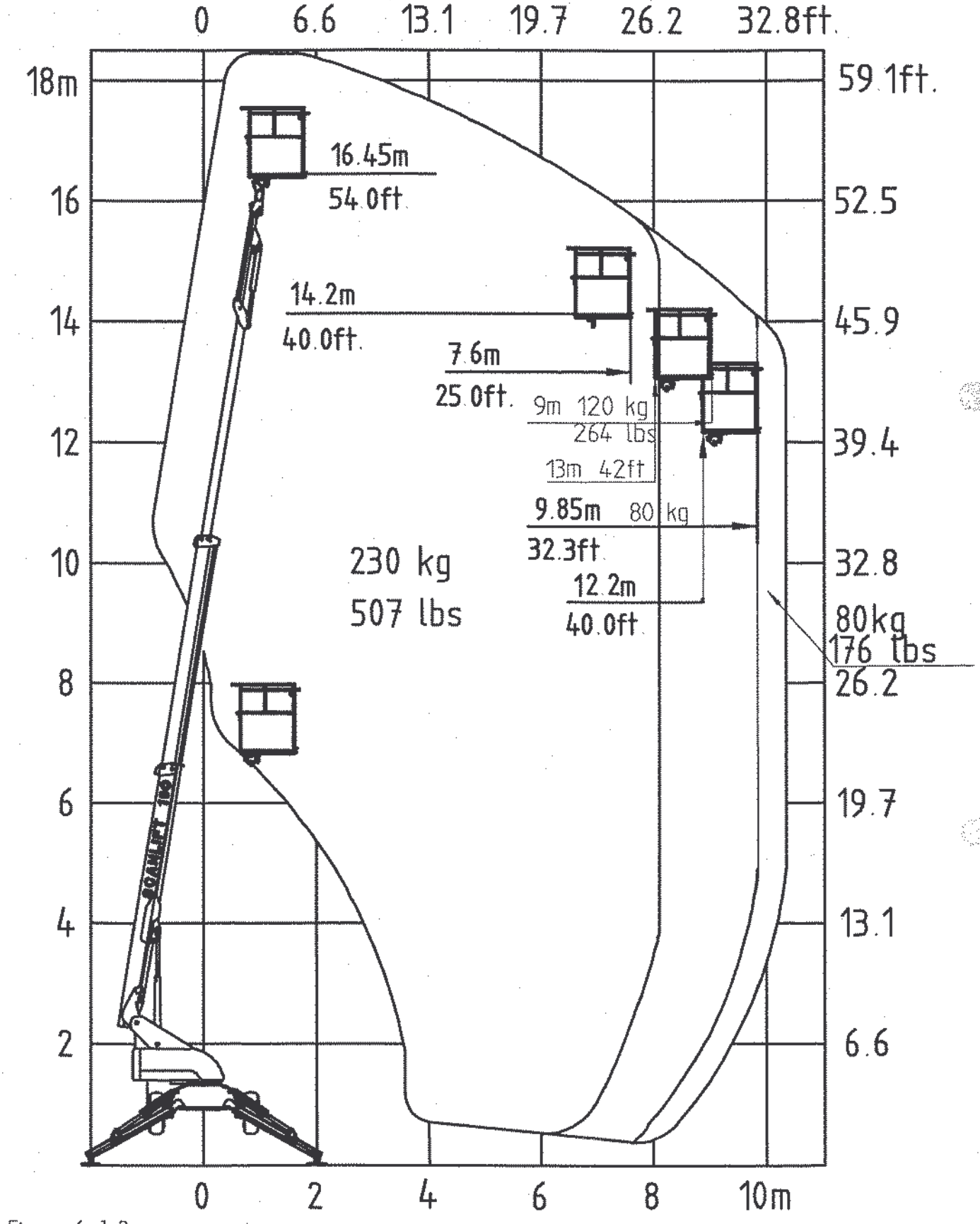
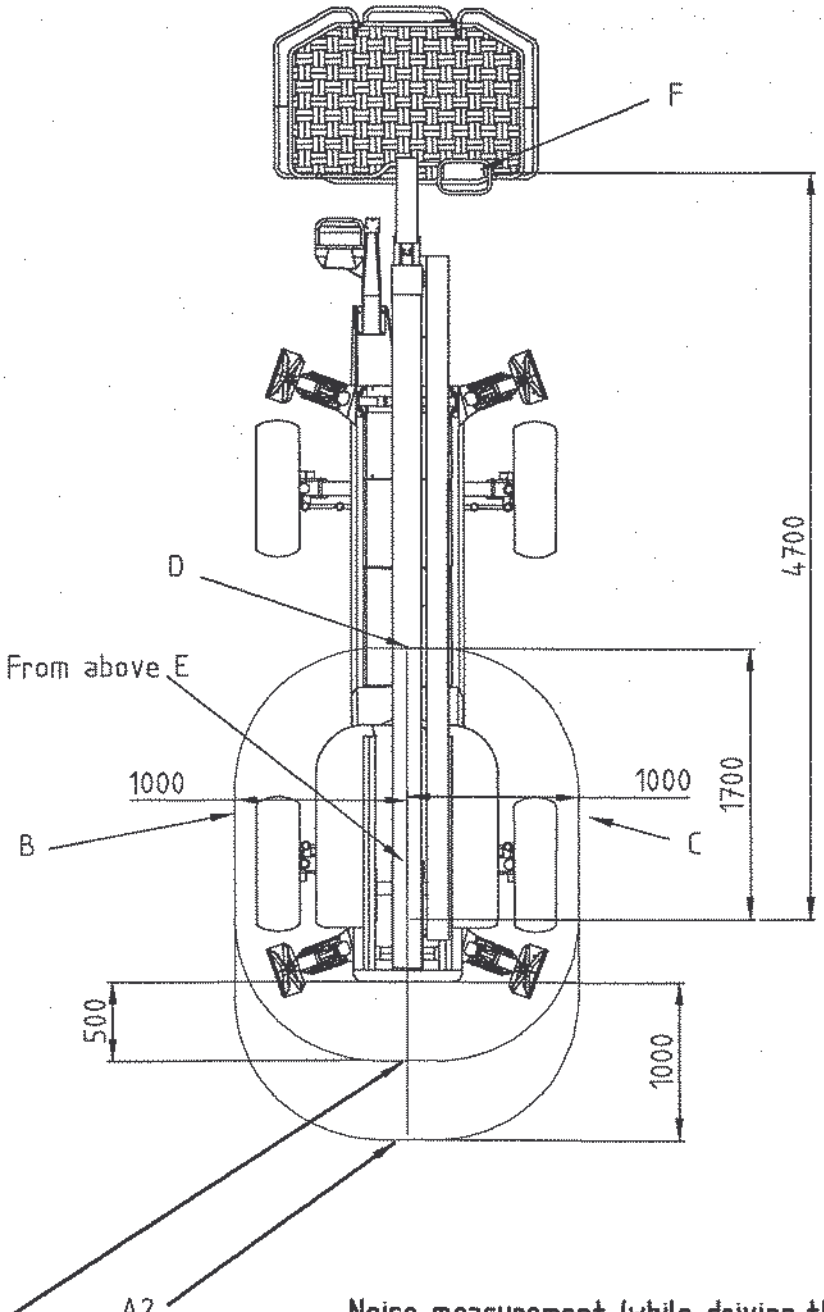


Figure 6.-1 Boom geometry

7.0 NOISE MEASUREMENT



Noise measurement (while driving the booms)

3000r/min A1=104dBA, A2=94dBA, B=89dBA, C=92dBA, D=89dBA, E=90dBA, F=78dBA

2500r/min A1=96dBA, A2=90dBA, B=84dBA, C=88dBA, D=86dBA, E=86dBA, F=76dBA

A1,A2,B,C,D surface of the chassis 0.6m E=1m engine cover F 1,5m platform bottom

8.0 CONTROLS AND FUNCTIONS

8.1 Main switch

-The main switch (switch no. 1 figure 8.-1) is located at the engine side of the turntable, on the left side seen from the platform.
-The switch disconnects the battery + terminal from the MEWP's electrical system.
-Do not open the main switch while the combustion engine is running; this will prevent charging of the battery.

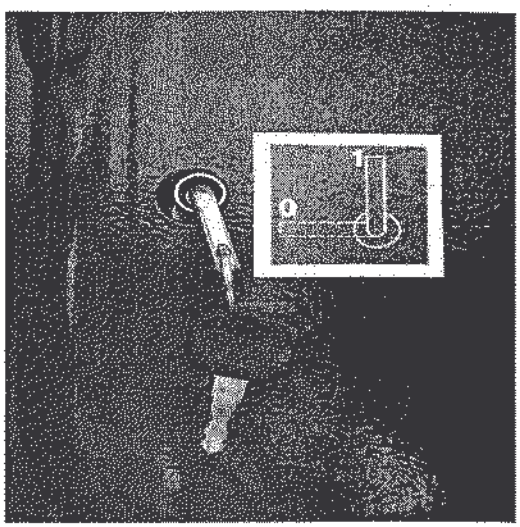


Figure 8.-1 Main switch

8.2 Sound signal

-Button (button 2, figure 8.-2) is located on the platform control box.
-The signal will sound when the button is pushed.
-The sound signal functions independent of the position of the main switch.

Platform control box

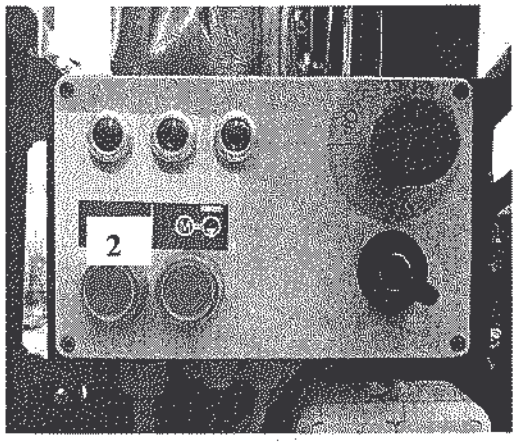


Figure 8.-2 Sound signal button 2

8.3 Construction ond operotion of the emergency lowering system

The emergency lowering system consists of the pump for emergency lowering, the emergency lowering pump control buttons on the platform and at the lower control position, the control valve on the platform, the lower control valve, and the labels with operating instructions glued to the platform and turntable.

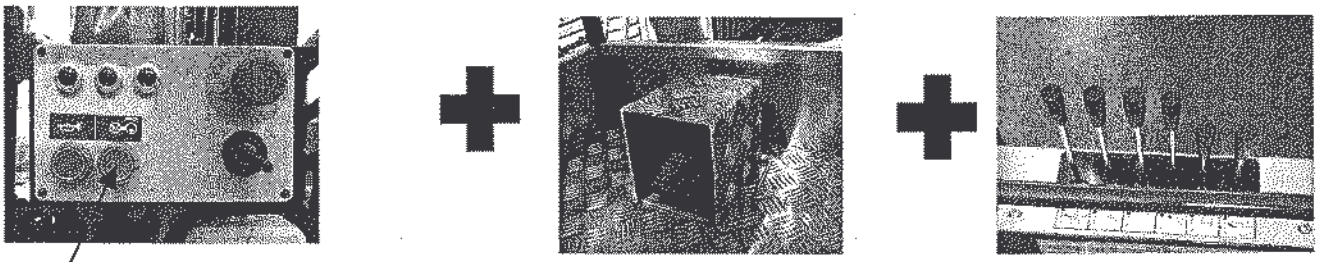
1. The electric emergency lowering system pump is continuously ready to back up the regular hydraulic pump of the hydraulic system by feeding oil into the system, if the regular hydraulic pump breaks down or if for some reason the boam valves on the platform cannot be used. Note! Load control functions normally when using emergency lowering. Only the booms can be controlled with the emergency lowering system.

2. Oil is pumped from the emergency lowering pump into either the platform control valve or the lower control valve. When emergency lowering is used, the main switch must be switched on.

How to operote the emergency lowering system

From the plotform:

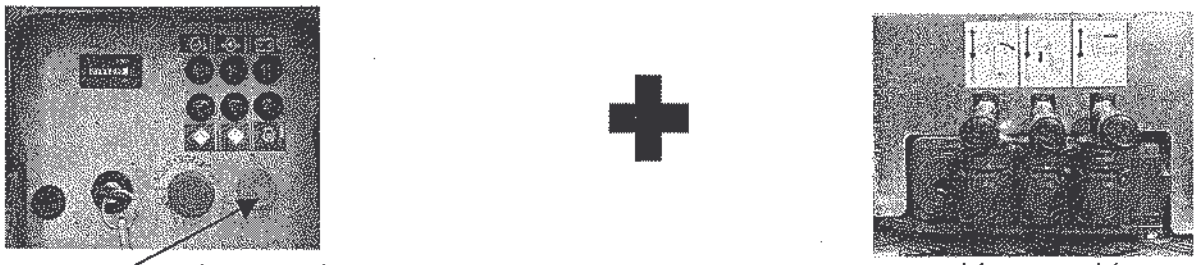
1. Press the emergency lowering button all the way down and continue to hold it down during the lowering procedure. Press the boom foot pedal to the floor while you use the platform control valve, refer to figures 8.3.-1.
2. Always retract the telescope prior to lowering the boom.



1. emergency lowering button *foot pedal* *platform control levers*
Figures 8.3-1

From the turntable:

1. Press the emergency lowering button all the way down and continue to hold it down during the lowering procedure. Lower the platform by using the control valve. Refer to figures 8.3.-2.
2. Always retract the telescope prior to lowering the boom.



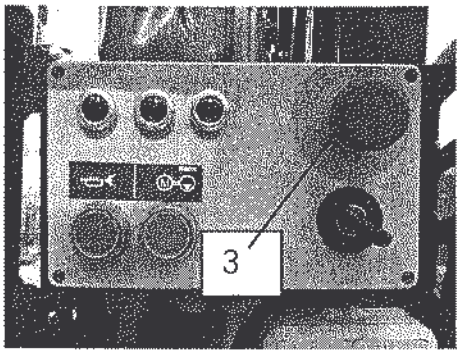
1. emergency lowering button *turntable control levers*
Figures 8.3-2

WARNING!

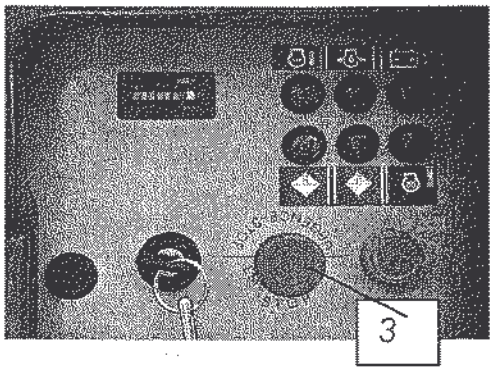
Do not use the emergency lowering system for operoting the booms in normol working conditions.

The pump motor may not be used continuously for longer than about 3 minutes. In addition, the battery runs down very quickly (the combustion engine does not start).
The motor of the emergency lowering pump is protected by a thermal overload relay. If the relay is tripped, the motor stops. Wait about 3-5 minutes until the motor cools. The thermal relay will engage automatically.

8.4 Emergency stop push-button



3. Emergency stop push-button on the platform



3. Emergecy stop push-button on the turntable

1. *When pushed down, either at the platform or the turntable (the switch must lock in the lower position when pushed), the emergency stop push-button will stop the combustion engine and all the MEWP's functions.*
2. *Stops the functions of the emergency lowering pump, as well.*
3. *The button is released by turning it to the right.*
4. *Do not replace the emergency stop push-button with any other type of button.*
5. *Never shunt the emergency stop push-button or prevent its operation in any other way.*
6. *Do not use the emergency stop push-button for turning off the MEWP in normal conditions. The ignition locks are provided for that purpose.*

8.5 Ignition locks

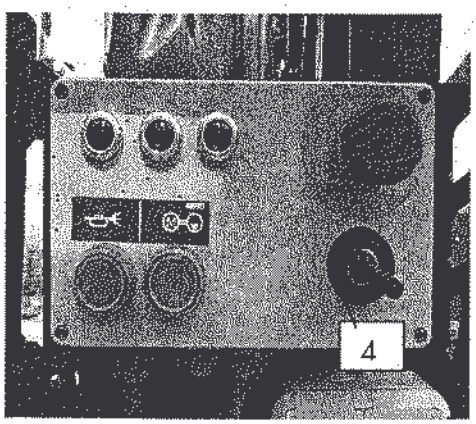


Figure 8.5-1

4. Ignition lock on platform

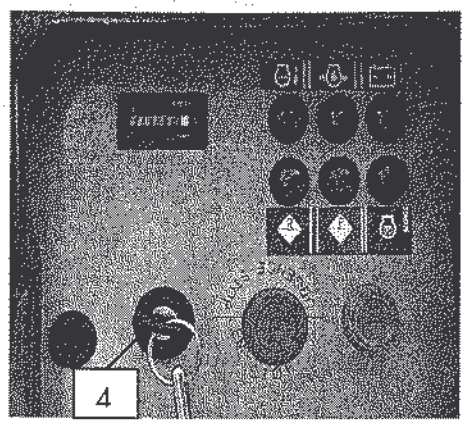


Figure 8.5-2

4. Ignition lock on turntable

1. OFF-position: stops the combustion engine, switches off electricity from all the MEWP's control devices.
1.1 Emergency lowering functions normally.
1.2 Load control functions normally.

2. ON-position: keeps the combustion engine running.
2.1 Switches on electricity to the MEWP's electrical equipment.
2.2 The engine can be started, but the MEWP can not be used, if the ignition locks on the turntable and on the platform are simultaneously in the ON-position.

3. GL-position: Glowing of combustion engine.

4. ST-position: Starting of combustion engine. Returns automatically to ON-position when released. Starting time 5-10 sec. at a time.

5. Keep all keys in one chain.
5.1 The MEWP may only be used from one point of control at a time. Simultaneous use has been prevented in accordance with item 2.2.

8.6 Signal and warning lights

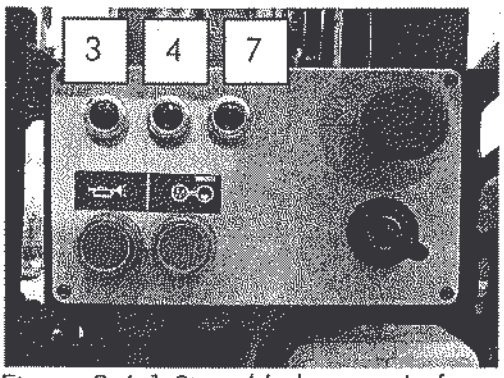


Figure 8.6-1 Signal lights on platform

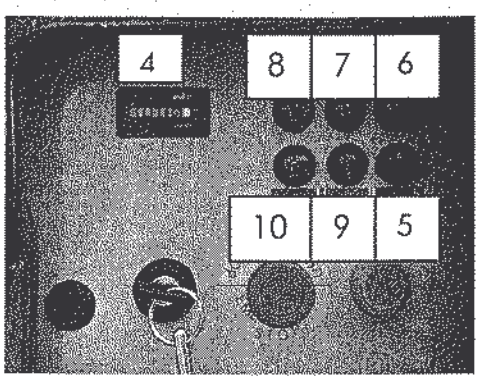


Figure 8.6-2 Signal lights on turntable

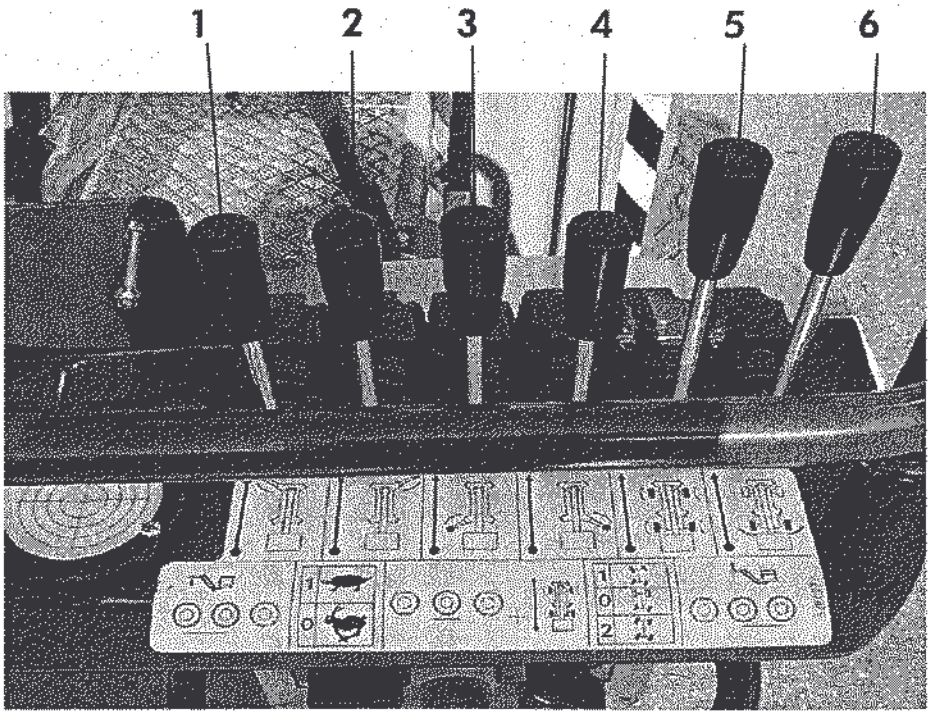
8.6-1 Signal lights an platform, figure 8.6-1

1. *Glow signal light 4 : Lights up when the ignition lock is switched to GL-position, goes out at the end of a preset period.*
2. *Warning light 7:Lights up when the ignition lock is switched to ON-position, goes out when the engine starts. Warning of malfunction: Lights up when the engine is running; oil pressure low, charging malfunction, overheating of the engine.*
3. *Overload warning light 3: Lights up when the max. lifting radius has been reached, goes out when the lifting radius is shortened.*

8.6-2 Signol lights on turntable, figure 8.6-2

1. *Glow signal light 5: Lights up when the ignition lock is switched to GL-position, goes out at the end of a preset period.*
2. *Charge signal light 6: Lights up when the ignition lock is switched to ON-position, goes out when the engine starts.*
   Warning of malfunction: Lights up when the engine is running, charging malfunction.
3. *Oil pressure signal light 7. Lights up when the ignition lock is switched to ON-position, goes out when the engine starts.*
   Warning of malfunction: Lights up when the engine oil pressure drops.
4. *Engine temperature signal light 8: Warning of malfunction: Lights up when the engine is running, engine temperature too high, cooling out of order.*
5. *Signal light for the hydraulics pressure filter 9: Warning of malfunction: Lights up when the pressure filter is clogged.*
   Note! May light up, if hydraulic oil is stiff, e.g. when starting in cold weather.
6. *Signal light for the hydraulics return filter 10: Warning of malfunction: Lights up when the return filter is clogged.*
   Note! May light up, if hydraulic oil is stiff, e.g. when starting in cold weather.
7. *Hour meter 4. Calculates hours of operation when the combustion engine is running.*

8.7 Drive and outrigger valve levers



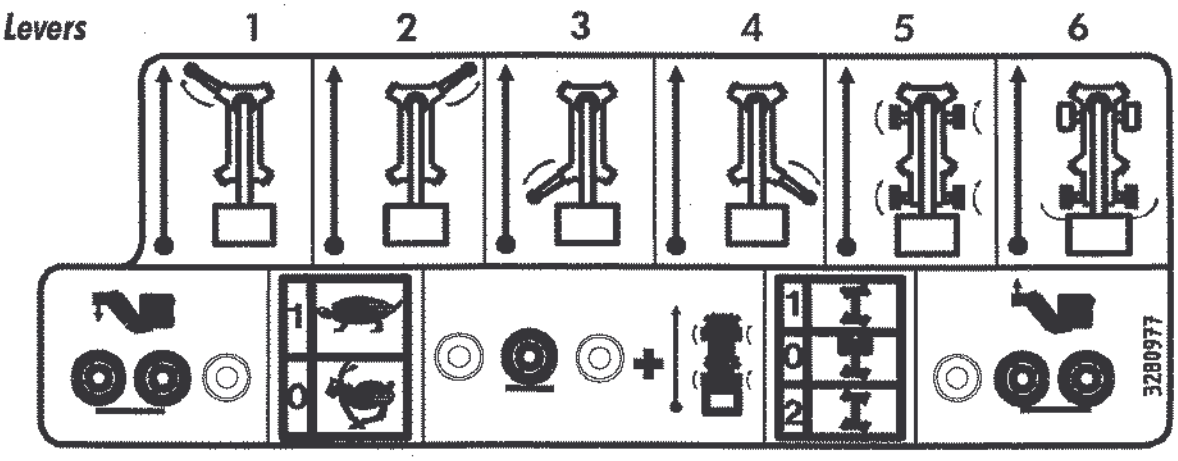


Figure 8.7-1 Drive and outrigger valve levers

Lever 1. Front left outrigger up / down
Lever 2. Front right outrigger up / down
Lever 3. Back left outrigger up / down
Lever 4. Back right outrigger up / down
Lever 5. Drive forward / reverse
Lever 6. Steer right / left
When levers 1, 2, 3 and 4 are pushed, the outriggers lower to the ground. When lever 5 is pushed, the MEWP moves forward. When lever 6 is pushed, the MEWP turns to the right.

8.8 Electric control box for drive / outrigger volves

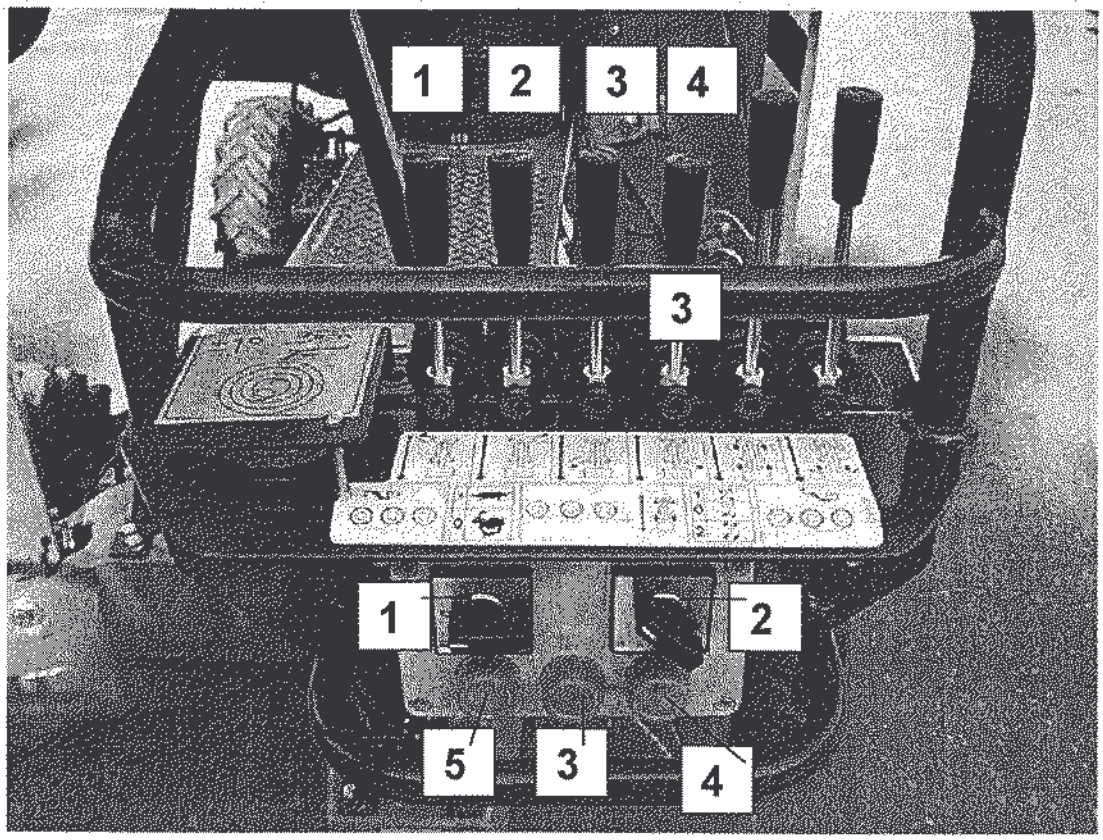
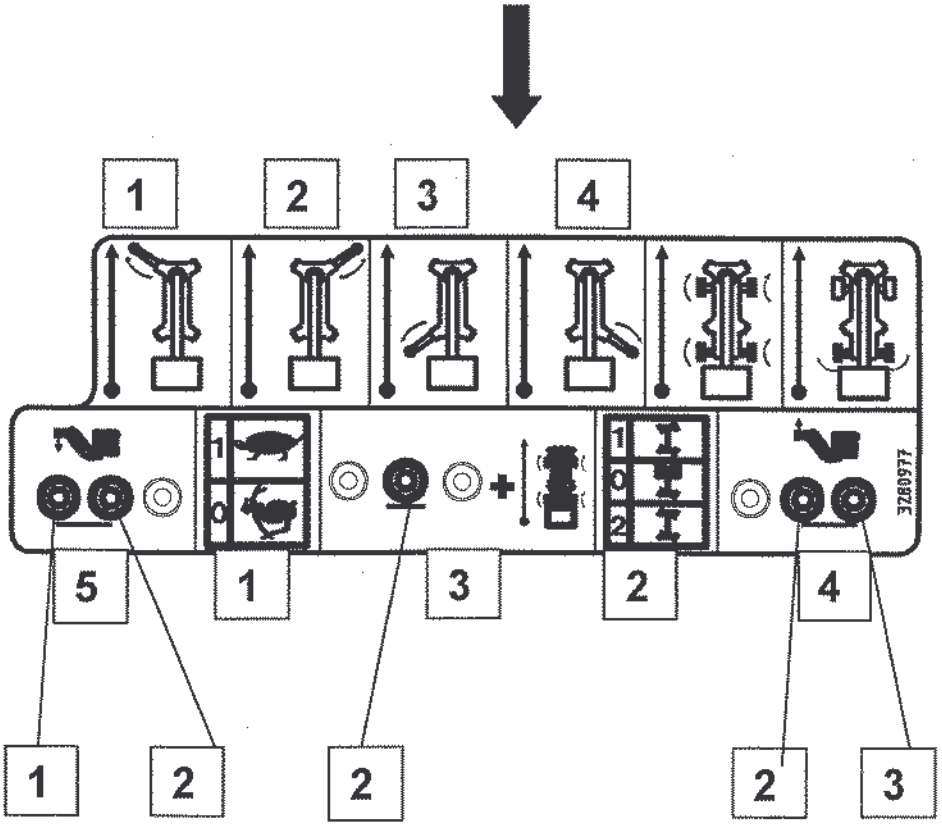


Figure 8.8-1 Electric control box for valve levers



8.8.1 Switch 1: Selection of driving speed

1. Position 1: "turtle", slow speed range 0-1.8 km/h, hill climbing capacity approx. 35% = (16°) combustion engine 3000 r/min
2. Position 0: "rabbit", fast speed range 0-3.6 km/h, hill climbing capacity approx. 17% = (8°) combustion engine 3000 r/min

8.8.2 Switch 2: Selection of method of steering (both drive speeds)

1. Position 0; rear wheel steering: When using control lever 6, figure 8.7-1, only the pair of wheels on the platform side turn.
2. Position 1; four wheel steering: When using control lever 6, the pair of wheels on the platform side and the pair of wheels on the engine side turn to different directions.
3. Position 2; crab steering: When using control lever 6, the pair of wheels on the platform side and the pair of wheels on the engine side turn to the same direction.

8.8.3 Override switch 3: (both drive speeds ond oll methods of steering)

When pressing push-button 2 and using lever 5 simultaneously, figure 8.7-1, the MEWP can be driven forwards/backwards with the boom elevated and the outriggers up. If necessary, the wheels can be turned with lever 6, figure 8.7-1.

8.8.4 Override switch 4: Roising the booms with outriggers up

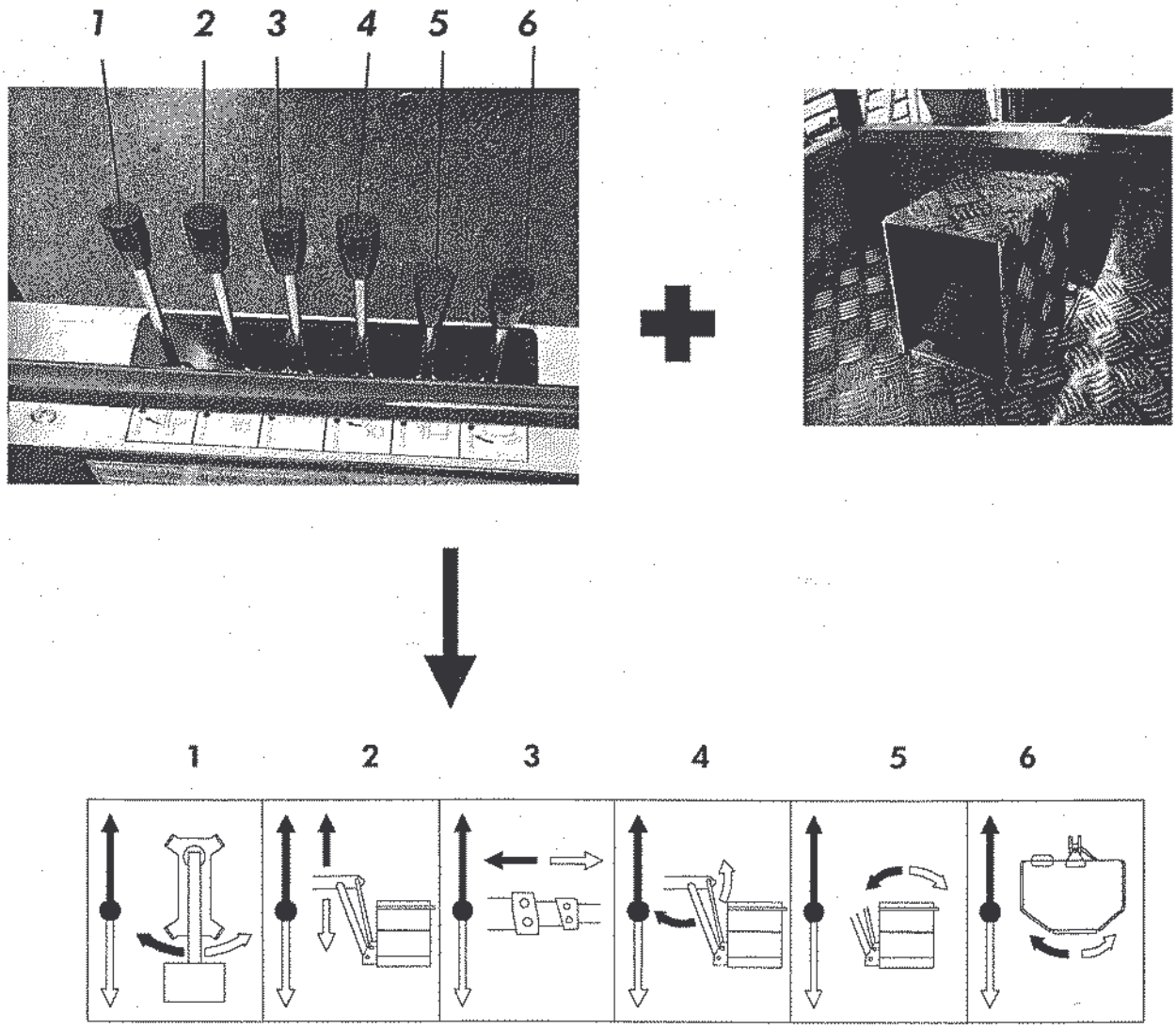
When buttons 2 and 3 are pressed, the booms can be raised off the transport support max. 20° (with the combustion engine started from the platform). Extending and slewing the booms and using the jib are prevented. In the uppermost position on level ground the platform bottom is about 2.5 m above ground.

8.8.5 Override switch 5: Lowering the booms with outriggers up

To lower the booms on the transport support, push buttons 1 and 2.

8.9 Controls on the platform

Figure 8.9-1 Control levers and symbols



Control levers from left to right

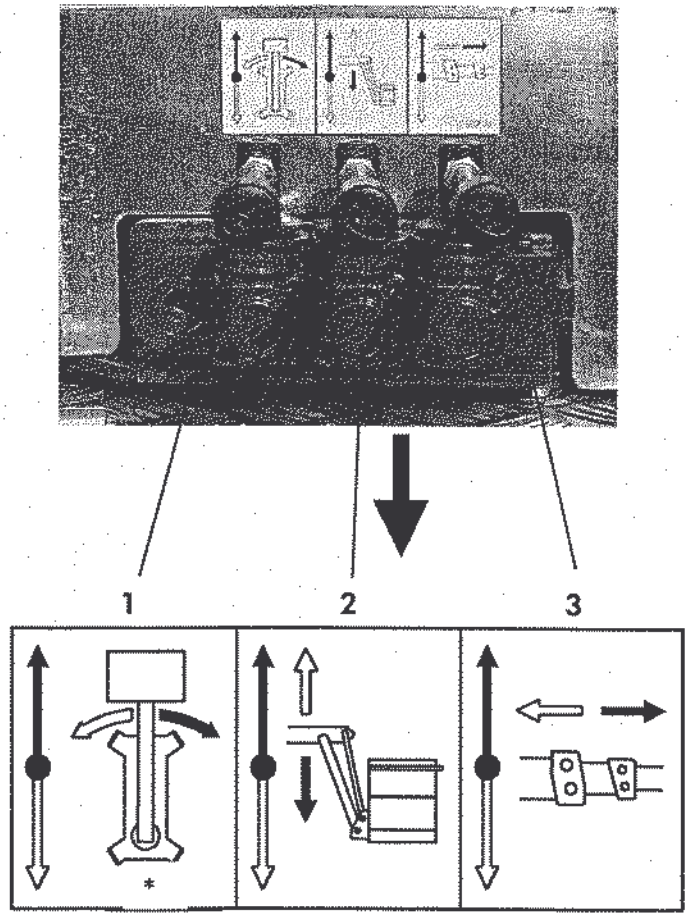
1. *Slewing the booms; when the lever is pushed the booms turn to the left*
2. *Raising / lowering the booms; when the lever is pushed the booms will rise*
3. *Extending / retracting the telescope; when the lever is pushed the telescope will retract*
4. *Raising / lowering the jib; when the lever is pushed the jib will lower*
5. *Adjusting the horizontal plane of the platform; when the lever is pushed the platform will turn inward*
6. *Rotating the platform; when the lever is pushed the platform will turn to the left*

8.9.1 Note! When the booms are operated with levers 1–6 the foot pedal must be pressed at the same time.

8.9.2 The combustion engine must be started from the platform. The ignition lock on the turntable must be in OFF-position.

8.10 Controls on the turntable

Figure 8.10-1 Control levers and symbols



*) control position

Control levers from left to right

1. *Slewing the booms: When the lever is raised the booms turn to the right.*
2. *Raising / lowering the booms: When the lever is raised the booms will lower.*
3. *Extending / retracting the telescope: When the lever is raised the telescope will extend.*

8.10.1 The combustion engine must be started from the turntable with the platform ignition lock in the OFF-position.

9.0 TEST LOADING WITH OVERLOAD

1. Overlooding must be carried out whenever the MEWP's supporting structures have been renewed or repaired, e.g. platform, jib, booms, turntable, chossis, slew bearing, outriggers, cylinders and spindles.
2. The overlood weight is the max. allowed platform lood x 1.25, i.e. 230 kg x 1.25 =290 kg

9.1 How to corry out overlooding

1. The booms on the transport support: Adjust load control adjustment screws 1; 2 pcs, measure 8 mm, see figure 9.1.-1

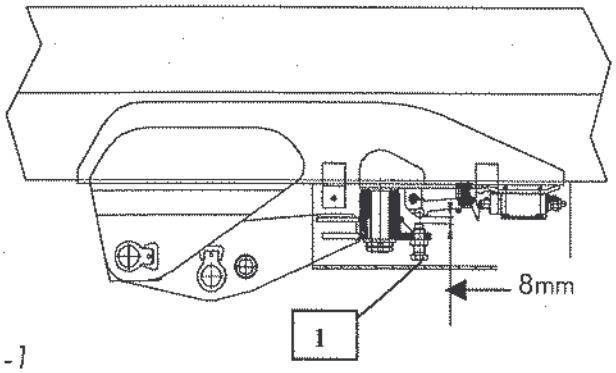
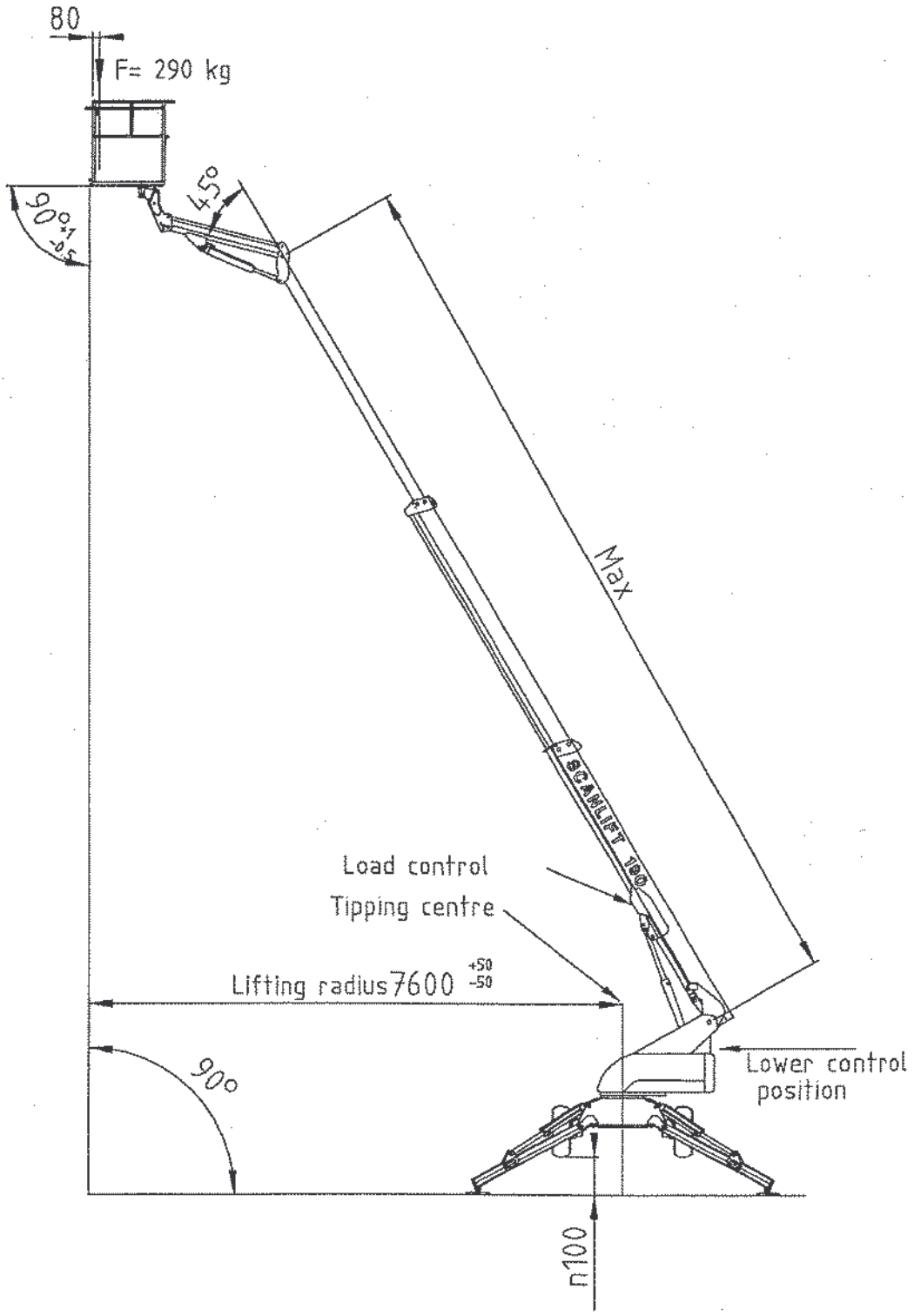


Figure 9.1-1

2. Support the MEWP on the outriggers, ensure that the support is horizontol (+- 1°), wheels off the ground about 100 mm. Roise the jib boom to an angle of 45 degrees to the booms, refer to figure 9.1-2. Raise the booms off the transport support, lower the booms all the way down. Keep the booms at min. length. Check soil tightness under the outrigger soles.
   Refer to 10.0 Soil tightness table.
3. Place a test looding weight on the platform, 290 kg + 1–2.5 kg.Place the weight so that its centre is 100–200 mm from the gote side of the platform, in the middle of the platform in longitudinal direction, refer to figure 9.1-2. Note! When the weight is placed on the platform, no persons or other additional load are allowed on the platform. Do not drop the test loading weight on the platform.
4. Guiding from below, raise the booms all the way up. Extend the telescope fully. Lower the booms gently and stop when the radius is 7600 mm (from the edge of the plotform to the tipping centre, refer to figure 9.1-2). Exercise caution. The load control has not yet been odjusted.
5. Slew the booms carefully above each of the four outriggers. Mark or measure the extended length of the outrigger cylinder rod. Keep the booms for at leost two (2) minutes above each outrigger. Watch the cylinder rod for any movement. If the rod slides inwards during the test more thon one (1) mm, the test loading must be interrupted immediately. The cylinder must be repoired or reploced, including the valve block in the cylinder. Repeat test loading with the repaired cylinder. Also check cylinder locking cortridges and housings.
6. Check the lifting cylinder rod. If the rod slides inwards more than one (1) mm, the cylinder must be repaired. Repeat the test loading procedure after the cylinder has been repoired or replaced.

7. *After test loading, check all structures of the MEWP. If you detect tears or distortions, the damaged parts must be replaced and test loading repeated.*
8. *Remove the test loading weight. Make a note of the test loading in the examination record. Name and date.*
9. *Note! Always adjust load control after a test loading with overload.*
10. *Note! In items 5 and 6 (sliding inwards of the cylinder rods 1 mm) means that the test load is kept in a static state above each cylinder for 2 minutes.*

Figure 9.1-2 Test loading with overload



10.0 SOIL TIGHTNESS TABLE

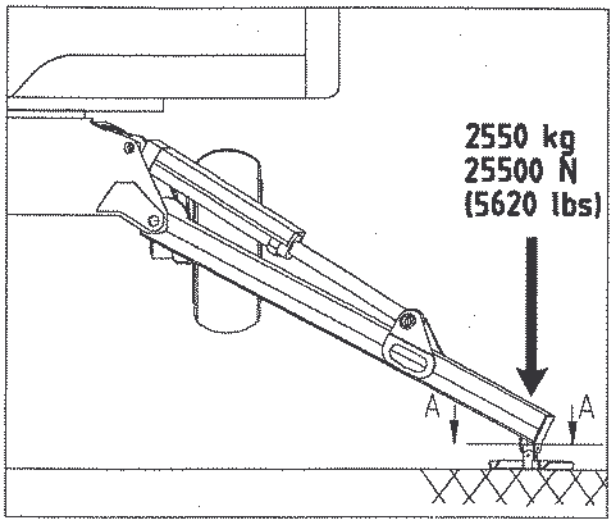


Figure 17.-1 Max. load on sole

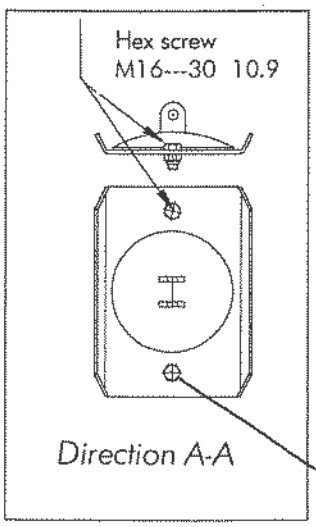


Figure 17.-2 Sole

hex screw

On icy surface, attach extra calks to the sole plates as indicated in figure 2. The soles are provided with holes for the purpose.

Surface A of the sole: (SL190 standard sole)
A = 32.5 cm x 20 cm = 650 cm^2

Pressure $\frac{** 2550\ kg}{650\ cm^2} = 3.9\ kg/cm2$

A (extra plate) when safe pressure = 2.00 $A = \frac{2550\ kg}{Safe\ 2.00} = 1275\ cm^2$ (36cm x 36cm)

Safe contact pressure for some soil types.

Soil type	Soil density (structure)	Safe contact pressure kg/cm^2
Gravel	very tight somewhat tight loose	6.00 4.00 2,00 * <3,9
Sand	very tight somewhat tight loose	5.00 3.00 * < 3.9 1.50 * < 3.9
Fine sand	very tight somewhat tight loose	4.00 2.00 * < 3.9 1.00 * < 3.9
Clay & fine silt	very tight somewhat tight loose	1.00 * < 3.9 0.50 * < 3.9 0.25 * < 3.9

Note! In items marked with (*) broader extra plates must be used.
Note! Items marked with (**) include max. wind load, max. platform load with max. allowed lifting radius, and the continuity moment of the booms and the load when lowering the booms.

11.0 ADJUSTMENT OF LOAD CONTRDL: Limit switches LS13 and LS25

1. *Level the MEWP with the outriggers (accuracy ±1). Wheels about 100 mm above the ground. Raise the jib boom to an angle of 45 degrees to the booms, refer to figure 11-1. Raise the booms off the transport support and lower the booms all the way down. Keep the booms at minimum length. Note! Check soil tightness under the outrigger soles. Refer to 10.0 Soil tightness table.*
2. *Place a weight of 230 kg ± 2.5 kg on the platform. Place the weight so that its centre is about 100-200 mm from the gate side of the platform, in the middle of the platform in longitudinal direction. Note! When the weight is placed on the platform, no persans or other additional load are allowed on the platform.*
   Do not drop the weight on the plotform.
3. *Guiding from below, raise the booms all the way up. Extend the telescope fully. Lower the booms gently and stop when the radius is 7600 mm (from the edge of the platform to the tipping centre, refer to figure 11.-1)* ***Exercise caution****. The load control has not yet been adjusted.*
4. *Check that the limit switch LS13 is against the stopper and that fixing screws 2 are tight, refer to figure 11.-2.*
5. *Keep power on in the lower control boxes, ignition lock in ON-position. Place a magnetic light pen by the valve coil Y10 in the turntable filter group so that the light of the pen is on, refer to figure 11.-3.*

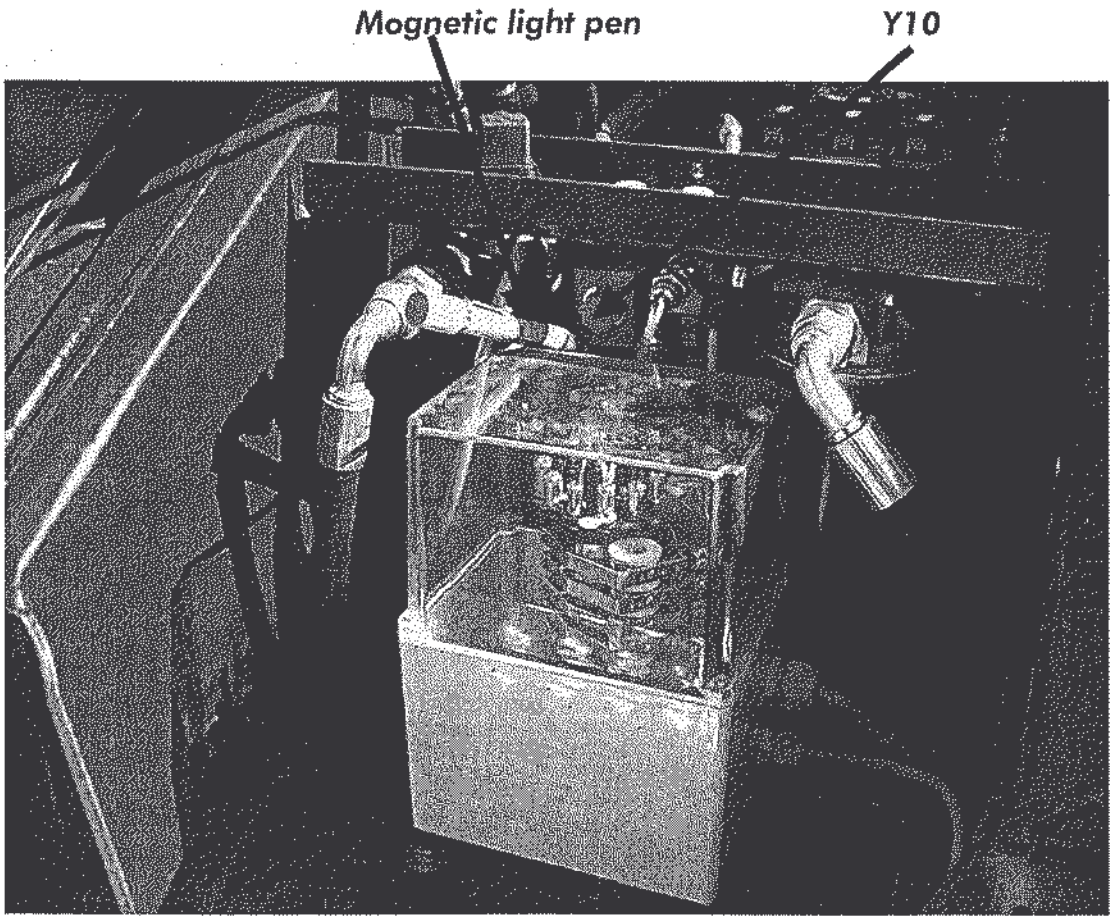


Figure 11.-3

Figure 11.-1 Adjustment of load control

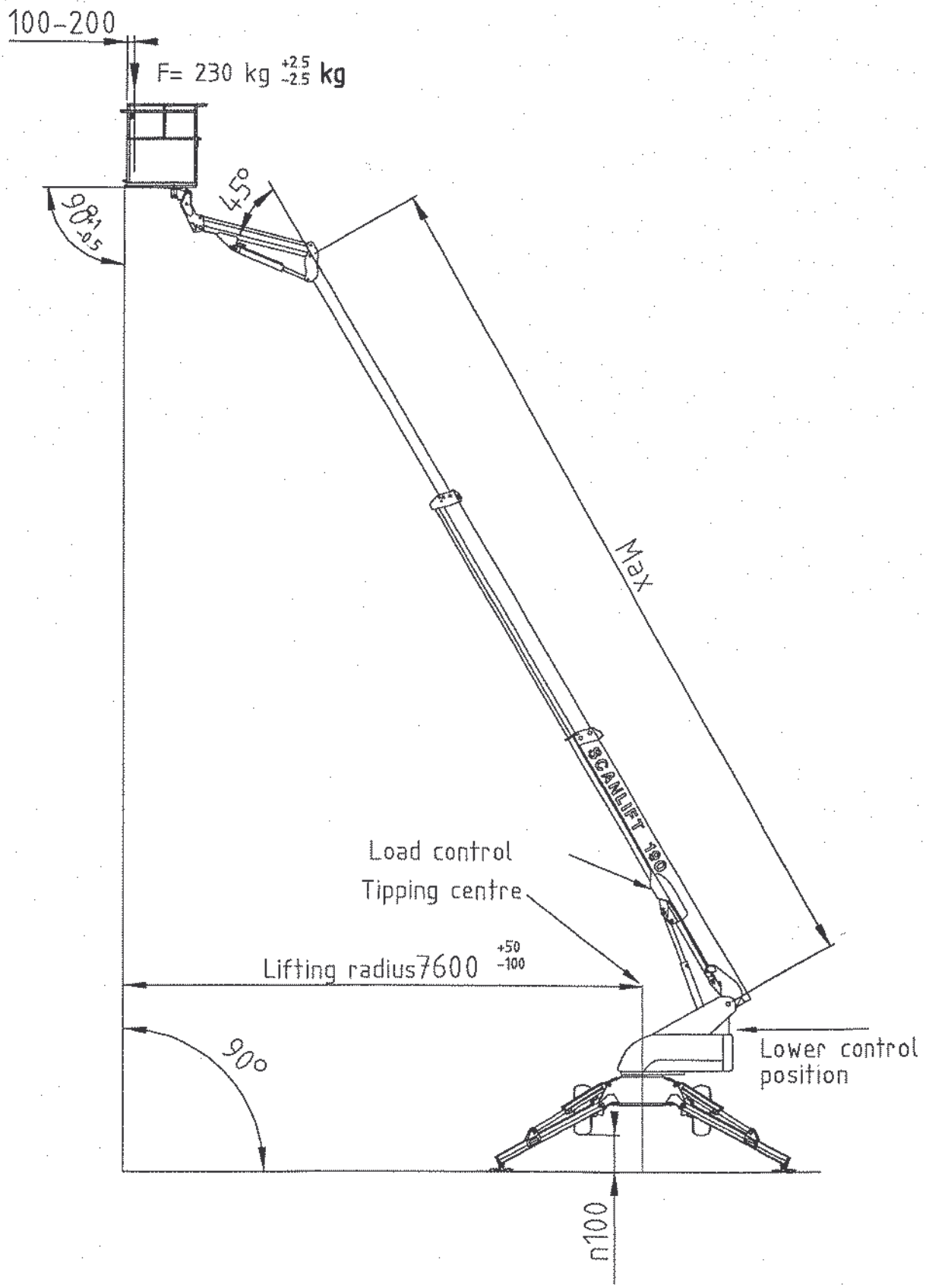
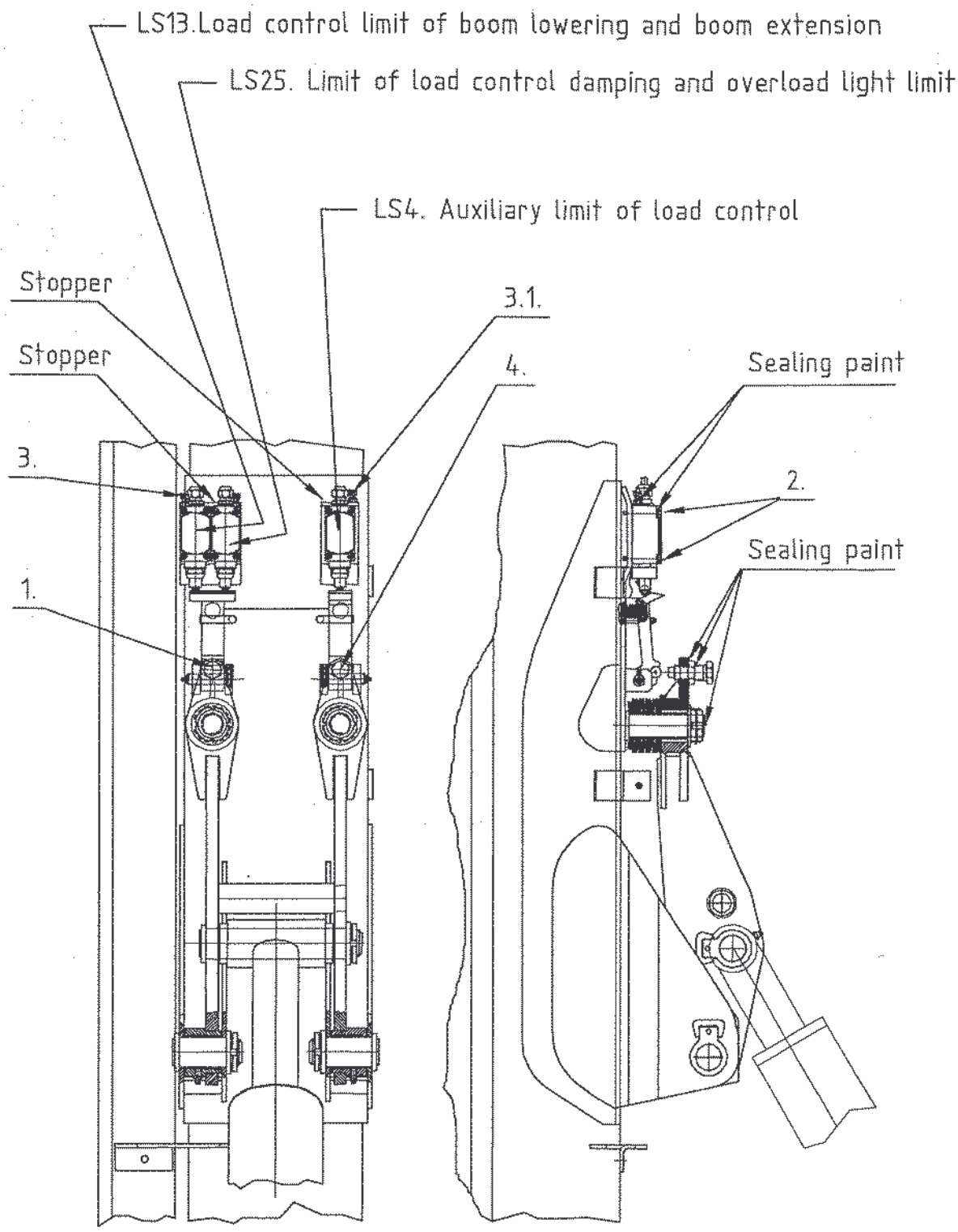


Figure 11.-2 Adjustment of load control

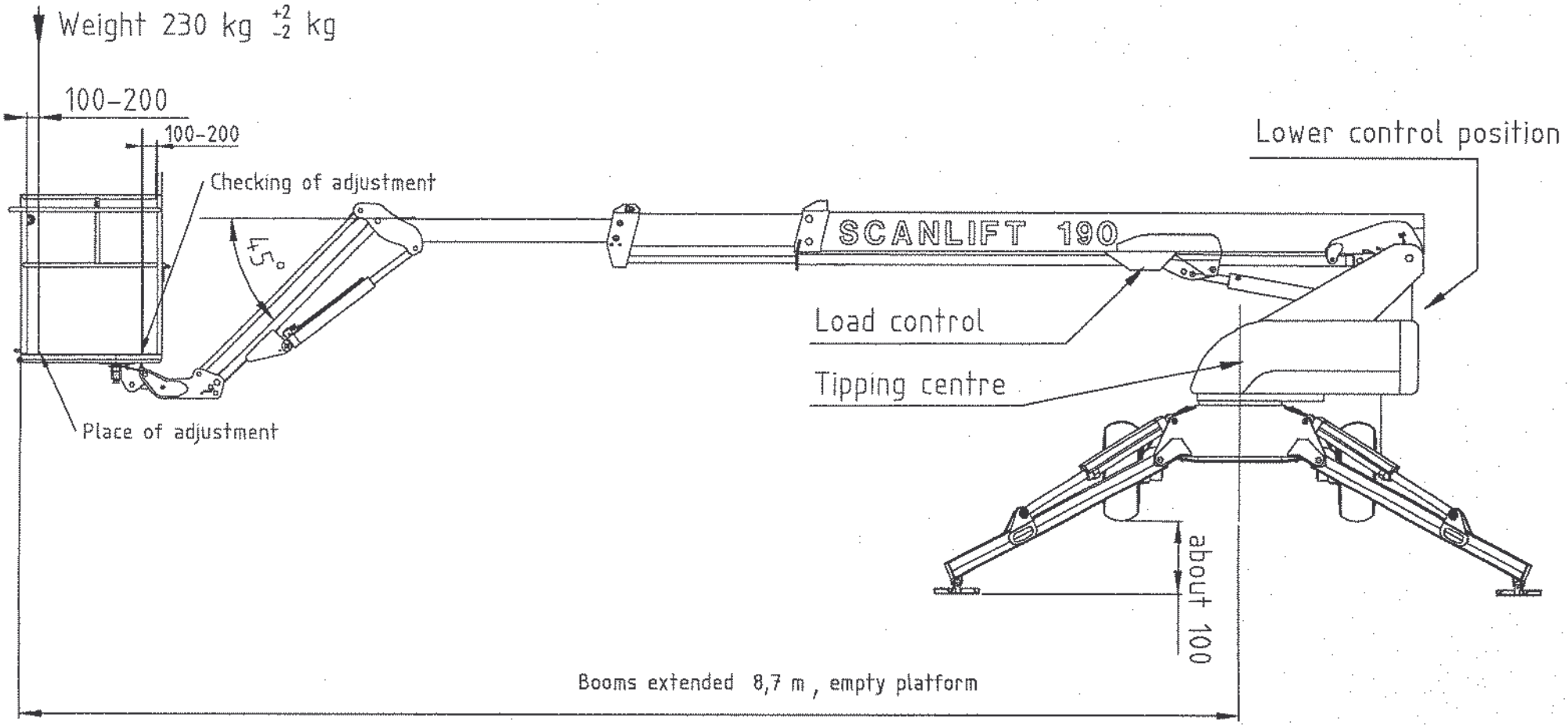


6. *Tighten adjustment screw 1, figure 11.-2 until the light of the magnetic pen goes out. Tighten the locking nut of screw 1 lightly.*
7. *Raise the booms all the way up, do not retract the booms. Lower the booms all the way down in a continuous movement. Load control will stop the lowering movement. Check the radius from the edge of the platform to the tipping centre. The radius must be 7600 mm +50 –100 mm. 1. If the lifting radius exceeds this, tighten screw 1. If the lifting radius is shorter than this, tighten scew 1. Repeat the procedure until the required accuracy 7600 + 50 – 100 mm is reached. Tighten the locking nut of screw 1 while simultaneously holding the screw head.*
8. *Check the operation of load control one more time after tightening the locking nut.*
9. *Raise the booms all the way up, do not retract the booms. Lower the booms in one continuous movement, load control will stop the movement.*
10. *Retract the booms at least one half of their length. Lower the booms about 10 degrees.*
11. *Extend the booms fully in one continuous movement. Check radius from platform edge to tipping centre. The radius must be 7600 mm ± 150 mm.*
12. *If the deviation is larger, check operation of valve Y11 (the valve is located by the rear end of the boom extension cylinder on the turntable).*
13. *Load control limit switch LS13 controls valves Y10 boom lowering, Y11 boom extension and Y12 jib raising, thus preventing the extension of the load dependent max. allowed lifting radius when the load control is in operation. After the operation of load control, all functions that shorten the lifting radius are allowed: raising the booms, retracting the booms and lowering the jib. Refer to hydraulic scheme / electricity scheme.*
14. *The limit switch LS25 controls the overload warning light on the platform, figure 8.6-1 point 3, H8 in the electricity scheme. The warning light goes on when the max. allowed lifting radius has been reached either by lowering the booms or by telescoping. The warning light goes out by raising or retracting the booms. In addition, limit switch LS25 controls time relay K7. The purpose of time relay K7 is to damp the "bouncing" of the booms when the fully extended booms are lowered and load control stops the movement.*
15. *Limit switch LS25 is adjusted to operate simultaneously with limit switch LS13.*
16. *Adjustment: losen fixing screws 2, tighten or loosen check screw 3.1. Tighten fixing screws and 3.1 locking nuts (figure 11.-2).*

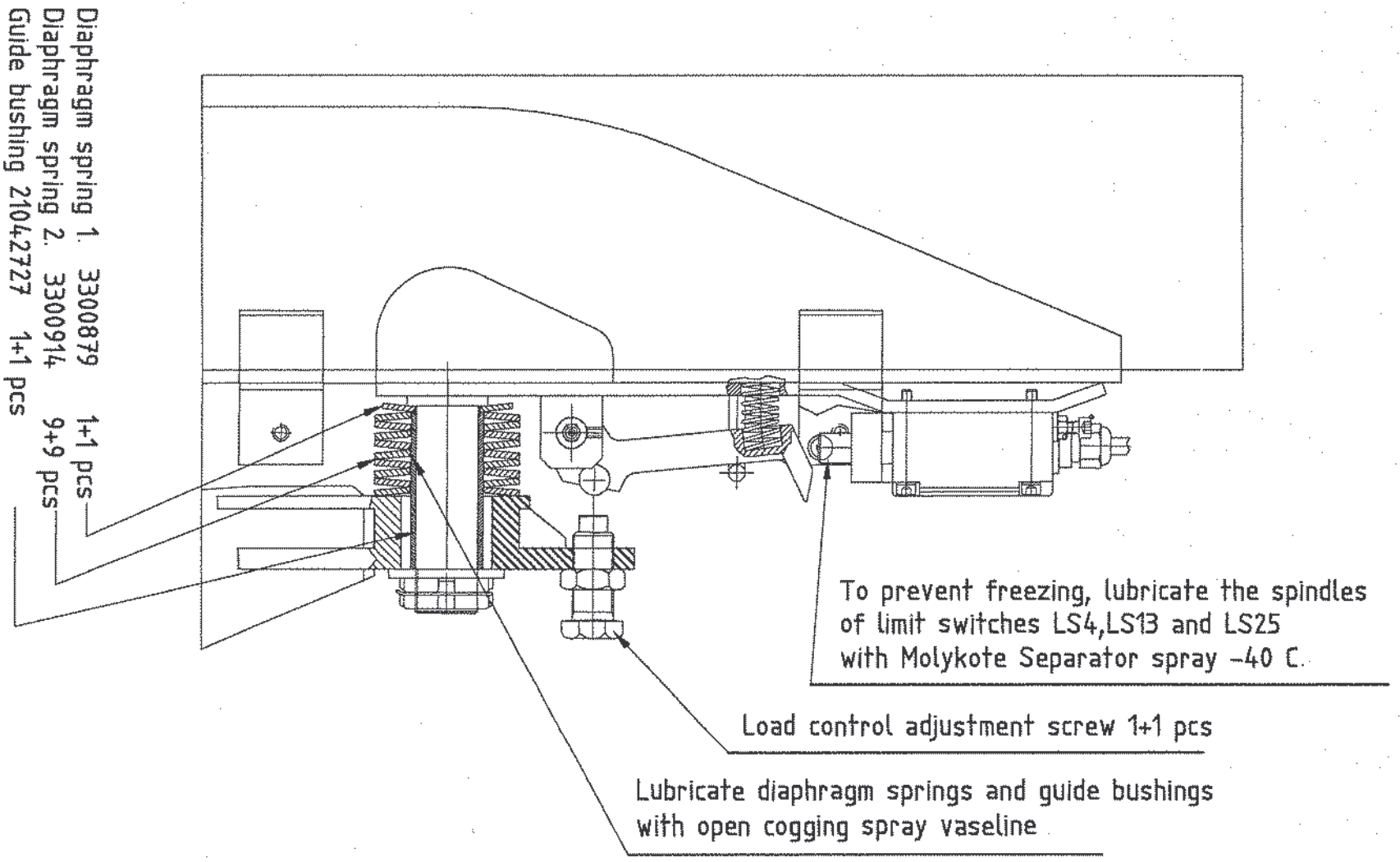
12.0 STANDBY SAFETY LIMIT OF LOAD CONTROL LS4

1. *Takes over, if the primary load control limit switch LS13 is defective.*
2. *The standby safety limit LS4 requires a somewhat longer lifting radius to operate.*
3. *The safety limit LS4 cuts electricity to the stop solenoid of the combustion engine thus cutting the combustion engine. Note! The safety limit LS4 does not operate during emergency lowering.*
4. *The safety limit LS4 is adjusted after the primary load control has been adjusted.*
5. *Level the MEWP with the outriggers (accuracy ±1degrees) so that the wheels are about 100 mm off the ground. Raise the jib boom to an angle of 45 degrees to the booms. Empty the platform of all loose objects. Guiding from the turntable, raise the booms off the transport support and slew the booms about 10–15 degrees. Leave the booms on the horizontal plane, telescope the booms 8.7 m (figure 12.-1). Leave the combustion engine running. Note! Before supporting the MEWP on the outriggers check soil tightness under the outrigger soles. Refer to chapter 10 Soil tightness table.*
6. *Place a weight on the platform (230 kg ± 2 kg). Place the weight so that its centre is about 100-200 mm from the gate side of the platform, in the middle of the platform in longitudinal direction. Note! When the weight is placed on the platform, no persons or other additional load are allowed on the platform.* ***Do not drop the weight on the platform.***
7. *Tighten adjustment screw 4 (figure 11.-2) until the combustion engine stops. Lock screw 4 lightly. Raise the weight on the platform about 200 mm, then start the combustion engine. Carefully move the weight to the jib side of the platform and gently lower the weight, the combustion engine must not stop. If necessary, tighten or loosen screw 4.*
8. *Tighten the locking nut of the adjustment screw while holding the adjustment screw. Check the operation of standby safety limit LS4 after tightening the locking nut.*
9. *Seal load control with sealing paint in accordance with figure 11.-2.*

Figure 12.-1 Adjustment of standby safety limit LS4



13.0 DIAPHRAGM SPRINGS OF LOAD CONTROL



14.0 CHECK MARK FOR BOOM EXTENSION LOAD CONTROL
(Morking only after lood control hos been adjusted)

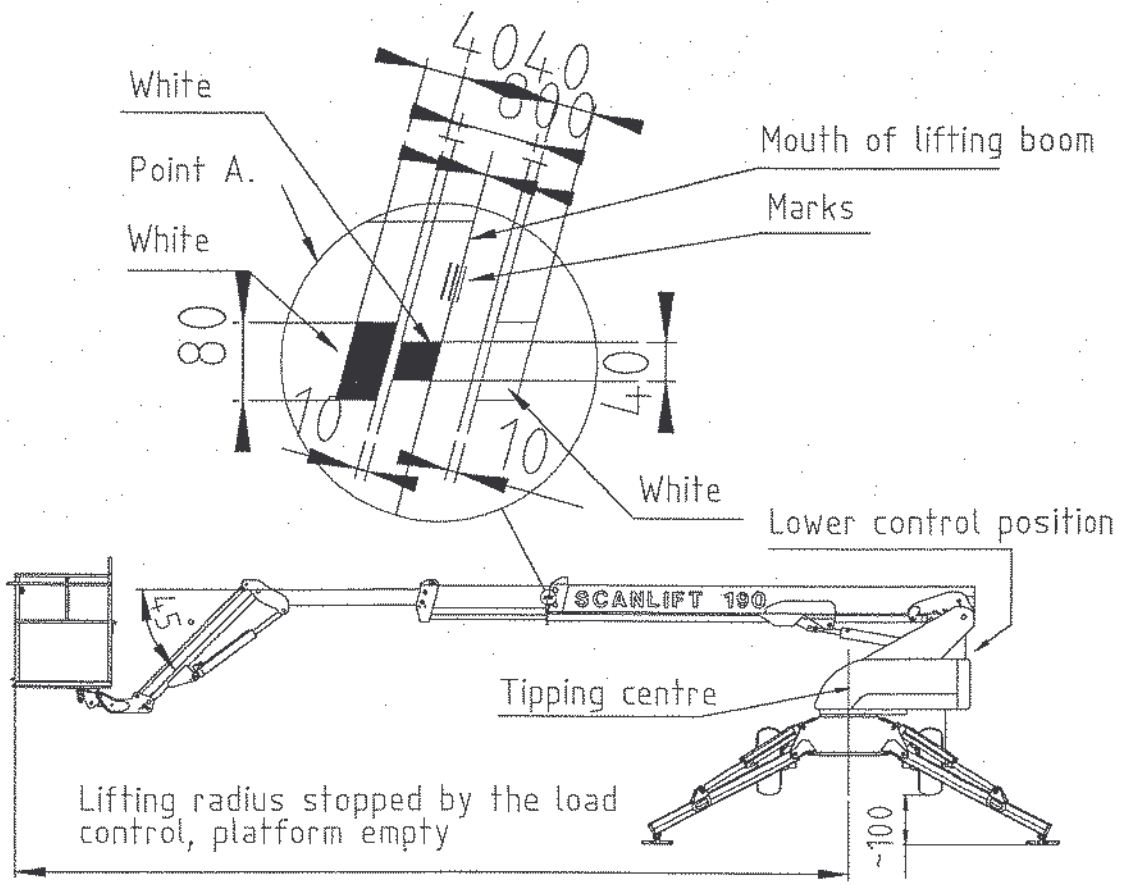


Figure 14.-1

1. *Level the MEWP with the outriggers (accuracy ±1 degrees) so that the wheels are about 100 mm off the ground. Raise the jib boom to an angle of 45 degrees to the booms. Empty the platform of all loose objects. Guiding from the turntable, raise the booms off the transport support, slew the booms about 10–15 degrees. Leave the booms on the horizontal plane. Extend the booms in one continuous movement until load control stops the movement (figure 14.-1). Note! Check soil tightness under the outrigger soles. Refer to chapter 10 Soil tightness table..*
2. *Make a mark on the middle boom with e.g. a felt pen, at the mouth of the lifting boom (figure 14.-1 point A). Retract the booms. Extend the booms according to item 1 three times. Mark the stopping point each time (figure 14.-1 point A).*
3. *Retract thè booms, lower the jib all the way down. Extend the booms, in which case the marks you have made become visible.*
4. *Select the middle one of the marks and measure the correct place for the check marks from that in accordance with figure 14.-1 point A. Paint the marks with white, durable paint. Note! The marks can also be black. Note! Position the marks so that the side glide pads do not rub them.*
5. *Check the operation of the telescope load control daily in accordance with figure 14.-1 point 1. For more detailed instructions regarding daily inspections please refer to chapter 8.2 of the Operating Manual.*

15.0 CHECK MARKS FOR BOOM LOWERING LOAD CONTROL
(Morking anly after load control has been adjusted)

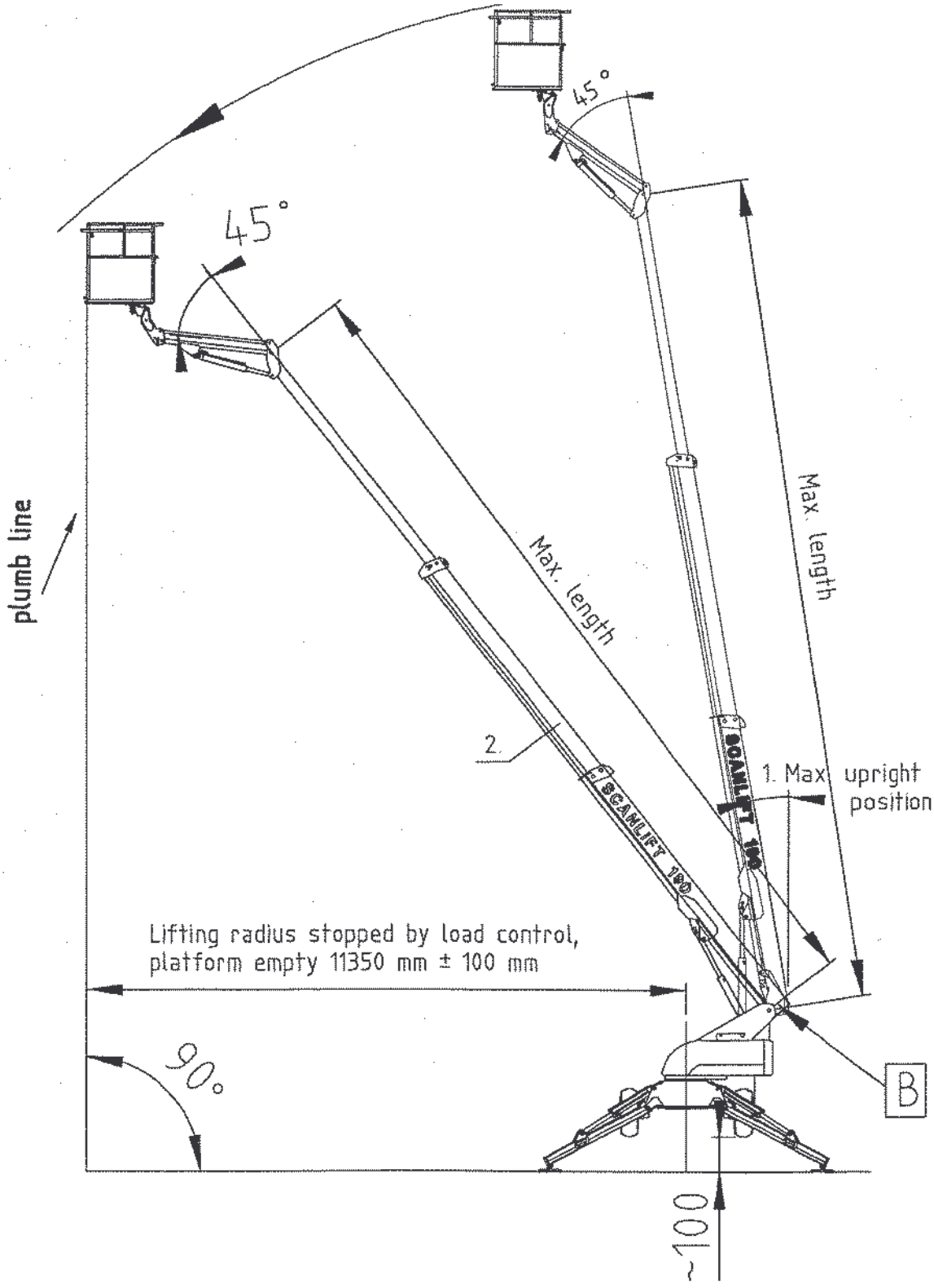


Figure 15.-1

1. *Level the MEWP with the outriggers (accuracy ±1 degrees) so that the wheels are about 100 mm off the ground. Raise the jib boom to an angle of 45 degrees to the booms (figure 15.-1). Guiding from below, raise the booms all the way up and extend them fully to position 1.*
2. *Lower the booms in one continuous movement until load control stops the movement to position 2. Refer to figure 15.-1. Repeat the procedure three times.*

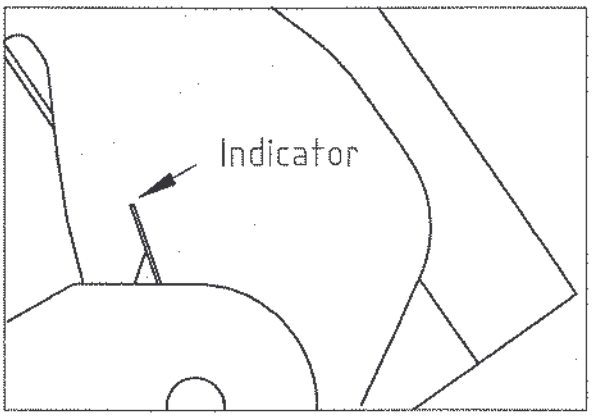


Figure 15.-2, point B

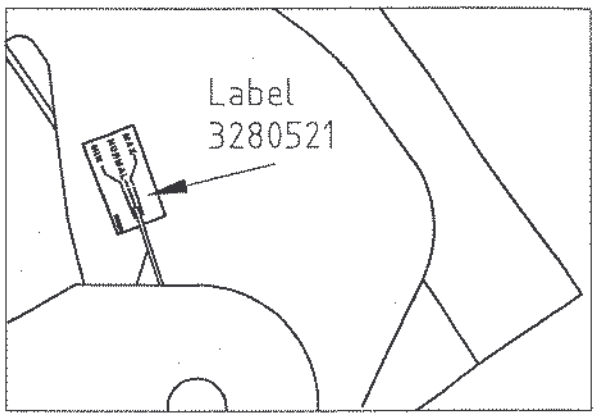
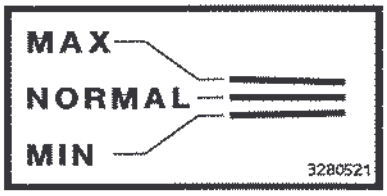


Figure 15.-3, point B

1. *Attach label 3280521 so that the indicator is on the NORMAL mark of the label, refer to figure15.-3 point B. Attach the label on the lifting boom.*



Label 3280521

16.0 OUTRIGGER LIMIT SWITCHES

1. *Position limit switches LS19, 20, 21, 22*
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 16.-1. The adjustment is set by the manufacturer.*
3. *Ground sensor limit switches LS15, 16, 17,18*
4. *Operation: When the MEWP is supported on the outriggers and the sole rests on the ground, plate B is pushed by the cylinder and pressed against the outrigger. At the same time guide plate C closes limit switch points 13-14 by means of a lever. Note! After supporting the MEWP on the outriggers the booms can not be raised off the transport support unless the points of all limit switches LS15, 16, 17, 18, 19, 20, 21 and 22 are closed, refer to the electricity scheme.*
5. *Alarm function: When one or more of the outriggers lose touch with the ground, points 13-14 of limit switches LS15, 16, 17, 18 engage, switching on the sound signal and notifying of the need to check the support. Refer to Operating Manual, chapter 8.1.2. When the booms are lifted off the transport support, the safety limit switch LS12 bypasses points 21-22 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 in accordance with chapter 16.2, if the position of the outrigger exceeds the horizontal level with 24-26 degrees.*
6. *Adjustment of ground sensor limit switches LS15, 16, 17, 18.*
7. *Place a jack or other hoisting apparatus by an outrigger (see figure 16.-3). 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 16.-2.*

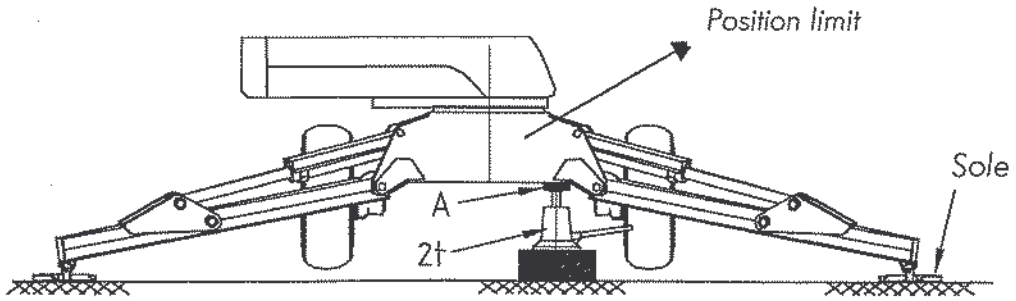


Figure 16.-3

8. *Raise the outrigger from the sole, in which case distance D is 27-30 mm. Adjust points 13-14 of limit switches LS15, 16, 17, 18 to close in this position.*
9. *Raise the outrigger from the sole, in which case plate B touches the outrigger, refer to figure 16.-2. 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 16.-1 and 16.-2.*

Position limit switches of outriggers LS19, 20, 21, 22, figure 16.-1

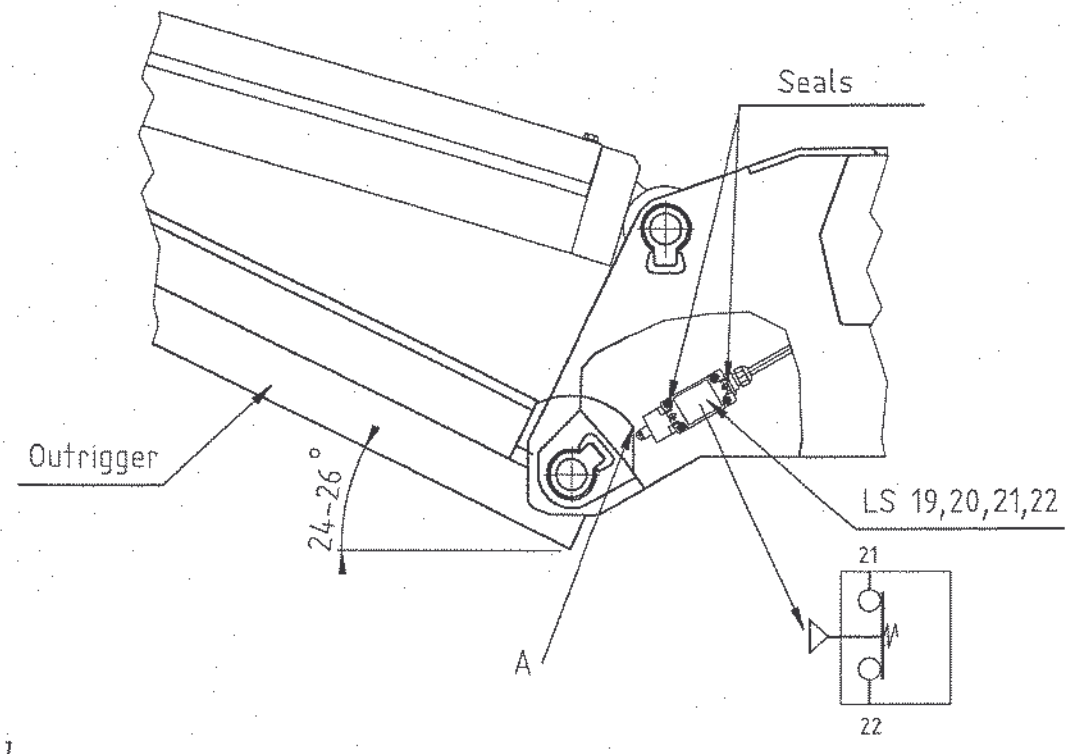


Figure 16.-1

Ground sensor limit switches of outriggers LS15, 16, 17, 18, figure 16.-2

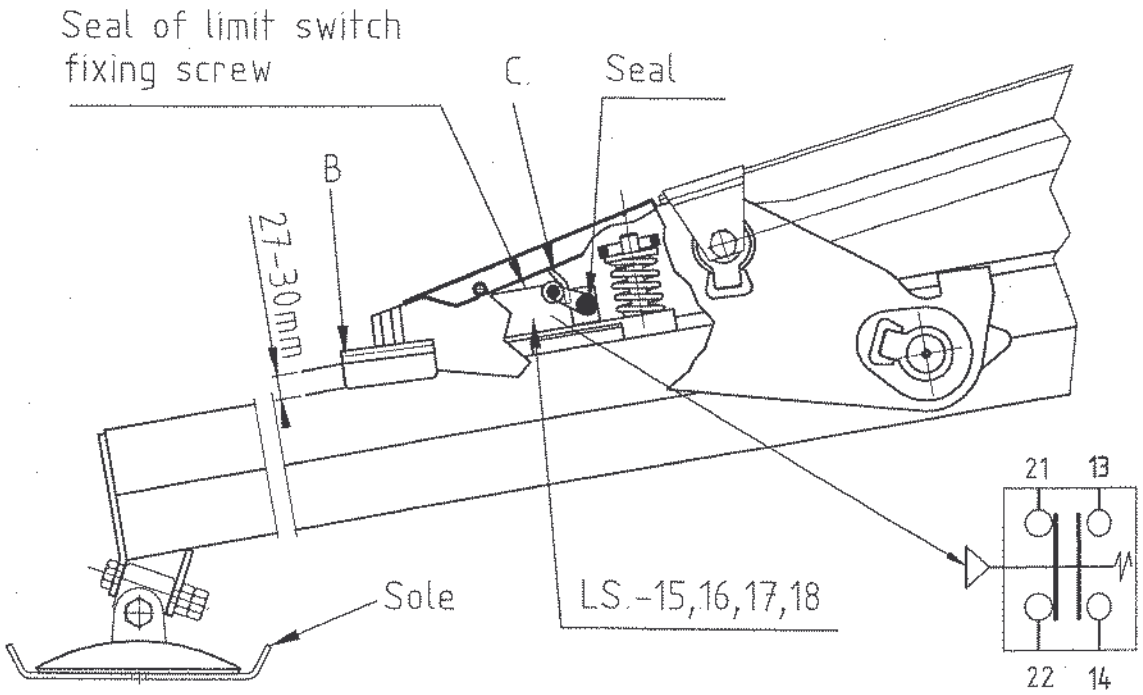


Figure 16.-2

17.0 TRANSPORT LIMIT SWITCH LS 12

1. *Operation: Booms on the transport support, points 11-12 open and prevent the use of the booms when the outriggers are up, refer to figure 17.-1. Points 13-14 close and allow driving/steering and the use of outriggers. Points 23-24 close preventing the use of the telescope.*
2. *Adjustment: Points 11-12 of limit switch LS12, for example, are adjusted to open by adjusting lever A with nut B when the lifting boom is off the transport support 5 mm, refer to figure 17.-1 distance L.*
3. *Check adjustment by using the booms/outriggers.*
4. *Seal the adjustments with sealing paint in accordance with figure 17.-1.*

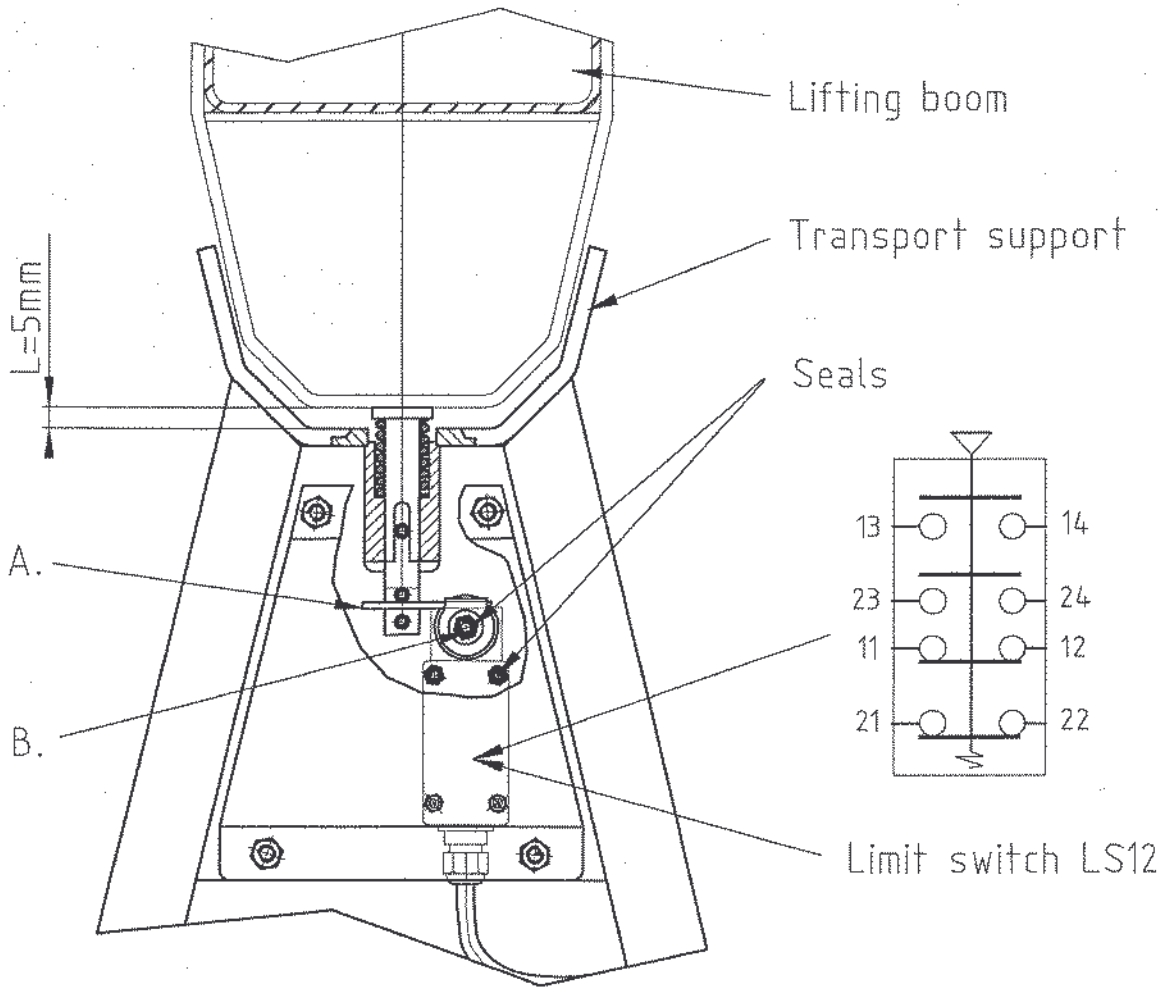


Figure 17.-1

18.0 LIMIT SWITCH LS 23 FOR RAISING

1. *Operation: When the booms are used with override switches (refer to Operating Manual, chapter 11.2 How to use the override switches), limit switch LS23 prevents raising the booms too high due to the danger of tipping over.*
2. *Adjustment: Support the MEWP with the outriggers wheels about 100 mm off the ground. Guiding from below, raise the booms to an angle of 18-20 degrees from the horizontal plane, refer to figure 18.-1. Adjust the roller lever of limit switch LS23 so that cam A of the guide plate opens points 21-22 of the limit switch by means of the roller lever.*
3. *Seal the roller lever shaft nut and limit switch fixing screws with sealing paint after the adjustment, refer to figure 18.-1*

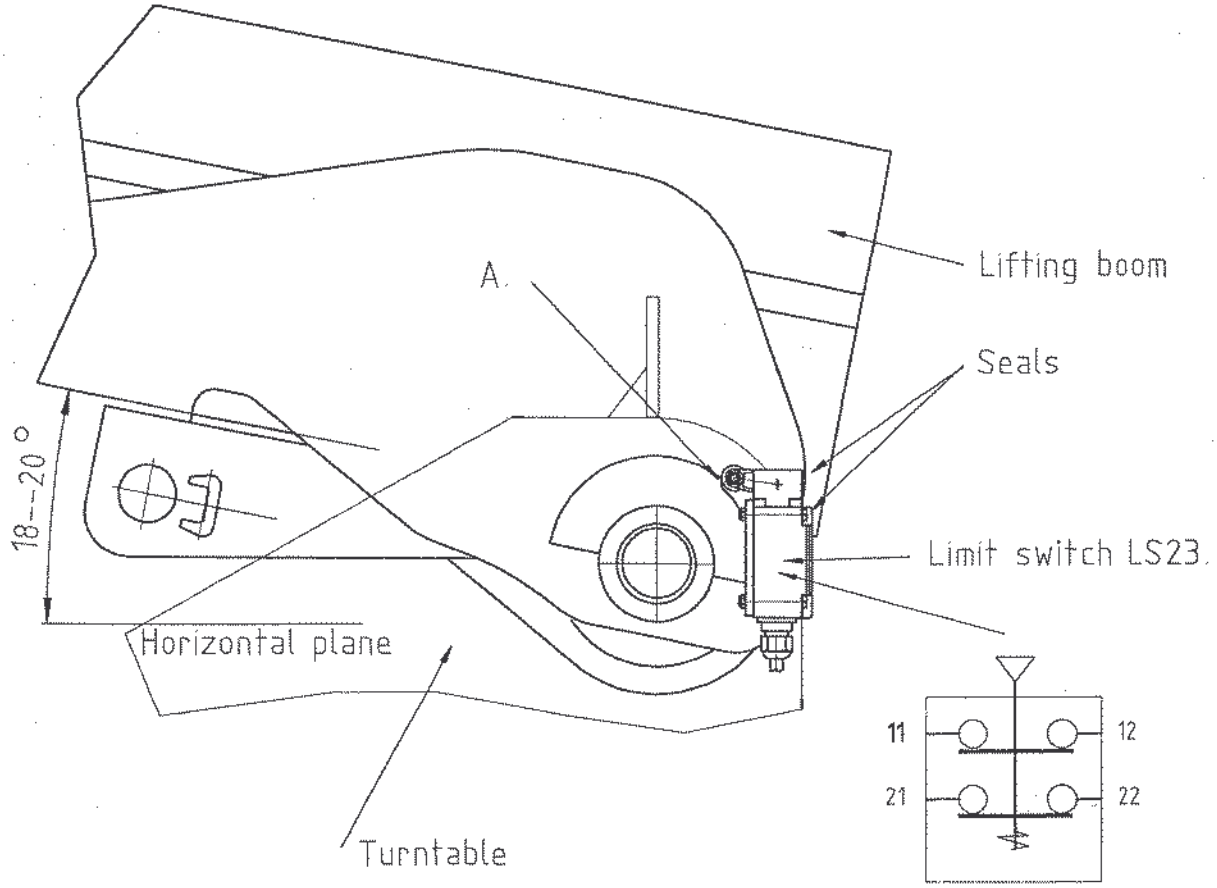


Figure 18.-1

19.0 JIB LIMIT SWITCH LS27

1. *Operation: When lowering the jib, inclining the platform towards the jib or rotating the platform, limit switch LS27 prevents the upper part of the platform from bumping into the stabiliser boom of the jib (figure 19.-1 point A) by stopping the lowering of the jib. If the platform is inclined or the booms are lowered, the limit switch will push the jib boom outwards.*
2. *Adjustment: Support the MEWP with the outriggers with the wheels slightly off the ground. Guiding from the platform, lower the jib, adjust roller lever of limit switch LS27 so thot it closes limit switch points 13-14 by means of the guide and stops the lowering of the jib to length L (50 – 0 +20), refer to figure 19.-1 point A.*
3. *Seal roller lever shaft nut and limit switch fixing screws with sealing paint after adjustment, refer to figure 19.-1, partial enlargement.*

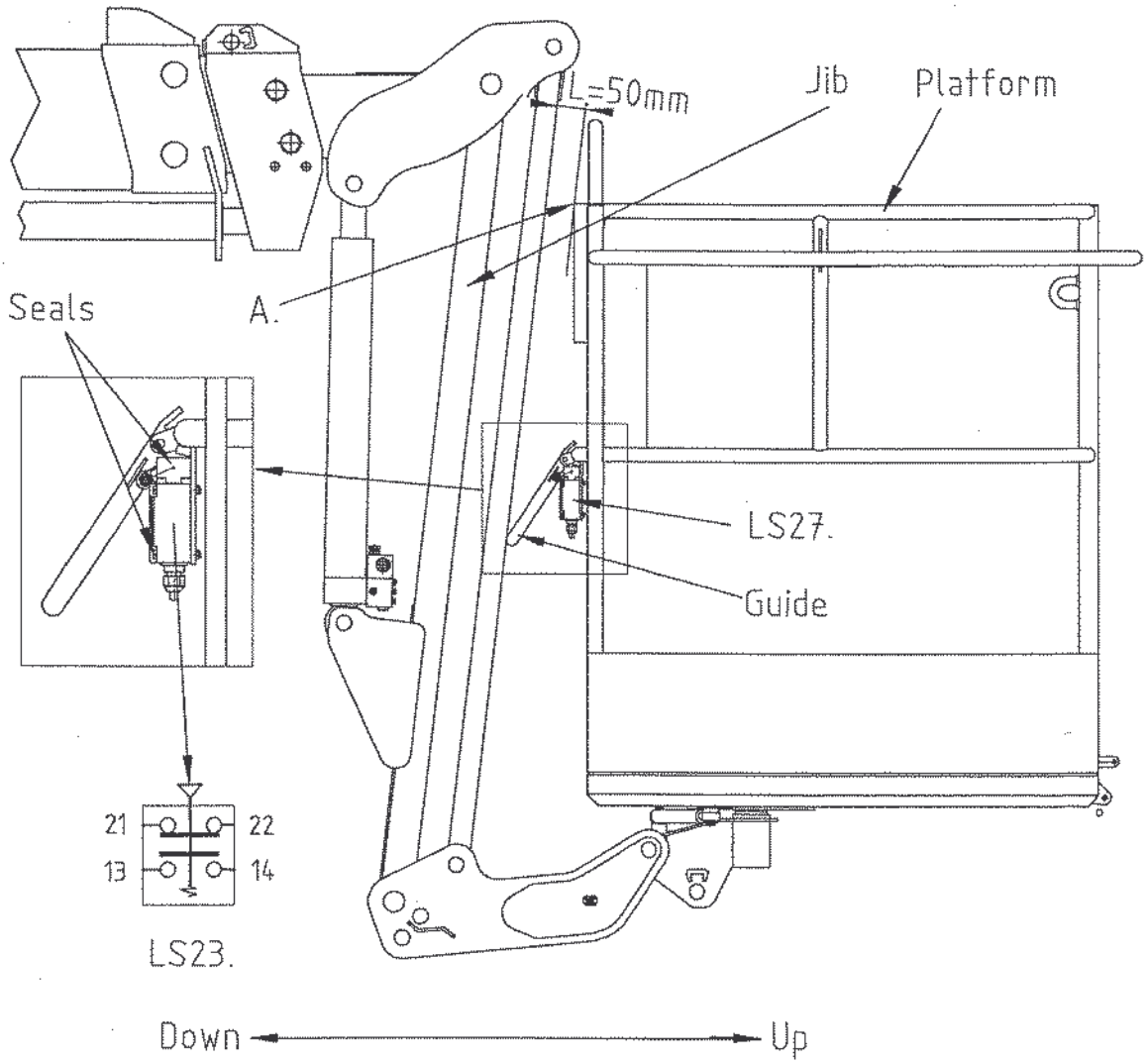
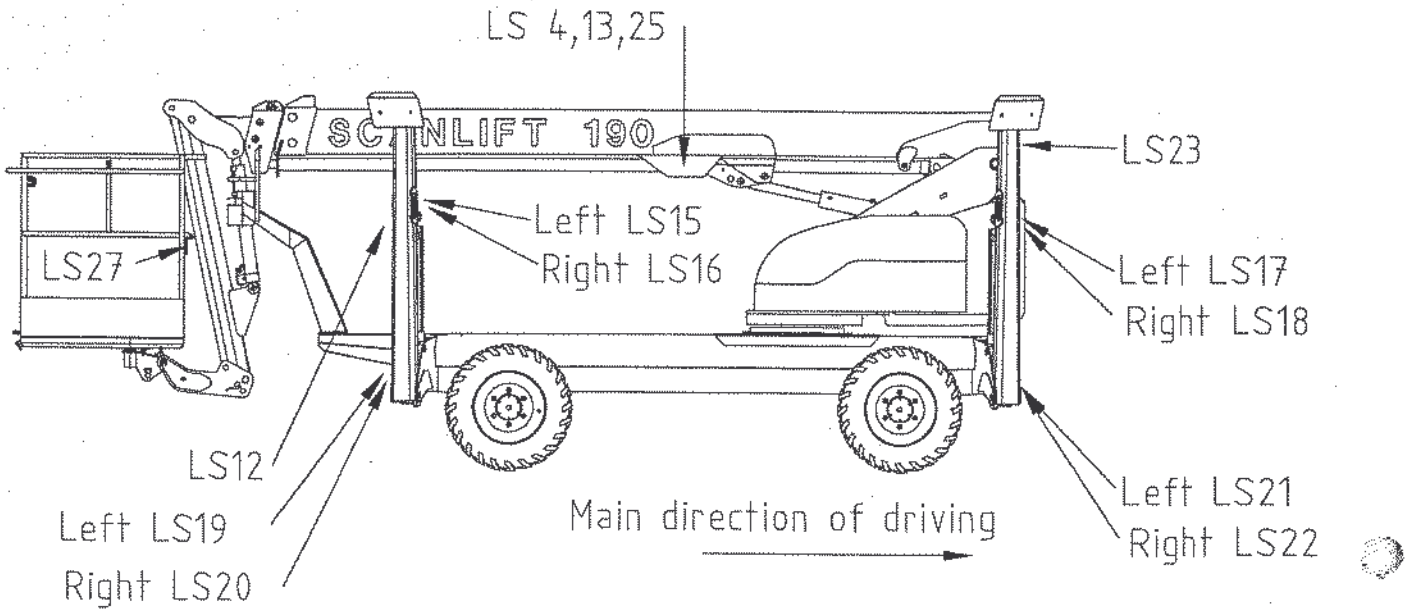


Figure 19.-1

20.0 LIMIT SWITCHES ANO THEIR POSITIONS



1 pc	3180288	LS4	Standby safety limit for load control	Telemecan XCK-S502+
1 pc	3180802	LS12	Limit switch for transport support	Telemecan XCK-S254+
1 pc	3180614	LS13	Limit switch for load control	Telemecan XCK-J767+
4 pc	3180602	LS15,16 17, 18	Ground sensor limit switches	Telemecan XCK-J50511+
4 pc	3180288	LS19,20 21, 22	Limit switches for the position of outriggers	Telemecan XCK-S502+
1 pc	3180615	LS23	Limit switch for raising	Telemecan XCK-J70531+
1 pc	3180288	LS25	Standby safety limit for load control	Telemecan XCK-S502+
1 pc	3180275	LS27	Jib limit switch	Telemecan XCK-S531+

21.0 ADJUSTING THE HYDRAULIC PUMP REXROTH A10VS010DFR1/52R-PKC64N

Preparations: The MEWP can be in transport position (figure 21.-2) Remove the left-hand side cover, platform side front cover and valve group top cover. Connect a pressure gauge to measuring point M1, refer to figure 21.-1.

Adjusting idle pressure 1

1. *Disconnect the hose of the pump regulator adjustment connection LS. Plug the hose end with a pressure resistant plug.*
2. *Remove protecting cap B and loosen the locking nut of adjustment screw 1 (figure 21.-3.)*
3. *Start the engine. Adjust the engine to 3000 r/min. Use the control lever of one of the outriggers to raise the outrigger all the way up and keep the lever in this position for about 10 seconds. Release the lever and leave the engine running.*
4. *Adjust with adjusting screw 1 until the pressure gauge indicates 1500 + 100 kPa – 0 (15 bar +1 bar –0)*
5. *Tighten the locking nut of adjustment screw 1 while holding the adjusting screw. Read the pressure gauge after tightening. Stop the engine, replace the protecting cap. Note! gasket. Connect the LS adjustment connection hose.*

Adjusting main pressure 2

1. *Remove protecting cap A and loosen the locking nut of adjustment screw 2 (figure 21.-3.).*
2. *Start the engine. Adjust the engine to 3000 r/min. Use the control lever of one of the outriggers to raise the outrigger all the way up and keep the lever in this position. Adjust with adjusting screw 2 until the pressure gauge indicates 25000 ± 500 kPa (250 ± 5 bar).*
3. *Tighten the locking nut of adjustment screw 2 while holding the adjusting screw. Read the pressure gauge after tightening. Stop the engine, replace the protecting cap. Note! gasket.*
4. *Seal the locking nuts and protecting caps of both adjusting screws (figure 21.-3) with sealing paint.*
5. *Note! If the pump has not been used after replacement or service, fill it first with hydraulic oil through the housing leakage connection (figure 21.-3.).*
6. *Only hoses, nipples and connectors approved by the manufacturer may be used in the leakage connection.*

Adjusting the hydraulic pump

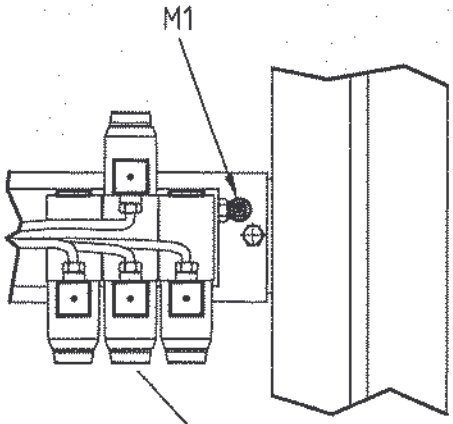


Figure 21.-1

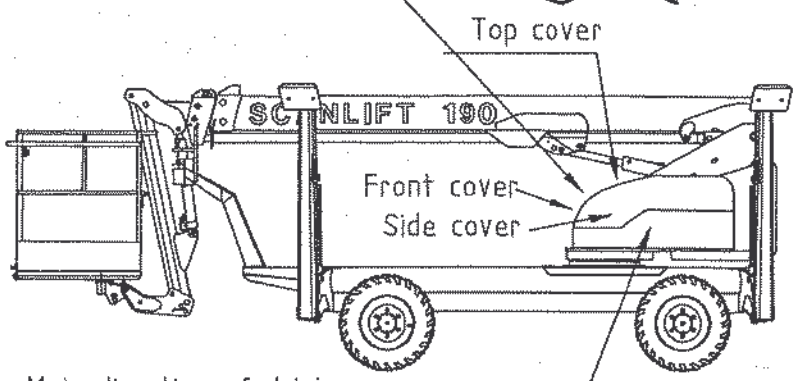


Figure 21.-2

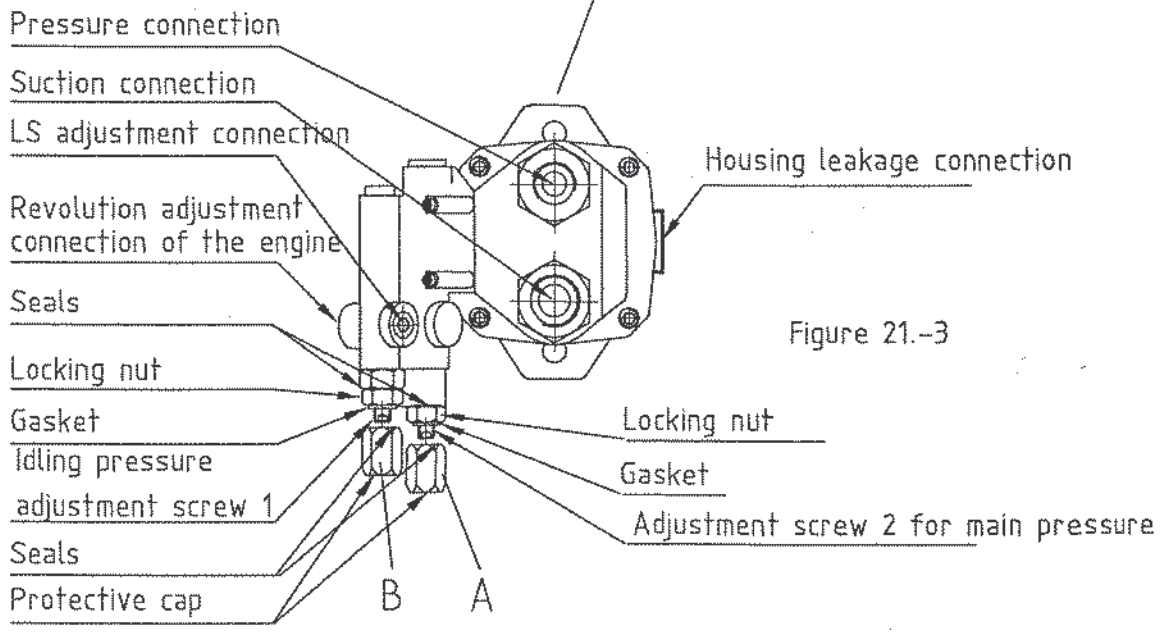


Figure 21.-3

HD-PUMP REXROTH A10VS010DFR1/52R-PKC64N

22.0 ADJUSTING THE HYDRAULIC LOWERING PRESSURE OF BOOMS

1. *Remove shield plug 1 and connect a pressure gauge to point M4.*
2. *Warm hydraulic oil to +30°C.*
3. *Raise the booms to position A, all the way up. Jib fully out (figure 22.-1.).*
4. *Pull the lowering spindle fully open, in which case the pressure gauge should indicate 100 ± 3 bar. Lower the booms to position B where the pressure is about 95 bar.*
5. *Retract the booms, point C, pressure approx. 100 bar. Then lower the booms to position D, where pressure is approx. 98 bar.*
6. *When adjustment 2 is turned to plus (+) direction the pressure increases and when turned to minus (-) direction the pressure decreases.*
7. *Tighten shield plug 1 and seal with sealing paint.*
8. *Note! The pressures in points A, 8, C and D are those during boom lowering.*

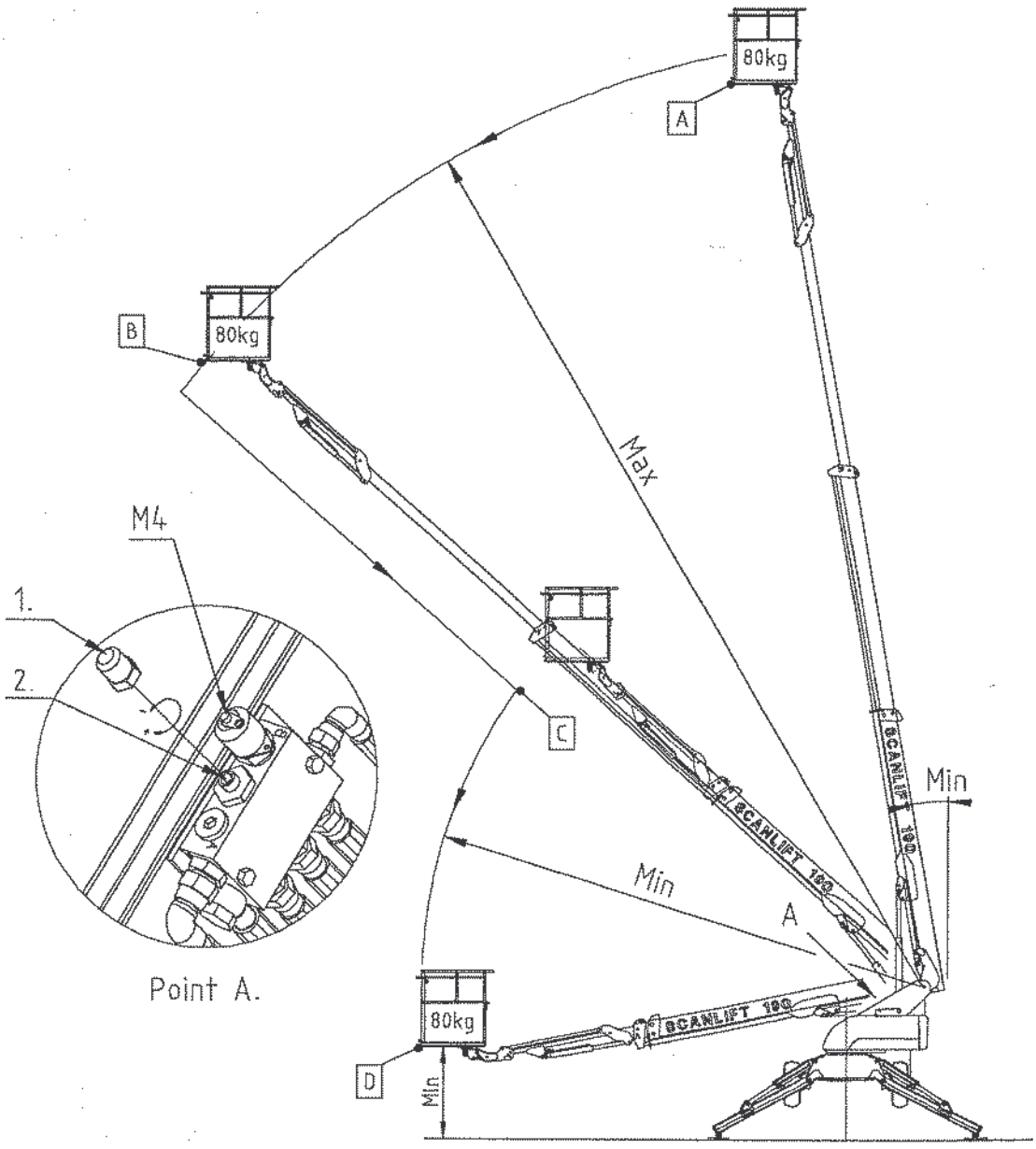


Figure 22.-1

23.0 ADJUSTING THE STARTING OF BOOM LOWERING

Adjustment is required, if starting from position A is too rapid or if the booms do not lower from position C – D with cold oil (figure 22.-1.).

1. Support the MEWP with the outriggers on firm ground and verify that the support is horizontal. Wheels off the ground about 100 mm. Warm hydraulic oil to +30 °C.
2. Remove cap nut 2 of throttling screw 1 (figure 23.-1) in the lifting cylinder valve block.
3. First tighten throttling screw 1 carefully. Then unscrew the throttling screw $^1/_2$ turn. Check the condition of gaskets 3 and replace the cap nut. Note! Do not unscrew the throttling screw too much, otherwise there will be a sharp jerk when the booms start to lower from the upper position. Also, do not leave the screw too tight, because the booms can then not be lowered.
4. Guiding from the platform, drive the booms all the way up, extend the booms completely with the telescope and straighten the jib boom completely (figure 23.-2, point A). Weight of person on platform 80-90 kg, platform otherwise empty.
5. Lower the booms slightly.
6.Raise the booms slightly so that the mouth brake of the lifting cylinder starts to operate. Stop the raising there.
7.Pull the boom lowering lever to its extreme position. Start a stopwatch the moment the platform starts to move. Keep the lever in the extreme position, until load control stops the movement. Stop the watch the moment the movement stops (figure 23.-2, point B)
8. Check the stopwatch. The time spent on lowering should be 17 +0 –1.5 seconds.
9.If the lowering takes less than 15.5 seconds, open locking nut 4 of adjustment screw 5 (figure 23.-1) and unscrew adjustment screw 5, in which case time t increases and the lowering speed decreases.
If the time spent on lowering is more than 17 seconds, tighten adjustment screw 5, in which case time t decreases and lowering speed increases.
10. Lock adjustment screw 5 with locking nut 4.

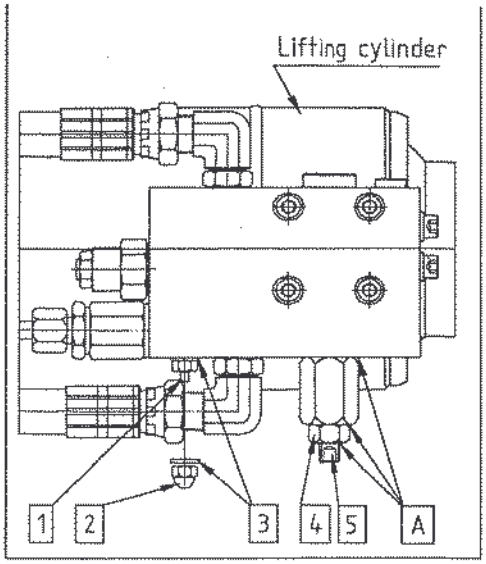


Figure 23.-1

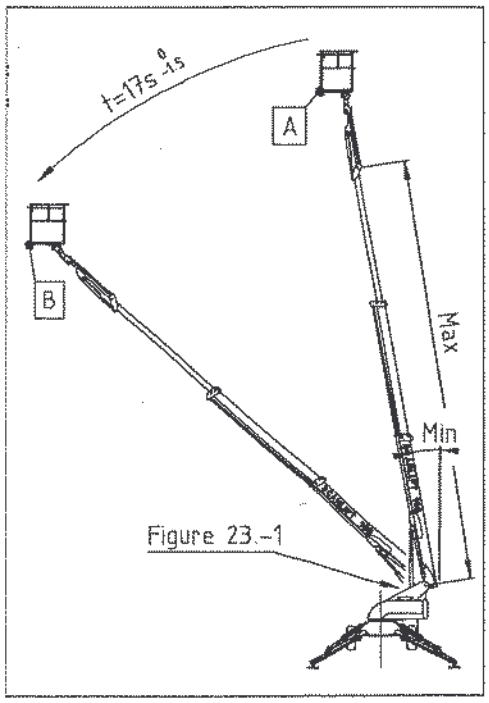


Figure 23.-2

11. Check lowering speed after locking the screw and readjust, if necessary.
12. Seal points A after adjustment (figure 23.-1)

24.0 ADJUSTING THE RAISING SPEED OF BOOMS

1. Support the MEWP with the outriggers on firm ground and verify that the support is horizontal, wheels off the ground about 100 mm. Warm hydraulic oil to +30 °C.
2. Guiding from the platform, drive the booms all the way up. Extend the booms completely with the telescope and straighten the jib boom completely (figure 24.-1.). Weight of person on platform 80-90 kg, platform otherwise empty.
3. Pull the boom lowering lever to extreme position. Keep the lever in this position until load control stops the lowering movement (figure 24.-1, point B).

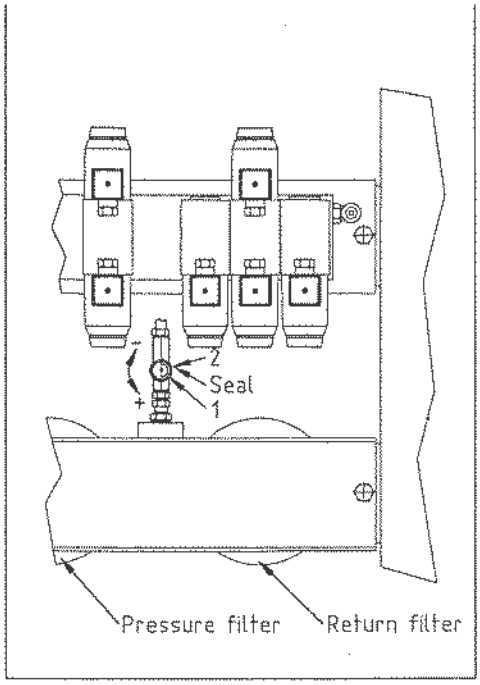


Figure 24.-2

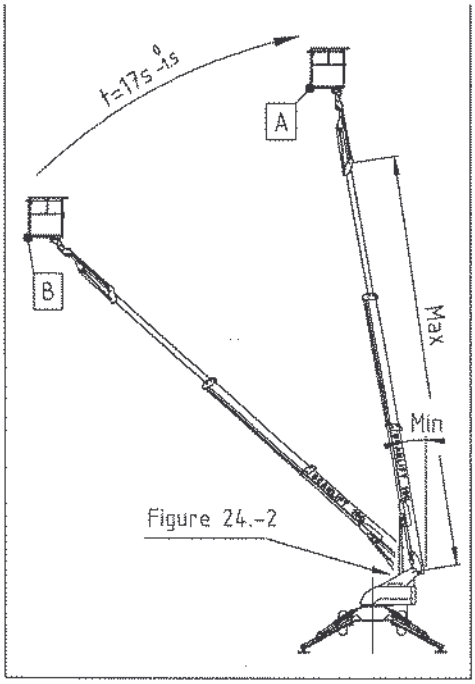


Figure 24.-1

4. Push the boom raising lever to extreme position. Start a stopwatch the moment the platform starts to move. Keep the lever in the extreme position until the movement begins to stop, i.e. the mouth brake of the lifting cylinder starts to function. Stop the watch.
5. Check the stopwatch. The time spent on lowering should be 17 +0 – 1.5 seconds.
6. If the time is less than 15.5 seconds, unscrew locking screw 2 (in the turntable valve group) and turn valve 1 (figure 24.-2) in the minus direction, in which case time t increases and the raising speed decreases.
   If the time spent on raising is more than 17 seconds, turn valve 1 in plus direction, in which case time t decreases and the raising speed increases.
7. Lock the valve with locking screw 2.
8. Check raising speed after locking the valve and readjust, if necessary.
9. When you have adjusted the raising speed to the desired value, seal the speed adjustment valve with sealing paint.

25.0 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, figure 25.-2)*
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 (3.6 km/h).*
7. *Release the drive lever quickly to the middle position.*
8. *Adjust the stopping distance of the MEWP to 0.3 m from valve A (figure 25.-1) and to 0.3 m from valve B.*
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.
10. *Lock adjustments A and B with locking screws 1.*

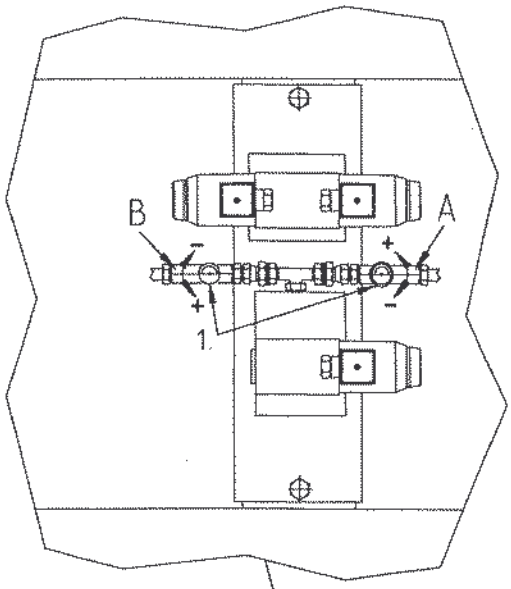


Figure 25.-1

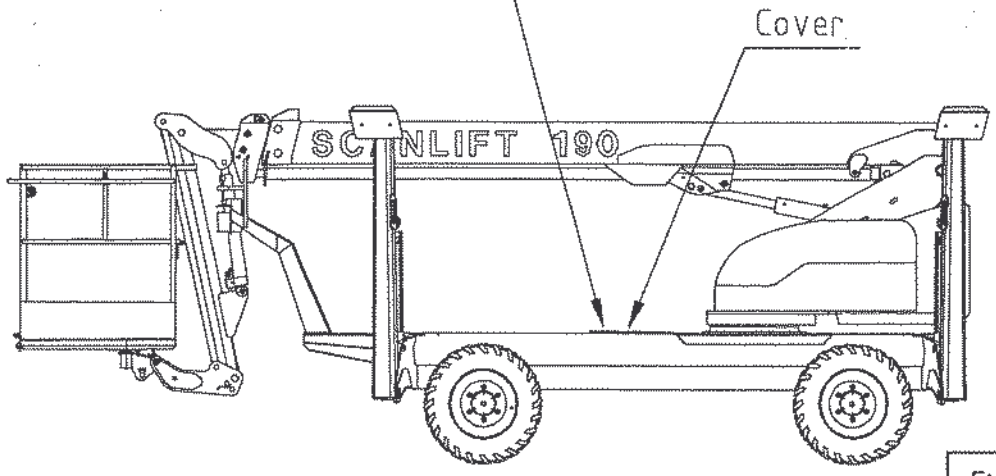


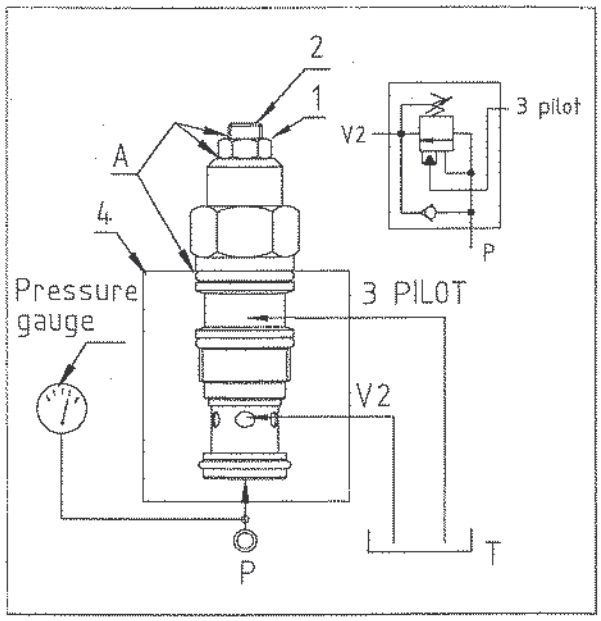
Figure 25.-2

26.0 ADJUSTING LOAD LOWERING VALVES

Design values

- Type of load lowering valve: SUN, CBCG-LJN 345 bar (3120351)
- Load lowering valve for lifting, telescope and jib cylinder 34500 ± 500 kPa (345 ± 5 bar).
- Testing oil: 10 W -OW30
- Oil temperature 18°C - 30°C

Adjustment



1. The valve is fixed to adjustment block 4 in accordance with the drawing (figure 26.-1).
2. Loosen nut 1.
3. Connect 35000 kPa (350 bar) pressure, output 10-15 l/min to point P.
4. Turn adjustment screw 2 until the pressure rises to 35000 kPa (350 bar), in which case oil flow from gate V2 stops.
5. Unscrew the adjusting screw 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 1 while holding adjustment screw 2.
8. Seal points A with Kesla sealing paint after instalment in the cylinder.
9. Observe extreme cleanliness when handling valves.
10. Note! When the adjustment screw is loosened, pressure will rise.

27.0 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. Unscrew screw B so that the head of the screw is level with the inner edge. Remove the wire rope clip of screw C from the wire rope, refer to figure 27.-1.*
2. *Start the combustion engine. Adjust from screw A the max. speed of rotation of the engine to 3000 r/min. Pull the cylinder rod fully out (stroke 50 mm), using the boom lowering lever, guiding from the lower point of control. Stop the engine and keep the lowering lever engaged in which case the rod remains out.*
3. *Attach and tighten the wire rope clip of screw C, pick up the slack of the wire rope.*
4. *Start the engine, adjust from valve E the delay of the cylinder reverse stroke to 3–8 sec. Operation: When using the MEWP's hydraulic functions, the speed of rotation of the engine increases.*
5. *When the hydraulics control lever is released to the middle position, the speed of rotation of the engine returns to the adjusted idling speed after a delay.*
6. *Loosen screw A about 5 mm. Start the engine, adjust idling speed to 1600 r/min from screw A.*
7. *If necessary, adjust with screws C and D the max. speed of rotation to 3000 r/min using one of the MEWP's hydraulic functions.*

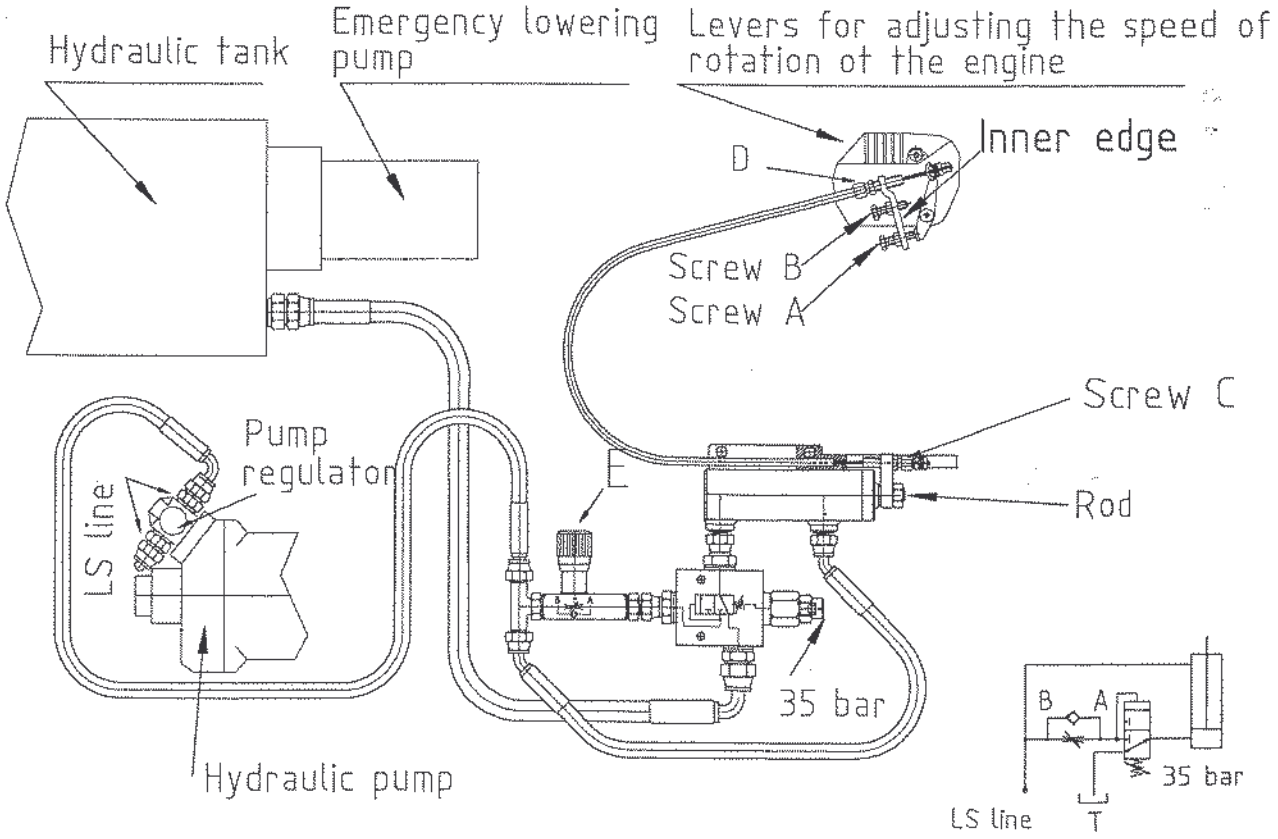


Figure 27.-1 Adjusting the equipment for increasing/decreasing the speed of rotation

28.0 MAINTENANCE OF DRIVING BRAKES

28.1 Brake structure

-The Scanlift SL 190 has driving brakes on both the front and rear axles of the wheel hub.
- The disc brake is opened by hydraulic pressure.

- When the pressure of the driving motar exceeds 30 bar (430 psi), the disc brakes open. When the driving mator pressure draps belaw 30 bar (430 psi), a spring autamatically closes the brakes.

- The constructian of the brake calliper is called "flaating", which means that the spring presses against one of the brake pads but the slide mechanism distributes the clamp pressure so that both pads af the brake calliper squeeze the disc equally from bath sides.

28.2 Maintenance of the brakes:

- Verify that the brake pads are pressing against both sides of the brake disc with equal pressure.

- Clean, lubricate, and check the functioning af the floating brake calliper mechanism every six manths, or more often in hard or dirty conditions.

- If the brake pad on the spring side is clearly more worn, pay extra attention to the cleaning and lubricating of the mechanism.

- The driving brake can be released (for example, during tawing) by using the special nipples which are supplied in the MEWP equipment case. Screw these into the brake cylinder in place of the nipple already on its hydraulic hose, and use an M8 bolt in the nipple thread hole to release the brakes.

- Change the brake pad if the friction surface of the pad is less than 1.5 mm (0.059 in) thick.

- support the MEWP on the outriggers, lawer the wheels on the opposite side to the ground, switch on the fast driving speed and remove the wheels on the side of the brakes to be adjusted. Adjust the distance between the brake pads and the disc to 0.8 mm (0,031 in) (the other pad and disc 0.0 mm). **Exercise extreme cautian. Scanlift may mave when drive is engaged.**
- Do the adjustment by loosening locking nut 2 and adjusting the gap from adjusting screw 4. Finish by tightening locking nut 2.

For the adjustment push the drive lever ta extreme positian and keep it there during the adjustment. The selected driving speed "fast" must be kept engaged the whole time.

28.3 Changing the brake pads

Change the brake pad if the friction surface of the pad is less than 1.5 mm (0.06 in).

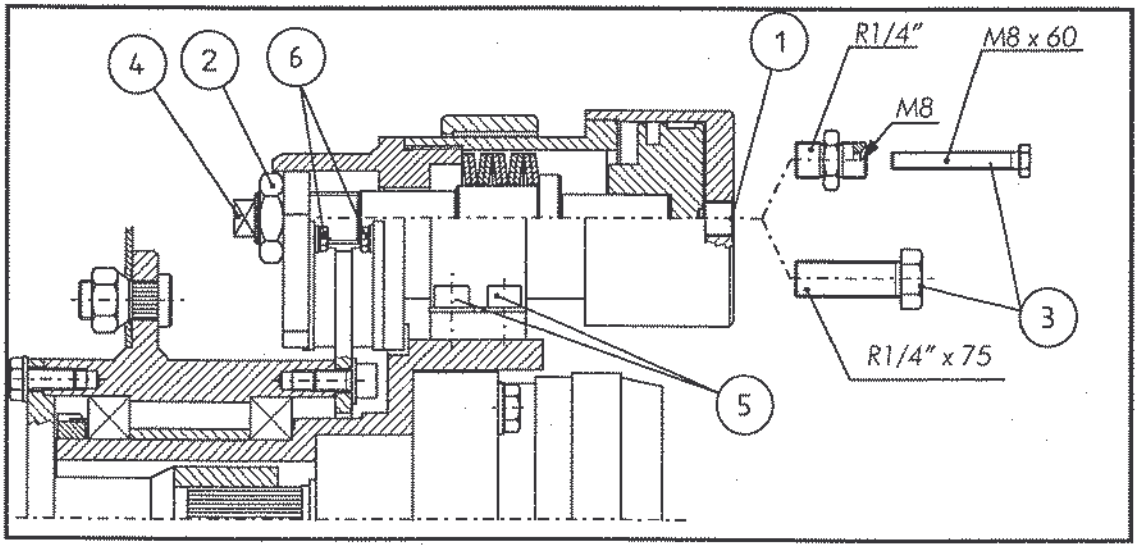


Figure 28.-1. Brake, special nipple, and M8 bolt

1. *Drive the MEWP onto level and firm ground*
1. *Use the outriggers to raise the wheels slightly above the ground. Turn off the engine*
2. *Remove the wheels*
3. *Remove the brake hose from point 1 and plug the hose*
4. *Remove nut 2*
5. *Screw in a R1/4" x 75 screw or a 1/4" double nipple with a M8 x 60 screw into point 1*
6. *Tighten screw 3 so that brake pads detach themselves from the brake disc*
7. *Tighten from shank 4, and the brake pad will detach itself from the brake disc*
8. *Remove screws 5 and set the brake cylinder aside*
9. *Remove screws 6 and the brake pads*

Install the brake caliper mechanism in reverse order.

28.4 Brake cylinder

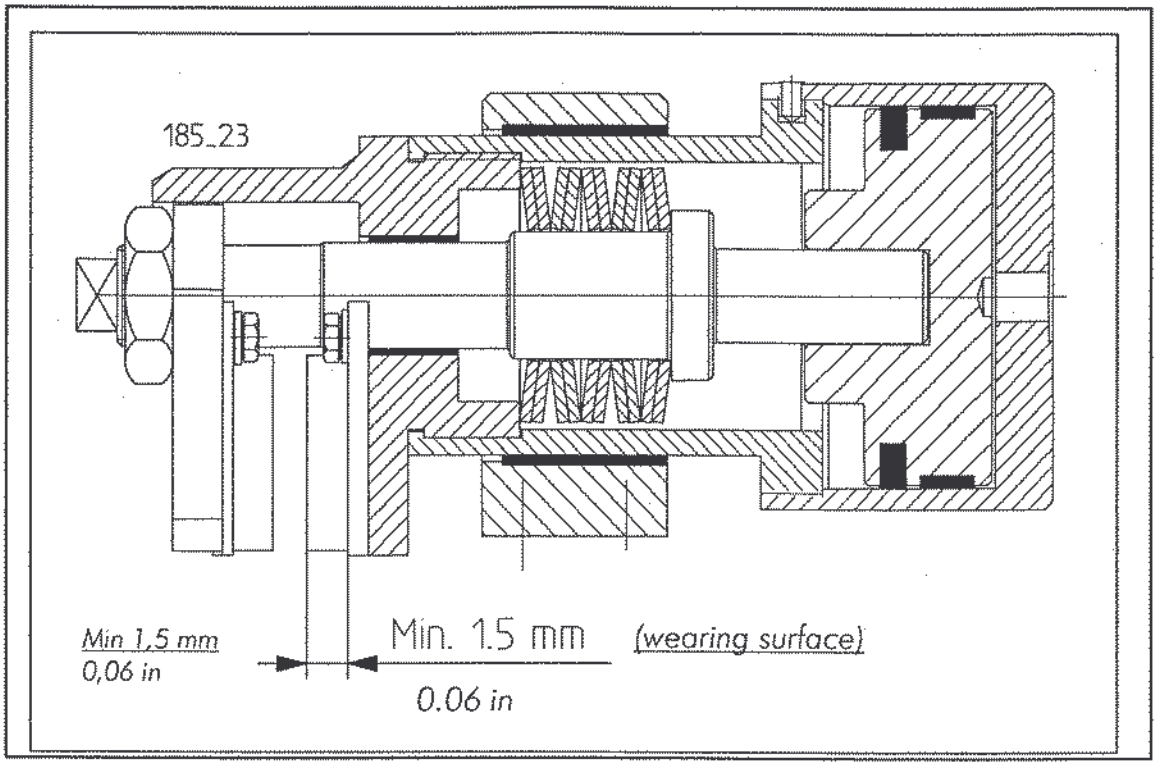


Figure 28.-2 Brake cylinder

29.0 ADJUSTMENT AND MAINTENANCE OF THE BOOM CHAINS

29.1 Inspection instructions

1. Retract the boam completely using the telescope cylinder.
2. Position of autermast boom extension:
   - Check gap A (figure 29.-1). If gap A is larger than 10 +5 mm (0.39 in. +0.196 in.), loosen nuts 2 and 4 of the extend chain 1 and tighten nuts 2 and 4 af retract chain 2. At this point, the outermost boom extensian will move inwards.
   - If gap A is smaller than 10 -3 mm (0.39 in –0.118 in), laosen nuts 2 and 4 of the retract chain 2 and tighten nuts 2 and 4 of extend chain 1.
   - After adjustment, tighten lock nuts 2 while halding nut 4. Check that the split cotter 5 is intact and definitely in place.
3. Check the maximum allowable chain elangation, max. elongatian 2%

3.1 Extend the baoms until at least 2 m of the chain is visible.
3.2 Caunt e.g. 100 chain links (distance between pins).
3.3 Measure this length +- 1 mm (the chain must be straight, use e.g. a baard under the chain), refer ta figure 29.-2
3.4 The theoretical length of a 5/8"chain is 100 x pitch 15.875 = 1587.50 mm
3.5 If the measured length is mare than 1620 mm, the chain must be replaced.
3.6 The chains must be replaced, if they are very warn, cracked, or plates are distorted. Also check the chain ends.

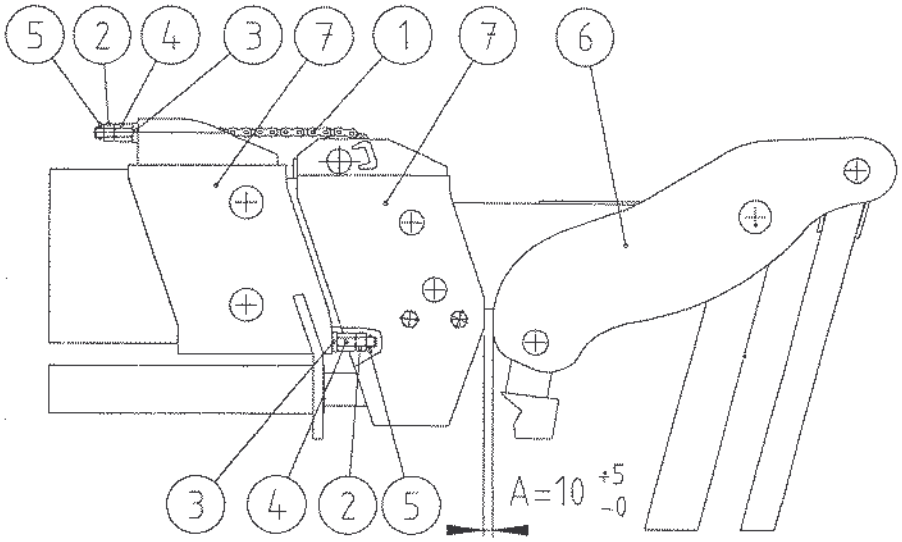
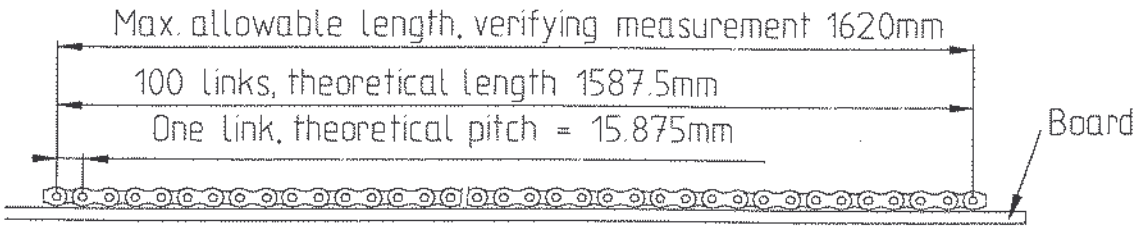


Figure 29.-1. Adjusting the boom chains



29.2 Adjustment of choin tension

1. Support the MEWP on the outriggers with the wheels raised slightly off the ground. Raise the jib boom to an angle of 45° (refer to figure 29.2). Lower the platform to the ground and get off the platform.
2. Drive the booms fully out, with the work platform trailing on the ground and the lifting cylinder compensating. If the work platform rises off the ground during extension, the limiter of the lifting radius will cut both the lowering and extending movements of the booms. For this reason it is important to lighten the boom load during extending by trailing the platform on the ground. Use a base equipped with wheels under the platform, e.g. a pump carrier or similar.
Retract the booms about 50 mm (1.96 in.) from maximum reach and leave the booms in this position. Figure 29.-2.
NOTE! During extension no load must be placed on the work platform and extreme caution must be observed. It is extremely important to compensate the booms with a lifting cylinder. If the boom is extended far enough the load control standby limit switch may be triggered and the engine cut.
3. Adjust the tension of both extend chains so that with a single load of 8 kg (17.6 lbs) they just touch the top surface of the boom. The single load should be at the middle of the freely visible chain. A gap of 1-3 mm (0.039 - 0.118 in) may remain between the chain and the top surface of the boom.
4. Adjust the chains so that there is a gap of approximately 10 mm (0.39 in) between the loose chains and the boom at the centre point of the chain.
5. For adjustment and inspection, it is recommended that you use a counter-motion to loosen the chains to be inspected. The extend chains can be loosened by slightly retracting the telescope which you have extended fully according to the above instructions.
To loosen the retract chains, on the other hand, slightly extend the fully retracted telescope.

Adjusting the chain tension

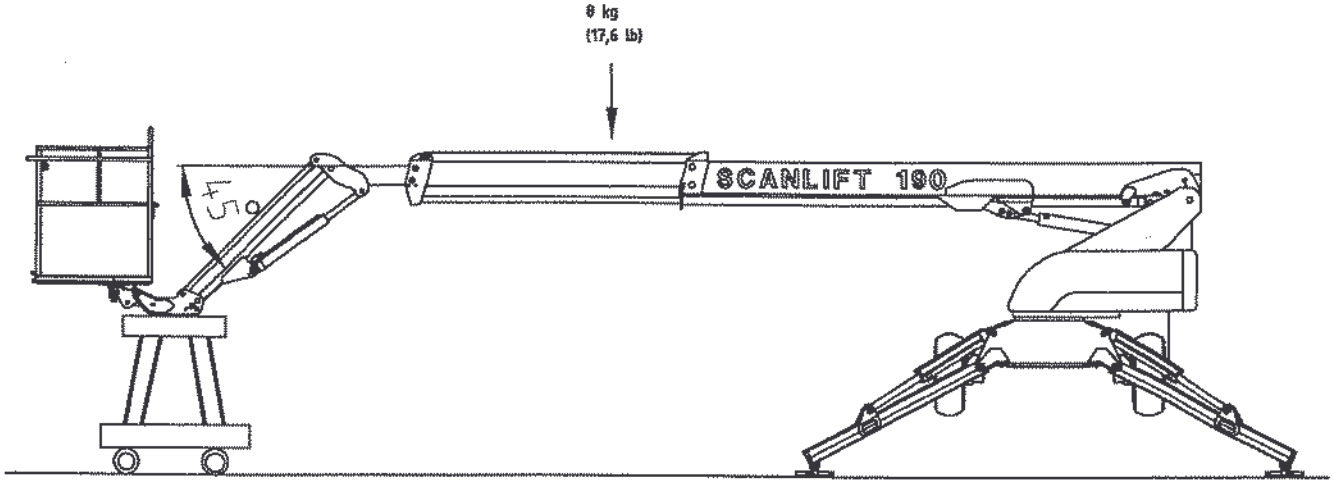


Figure 29.2 Adjusting tension of the boom extension chain

30.0 TORQUE SCHEME

Wheel nuts ..... *250 Nm*

Bolts of pivot bearing, inner shell ..... *280 Nm*

Bolts of pivot bearing, outer shell ..... *280 Nm*

Holding capacity of pull eliminator in inlet of electricity boxes ..... *5 kg(11lbs) when pulling from cable*

Outrigger axle clasp nuts (nylon nuts) ..... *50-70 Nm*

Wheel hub nuts and pivoted axles ..... *50-70 Nm*

Locking of cylinder pin axle nuts (nylon nuts) ..... *50-70 Nm*

If you see that the nylon lock nuts have loosened during operation, replace them with new nylon lock nuts. Whenever a nylon nut has been unscrewed, such as during repairs, always replace it with a new nylon nut.

30.1 Torques, if nat mentioned separately

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
M1 x 1,25	49	68,6	80
M1 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

31.0 MEASURING THE GAP OF SLEW MECHANISM

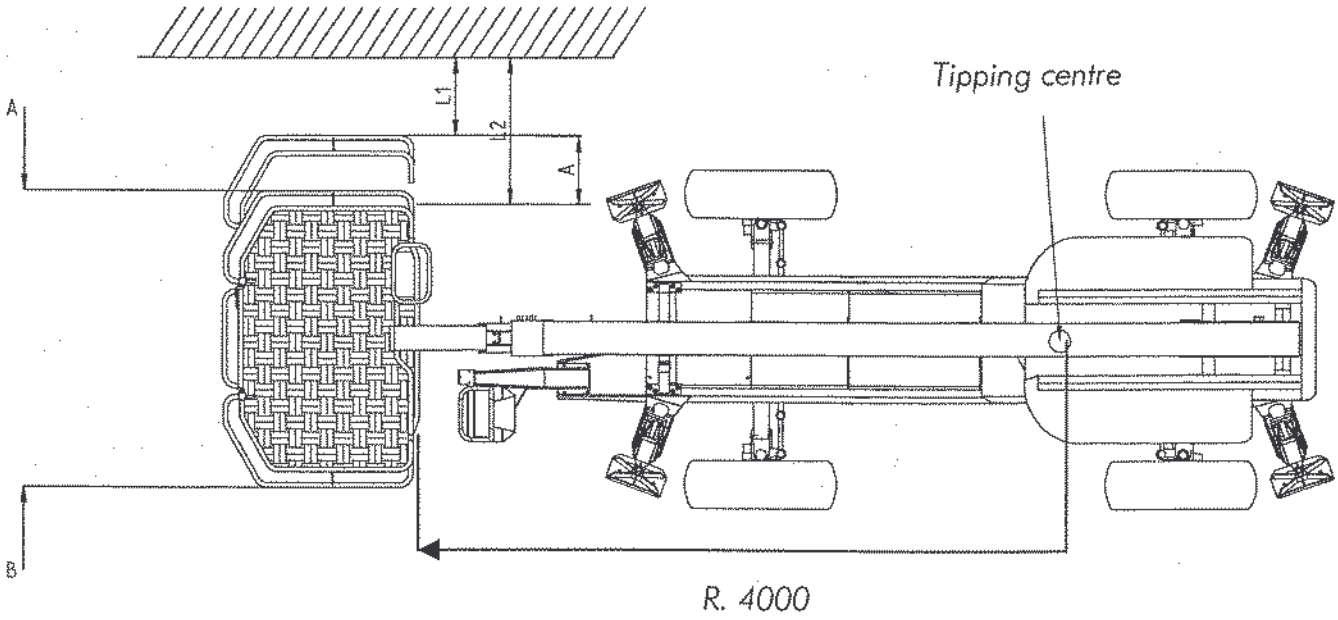


Figure 31.-1 Measuring the gap of the slew mechanism

1. *Retract the booms completely and lower the jib.*
2. *Raise the booms off the transport support 100 mm.*
3. *Push the platform lightly from direction B, removing any slack. Measure distance L1.*
4. *Now push the platform lightly from direction A. Measure L2.*
5. *L1 minus L2 must not be greater than 40 mm (1.57 in)*
6. *Check wear on the worm gears in accordance with instruction 33.0.*

32.0 TIGHTNESS OF SLEWING RING BOLTS

32.1 Inner shell bolts : figure 32.-1

1. Detach the turntable front plastic guard and filter group from their fastenings.
2. Tighten the bolts to torque 270 Nm using a torque wrench. Bolts M16x90 10.9 initial installation tightness 280 Nm.

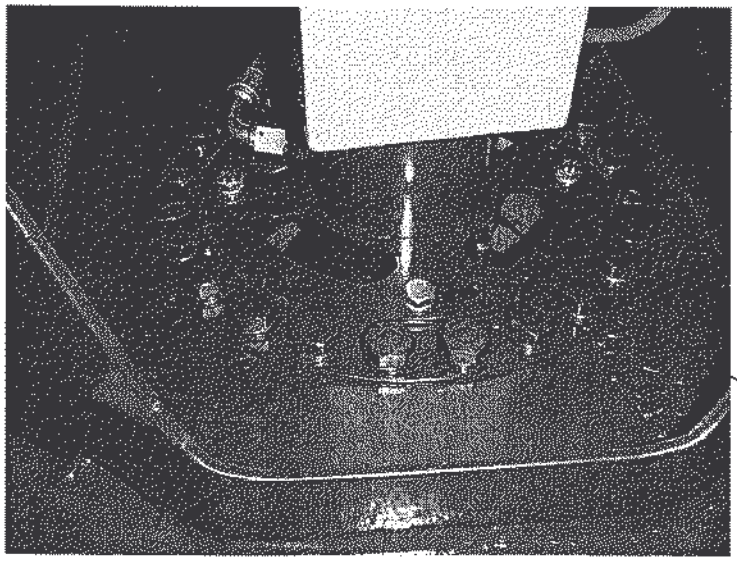


Figure 32.-1 Inner shell bolts

32.2 Outer shell bolts: figure 32.-2

1. Tighten the bolts of the outer shell through the chassis bottom by removing the hexagonal base plate.
2. Tighten the bolts to torque 270 Nm using a torque wrench. Bolts M16x90 10.9 initial installation tightness 280 Nm.

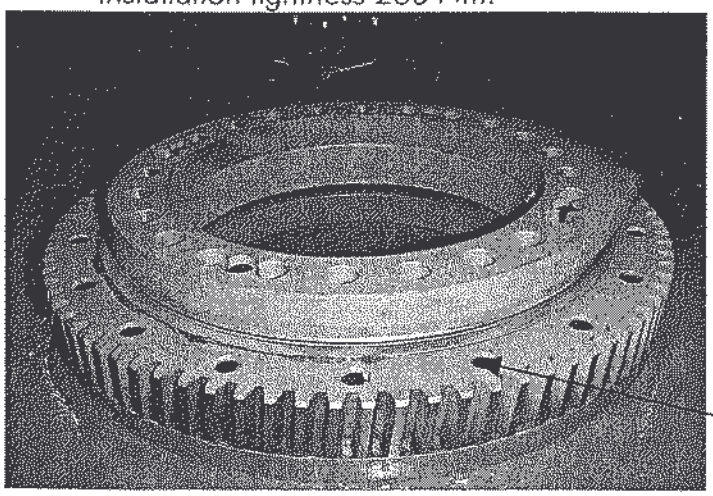


Figure 32.-2. Outer shell bolts

3. When the slewing ring is detached from the turntable or chassis, all fixing bolts and washers must be replaced. All bolts must then be tightened to torque 280 Nm.

33.0 ADJUSTING THE SLEW BEARING GEAR CLEARANCE

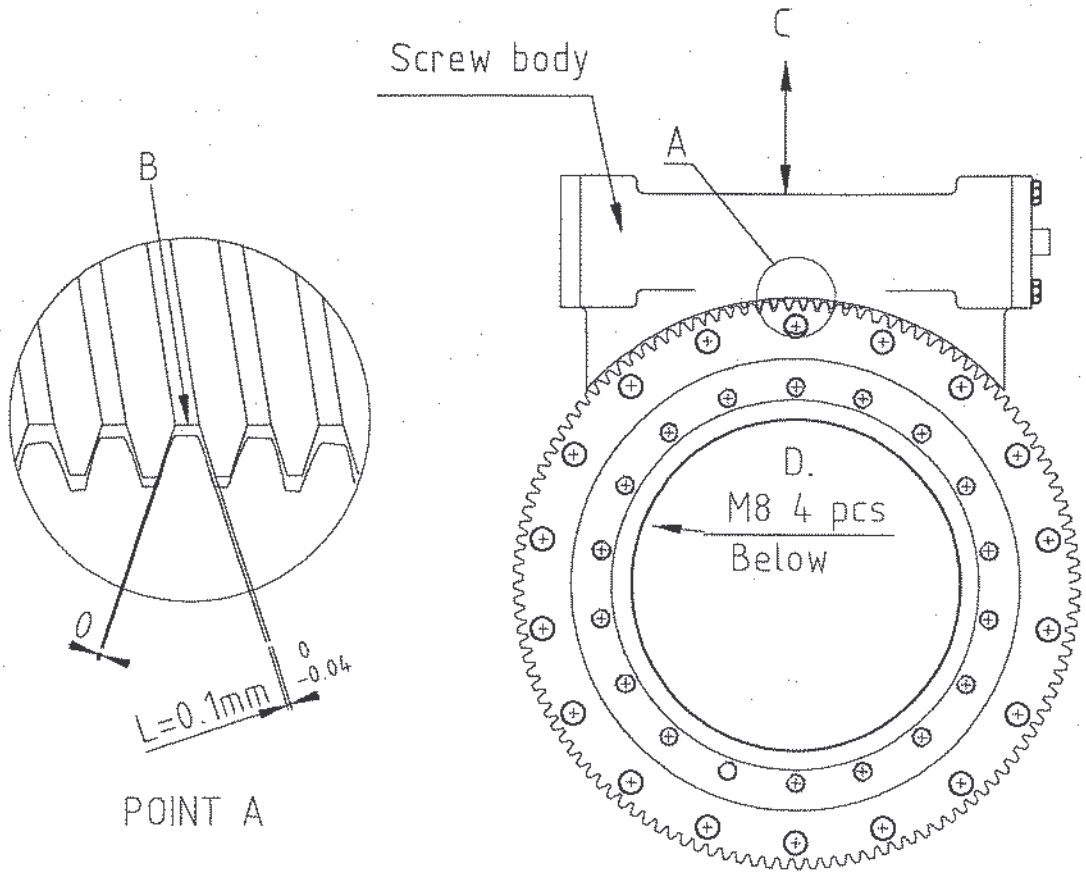
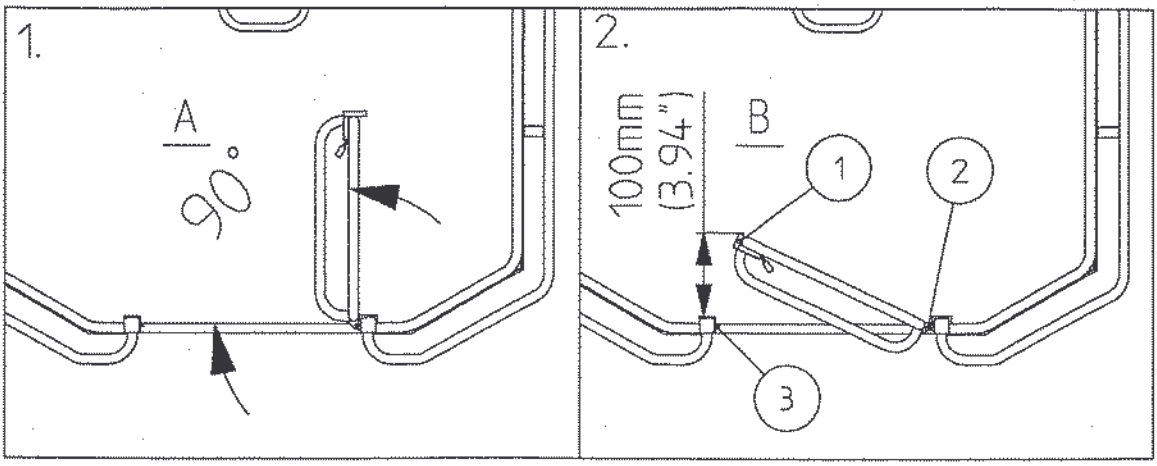


Figure 33.-1

33.1 Adjustment

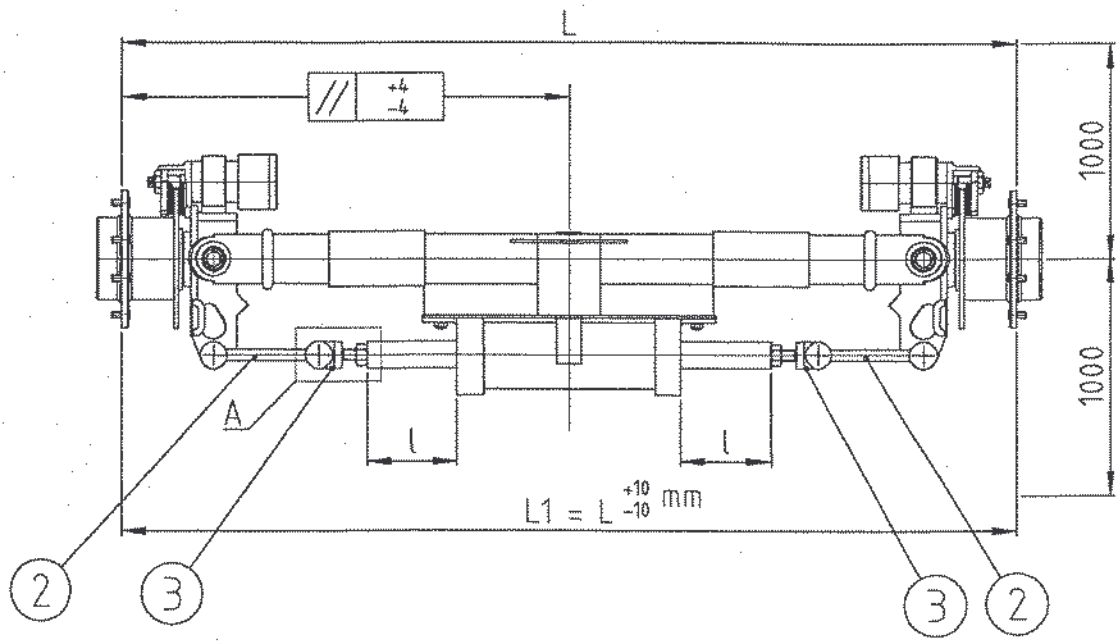
1. *Detach the turntable from the slewing gear.*
2. *Turn the screw until the tooth with the red mark is in the middle of the screw, refer to point A, B.*
3. *Measure gear clearance in accordance with point A, L=0.1 + 0 – 0.04 mm*
4. *If the gear clearance differs from measure L, adjust the clearance.*
5. *Loosen screws D (M8 hex screws 4 pcs), move the screw body in direction C. Check gear clearance L, tighten screws D lightly.*
6. *Check gear clearances by turning the screw. Measure clearances every 90 degrees. The gear clearance must be between 0.06 – 0.1 mm.*
7. *Check the condition of gears and screws.*
8. *Tighten screws D in accordance with 30.0 Torque scheme.*
9. *Mount the turntable and tighten bolts in accordance with instruction 32.0.*

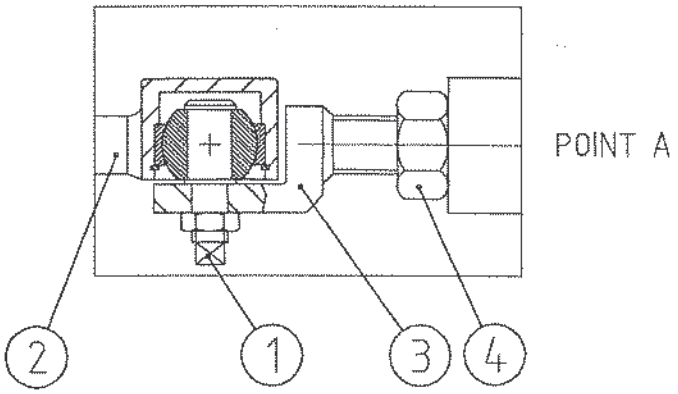
34.0 OPERATION OF PLATFORM GATE



1. *Check the operation of the gate. The gate has to close and lock when it is released from position A (figure 34.-1) and position B (figure 34.-2).*
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.*

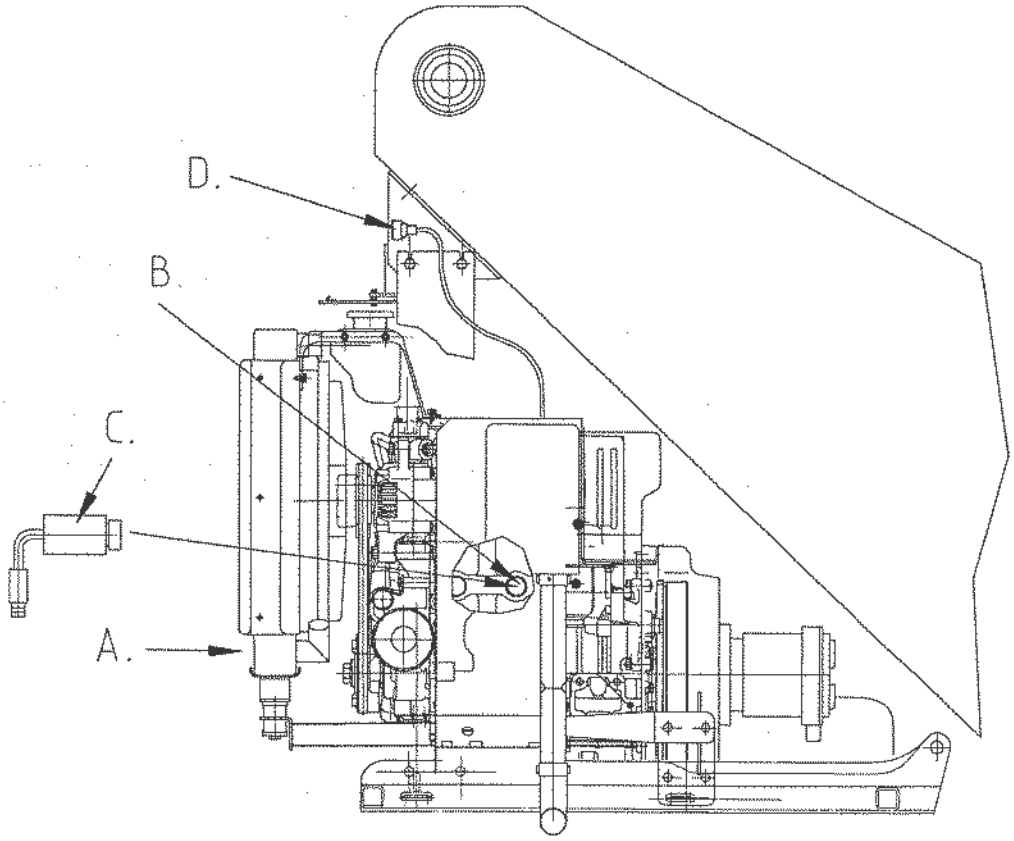
35.0 ADJUSTING WHEEL ALIGNMENT





1. *Remove nuts 1 and lift track rods 2 off connecting piece 3. Loosen nuts 4.*
2. *Guide cylinder rods so that measure 1 is equal on both the left and the right side with an accuracy of ± 1.5 mm.*
3. *Position hubs so that they are parallel with an accuracy of ± 4.0 mm.*
4. *Turn parts 3 to the closest suitable position. Note measure L1 = L ± 10 mm.*

36.0 INSTALLING AN ENGINE HEATER IN SL190D / LOMBARDINI 1003 FOCUS



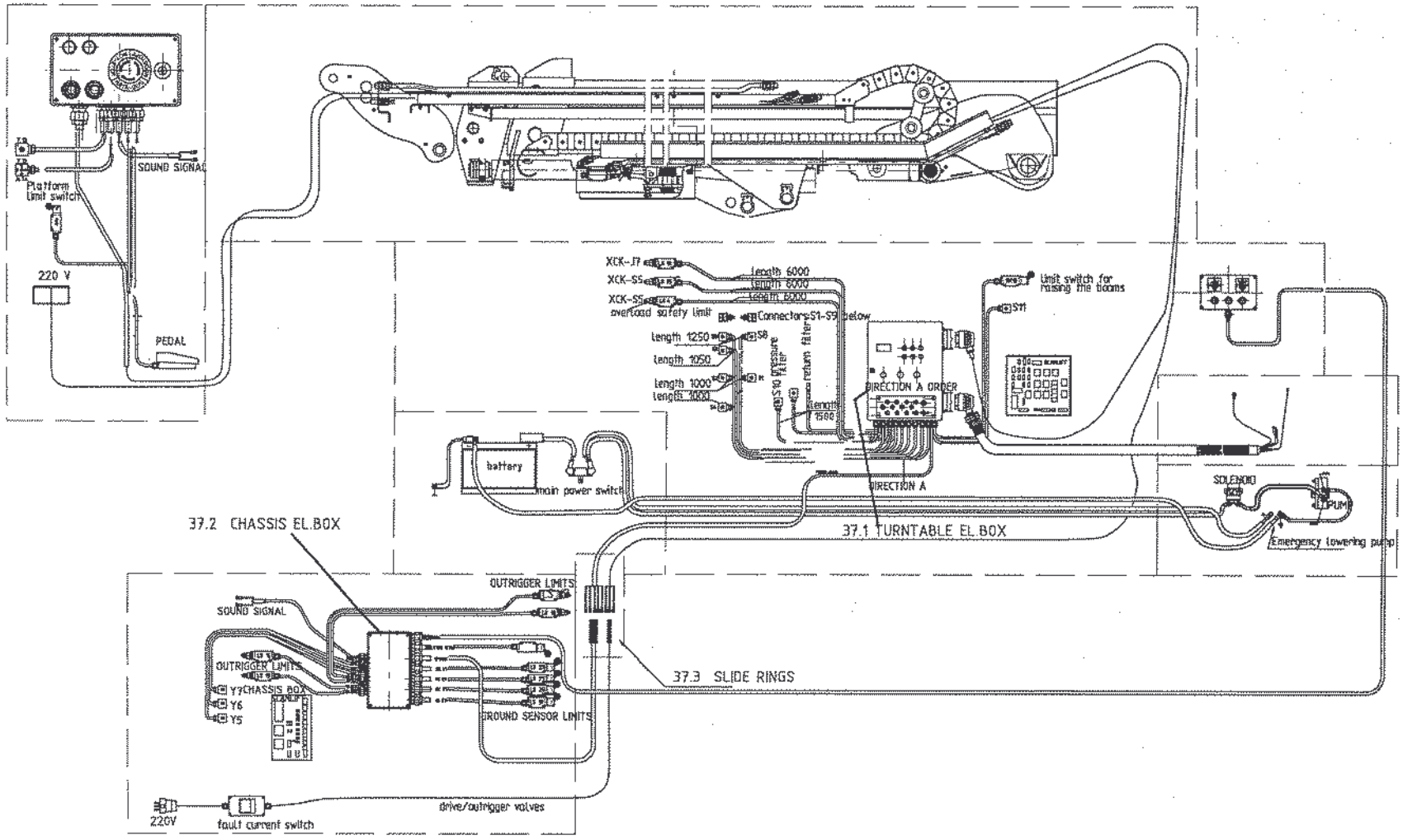
36.1 Type af heater: Defa DA 411122 600 W 230 VAC +DA460785 (3180726)

36.2 Installatian

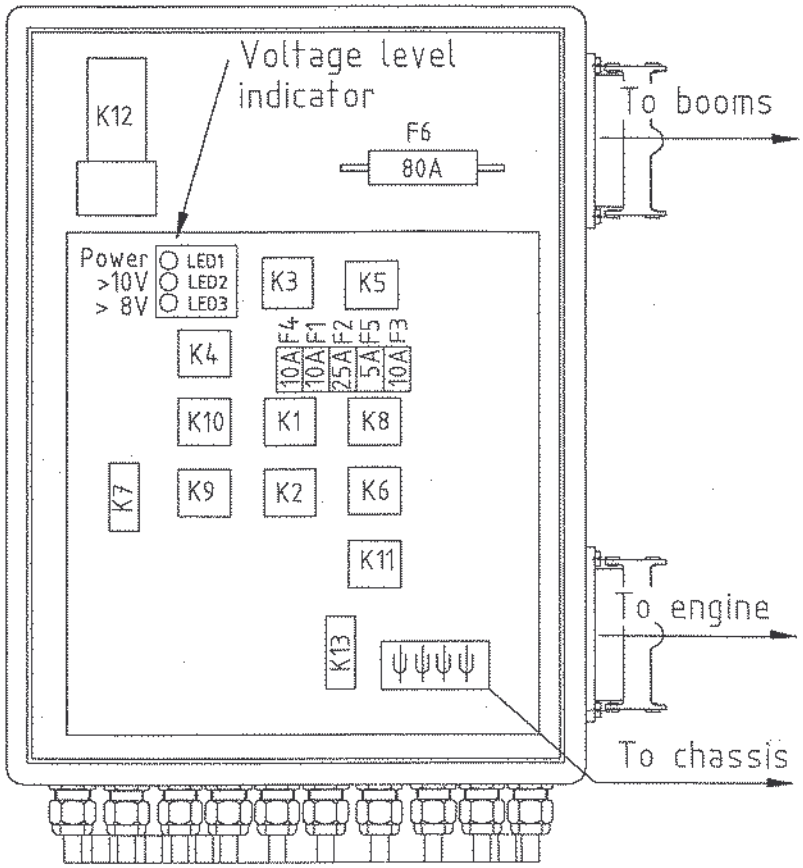
1. *Empty the cooling system by opening the plug left of point A.*
2. *Remove plug B.*
3. *Install heater C to hole B according to the accompanying instructions.*
4. *Install the heater socket to point D (drill the necessary holes) according to the instructions delivered with the socket.*
5. *Check the fastening of drain plug A. Fill the cooling system with antifreeze agent.*
6. *Note! Do not connect power to the heater before the cooling system is filled with antifreeze agent. Change dirty antifreeze agent.*

WARNING! *Handle the mains connection cable with care. Ensure that the hood or other sharp edges do not squeeze the cable and damage the insulation.* ***Alwoys keep the protective cover on the plug when the coble is not connected****. ONLY USE THE ORIGINAL DEFA CONNECTION CABLE WITH THE ORIGINAL DEFA SOCKET. Only connect the connection cable to an earthed socket*

37.0 ELECTRICAL EQUIPMENT; SCHEMATIC DIAGRAM



37.1 TURNTABLE ELECTRICITY BOX



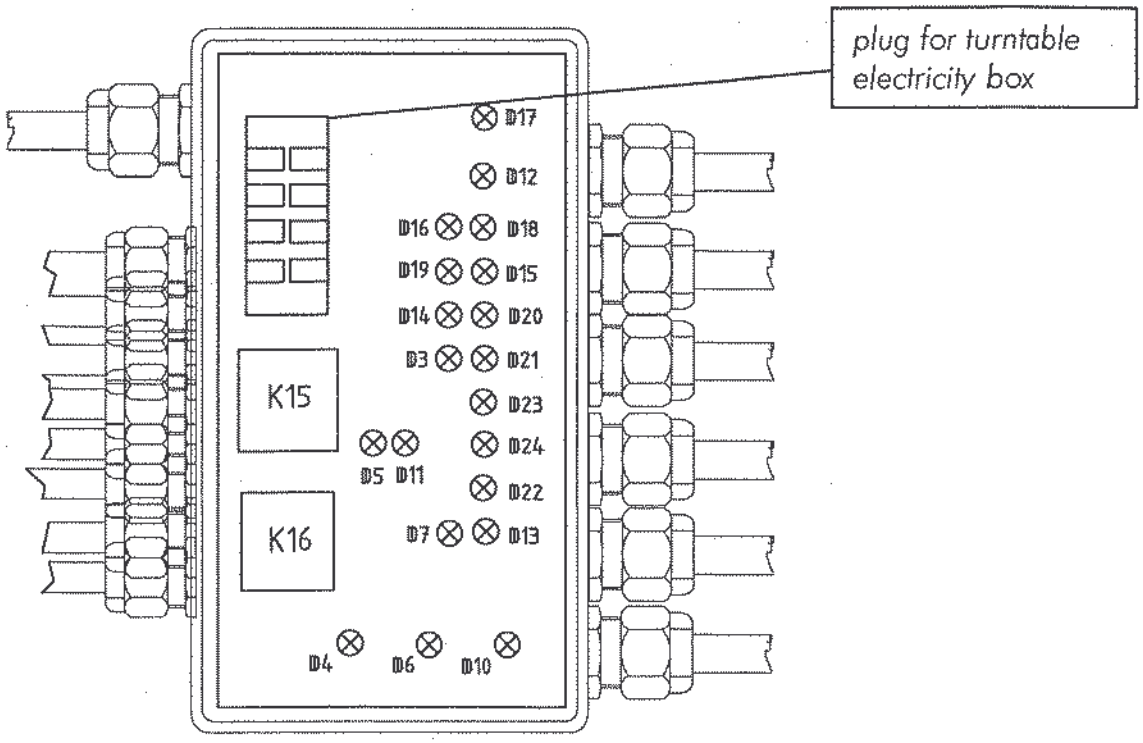
37.1.1 Fuses

F1 = emergency stop circuit
F2 = engine running
F3 = sound signal
F4 = starting engine
F5 = fuel selection
(not used in diesel)
F6 = glow

37.1. 2 Relays

K1 = main relay
K2 = auxiliary relay of emergency lowering pump
K3 = prevents double starting
K4 = prevents double starting
K5 = prevents double starting
} for starting
K6 = auxiliary relay for use of booms
K7 = time relay (for boom lowering)
K8 = emergency lowering of booms, control relay
K9 = use of booms, auxiliary relay in lower control box
K10= auxiliary relay of time relay K7
K11= fuel selection relay (not used in diesel)
K12= control relay of glowing
K13= relay for preventing the use of the extension/lowering

37.2 CHASSIS ELECTRICITY BOX



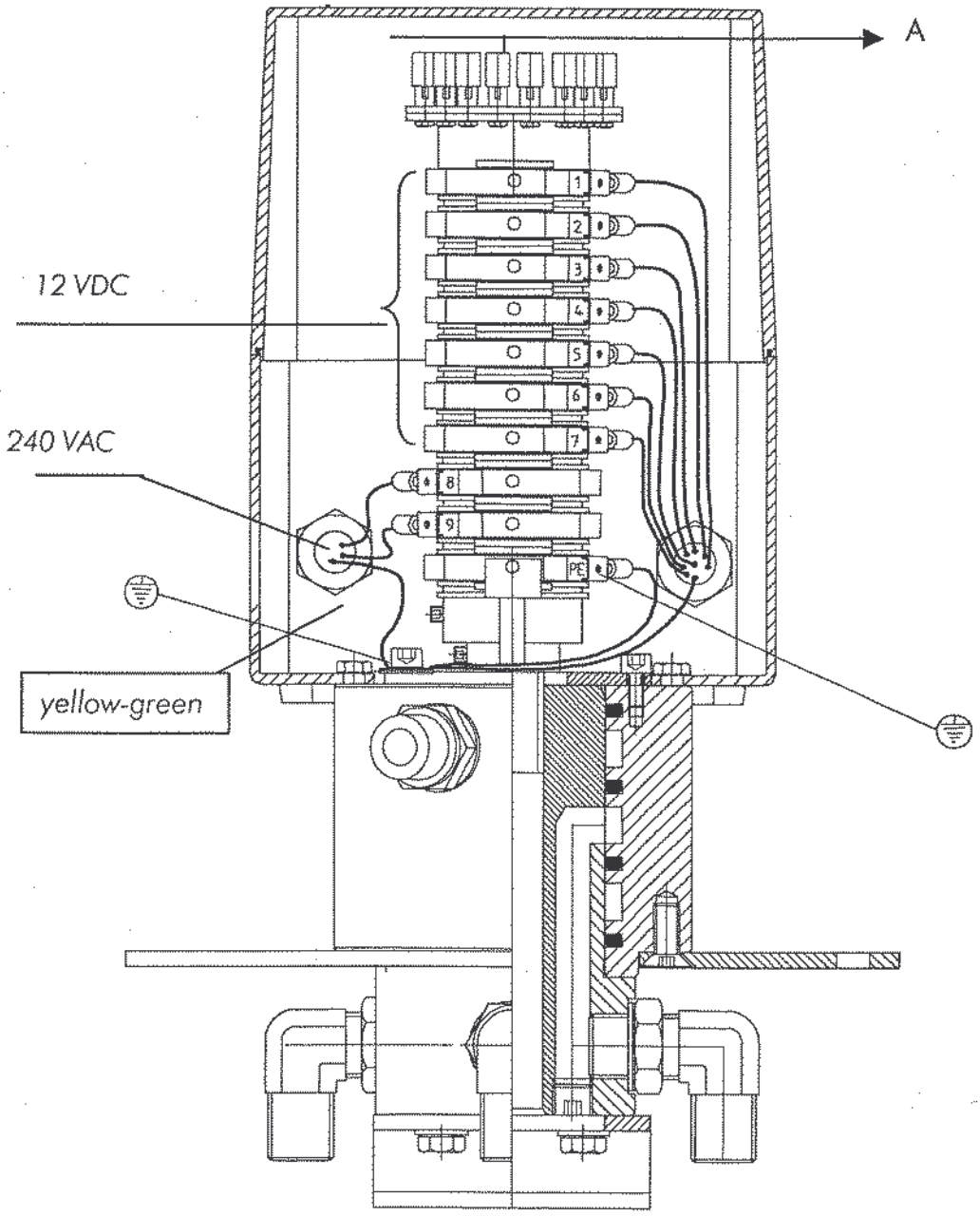
37.2.1 Relays

K15 = auxiliary relay for pressurization
K16 = auxiliary relay for raising and lowering

37.2.2 Leds (leds are on when functions are in order)

D 3 = contact NC for the rear left-hand outrigger position limit LS19
D 4 = selector valve Y5 for steering
D 5 = foot pedal / use of booms
D 6 = selector valve Y6 for steering
D 7 = contact NC for the rear left-hand outrigger ground sensor limit LS15
D10 = slow driving Y7
D11 = driving/steering/outriggers
D12 = limit switch LS12 for transport support
D13 = contact NO for the rear left-hand outrigger ground sensor limit LS15
D14 = contact NC for the rear right-hand outrigger position limit LS20
D15 = contact NO for the front left-hand outrigger position limit LS21
D16 = contact NC for the front right-hand outrigger position limit LS22
D17 = override use of the booms
D18 = contact NO for the front right-hand outrigger position limit LS22
D19 = contact NC for the front left-hand outrigger position limit LS21
D20 = contact NO for the rear right-hand outrigger position limit LS21
D21 = contact NO for the rear left-hand outrigger position limit LS19
D22 = contact NO for the rear right-hand outrigger ground sensor limit LS16
D23 = contact NO for the front right-hand outrigger ground sensor limit LS18
D24 = contact NO for the front left-hand outrigger ground sensor limit LS17

37.3 SLIDE RING BOX

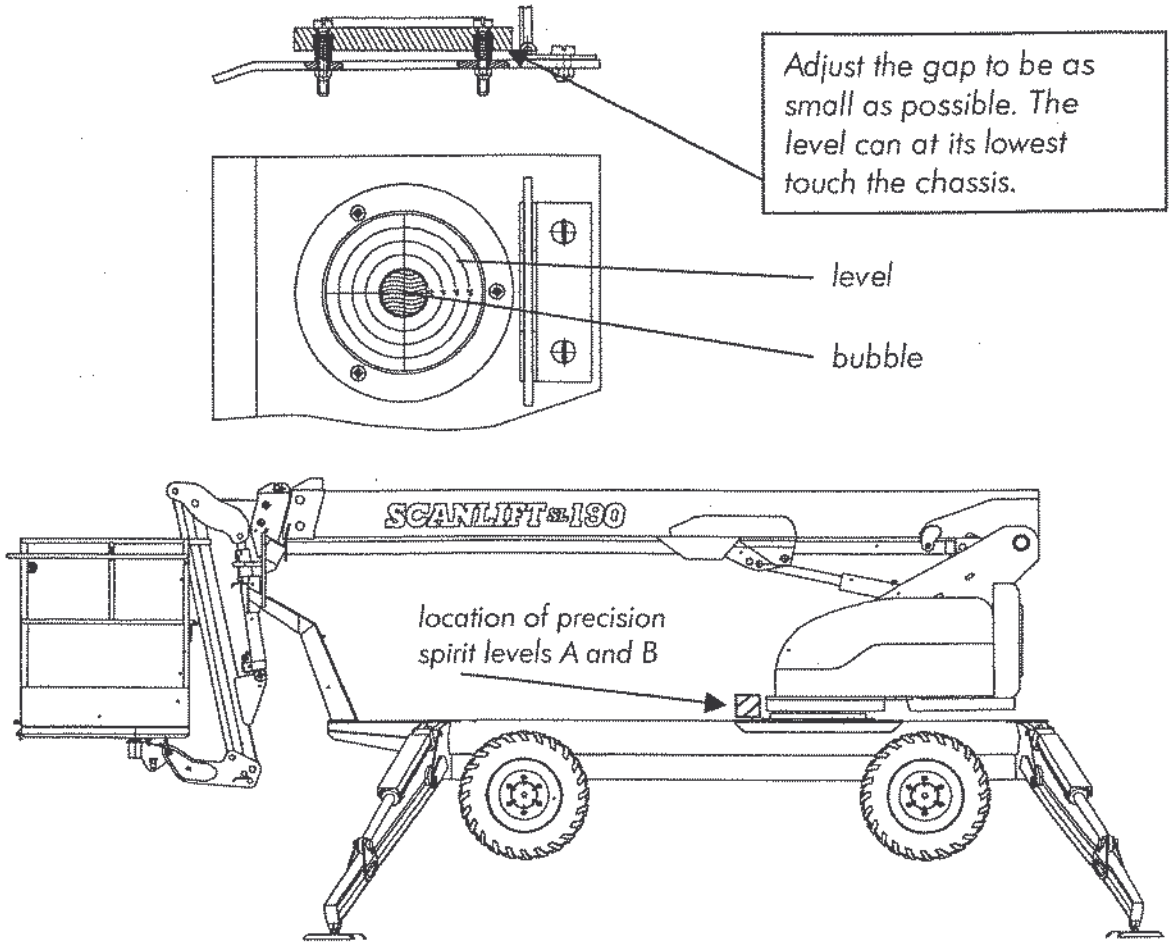


37.3.1 NOTE! *Slide ring PE has common earthing for 240 VAC and 12 VDC*

37.3.2 Danger! *Do not connect the 240 VAC conductors of slide rings 8 and 9 to slide rings 1, 2, 3, 4, 5, 6, and 7. Also note the connection at point A.*

37.3.3 *Connectors and screws must be securely attached to slide rings and conductors.*

38.0 ADJUSTING THE HORIZONTAL LEVEL INDICATOR



1. Support the MEWP on the outriggers, wheels slightly off the ground. Using precision spirit levels (A lengthwise direction and B crosswise direction) bring the MEWP to a level with an accuracy of ± 0,2°.
2. Loosen nuts C, 3 pcs. With screws D adjust the bubble of the level to be as close to the middle of the 0° ring as possible.
3. After adjustment, tighten nuts C while holding screws D.
4. Check the position of the bubble: it must be within the 0° ring.

39.0 TROUBLESHOOTING

Malfunctian	Cause
1. Internal combustion engine does not start	1. Check that the main power switch is on. 2. Check that the emergency push-button has not been pressed down at either point of control. 3. Check that the battery is not empty. 4. Check fuses. 37.1 Turntable electricity box.
2. Internal combustion engine starts but does not run	1. Starting a "cold" diesel engine: Turn the ignition key into the glowing position and keep it there until the glow indicator light 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. 4. Check that the standby safety limit LS4 is not activated, refer to 11.0 Adjustment of load control 11.-2. 5. Check the fuses, refer to 37.1 Turntable electricity box
3. 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 lower point of control. Only use one set of keys. 2. Check that the outriggers are in support position (lower position) and the sole plates are firmly pressed against the gound. 3. Check the outrigger position limits. LS 19, 20, 21 and 22 must be engaged (spindles fully out), also refer to 37.2 leds of chassis el. box. They indicate whether the limit switches of all outriggers are in order. Also check ground sensor limits LS15, 16, 17 and 18. 4. The foot pedal has to be pressed down before the control lever for the booms is used. 5. Check the fuses, 37.1 Turntable el. box.
4. Booms can not be guided from the lower point of control	1. Check that the combustion engine has been started from the lower point of control. 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). 3. Check outrigger switches in accordance with item 3.3.
5. Outriggers do not function	1. Check that the booms are on the transport support. 2. Check that the transport support limit switch LS12 is engaged, refer to 17.0 Transport support limit switch. 3. Check that the combustion engine has been started from the platform. 4. Check fuses 37.1 Turntable electricity box.
6. Emergency lowering does not function	1. Check fuses 37.1 Turntable electricity box. 2. Check that the max. allowed lifting radius has not been exceeded. If this is the case, only the raising of the booms and retracting the telescope are allowed, after which the booms con be lowered. 3. Check that the emergency stop push-button has not been pressed down at either point of control. 4. Check that the battery is not empty.

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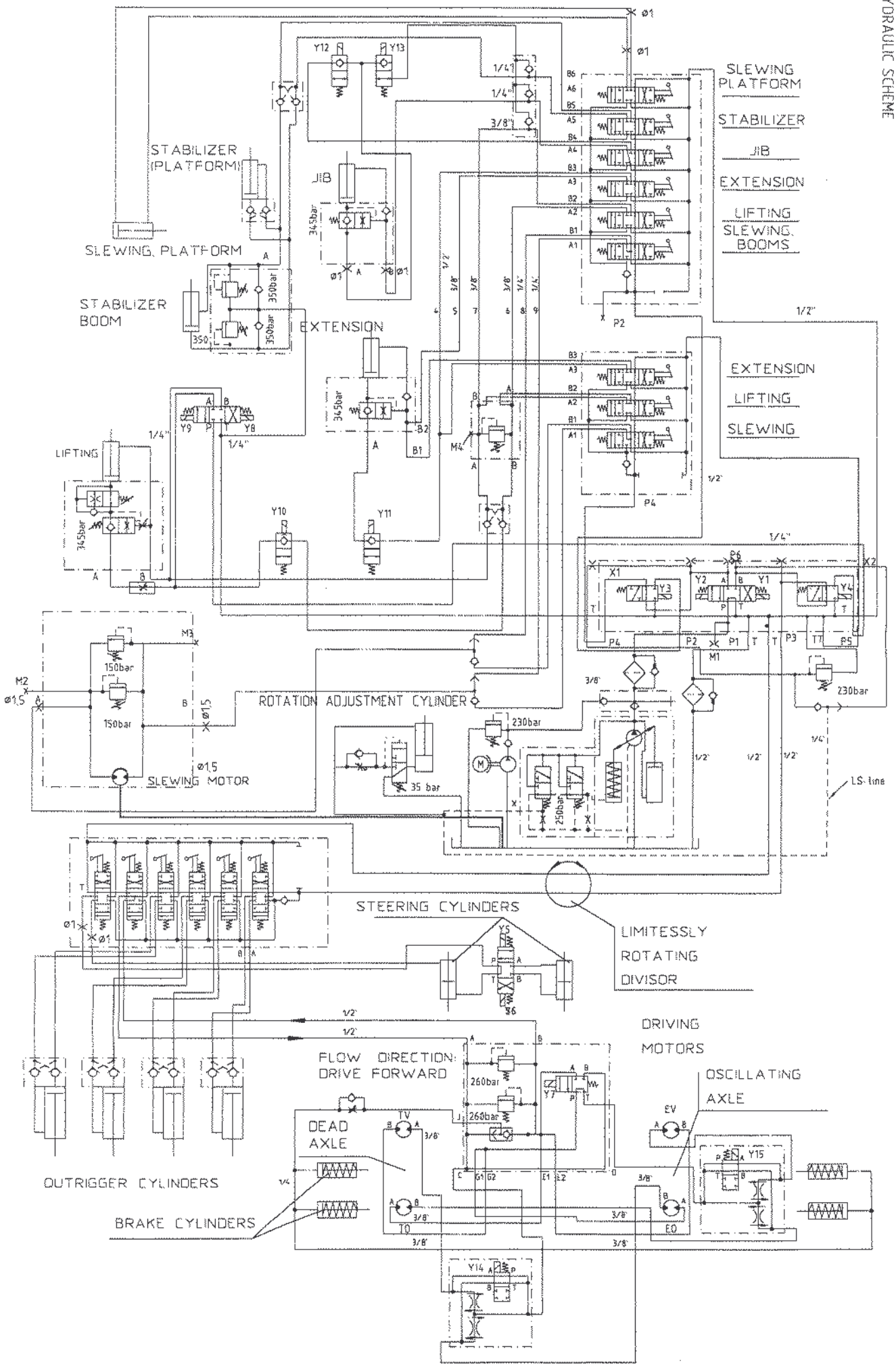
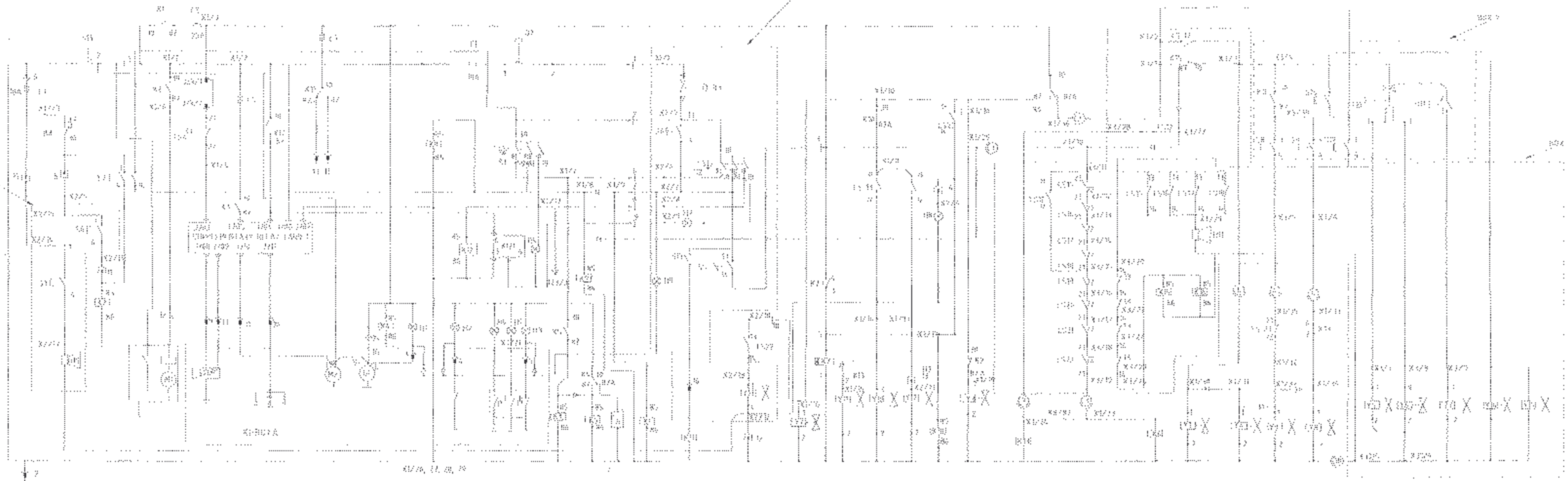
HYDRAULIC SCHEME



ST 190 ELECTRICITY SCHEME

KUBOTA D 905-E

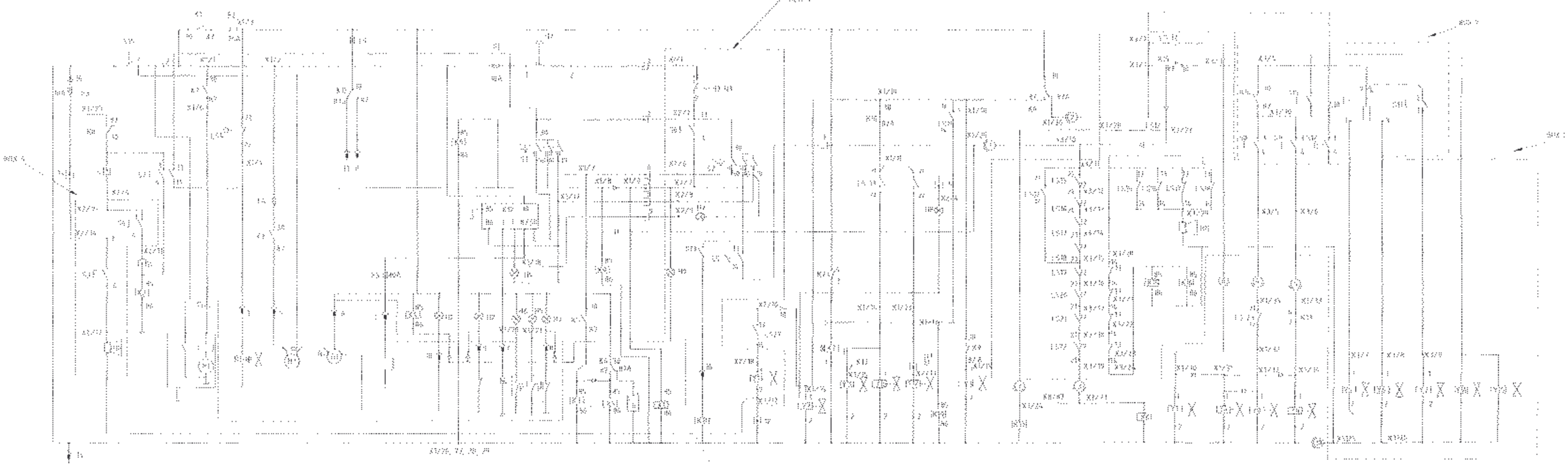


RELAYS

ELECTRICITY SCHEME

SI 100 ELECTRICITY SCHEME

LOMBARDINI 1003



SCHEMATIC DIAGRAM

SL 190 ELECTRICDIAGRAM