SCANLIFT SL 185

MOBILE ELEVATING WORK PLATFORM (MEWP)

MAINTENANCE AND ADJUSTMENT

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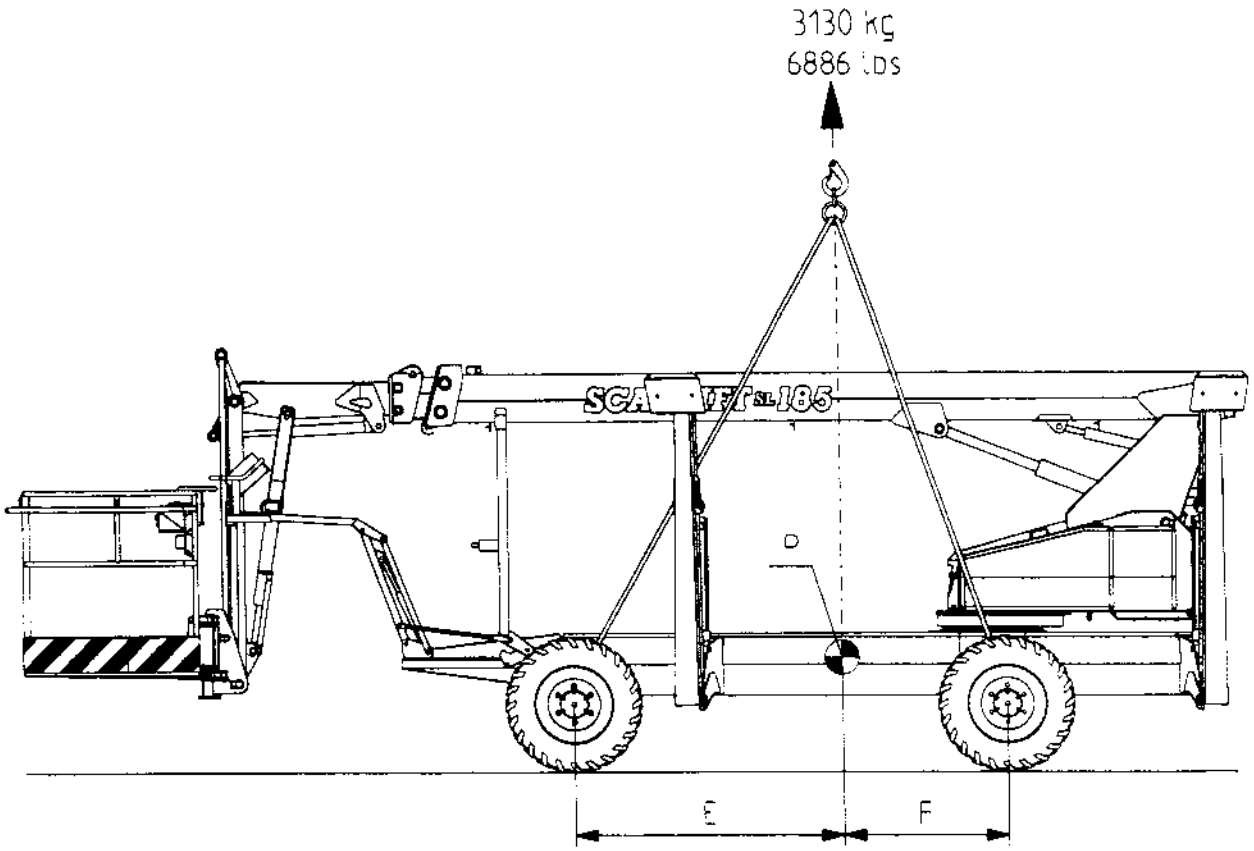
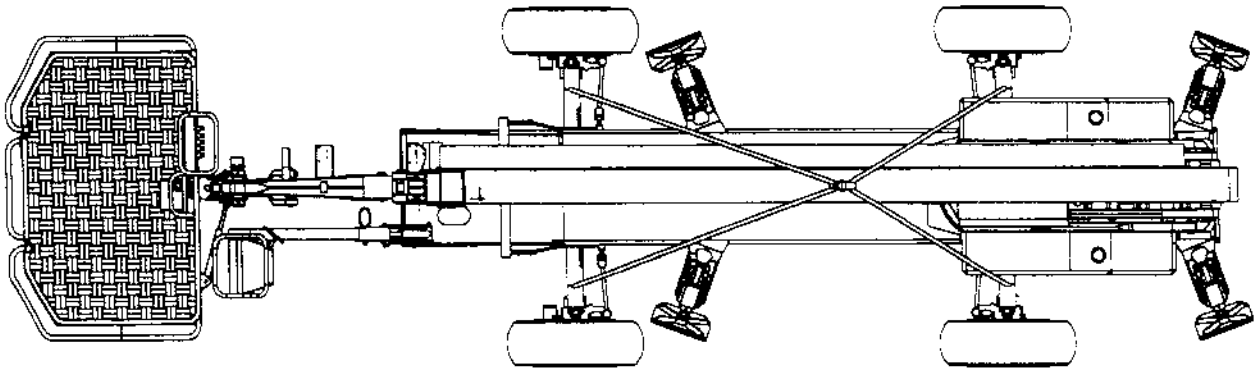




		m	ft.
E	Distance of centre of gravity	1,505	4.938
F	Distance of centre of gravity	0,925	3.035
P	Centre of gravity		

12. Rear axle, dead
13. Rear wheel and brakes
14. Jib
15. Pivot bearing
16. Slewing motor,gear and brake
17. Fuel tank, to the right of the MEWP
18. Hydraulic oil tank, to the left of the MEWP
19. Battery, to the left of the MEWP
20. Change-over switch: guiding the booms from platform or from ground (turntable)
21. Equipment case, place for manual
22. Gas device, to the left of the MEWP (SL 185 B)
23. Main switch, to the left of the MEWP
24. Shunt switch
25. Lifting cylinder
26. Cylinder for telescope
27. Stabilizer cylinder for platform
28. Jib cylinder
29. Control cylinder for transport support of booms
30. Steering cylinders
31. Hydraulic pump
32. Limiter device for lifting radius
33. Pedal /change-over switch (in the down position:free guiding of booms)
34. Electric pump for auxiliary lowering system
35. Place for spare wheel
36. Control cylinder for stabilizer cylinder
37. Drive selector, driving speed selector, horizontal level indicator lights and shunt switch
38. Platform step
39. Slewing cylinder of platform
40. Fastening hooks for safety harness
41. Operating switch for auxiliary lowering system, EMERGENCY STOP switch, ignition switch of combustion engine, electrical hourmeter, and indicator lights for engine charging, oil pressure, glowing (diesel) as well as overheating of the coolant (only Kubota diesel).
42. Push-button for sound signal, EMERGENCY STOP switch, operating switch for transport support of booms, fuel selector switch for petrol engine, operating switch for auxiliary lowering system and signal light for load control.
43. Contact boxes for electric tools (220V)
44. General signal light

Max. noise level (measured 1 meter from motor)..... 93 dB(A)

Output of hydraulic pump 3000 rpm:
for booms ..... 9,0 l/min (2.4 US.gpm)
for drive:
diesel..... 22 l/min (5.8 US.gpm)
petrol..... 20 l/min (5.3 US.gpm)

Hydraulic pressure:
upper turntable and booms..... 230 bar (3336 psi)
driving motors and stabilizers..... 250 bar (3626 psi)

Hydraulic pump: axial, adjustable-displacement piston pump

Volume of hydraulic oil tank..... 69 l (18US.gal.)
Volume of fuel tank ..... 69 l (18 US.gal.)

Combustion engine:
petrol/gas .....Kohler Command 20
diesel.....Kubota D722-E
diesel.....Hatz Silent Pack 1D 80 C

Kohler Command 20 :

Output, rotation speed of motor 3600 rpm ..... 14,9 kW (20 hp)
Max. rotation speed of motor, limited by the manufacturer..... 3000 rpm
Max. torque 2500 rpm..... 32 Nm (23 lbft.)
Fuel..... unleaded 95E or liquid petroleum gas (LPG.
Rotation speed limited to 3000 rpm.

Fuel consumption:
rotation speed 3000 rpm petrol..... 3,6 - 6,5 l/h (1-1.7 gph)
rotation speed 3000 rpm LPG..... 2,5 - 4,5 kg/h (5.5-10 lbsph)

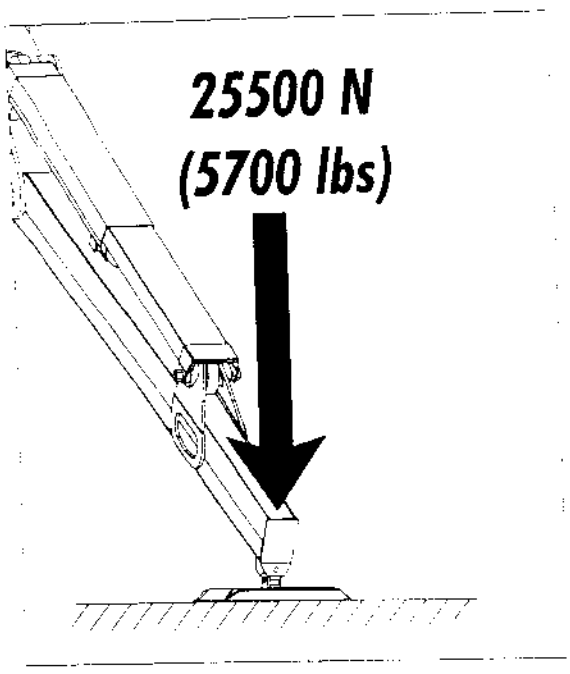
Hatz Silent Pack 1 D 80C:

Output, rotation speed of motor 3000 rpm ..... 11,0 kW (14.7 hp)
Max. torque 1800 rpm..... 34,5 Nm (25lbft.)
Fuel..... light fuel oil, diesel oil ASTM D 975-1D/2D
Rotation speed limited to 3000 rpm.

Fuel consumption:
rotation speed 3000 rpm ..... 2,3 - 3,5 l/h (0.6-0.9 gph)

Battery ..... 12 V 55 Ah
Operating temperature not below..... -25° C (-13°F)

5.0 SOIL TIGHTNESS TABLE



Sole area A:

A = 0,325m x 0,22m = 0,0715 m

$$\text{Pressure} = \frac{25500N}{0{,}0715m^2} = 357kpa$$

On icy ground use additional calks on sole plates, according to figure 2.
The soles have been provided with holes for the calks.

Permissible loads on ground for some soil types:

Soil type	Soil tightness	Safe surface pressure Ps kpa		SL 185 pressure
Gravel	Very tight structure	600	>	357
	Middle tight structure	400	>	357
	Loose structure	200	<	357*
Sand	Very tight structure	500	>	357
	Middle tight structure	300	<	357*
	Loose structure	150	<	357*
Fine sand	Very tight structure	400	>	357
	Middle tight structure	200	<	357*
	Loose structure	100	<	357*
Clay & fine silt	Loose (easy conditioned)	25	<	357*
	Tough (hard conditioned)	50	<	357*
	Firm (very hard conditioned)	100	<	357*

Note ! If marked with (*) use broader extra plates.

6.0 GENERAL SAFETY INSTRUCTIONS

1. The operator must be at least 18 years of age and have reasonable operating experience of MEWPs.

2. Scanlift SL 185 is fitted with the following fail-safe safety limit switches:

- support position of stabilizers

- guards for safe lifting radius, separately for raising functions (hydraulic), telescope (hydraulic), jib (electric) and standby switch for lifting radius (electric).Extra limit for MEWP's according to DIN 15120, second chain of telescope.

- for slewing the booms in transport position, for raising them from horizontal position (electric) and for inclining the jib to the low position (hydraulic)

3. The auxiliary lowering system consists of an electric pump placed in front of the hydraulic oil reservoir, of the boom's control valve and control switches on the turntable and on the platform. For detailed instructions refer to chapter 18.0 Auxiliary lowering system - operation.

4. Avoid rising near live electrical conductors. The minimum safe approach distance to different cables with voltage is made known on a plate on the platform.

5. Always use a yellow flashing warning light when working on streets with busy traffic. The zone shall be fenced to avoid risks. Also observe the traffic regulations.

6. When travelling the MEWP the platform shall always be supported in transport position. If the platform cannot be lowered against the transport base or the wafter, the transport support of booms shall always be used during transport.

7. Two (2) persons with tools and equipment are at most allowed on the platform at the same time, provided, however, that the total load does not exceed 230kg (507 lbs.).

8. The stabilizers shall always be well supported when using the MEWP. Use extra plates under the stabilizers, if needed. Make sure that the stabilizer is not slipping on the surface of the extra plate and that the extra plate withstands the weight of the stabilizer. On icy surface attach calks or bolts on the stabilizer plates. The sole plates have been provided with holes for the calks. For tightness of different soil types refer to chapter 5.0.

Note that even asphalt can yield.

9. When operating the MEWP, observe trouble caused by wind, rain, temperature, thunder, bad visibility and accumulated snow and ice.

10. Do not take extra load while lifting. R I S K O F T I P P I N G O V E R !

11. Be aware of the health risk in hot or chilly working environment.

12. Do not increase the MEWP's wind load with extra cover boards or load thus enlarging the wind plane.

13. Any increase in reach or working height of the platform by using planks, ladders or any other device is prohibited. Do not jump or swing the platform.

14. Do not throw down objects from the platform and make sure, that nothing can fall down.

15. Use ear mufflers when operating the MEWP from the ground guiding place, because the sound intensity exceeds 84 dB(A). When using the MEWP from the platform the sound intensity will be less than 84 dB(A), and the use of mufflers is not obligatory.

16. Always when you operate indoors or in a place with poor ventilation the engine shall only be used for moving the MEWP. Try to intensify the ventilation. Risk of intoxication!

17. Misuse of the MEWP as a crane for transporting goods or persons between different levels or floors is prohibited.

18. Do not ever deactivate the safety device, but repair it or have it repaired by a competent maintenance shop before re-use.

19. Ensure that the area below boom and platform are clear of all personnel and obstruction before lowering the platform.

20. To ensure the safe and trouble-free function of the MEWP, keep it free from snow, ice and other impurities.

21. Be very careful when handling fuels, lubricating and hydraulic oils as well as the lubricating greases of the MEWP. Avoid skin contact with them. Risk of exposure !

22. Always shut off the MEWP's engine when filling the fuel tank. Beware of splashes. Risk of fire!

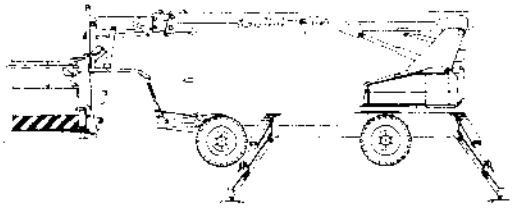
23. Check and maintain the MEWP regularly or let a maintenance shop, familiar with mobile elevating work platforms, carry out the service and repair works.

24. Do not cause any alteration of the MEWP construction without permission and instruction of the manufacturer.

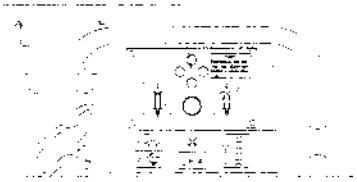
25. Do not ever open the filling hole of the cooling system, if the engine is warm. Risk of accident !

26. Daily pre-start checks:

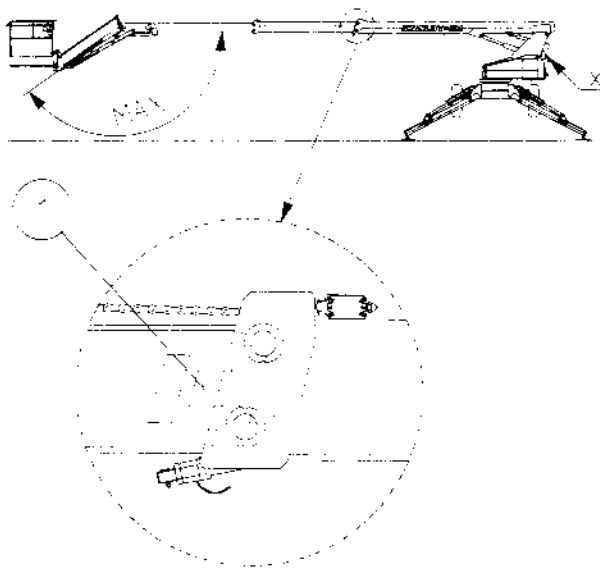
Checking the stabilizers:



- Check the function of stabilizer safety limits by using stabilizers in support position (with the wheels above the ground). After engagement and when all four horizontal indicator lights (H1 - H4) are on, the booms can be operated.



Checking the telescope:

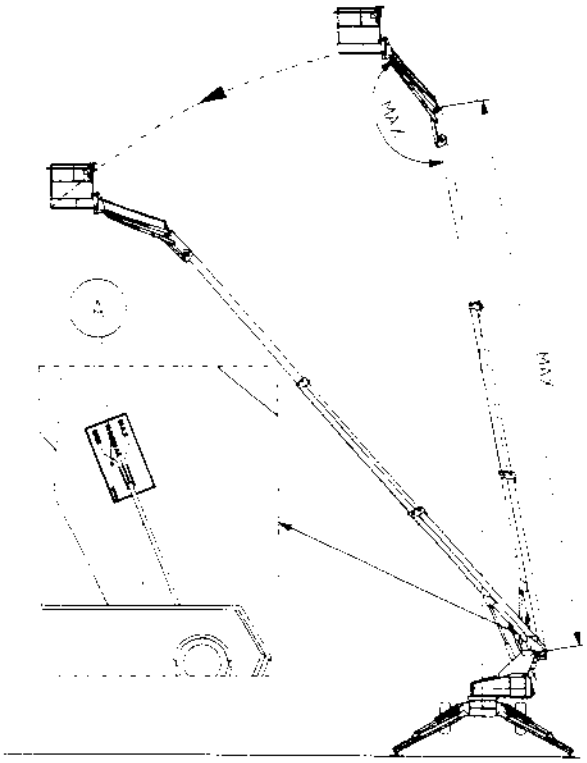


1. Ensure that the platform is absolutely empty during the test.

2. Drive out the telescope boom with the jib extended straight out with the turntable control valve (X) and with the boom at horizontal with the ground.

3. The telescope should stop, when the middle painted mark (1) on the boom becomes visible. So the limiter of the telescope lifting radius has been checked..

Checking the lifting:



1. Extend the jib to extreme position.
2. Raise the lifting boom to extreme position.
3. Extend the telescope to extreme position.
4. Lower the booms with the lifting cylinder by holding the lever in the lowering position.
5. Once the booms have stopped lowering, check the point of stopping from the indicator on the upper part of the turntable. The indicator should point to the scale on decal 'A' located on the booms.

Checking the jib:

- Analogously check the function of the lifting radius limiter of the jib by lowering the platform with the jib cylinder almost to the low position and by extending the boom at horizontal about 0,5 m (1.64ft). The platform is then straightened with the jib cylinder to the safe lifting radius, measured from the centre of the slew mechanism. Safe lifting radii for different loads are given in the user's manual, chapter 5.0 Boom geometry. Depending on ways of measuring a certain inaccuracy will occur in the safety limit functions, but exceedings of the lifting radius may not surpass 35 cm (1.14 ft) (. If the safe lifting radii are exceeded or not reached, an authorized service workshop must immediately be contacted to have safety limits adjusted to their correct values.

- Always make a pre-start check of the hydraulic oil, motor oil and fuel quantities.

- Make a pre-start visual inspection of booms, stabilizer arms, hydraulic hoses, cylinders, stabilizers, cylinder brackets and chassis. Any malfunctions must be repaired prior to starting the MEWP.

27. Check the function of the standby safety limit for load control RK 10 weekly. Refer to checking instructions, item 30.0)

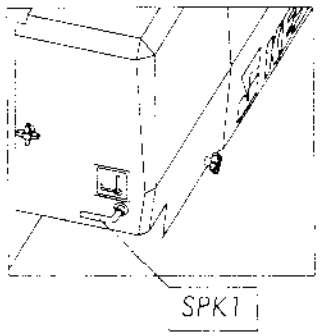
28. The owner of the MEWP shall cause a thorough annual inspection to be performed on the MEWP once in every twelwe (12) months and if conditions are hard, even in shorter time. This inspection shall be performed by a person familiar with MEWPs and their operation, structure and safety instructions. The dated record of this inspection shall always be retained with the MEWP, stored e.g. in the equipment case, and a secord copy in

retention of the owner. An official model record form is enclosed to this manual. The re-inspection shall be performed every twelwe (12) months, and at the latest during the same calendar month as the initial pre-delivery inspection at the factory. If the MEWP is used in hard conditions, the supporting structures have been welded or if there is any other special reason for it, the re-inspection should be done earlier. Have the construction, safety and general condition of the lifting equipment re-inspected, especially alterations having safety consequences. Alterations and repairs, their location on the MEWP and identification of the person(s) involved shall, respectively dated, be entered into inspection records. Keep abreast of the development in the field, check any retroactive amendment of laws and decrees since the last inspection and take eventual alterations into consideration when re-inspecting. Prior to repairs or alterations of supporting constructions the manufacturer or his authorized representative shall always be contacted.

29. When leaving, always drive the MEWP out of way. Put the booms and stabilizers in transport position. As protection against unauthorized use cut the motor, remove the ignition keys from both the platform and the control panel of ground guiding and switch off the main current. Remove all keys and keep them always together on one key ring, also during use.

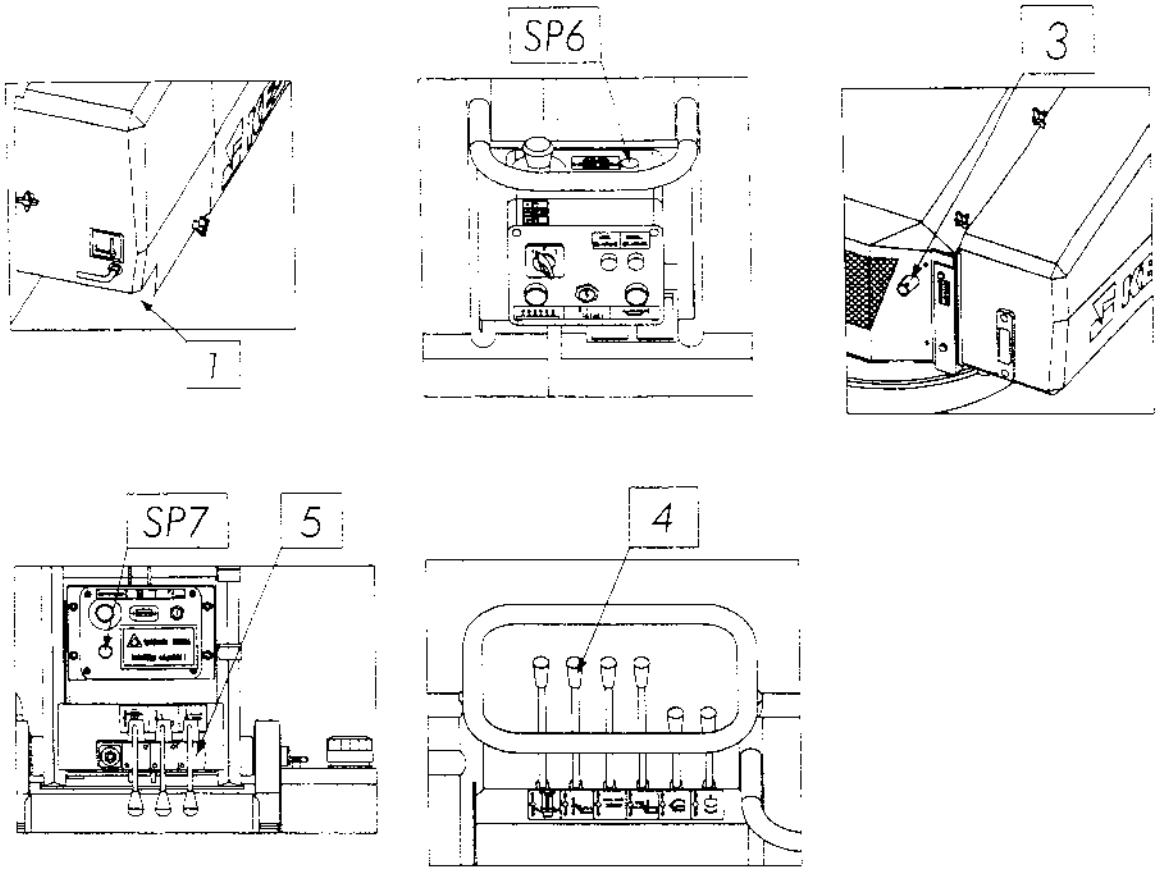
7.0 DESCRIPTION OF CONTROLS

1. Main switch SPK1



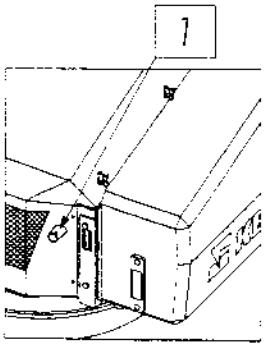
- The switch disconnects the battery – the terminal from the electrical system of the MEWP. Only the function of the sound signal is independent of the main switch.
- If the main switch is opened when the engine is running, the charging of the battery is prevented.

2. Auxiliary lowering system



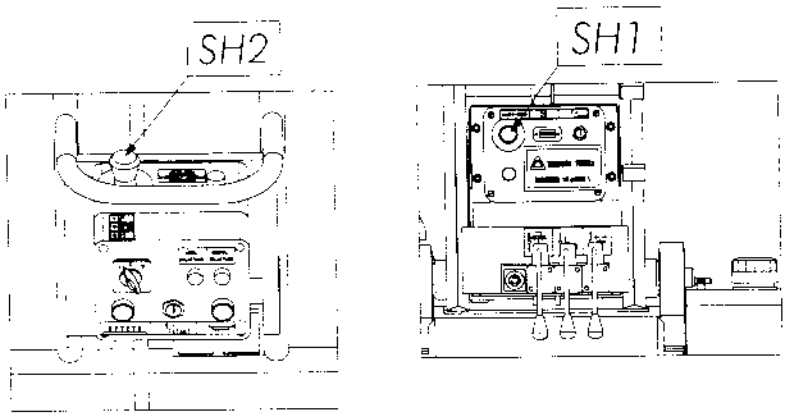
- *The auxiliary lowering system consists of the pump for auxiliary lowering 1, control push-buttons SP6 ja SP7 of the auxiliary lowering pump, the hydraulic change valve 3 of the turntable, the platform control valve 4, the valve for ground guiding 5 and instruction decals on operating the auxiliary lowering system on the platform and the turntable.*
- *Besides the ordinary hydraulic pump of the hydraulic system, also the pump of the auxiliary lowering is continuously ready to feed oil into the system, if the ordinary hydraulic pump is out of order or, for some reason, the valve of the booms cannot be used from the platform.*
- *For more detailed instructions on the auxiliary lowering system refer to chapter 18.0 of the Instruction manual, How to operate the auxiliary lowering system.*

3. Operation: change valve (1)



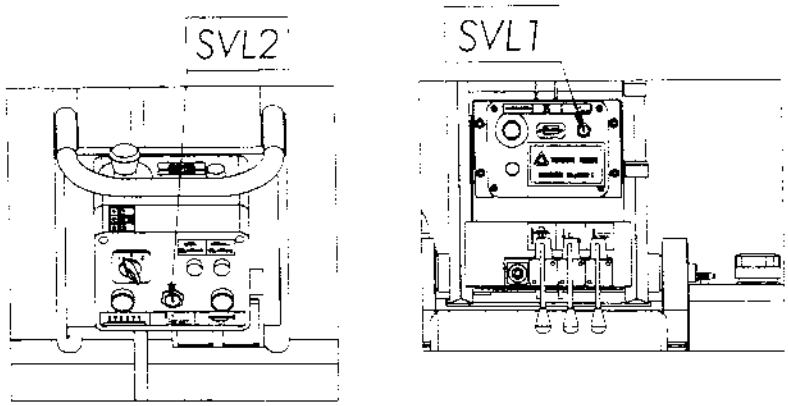
- *With the valve in position PLATFORM, the booms can only be controlled with the platform lever.*
- *With the valve in position TURNTABLE, the booms can only be controlled with the turntable lever.*
- *Booms can only be guided when the stabilizers are down.*

4. EMERGENCY STOP push-button (SH1 and SH2)



- *The EMERGENCY STOP push-buttons are located in the platform electrical box (SH2) and turntable electrical box (SH1)*
- *Pushing the EMERGENCY STOP push-button cuts off power from the hydraulic valve operating the booms, and the motor stops.*
- *The push-button is released by turning it in the direction indicated by the arrow.*
- *After releasing the push-button the motor does not re-start before it has stopped completely.*

5. Ignition lock (SVL1 ja SVL2)



- The ignition locks are located in the electric box of the platform (SVL2) and the electric box of the turntable (SVL1)

- Positions of the ignition lock, diesel motor

  - Position 0 stops the combustion engine and cuts off power from all electric components of the MEWP except the sound signal and the emergency lowering system.

  - Position 1 connects power to the electric components of the MEWP, depending on the selections of other switches.

  - Position 2, glowing of the diesel motor. Note! Glowing only in the ignition key of the turntable (SVL1). The glow indicator light will light up in MEWPs equipped with a Hatz diesel motor after about 35-45 seconds and in MEWPs equipped with a Kubota diesel motor after about 5 seconds.

  - Position 3, starting and glow. When the diesel engine is running or rotating free starting is prevented with relays R1, R4 ja R5.

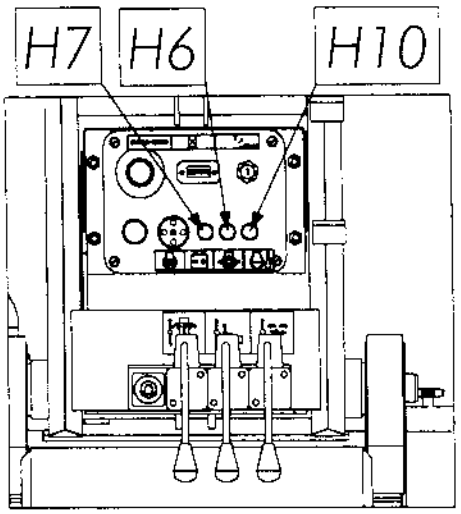
- Positions of the ignition lock, petrol motor

  - Position 0 stops the combustion engine and cuts off power from all electric components of the MEWP except the sound signal and the auxiliary lowering system.

  - Position 1 connects power to the electric components of the MEWP, depending on the selections of other switches.

  - Position 2, starting.

6. Charge signal light H7 (only in diesel models)



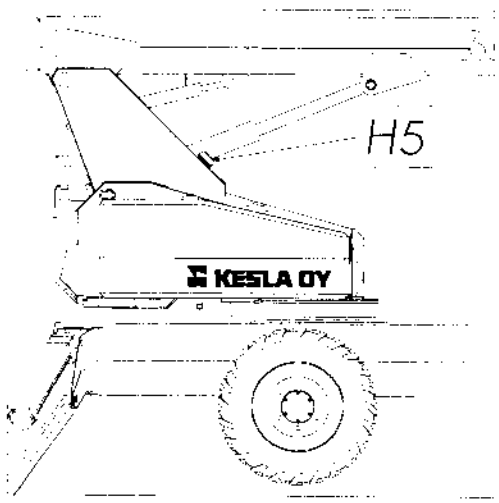
- The charge signal light functions when the combustion engine is running.
- Signal light H7 lights up and signal light H5 blinks, when ignition lock SVL1 or SVL2 is turned to position 1, and they should go out when the motor starts.
- If signal lights stay on while the motor is running, check charging circuit.

7. Oil pressure signal light H6 (only diesel models)

- The oil pressure signal light functions when the motor is running.
- Signal light H6 lights up and signal light H5 blinks, when ignition lock SVL1 or SVL2 is turned to position 1, and they should go out when the motor starts.
- If signal lights stay on while the motor is running, stop the motor immediately and find out why the lights are on, before re-starting the motor.

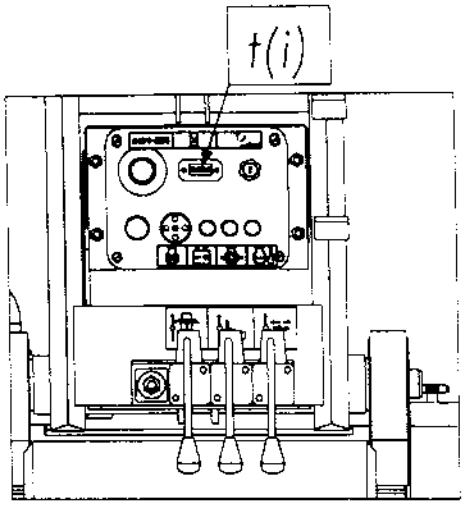
8. Warning light for the overheating of the motor H10 (only Kubota diesel)

- The warning light for overheating only functions when SVL1 or SVL2 is in position 1.



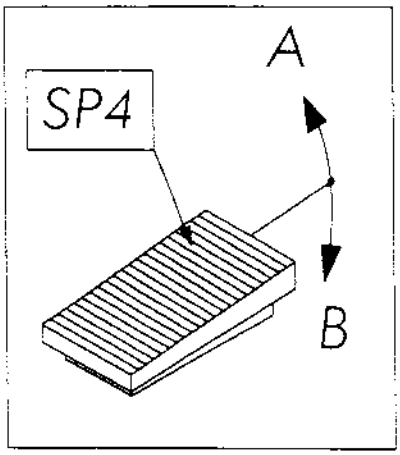
- Signal light H10 lights up and signal light H5 blinks when the temperature of the motor coolant exceeds +110° C (230°F).
- If the lights stay on while the motor is running, stop the motor immediately and find out why the lights are on, before re-starting the motor.
- Signal light H5 is located on the upper part of the turntable, on the left side when seen from the platform.

9. Hour meter t(i)



- The hour meter is engaged through relay R1 only when the combustion motor is running.

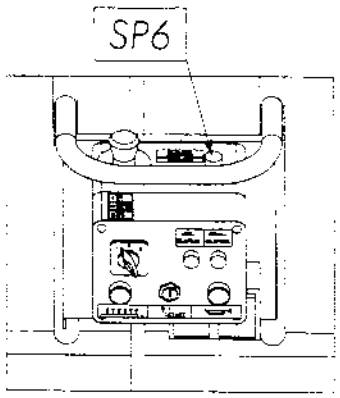
10. Pedal switch SP4, drive / booms

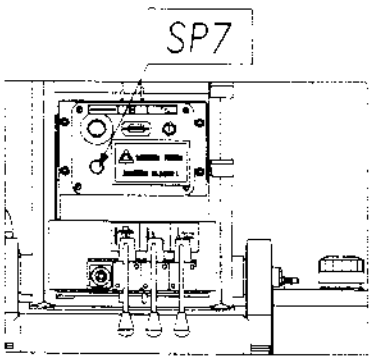


- When the pedal switch SP4 is pressed, hydraulic oil is directed to the booms.
- When the pedal switch SP4 is released, hydraulic oil is directed to drive, stabilizers and guiding.
- Pedal switch SP4 functions as control switch for relays R2 to R3.

A DRIVE
B BOOMS

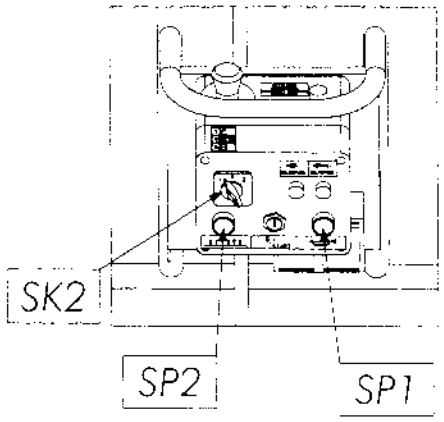
11. Push-buttons SP6 and SP7 for auxiliary lowering





- When buttons SP6 or SP7 are pressed, the auxiliary lowering pump will start to pump hydraulic oil into the system.
- Switches SP6 and SP7 control the function of relay R12.

12. Push-button SP2 for guiding the steering arms



- The push-button SP2 is used to control the steering arms. When the button is pushed the arms will move either up or down, depending on the position of the relay R7. When the button is released, pushing it the next time will move the arms to the opposite direction.

- The lifting arms can only be guided when the pedal is released and the booms are in a horizontal position and in line with the machine.

13. Push-button SP1 sound signal

- The sound signal functions when the battery is connected, regardless of the position of the main switch SPK1.

14. Selector switch SK2 LPG / petrol

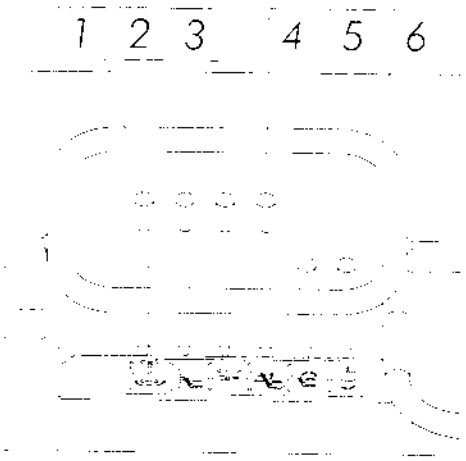
- Only in MEWPs equipped with a petrol engine

- Position 1, LPG as fuel

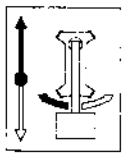
- Position 0, feeding of fuel prevented

- Position 2, petrol as fuel

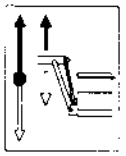
15. Control levers for the booms



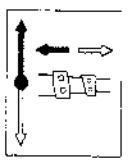
1. Slewing of booms



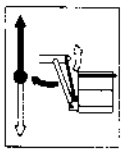
2. Raising /lowering the booms



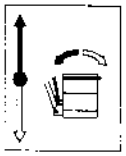
3. Telescope in/out



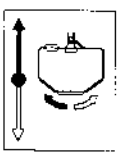
4. Raising / lowering the jib



5. Horizontal adjustment of platform



6. Slewing the platform



- Controlling the booms from the platform is possible when the change-over valve for guiding is in position platform, the pedal has been pressed down and the stabilizers are in the low position (RK1 - RK4 have closed).

- Levers 1-4 can be used simultaneously.

- Lever 5 is used to adjust the horizontal position of the platform.

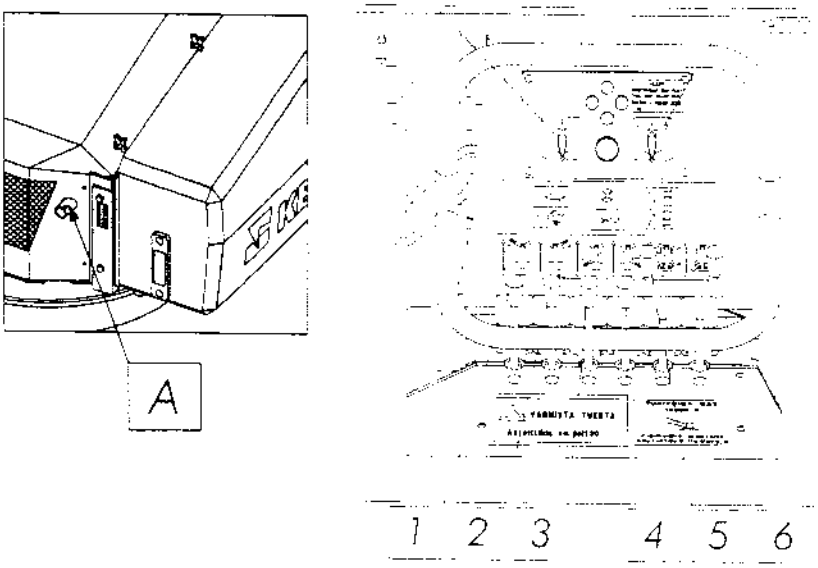
- When the platform is inclined upwards the platform movement is limited by the hydraulic limit, depending on the position of the jib.

- When the platform is inclined downwards the lowering is limited only by the hydraulic cylinder.

- When the MEWP is used the platform should be as horizontal as possible.

- Lever 6 is used to turn the platform counterclockwise by pulling the lever, and clockwise by pushing the lever.

16. Controls on chassis



- The controls on chassis function when the pedal on the platform is released (in upper position) and the booms are in line with the chassis.

- Levers 1-4, as well as levers 5-6, can be used simultaneously.

17. Horizontal position indicator H1 - H4

- Horizontal position indicators function when the levers 1 - 4 on the chassis are used.

18. Selector switch for driving speed SK4

- In position 0 the driving speed is 0 - 3,6 km/h (0 - 2.24 mi/hr), steering with lever 5.
- In position 1 the driving speed is 0 - 1,8 km/h (0 - 1.12 mi/hr), steering with lever 5.
- Driving speed should be selected with lever 5 in the middle position.

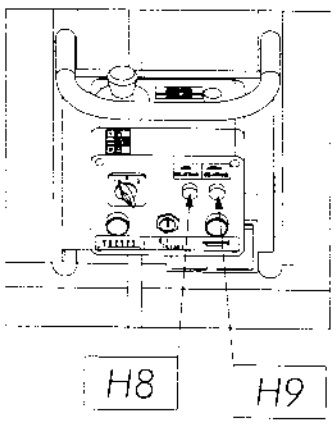
19. Selector switch for the way of steering SK3

- In position 0 steering is with the wheels on the side of the platform, lever 6
- In position 1 steering is with both wheels (= small turning radius)
- In position 2 steering is with both wheels (= diagonal driving)
- The way of steering can be selected while driving.

20. Shunt switch SP3

- The shunt switch can be used e.g. if you have to raise the platform to overcome an obstruction when driving on uneven terrain.
- The shunt switch by-passes the limit switches RK1 - RK4 of the stabilizers, and thus when the switch SK1 is in position BOOMS, the booms can be raised and lowered with lever 2 to a distance reached by the driver's hand.
- THE SHUNT SWITCH MAY NOT BE USED SO THAT ONE PERSON PRESSES THE SWITCH AND ONE GUIDES THE BOOMS - RISK OF TIPPING OVER.

21. Signal light for booms H8

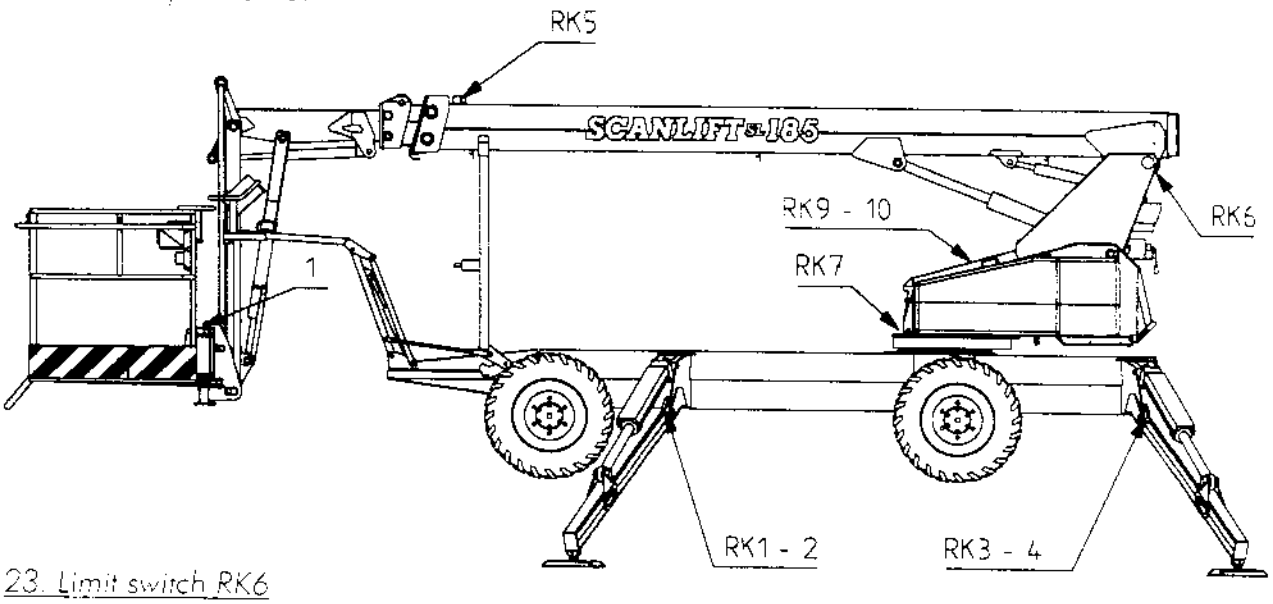


- The signal light for booms should be on when ignition lock SVL2 is turned to position 1 and the foot pedal SP4 is pressed.
- The signal light should go off when the foot pedal is released and/or the booms are overloaded. RK9 cuts off current from the lamp in overload situations.

22. Warning light, boom overloading H9

- The warning light should be on when ignition lock SVL2 is turned to position 1 and the booms are brought to overload. When the booms are overloaded, RK9 and RK10 switch the lamp on.

- The warning light should go off when the overload situation is over, or the ignition lock is turned to position 0.



23. Limit switch RK6

- Limit switch RK6 functions when the booms have been raised from the horizontal position about 15-20 degrees, preventing the use of stabilizers, driving and steering.

23. Limit switch RK7

- Limit switch RK7 functions when the booms are turned 5 degrees either right or left from transport position, preventing the use of stabilizers, driving and steering.

24. Limit switch RK9

- Limit switch RK9 functions as load control for the jib.

- RK9 is connected to the load control of hydraulic boom lowering.

- If booms have been lowered or extended to the max. lifting radius, the limit switch RK9 prevents the increase of lifting radius with the jib.

25. Limit switch RK10

- Limit switch RK10 functions together with hydraulic load control.

- RK10 functions, if hydraulic load control is disturbed e.g. due to hose leakage.

- RK10 stops the combustion engine and the movement of the booms.

- RK10 must be trimmed again after it has been active, and the reason for the release must be investigated.

- Limit switch RK10 has been adjusted so that it allows swings that are caused by persons and do not affect the stability of the MEWP.

26. Limit switch RK5

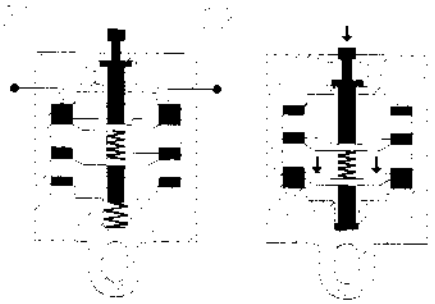
- RK5, when released, prevents the guiding of the booms.

- RK5 has been adjusted to function in case the extend chain of the booms breaks, and the load in line with the boom is supported by the standby chain only.

27. Limit switches for the stabilizers RK1 - RK4

- RK1-RK4 prevent the use of the booms, if stabilizers are not down in support position.

- The limit switches for the stabilizers RK1-RK4 have been connected in series, so even one active limit switch stops the movement of the booms.



Limit switches RK1 - RK9 are independent switches with contact according to the drawing.

RK10 is an independent switch with torque contact.

28. Hydraulic limit switch (Figure 1, ref. 1)

- The hydraulic limit switch protects the stabilizer arms.

- When the main lifting boom is lowered or the platform is inclined upwards with the lifting boom in an upright position and the jib all the way down, the hydraulic limit switch directs the hydraulic oil on the side of the lifting cylinder stem, platform stabilizer cylinder bottom and jib cylinder stem to the side of the jib cylinder bottom, lifting the jib upwards.

- Lowering the jib and inclining the platform upwards cause vibration due to the closing or opening of the hydraulic limit.

- The functioning of the hydraulic limit by-passes the jib cylinder load control, so it also functions with the auxiliary lowering system.

8.0 TORQUE SCHEME

Wheel nuts ..... 250 Nm (184 lbf.ft)

Fastening bolts of slewing gear ..... 22 - 26 Nm (16 - 19 lbf.ft)

Bolts of pivot bearing, inner shell ..... 300 - 360 Nm (221 - 265 lbf.ft)

Bolts of pivot bearing, outer shell ..... 150 - 175 Nm (111 - 129 lbf.ft)

Axle between upper and lower turntable (locking with claw ring) ..... 50 - 70 Nm (37 - 51 lbf.ft)

Clasp nuts of stabilizer axles (locking with claw ring) ..... 50 - 70 Nm (37 - 51 lbf.ft)

Wheel naves and pivoted axles (locking with claw ring) ..... 50 - 70 Nm (37 - 51 lbf.ft)

Axle nuts of cylinder pins (locking with claw ring) ..... 50 -70 Nm (37 - 51 lbf.ft)

Holding capacity of pull eliminator in inlet of el. boxes ... 5kg (11 lb), when pulling from cable

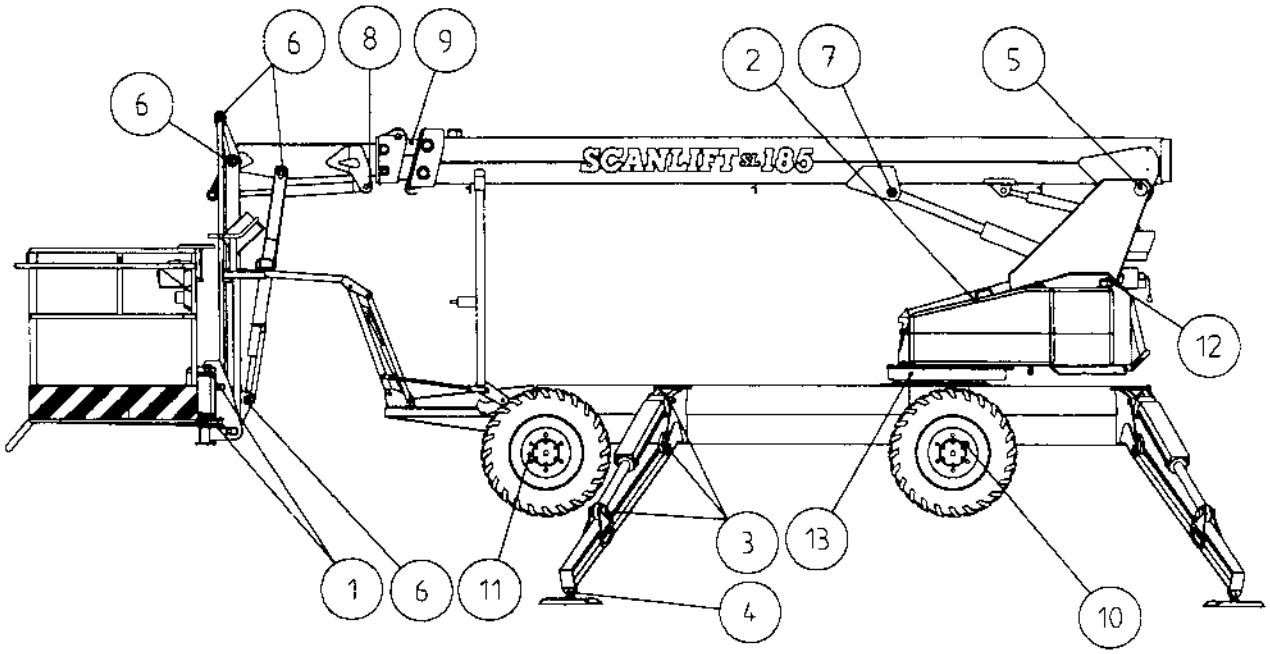
8.1 Torques, if not otherwise mentioned

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

9.0 LUBRICATION SCHEME



Lubricate following points every fifty (50) operating hours:

1. *The spherical bearings in the platform's slewing cylinder*
2. *Bearing surfaces of lifting radius guard*
3. *Stabilizer links and spherical bearings of cylinders*
4. *Links of supporting plates*
5. *Spherical bearings of boom and turntable*
6. *Spherical bearings of platform, stabilizer arms and jib*
7. *Spherical bearings of lifting cylinder*
8. *Spherical bearings of stabilizer cylinders*
9. *Sliding surfaces of booms and sprocket bearings*
10. *Pivoted axle bearings of wheels*
11. *Sliding surfaces of brake cylinders*
12. *Bearings in oscillating axle; every six (6) months, 2 pcs of nipples*
13. *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 pivot bearing and tooth ring lubrication point is attached with 2 bolts.*

10.0 SELECTION TABLE OF LUBRICANTS AND OIL VOLUME

Combustion engines:

Kohler Command 20
Oil volume ..... 1,9 l (0.5 gal) w/filter
SAE 30W SF ..... +0° ... -30°C (+32 ... +86°F) monograde oil
SAE 20W-30 SF ..... +0° ... +30°C (+32 ... +86°F) first filling
SAE 10W-30 SF ..... -5° ... + 30°C (23 ... +86°F)
5W-20 SF ..... -25° ... + 0°C (-13 ... +32°F)

Kubota D722-E
Oil volume ..... 3,8 l (1.0 gal) w/filter
SAE 30 or SAE10W-30, SAE10W-40 ..... above +25°C (-13°F)
SAE 20 or SAE10W-30, SAE10W-40 ..... 0°C ... +25°C (+-32 ... -13°F)
SAE 10W or SAE10W-30, SAE10W-40 ... below 0°C (+32°F)

Hatz Silent Pack 1D80C
Oil volume ..... 2,0 l (0.53 gal) w/filter
Oil quality API-CD/CE CCMC-D2/D3/PD1
SAE 10W-40 ..... -20° +50°C (-4 ... 122°F) first filling
SAE 5W-30 ..... -30° +20°C (-22 ... 68°F)

Hydraulics
Oil volume ..... 75,0 l (19.81 gal) total quantity
Oil quality ..... UNIVIS 32

Spherical bearings
Lithium-based all-round grease e.g. Esso Beacon EP2
Lubrication instruction: oozes out a little during greasing

Open cogging of pivot bearing
Molybdenum-sulphide-based e.g.
- Esso Surrent Fluid 30F
- Shell Cardium EP Fluid H
- Mobil Dorcia 30

Lubrication instruction: brushing

Sliding surfaces of booms
Lithium-based all-round grease e.g. Esso Beacon EP2
Lubrication instruction: brushing

Sliding bearings
Lithium-based all-round grease e.g. Esso Beacon EP2
Lubrication instructions: oozes out a little during greasing

Pivot bearing

Lithium-based all-round grease, e.g: Esso Beacon EP2, Shell Alvania EP2, Mobil Mobilux EP2

Slewing gear

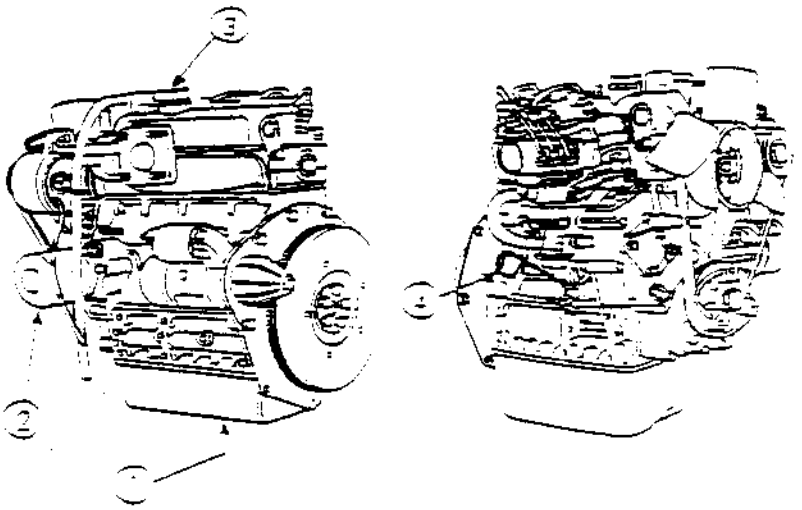
SOM

Oil volume ..... 1,5 l (0.4gal)
ISO 3448 Vg 150
SAE 90

DAVID BROWN

Oil volume, slewing gear .... 1,6 l (0.42gal)
Oil volume, brake ..... 0,1 l (0.03gal)
ISO 3448 Vg 150
SAE 90

11.0 CHANGING OIL FILTER AND OIL OF KUBOTA D722-E MOTOR



1. *Being an often repeated operation the change of motor oil and the filter is handily done without lowering the motor by following these instructions.*

2. *Lower the stabilizers and turn the MEWP so that the motor will go between wheel and chassis.*

3. *Open and remove the hood.*

4. *Remove one of the oil drain plugs (1) and drain the motor oil to the waste oil container.*

5. *Fasten the oil filter tool on the filter and turn counterclockwise to remove the old filter (2).*

6. *Apply a thin coating of oil to the rubber gasket on the oil filter. Turn the oil filter until the rubber gasket contacts the filter adapter, then tighten an additional ½ turn.*

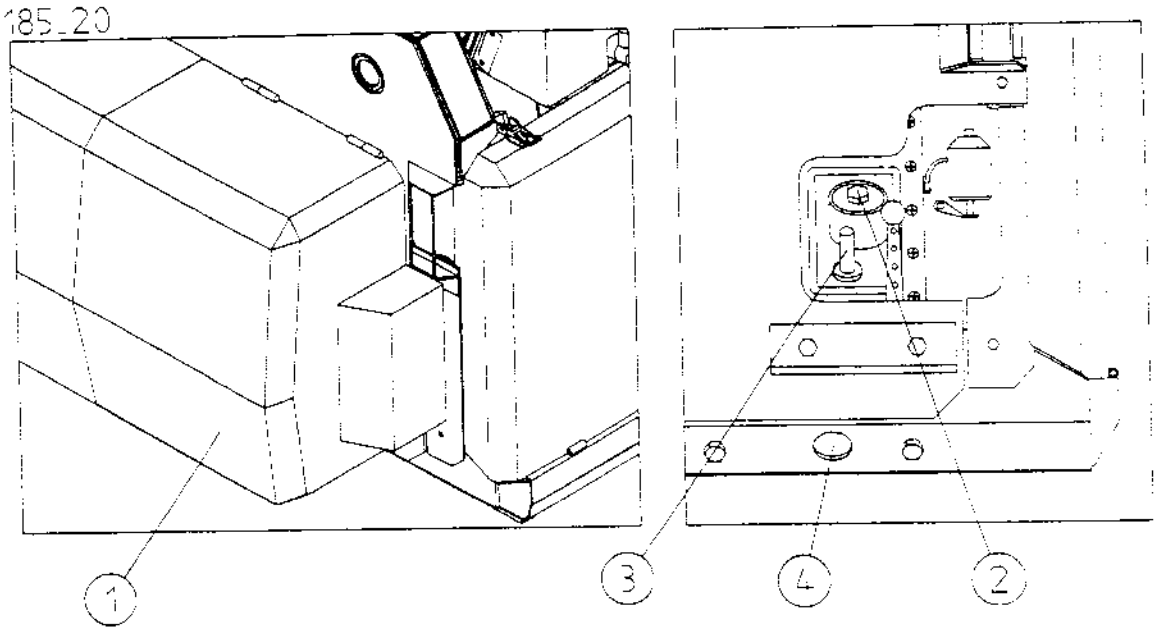
7. *Reinstall the drainplug and tighten it.*

8. *Open the oil cap (3) and fill the motor with new oil. Check that the oil level is up to the upper mark on the dipstick (4).*

9. Close the oil cap and replace the dipstick. Let the motor run for a few minutes. Check for oil leaks and after oil pressure is steady check the oil level with the dipstick. Add more oil if necessary.

10. Put the cover of the motor service opening back on.

12.0 Changing oil filter and oil of HATZ 1D80C diesel motor



Being an often repeated maintenance operation the change of motor oil and the filter is handily done without having to lower the motor by following these instructions.

1. Lower the stabilizers and turn the MEWP so that the motor will go between the wheel and the chassis.

2. Remove the covers 1 on the right side of the turntable thus revealing the motor oil filling pipe 2 and filter casing 2. The oil dipstick 3 is located under the filling pipe.

3. The oil drainage plug 4 is located under the filling pipe and it can be opened with a wrench through the hole in the base plate. Place a vessel of 4 l underneath before opening.

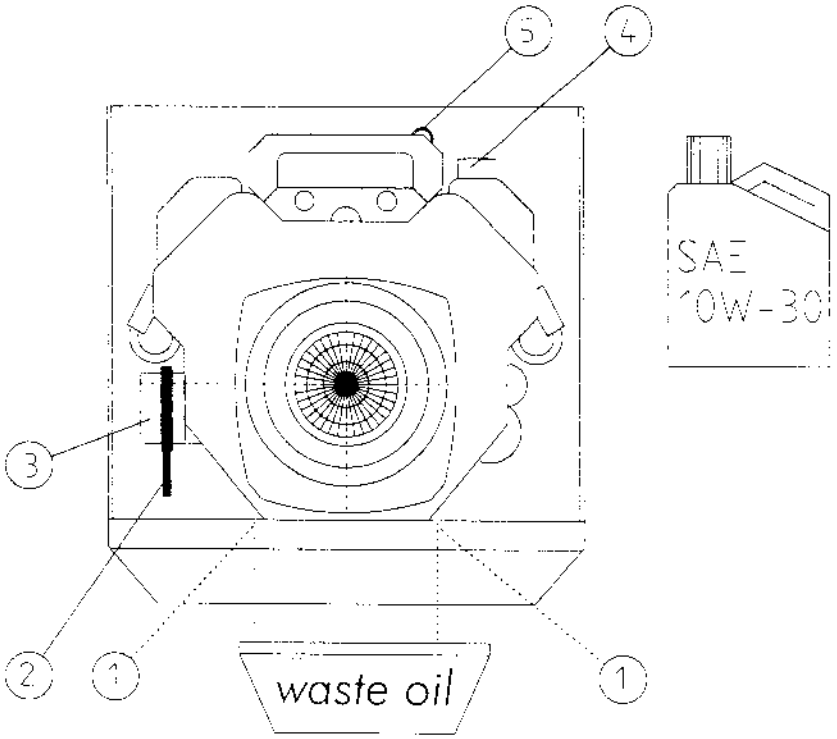
4. Open the filling pipe and remove the old filter.

5. Fasten the oil drainage plug in its place, pour new oil into the motor and put the new motor oil filter in its place. Wipe any eventual oil from the motor.

6. Let the motor run for a few minutes. Check for any leakage and, when the oil pressure is steady, check the oil level with the dipstick.

7. Put the cover of the motor service opening back on.

13.0 Changing oil filter and oil of KOHLER COMMAND 20 motor



Being an often repeated maintenance operation the change of motor oil and the filter is handily done without having to lower the motor by following these instructions.

1. *Lower the stabilizers and turn the MEWP so that the motor will go between the wheel and the chassis.*

2. *Open and remove the hood.*

3. *Remove one of the oil drain plugs (1) and drain the motor oil to a waste oil container.*

4. *Remove the old filter (3), by turning counterclockwise with the oil filter tool (2).*

5. *Apply a thin coating of oil to the rubber gasket on the oil filter. Turn the oil filter until the rubber gasket contacts the filter adapter, then tighten an additional ¾ turn.*

6. *Reinstall drainplug and tighten it.*

7. *Open the oil plug (4) and fill the motor with new oil, to the 'F' mark on the dipstick (5).*

8. *Close the oil cap and replace the dipstick. Let the motor run for a few minutes. Check for any leakage and when the oil pressure is steady, check the oil level with the dipstick. Add more oil if necessary.*

9. *Put the service opening cover back on.*

14.0 MAINTENANCE SCHEME BASED ON OPERATING HOURS

Daily	1. Check hydraulic oil quantity
	2. Check fuel quantity
	3. Check support constructions
	4. Check hydraulic hoses and pipes, tightness of hydraulic couplings
	5. Check function of emergency stop and safety devices
	6. Test all directions of function
Every 50 hours	1. Lubricate all bearing and sliding surfaces
	2. Check condition of telescope sliding pads and surfaces, lubricate and adjust if needed
Every 500 hours	1. Change hydraulic oil and filter
	2. Change oil of slew. gear. First change 100 h
	3. Check condition of brakes
Every 1000 hours or at least 6 months	1. Check condition of driving brakes, clean and lubricate
Every 12 months	1. Annual examination. Encl. records to be filled, signed and dated

Kubota D722-E

Daily	1. Check oil level, add if needed
	2. Check quantity of coolant
Every 50 hours	1. Check fuel pipes and hoses, tightness of couplings and cond. of clamp bands
Every 200 hours	1. Change engine oil and oil filter
	2. Check coolant hoses and clamp bands
Every 400 hours	1. Change fuel filter element
Every 500 hours	1. Clean radiator element
	2. Check condition and tightness of fan belt. Tighten or change belt, if needed
Every 800 hours	1. Check valve clearance
Every 12 months	1. Clean air filter (more often, if needed)
Every 24 months	1. Replace radiator hoses and clamp bands
	2. Change coolant
	3. Replace fuel pipes and clamps

Hatz 1D80C

Daily	1. Check motor oil level, add if needed
	2. Check cleanliness of cooling air intake, clean if needed
Every 250 hours	1. Change motor oil and oil filter
	2. Replace air filter
	3. Check valve clearance
Every 500 hours	1. Replace fuel filter

Kohler Command 20

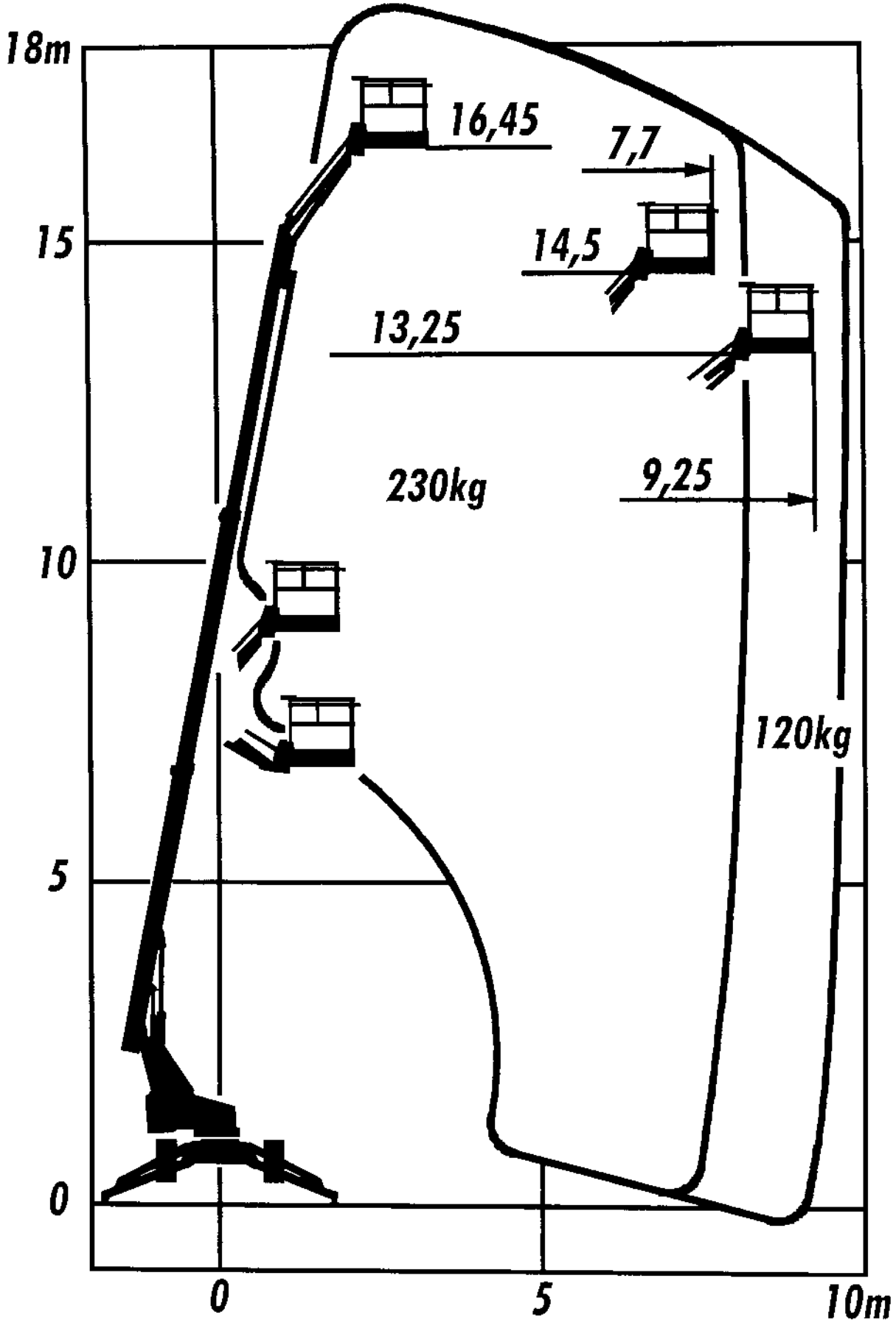
Daily	1. Check motor oil level, add if needed
Every 25 hours	1. Clean prefilter around the air filter element (wash with warm water. Reinstall prefilter after it has dried completely)
Every 100 hours	1. Replace air filter
	2. Change motor oil and oil filter
	3. Check spark plug condition, clean plugs and adjust gap, replace spark plugs if needed
	4. Check condition of spark plug leads and caps. Replace, if needed

15.0 TROUBLE SHOOTING CHART

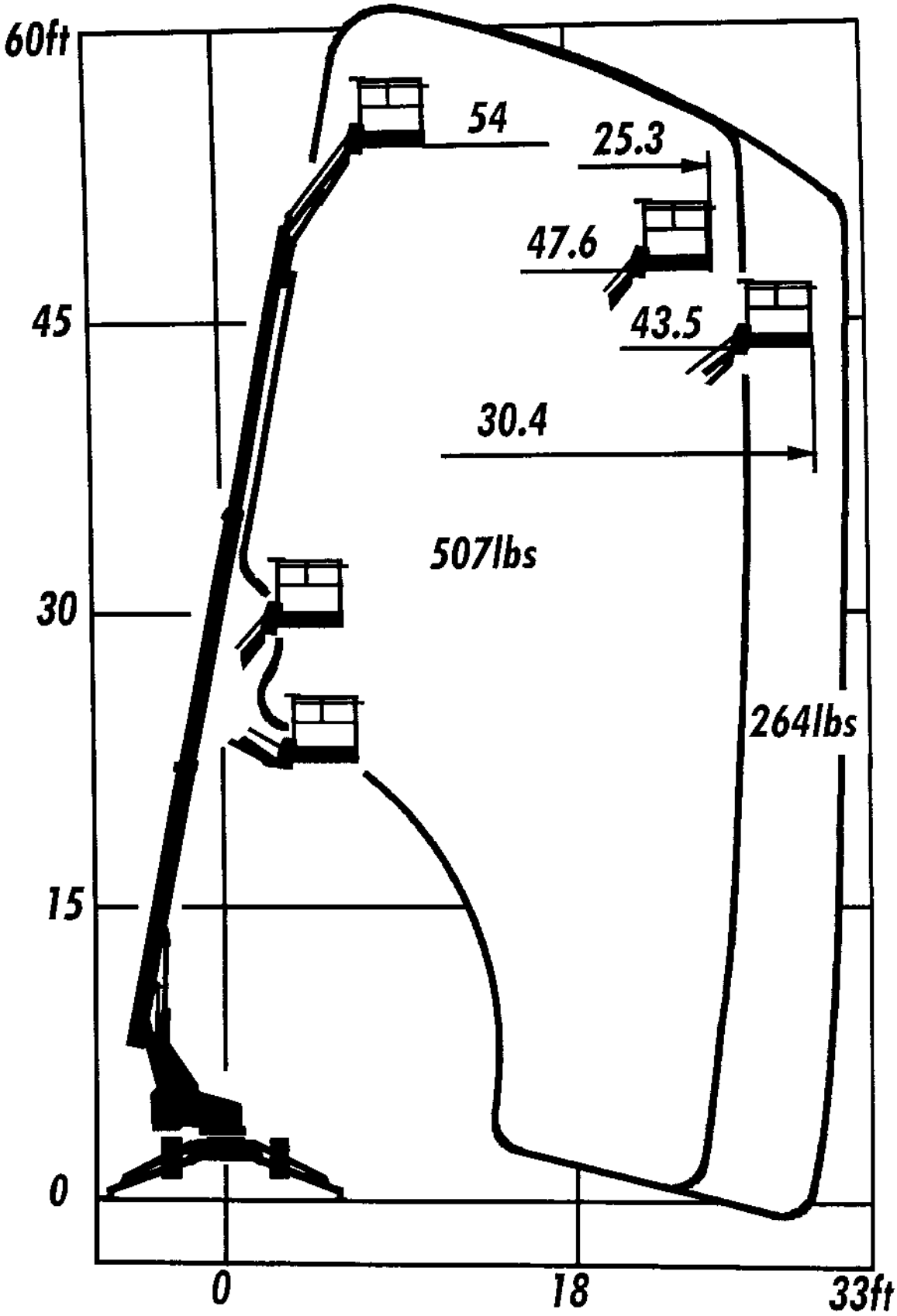
Malfunction	Cause
Booms can not be guided from platform	1. Pedal switch (on platform) has not been pressed down. 2. Change valve for platform/ground guiding located on turntable is not in platform guiding position. 3. Fuse F2 has blown.
Booms can not be guided from platform or from ground, but chassis movements function normally	1. Pedal switch (on platform) has not been pressed down. 2. One of the stabilizers is not low enough. 3. Electrical connection from the booms to the chassis control valve solenoid Y1 is off. 4. Does platform guiding function when shunt switch is pressed at the same time? If so, one of the stabilizer limit switches is damaged or a conductor has come loose. 5. If the above is not the cause of the malfunction, check next whether solenoid Y1 is unenergized. – Turn off the motor, leave power on and open the turntable cover. – Remove the plug of solenoid Y1 and measure voltage between connectors. If there is no voltage between connectors or it is remarkably under the battery terminal voltage (eg. battery = 12V and Y1 = 7V) the next thing to do is to try to locate the malfunction by measuring voltage or resistance of the circuit to Y1, according to the electric scheme. E.g. measure if there is a voltage from terminal block 3/3 between the terminal and ground. Check the circuit with limit switches RK10 ja RK5, relay 3 tips 30-87 as well as cylinder distributor LR3.
All guiding movements stop while platform is guided to the place of work.	1. One of the stabilizers is not low enough, and thus the tips of the stabilizer limit switch open due to platform load. Another person must press the shunt switch on the ground steering arm, so the MEWP operator can drive the booms to transport position and correct the position of the stabilizers. 2. Breaking of electrical connection to control valve solenoid Y1 caused by something other than the stabilizer limit switch. E.g. the limit switch RK 5 has opened due to a broken chain.

Malfunction	Cause
Chassis movements do not function, but booms function normally	1. Boom is not in transport position (= boom is down and in line with the chassis) 2. Platform pedal has not been released (in upper position) 3. Electrical connection off to the chassis direction valve solenoid Y2. Check electrical connection according to electrical plan.
Diesel motor starts, but does not run.	1. Is stopper active during start? 2. Check the stopper circuit. – In Hatz diesel the stopper is energized during the starting and running of the motor. – In Kubota diesel the stopper is de-energized during the starting and running of the motor. 3. Fuel is out.
Diesel motor does not start	1. Main switch is not on. 2. EMERGENCY STOP button has not been released. 3. The standby load limit switch RK10 has been active.
Diesel motor starts from ground but not from platform	1. Check fuse F3.

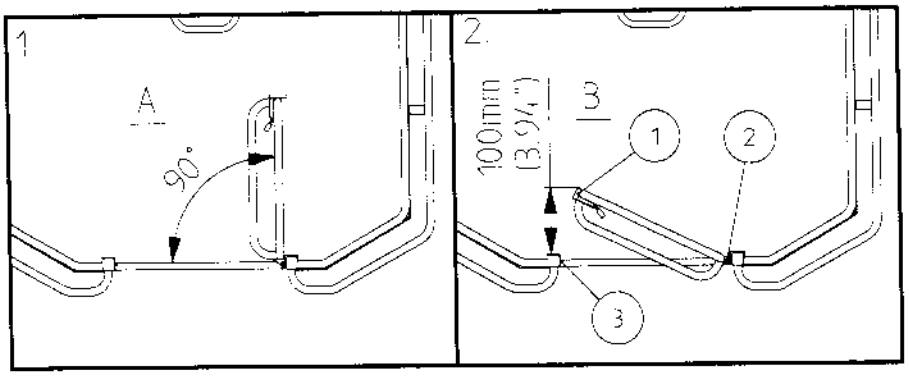
16.0 MEWP SL 185 OUTREACH DIAGRAM



16.0 MEWP SL 185 OUTREACH DIAGRAM



17.0 OPERATION OF THE WORK PLATFORM GATE



1. Lock
2. Spring
3. Lock pin

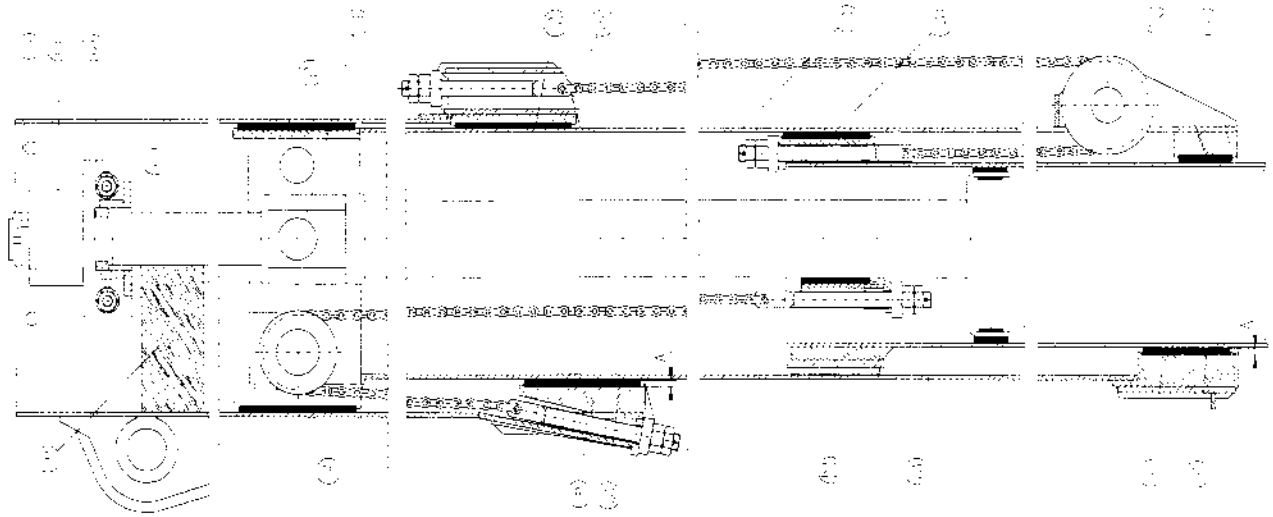
- *The platform gate must close and lock when freely released from position A (figure 1) and position B (figure 2)*

- *If gate does not lock in the above described manner, the gate closing spring can be tightened half a turn.*

- *If needed, the position of the lock pin must be adjusted.*

- *Lubricate lock, spring and hinges with thin machine oil. In cold conditions use E.g. Molykote separator spray.*

18.0 REPLACING THE SLIDING PADS OF THE BOOMS



Replace the pad when measurement A is under 1,5 mm (0.059 in), or the sliding pad retaining screws scratch the booms.

1. *Drive the booms fully out.*

2. *Remove lock nuts 1, valve block 2 and stopping piece 3. Support piston rod 4 with wooden support 5.*

3. *Remove sliding pads 6, 7, 8 and 9 including base.*

4. Remove side sliding pads and chain gear 10. Lift chain fork to the space of sliding pad 8.

5. Pull middle boom 11 out of the lifting boom, while supporting piston rod 4.

6. Remove cylinder carrier pins 12.

7. Pull the outermost extension 13 out of middle boom 11.

8. Replace sliding pads 14 - 20, and side sliding pads 16 pcs.

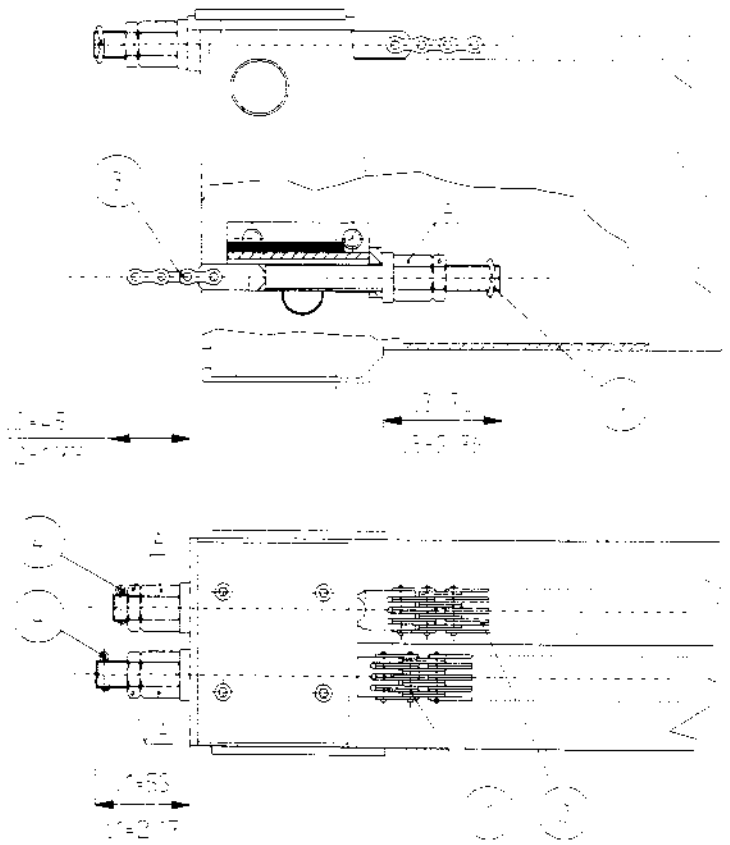
9. Check condition of chains, chain forks, chain gears and booms.

10. Reassemble the booms in the order 8, 7, 6, 5, 4, 3, and 2.

11. Adjust the lateral straightness of the booms (refer to adjustment instructions 21.0).

12. Adjust the chains of the booms (refer to adjustment instructions 22.0).

19.0 ATTACHING THE CHAINS OF BOOMS TO THE OUTER EXTENSION



1 Extend chain
2 Standby chain of extend chain
3 Retract chain
4 Cotter

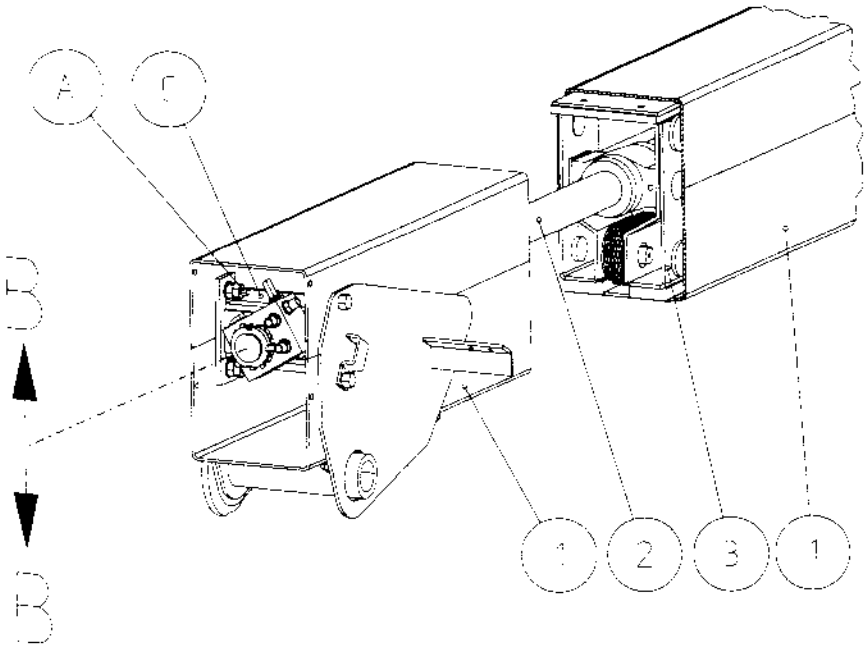
L1 = 55mm (2.17 in) right chain (extend chain)

L2 = 45mm (1.77 in) left chain (standby chain of extend chain)

L3 = 70mm (2.76 in) lower chain (retract chain)

Tighten nuts A reciprocally (3 pairs)

20.0 FITTING THE CYLINDER STOPPING PIECE



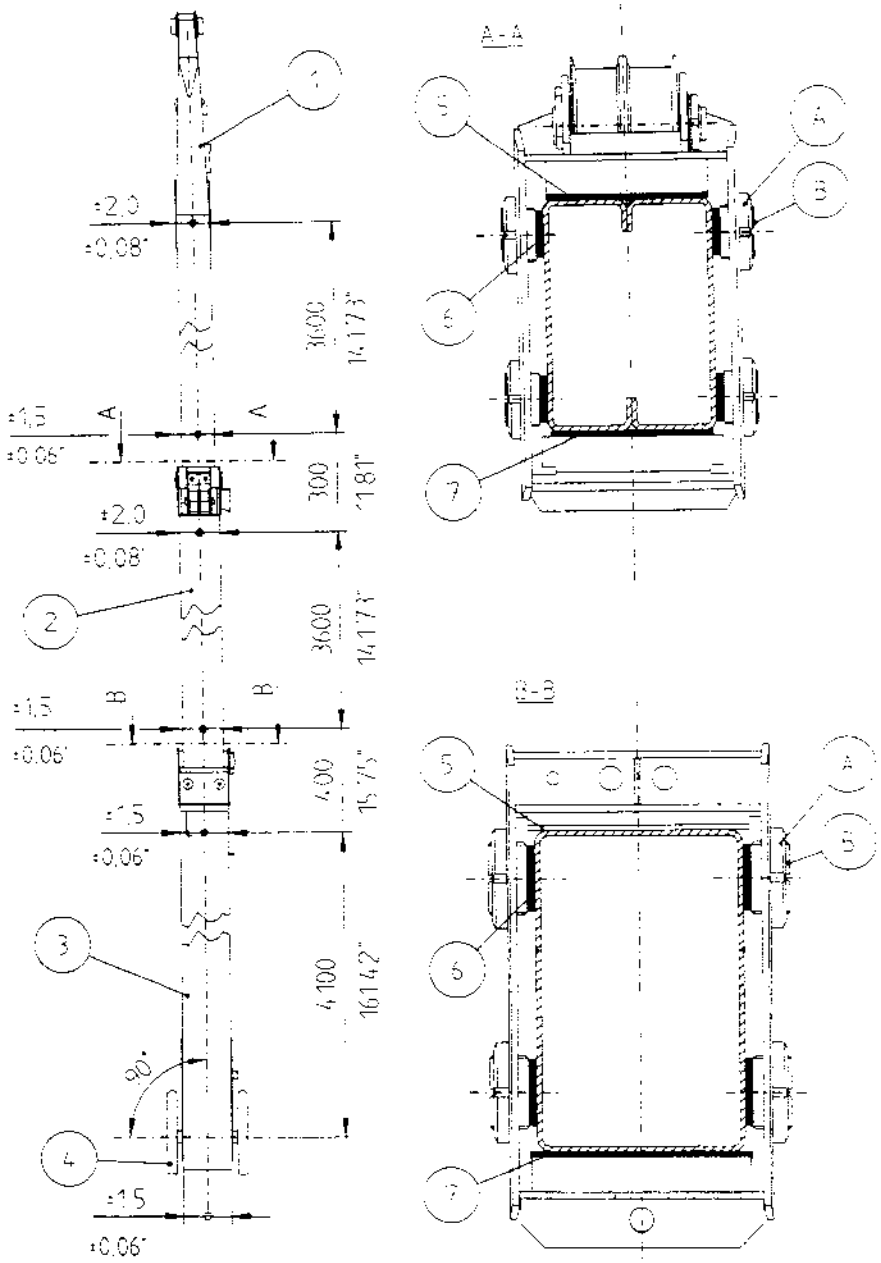
1	Lifting boom
2	Extension cylinder stem
3	Middle boom

1. While the middle boom is retracted keep bolts A (4pcs) loose, which enables the cylinder stopping piece C to move up or down in direction B-B. Check clearance.

2. Tighten bolts A (4pcs.) to 115Nm (84.8 lbft), with extension cylinder fully in and cylinder stopping piece C in its correct height.

NOTE! IF CYLINDER STEM IS FULLY OUT, THE STEM MUST BE SUPPORTED, OTHERWISE IT MAY DISTORT OR BREAK THE STEM BUSHING.

21.0 CHECKING AND ADJUSTING THE LATERAL STRAIGHTNESS OF THE BOOMS



A	Lock nut
B	Adjusting pin
1	Outer extension
2	Middle boom
3	Lifting boom
4	Turntable
5	Upper sliding pad
6	Side sliding pad
7	Lower sliding pad

1. *Drive the booms fully out.*

2. *Loosen lock nut A (8pcs)*

3. *Loosen adjusting pins B (8pcs)*

4. *Set centre line (note allowances)*

5. *Adjust booms with the centre line, use the adjusting pins to tighten the side sliding pads lightly to the boom. Watch that the lower surface of the boom rests evenly on the lower sliding pad.*

6. Tighten lock nuts.

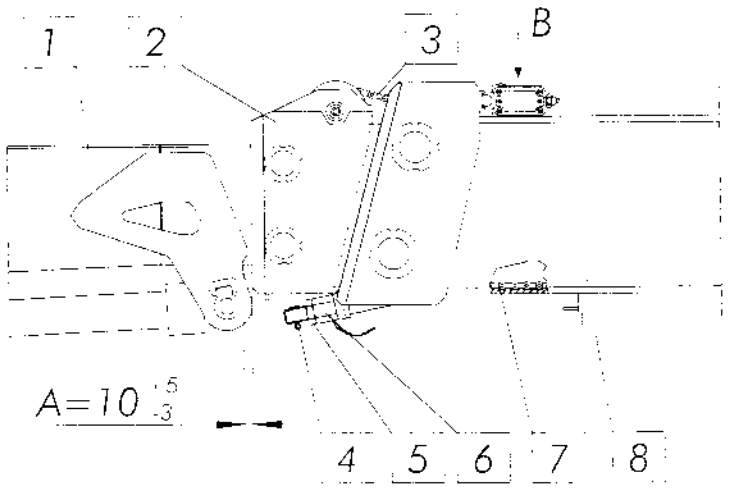
7. Test drive the booms. If the booms do not operate smoothly, loosen the side sliding pads slightly.

22.0 CHAINS OF BOOMS - ADJUSTMENT AND MAINTENANCE

Instructions for examination

1. Retract the boom totally with the telescope cylinder

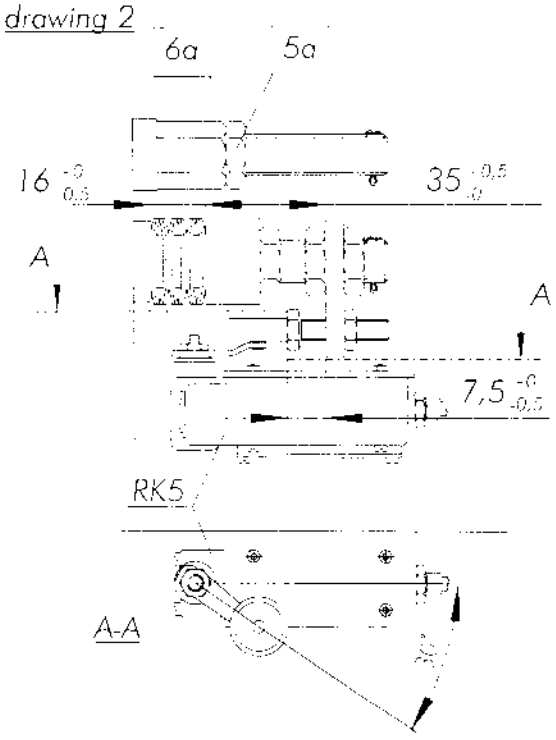
drawing 1



1 Outer extension
2 Middle boom
3 Extend chain
4 Cotter
5 Locking nut
6 Adjusting nut
7 Retract chain
8 Lifting boom

2. Position of the outer boom extension:

drawing 2

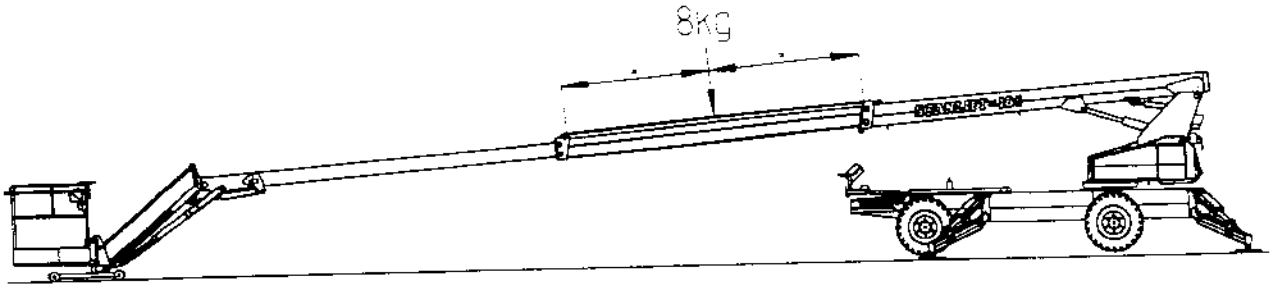


- Check gap A, drawing 1. If the gap exceeds 10mm −5mm (0.39in +0.2in) loosen nuts 5a ja 6a of the extend chain, drawing 2 (−direction B) and analogously tighten nuts 5 and 6 of the retract chain, drawing 1, which makes the outer boom extension move inwards.

- If gap A is smaller than 10mm -3mm (0.39in +0.12in) loosen nuts 5 ja 6 of the retract chain, drawing 1 and tighten nuts 5a and 6a of the extend chain, drawing 2 (−direction B).

- When adjusted, tighten locking nuts 5 and 5a slightly.

Adjustment of chain tension



1. Support the MEWP on the stabilizers with the wheels slightly risen from the ground. Raise the jib boom fully up (the cylinder will restrict). Lower the platform to the ground and leave.

2. Drive out the booms totally with the platform dragging along the ground, but compensating with the lifting cylinder. If the platform will rise up from the ground during extending, the limiter of the lifting radius will cut both the lowering and extending movements of the booms. Therefore it is important to compensate the load of the booms by dragging the platform along the ground during extension. Use some kind of wheeled support under the platform, e.g. pump carriage or similar.
   Retract the booms about 50mm (1.97 in) from max. reach and leave the booms in this position. The situation is shown in drawing.
   NOTE! During the extension no load is allowed on the platform and even otherwise extreme caution must be observed. It is most essential to compensate the booms with the lifting cylinder.

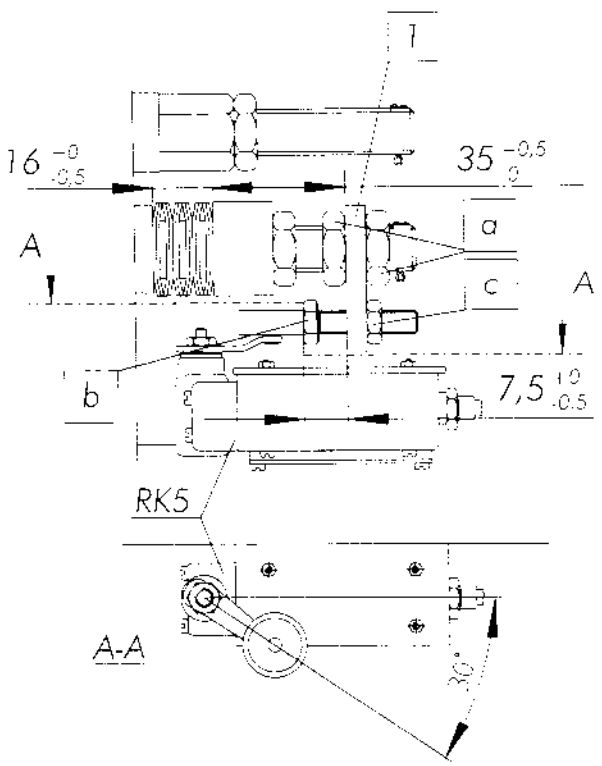
3. Adjust the tension of the extend chain (the chain to the left seen from the platform) so that it with a single load of 8 kg (17.6 lb) will slightly touch the upper surface of the boom. The single load must be at the middle of the freely visible chain. The permitted gap between the chain and the upper surface of the boom is 1 to 3 mm (0.04 to 0.12 in).

4. Adjust the tension of the standby chain (the chain to the right seen from the platform) so that the measure of the spring pack is 16mm +0mm -0,5mm (0.63in +0in -0.02in) (drawing 2). Check that there is a gap of about 10mm (0.39 in) between the chain and the boom, when the chain is unloaded and hanging freely. Finally tighten the locking nut of part 3 (drawing 2).

5. Adjust the standby chain, which has no spring pack or limit switch, so that there will be a gap of about 10 mm (0.39 in) at the middle of the freely hanging chain and the boom. Thus the extend chain will take all the load and the standby chain will secure.

6. For adjustment and checking you should loosen the chain to be checked slightly by a counter-motion.
   Loosen the extend chains by retracting the fully extended telescope slightly. The retract chains can be loosened analogously by extending the fully retracted telescope slightly.

23.0 LIMIT SWITCH RK 5 INFORMING OF EXTEND CHAIN BREAKAGE - ADJUSTMENT AND OPERATION



1. Loosen the nuts of part 1 (a). Adjust part 1 to measure 35 −0,5 -0 mm (1.38 + 0.02 -0 in) and tighten nuts (a).

2. Check that the roller shaft of the limit switch RK5 is 30 degrees above the horizontal level, when the roller is free (profile A-A).

3. Adjust the hexagon screw (b) to measure 7,5 −0 -0,5 mm (0.29 +0 -0.02 in). Lock with locking nut (c) and check the measure.

Function of limit switch RK5

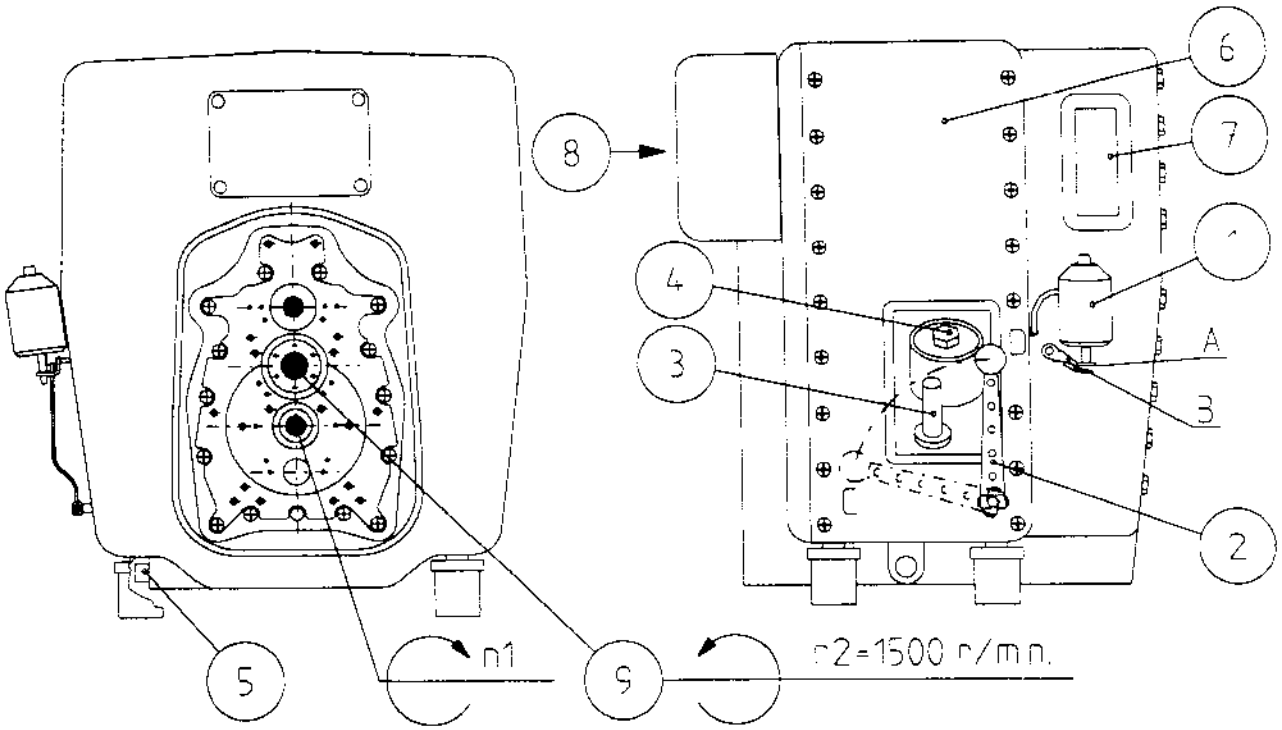
1. If the extend chain breaks or is too slack, the standby chain will be loaded and the spring pack will be jammed thus, transmitted by the hex. screw, pushing open the tips of the RK5 switch and cutting all movements of the MEWP. In this case the booms can be operated only with the auxiliary lowering system.

2. When the limit switch RK5 has been active, always check the condition and adjustment of the extend chain and the adjustments of the standby chain. If needed, change the extend chain when stretched or corroded, when the chain links or pins are worn out or when the chain is broken.

3. When the adjustments are completed, drive the booms in and out for a few times with the booms raised in upper position. After test drive examine all locking nuts, cotters and adjustments in accordance with these instructions.

24.0 HATZ DIESEL - PRINCIPAL CONTROLS AND MEASUREMENT OF THE SPEED OF ROTATION

Principal controls:



1. Stop solenoid
2. Adjusting the speed of rotation
3. Oil dipstick
4. The engine oil filling pipe and filter
5. Bleeding of motor oil
6. Air filter replacement by removing bonnet 6
7. Suction hole for operating and cooling air
8. Outlet hole for cooling air
9. Measuring point of the speed of rotation, n2=1500 r/min.

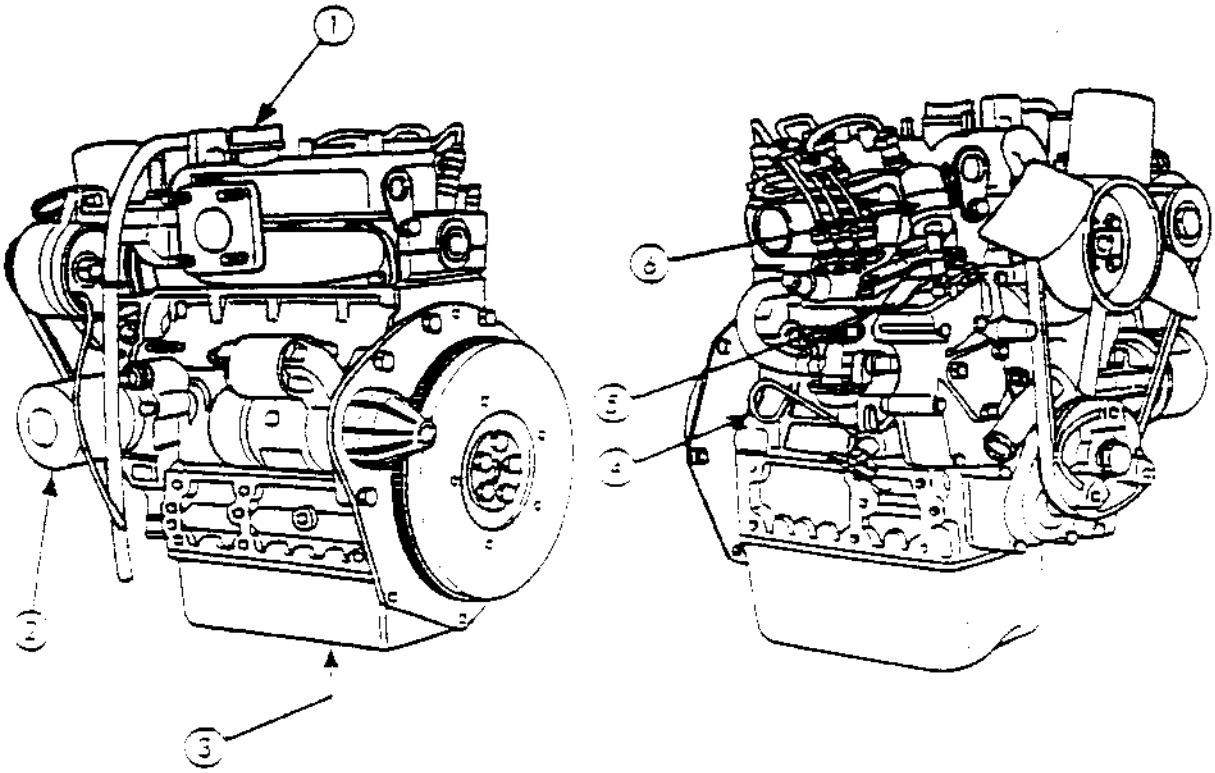
Measurement of the speed of rotation:

1. Measuring point of the speed of rotation n2=1500 r/min (i=2:1). Note! If full speed of rotation can not be reached with adjusting lever 2 or if the speed of rotation at the measuring point 9 (n2=1500 r/min) is more than 1500 r/min, refer to paragraph 3.1.a (=internal adjustment of the motor) in the service manual of the motor. Adjustment of the speed of rotation is done without loading the motor, that is with the hydraulics unloaded.

2. Adjustment of valves: refer to the service manual of the motor.

25.0 KUBOTA DIESEL - PRINCIPAL CONTROLS AND MEASURING THE SPEED OF ROTATION

Principal controls:



1. Filling cap for motor oil
2. Motor oil filter
3. Bleeding tap for engine oil
4. Oil dipstick
5. Adjusting the speed of rotation
6. Stop solenoid

Measuring the speed of rotation:

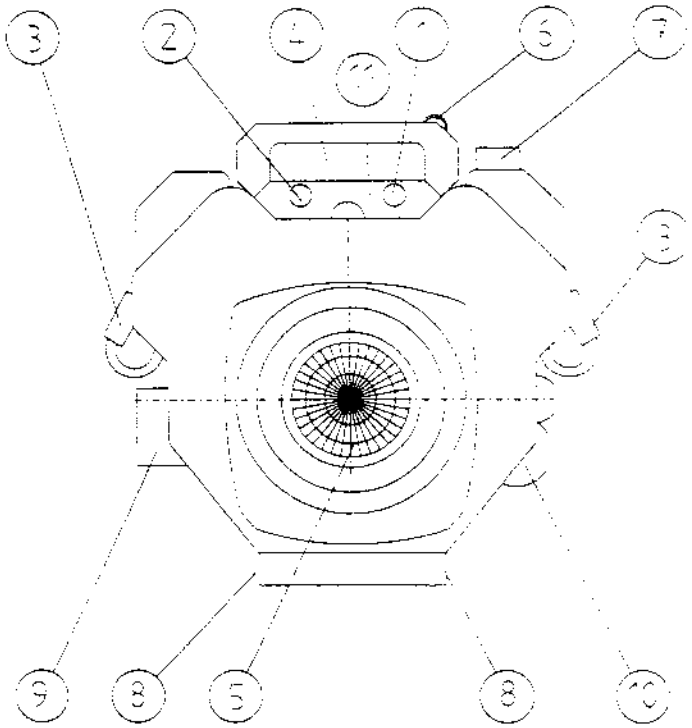
1. The speed of rotation is measured from the crankshaft pulley.

2. The max. engine speed of rotation has been adjusted and sealed by the manufacturer to 3000 r/min, which should not be exceeded.
3. If 3000 r/min can not be reached with the adjuster or if the speed of rotation is more than 3000r/min, the speed of rotation must be adjusted according to the service manual of the motor, and the parts in question must be sealed.

4. Measurement of the speed of rotation is done without loading the motor, that is with the hydraulics unloaded.

26.0 KOHLER COMMAND 20 PETROL/GAS ENGINE - PRINCIPAL CONTROLS AND MEASUREMENT OF THE SPEED OF ROTATION

Principal controls:



1. Adjusting the speed of rotation
2. Choke
3. Plugs
4. Air filter and carburator
5. Suction strainer for cooling air
6. Dipstick for engine oil
7. Filling cap for engine oil
8. Bleeding tap for engine oil
9. Engine oil filter
10. Electric starter
11. Measuring probe for engine oil pressure

Measuring the speed of rotation:

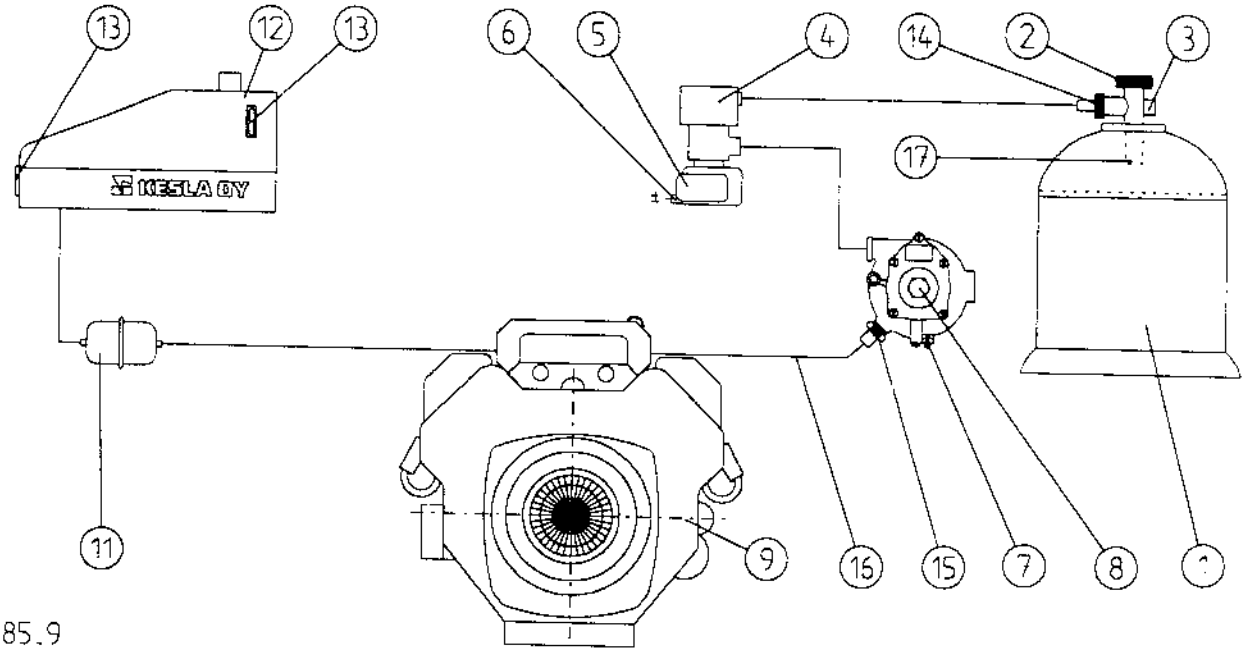
1. The speed of rotation is measured from the strainer of the inlet air opening 5.

2. The max. engine rpms have been adjusted by the manufacturer to 3000 r/min, which should not be exceeded.

3. If 3000 r/min can not be reached with the adjuster 1 or if the speed of rotation is more than 3000r/min, the speed of rotation must be adjusted according to the service manual of the motor.

4. Measurement of the speed of rotation is done without loading the motor, that is with the hydraulics unloaded.

27.0 OPERATING THE GAS DEVICE



185_9

1. Standard LPG holder 11 kg (24.25 lb)
2. Turnable closing cock
3. Relief guard (always with the holder)
4. Fine filter
5. Solenoid valve for gas
6. Solenoid valve 12 V, guided from platform with control switch and together from the motor oil pressure with relay
7. Idling regulator screw
8. LPG device
9. Combustion engine (petrol)
11. Petrol filter
12. Petrol tank
13. Glass gauge for fuel quantity
14. Holder adapter VMT9/16-18JIC
15. Power regulator screw
16. Feeding hose for gas
17. Equipment for LPG gas holder (gas is taken vaporous from holder)

27.1 Starting with gas

Petrol drive has been used previously.
1. Connect gas holder hose 14 and open cock 2

2. Turn the gas/petrol selector switch from position 2 (petrol) to position 1 (gas). In the middle position 0 the engine will get no fuel.

- The engine might run irregularly for a while after engaging the gas drive. Wait until the engine runs smoothly before you load it.

27.2 Stopping

Shut off the power. If the engine will be out of operation for a longer period, close the closing cock 2 of the gas holder.

27.3 Principle of operation

The LPG is taken from a gas holder which is in a vertical position. The gas is taken vaporous, but with a holder pressure for the gas device. Check the tightness of the adapters. When opening the closing cock 2 of the LPG holder and turning the selector switch for gas drive on the platform into position GAS 1 and when the engine oil pressure has risen, vaporous LPG will flow to the fine filter 4 and from there via the power regulator 15 to the gas device 8. When starting the engine, a vacuum will occur in the inlet manifold sucking gas into the engine via the feeding hose for gas 16. Behind the big membrane of the secondary side the air pressure is normal and inside a vacuum occurs, which corresponds to that of the running motor. Consequently the membrane moves inwards and opens the secondary valve. When the carburator flap is further opened (when the engine output is increased), the vacuum on the secondary side increases. This increases the movement of the membrane, the secondary valve opens up more and the flowing gas quantity increases.
The power range of the gas quantity feeded into the engine is regulated with screw 15 and the idling analogously with screw 7. The easiest and most precise way of regulating is the use of an exhaust gas analyzer. For the ratings refer to the table below. According to the information of the Kohler engine manufacturer the CO-values of the exhaust gases are about 8%, when loaded with different rpms. In gas drive the power drop is about 10% compared with petrol drive.

Engine outlet of the gas device - deliverer's recommendation

Reading	Full power	Partial power	Idling
in petrol scale	13,0	14,0-14,5	13,2
in LPG scale	14,4	15,1-15,6	14,4
in power scale	84,0	90,0-94,0	85,0

If an analyzer like this is not available, the regulation can be carried out as follows: First run the engine warm. The engine is loaded with the hydraulic pump mentioned above and at full throttle. The power regulator screw is tightened until the revs drop. Open the screw carefully until the engine reaches full revs and then lock the regulator screw. The idling mixture can analogously be regulated with the idling regulator screw. Regulate for idling and without loading the engine. The screw is tightened until the engine rpms drop. Then the regulator screw is opened until the engine runs cleanly, which means that the regulation is in order.

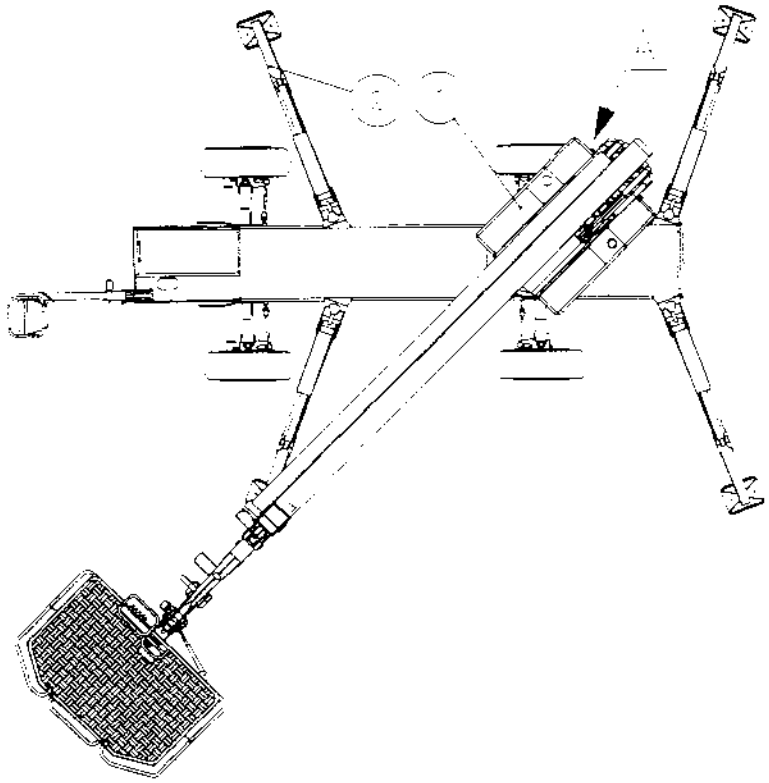
27.4 Service (engine used max. 8 h per day)

Fine filter, part 4, should be cleaned every 6 months. Every 12 months clean the evaporator, check the condition of membranes and replace them if needed, clean the carburator and check the condition and tightness of tubing.

28.0 ADJUSTING THE HYDRAULIC PUMP

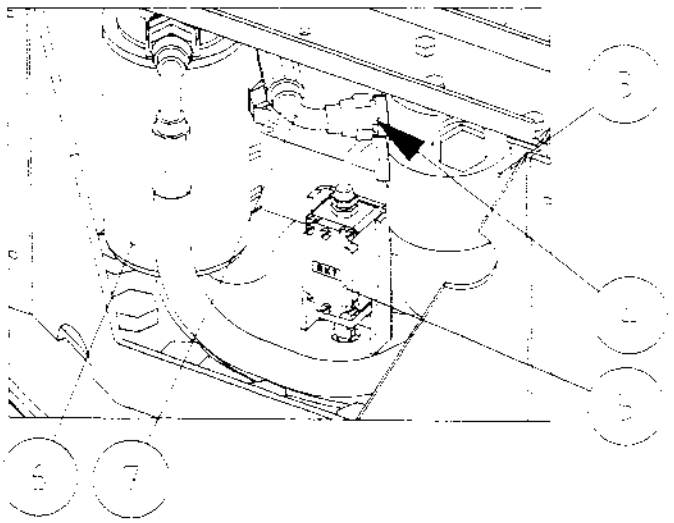
1. Check that the oil level of the hydraulic tank (1) is in the middle of the measuring glass, when the MEWP is in transport position. (= all hydraulic cylinders are in .

2. Position the MEWP according to the drawing. The hydraulic pump is adjusted from direction A, under the turntable.



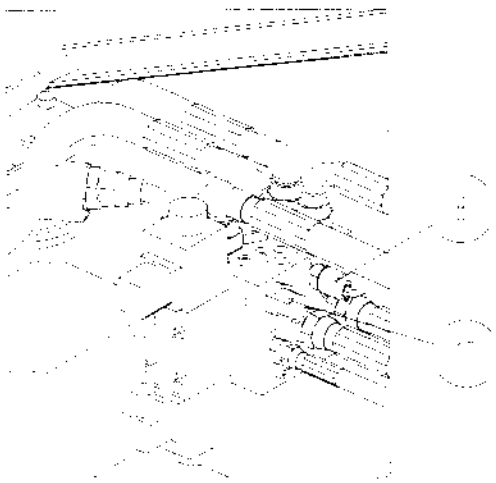
1	Hydraulic oil tank
2	Stabilizer (refer to item 12

3. Connect flow meter between outlet hose of pressure filter (point 4), and remove limit switch RK7.



3	Pressure filter
4	Flow meter here
5	Limit switch RK7
6	Return filter
7	Outlet hose of pressure filter

4. Connect pressure gauge to measuring point M1.

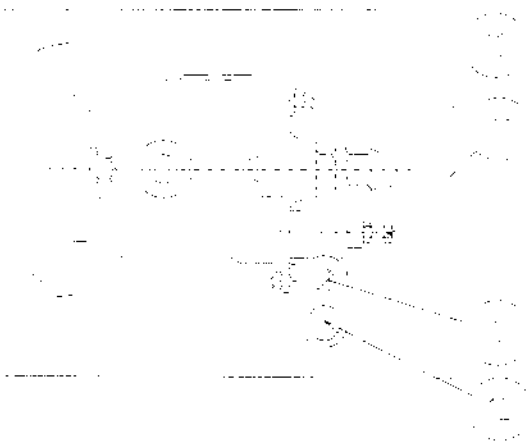


8	Measuring point M1
13	Pressure relief cartridge

5. Raise the rpm of the combustion engine to 3000 r/min.

6. Use the pedal switch on the platform to switch the pump ouput for the booms, that is, keep the pedal down.

7. Remove plug 9 and use the screw under the plug to adjust output to 9-10 l/min (2.38 - 2.64 gal./min). Output is adjusted with the hydraulics unloaded.



9	Plug 9. Adjustment of output to booms
10	Locking nut
11	Adjustment screw: output to drive
12	Adjustment of pressure to drive

8. Release the pedal switch on the platform, thus switching the pump output to drive.

9. Loosen locking screw 10.

10. Adjust output with the adjusting screw 11 to 23 l/min in MEWPs equipped with Kohler petrol engine or Hatz diesel engine, and to 25 l/min in MEWPs with Kubota diesel engine. Output is adjusted with the hydraulics unloaded. Reduce output by tightening the screw.

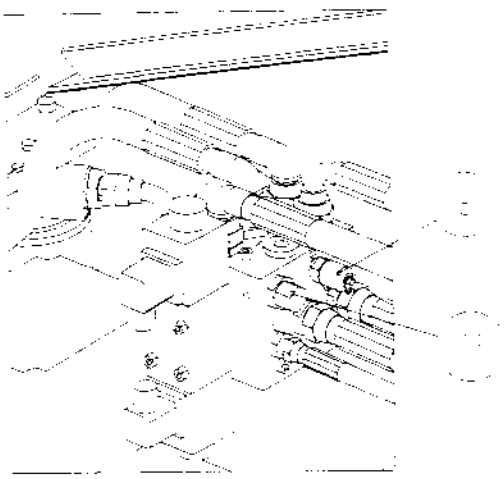
11. Tighten locking nut 10 while holding the adjusting screw 11.

12. Raise stabilizer 2 fully up, keep the spindle open, the pressure in measuring point M1 should be 248-250 bar (3597 - 3626 psi).

13. Adjust pressure with screw 12, to 248 - 250 bar (3597 - 3626 psi). NOTE! DO NOT TURN THE ADJUSTING SCREW WHILE UNDER PRESSURE. MAX. 15 bar (217 psi). PRESSURE IS INCREASED BY TIGHTENING THE SCREW.

14. Use the pedal switch on the platform to switch the pump ouput for the booms, that is, keep the pedal down.

15. Remove shield plug from pressure relief cartridge 13.



8	Measuring point M1
13	Pressure relief cartridge

16. Retract the booms, keep the spindle open, in which case the pressure in the pressure measuring point M1 should be 235 bar (3408 psi).

17. Adjust pressure with the pressure relief cartridge to 235 bar (3408 psi). NOTE! DO NOT ADJUST WHILE UNDER PRESSURE. MAX. 15 bar (217psi). PRESSURE INCREASES BY TURNING CLOCKWISE.

18. Raise the temperature of hydraulic oil to +30°C (+86°F).

19. Check output and pressures, for drive and for booms, according to items 5-16.

20. Install shield plug as well as plug 9 and limit switch RK7.

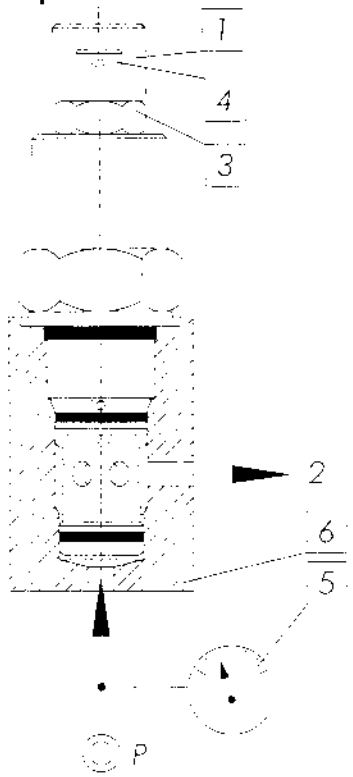
21. Seal targets 10 and 11 with sealing paint marked "KESLA"

29.0 ADJUSTING THE LOAD LOWERING VALVE

Adjustment values:

1. Load lowering valve of lifting cylinder 345 −5 / -0 bar (5004 −73 /-0 psi)
2. Load lowering valve of boom extension cylinder 345 +5 / -0 bar (5004 +73 /-0 psi)
3. Load lowering valve of jib cylinder 345 +5 / -0 bar (5004 +73 /-0 psi)

Adjustment:



1 Protecting cap
3 Nut
4 Adjusting screw
5 Pressure gauge
6 Adjustment block

1. Install the valve to the adjustment block according to the drawing.
2. Raise the temperature of hydraulic oil to +30°C (· 86°F).
3. Remove protecting cap 1 and loosen nut 3.
4. Connect pressure 350 bar (5076 psi) to point P. Output 10-15 l/min.
5. Loosen adjusting screw 4, until pressure increases to 350 bar (5076 psi), in which case the oil flow ceases from gate 2.
6. Tighten adjusting screw 4 , until the pressure gauge shows the desired value, and oil starts to flow from gate 2.
7. Check the adjustment value by dropping pressure in point P to eg. 250 bar (3636 psi), then start to raise the pressure of point P; watch the pressure gauge and gate 2. Oil will flow from gate 2 when the adjusted pressure value has been reached.
8. Lock nut 3 and protecting cap 1. Seal with sealing paint marked "KESLA".

30.0 ADJUSTING THE LOAD CONTROL VALVE LEVERS, STAGE 1

General

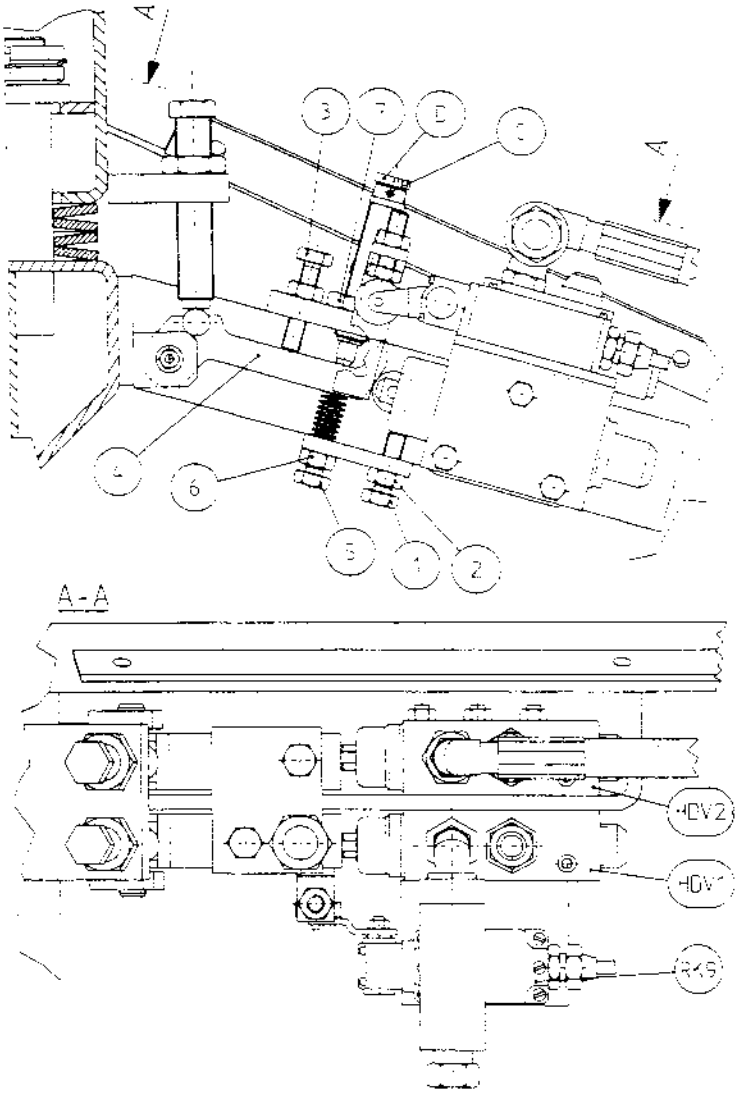
The pipelines on the bottom side of the boom lifting and extension cylinder have as load control valves a roller guide 2/3 directional control valve.
The diaphragm spring pack between the upper and lower part of the turntable is compressed according to the boom loading. This compression of the spring pack is directed by means of a

lever to the roller guide 2/3 valve, which closes before the limit of the lifting moment. Thus the flow to boom lowering and extension is prevented.
There is a check valve in connection with the load control valve, which allows opposite function, that is lifting the boom and retracting the extension.
There is also a limit switch at the levers of the load control valve, preventing by means of an electrical control valve the furthering of the load with the jib boom as well, if the boom lowering and extension are prevented.
The lever of the boom lowering control valve is connected to the shock absorber, which returns the movement of the lever (valve stem) slowly, preventing thus the platform from bouncing. In addition to load control, there is also a limit switch, in case the load limit should be exceeded due to e.g. malfunction of load control or external overload.

Pre-adjustment of load control

1. Drive the booms on the transport support.

2. Check that screws 1 support lightly valves HDV1 and HDV2.



HDV1	Load control of boom lowering
HDV2	Load control of boom extension
RK9	Limit switch of jib load control

3. Tighten nuts 2.

4. Turn screw 3, until part 4 lightly touches the roller of HDV1.

5. Press lever 4 so that the return spring of the lever compresses fully. At the same time tighten screw 5, until lever 4 rises 0,5 mm (0.02 in).

6. Lock screw 5 with nut 6.

7. Adjust the lever of HDV2 according to items 3-5.

Adjustment of shock absorber

1. Loosen the locking screw C of shock absorber adjustment.

2. Turn adjustment screw D into position where the shock absorber stem most easily retracts.

3. Turn the body of the shock absorber towards the closed position, in which case the stem retracts, and part 4 does not move. Turn the body until part 4 moves, then turn one turn backwards. Lock by tightening nut 7.

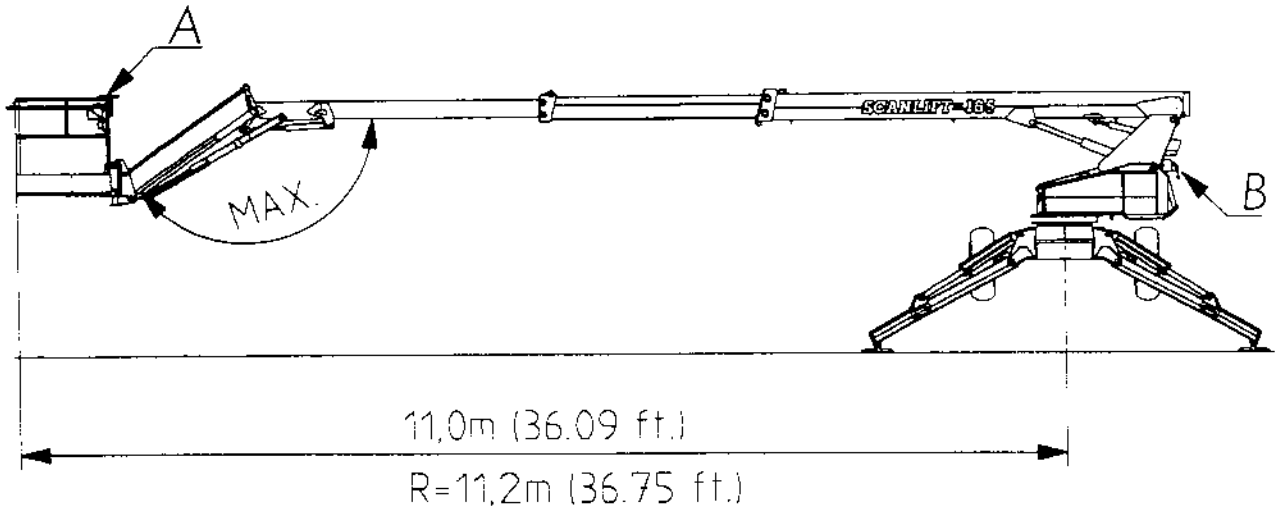
4. Turn adjusting screw D towards 0. Push part 4 all the way down. Adjust free reset time to 12 +2 / -1 seconds. Lock screw C and seal with sealing paint. Adjustment temperature should be about −20°C (68°F).

5. Note! Check that there is no paint or dirt in rollers of valves HDV1 and HDV2 and stop faces of parts 4.

31.0 ADJUSTING THE LOAD CONTROL VALVE LEVERS, STAGE 2

1. Support the MEWP on stabilizers.

2. Extend the jib fully with empty platform from the platform guiding place (A). Drive other boom movements from the turntable guiding place B.



3. Use the adjusting screw 1 of the boom extension load control lever so that the extension stops when the distance of the platform edge from the tipping centre is 11,0 m (36.1 ft). Tighten screw 2.

4. Leave the booms to length given in item 3.

5. Raise the booms from horizontal level to 30° - 50° angle.

6. Extend the booms to length R=11,2m (36.75 ft) (empty platform).

7. Use the adjusting screw 3 of the boom lowering load control lever so that the lowering of the booms stops to 11,0m (36.1 ft). Note! Platform height from ground is over 1,0m (3.28 ft).

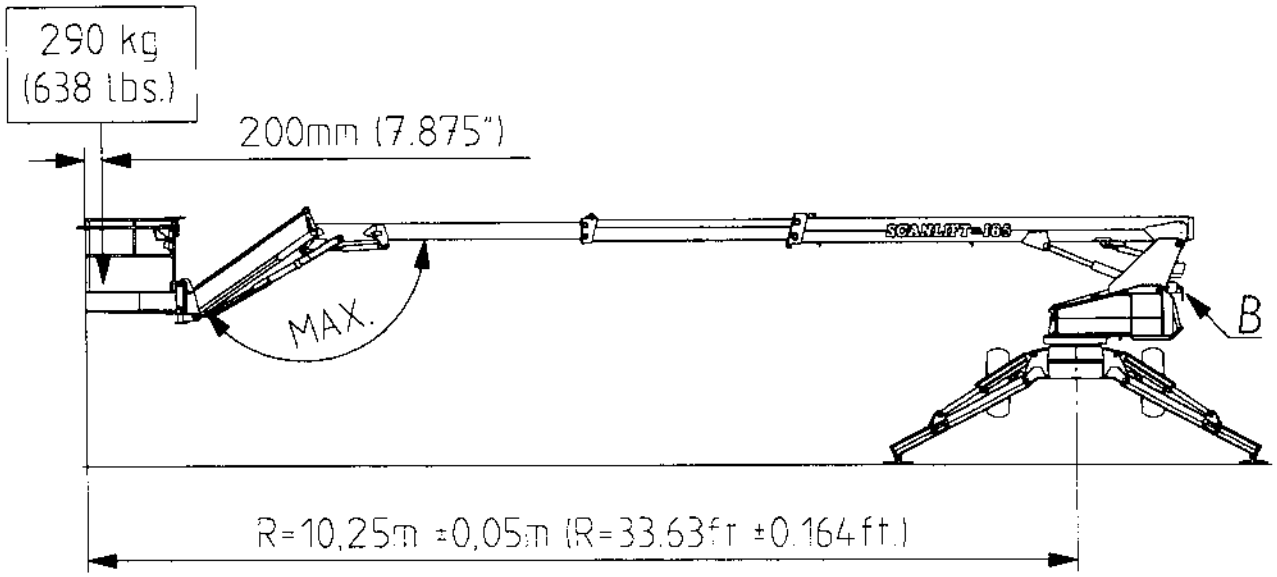
8. Tighten nut 4.

9. During adjustment the booms are guided from the turntable control device B.

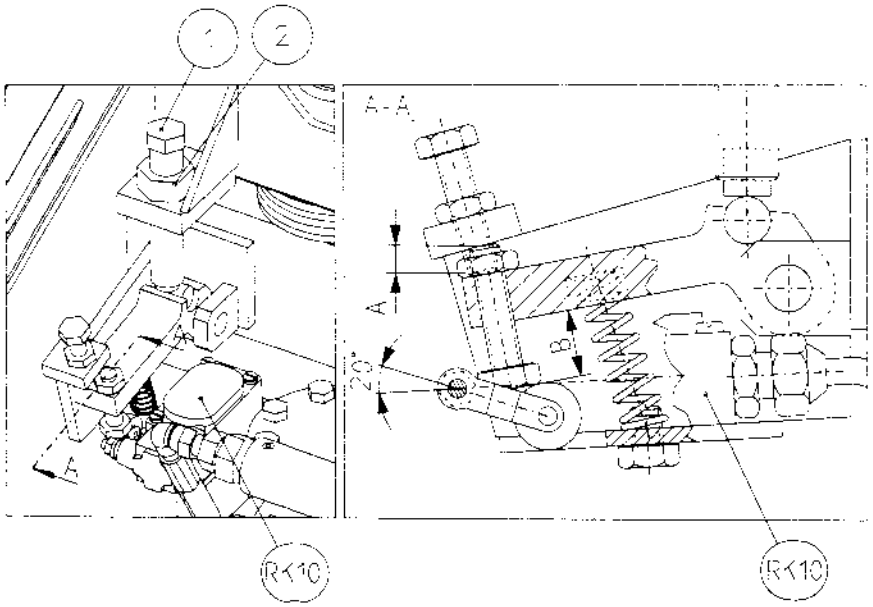
10. Hydraulic oil temperature −30°C (−86°F).

32.0 CHECK / ADJUSTMENT OF LOAD CONTROL SAFETY LIMIT RK10

1. Support the MEWP on stabilizers (platform empty).Boom horizontal. Jib totally out (refer to picture).



2. Check length A=9,0mm ± 0,5mm (0.35 in ± 0.02 in) and length B=15mm ± 1,0mm (0.59 in ± 0.04 in), and the roller shaft angle −20° downwards from horizontal level of limit switch.



A	9mm ± 0,5mm (0.35" ± 0.02")
B	15mm + 1,0mm (0.59" − 0.04")

3. Extend the booms to length R=10,25m (33.63 ft.). Boom guidance from turntable guiding place B.
4. Cautiously add a 290 kg (639.3 lb) load on platform (refer to picture)

5. Tighten cautiously screw 1 thus triggering limit switch RK10 and stopping the combustion engine.

6. Lock nut 2.

7. Unladen the platform.

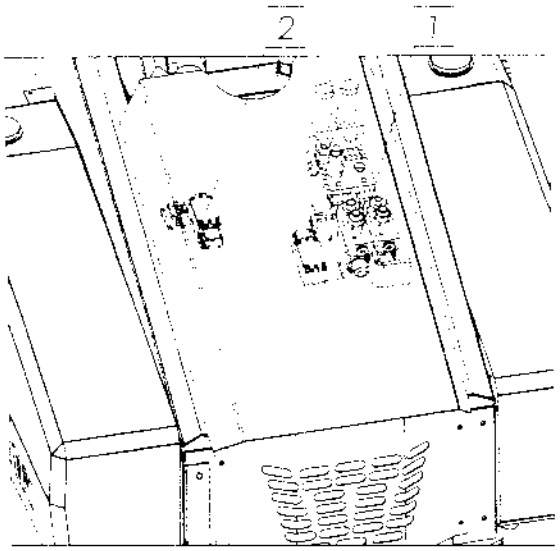
8. Trim limit switch RK10 (refer to instructions: TRIMMING SAFETY LIMIT RK 10), then you can start the combustion engine.

9. Seal targets 1 and 2 with sealing paint.

33.0 TRIMMING SAFETY LIMIT RK10

Location in MEWP

The actual safety limit switches for lifting, telescope and jib are located on the right side of the turntable (ref. 1). The standby safety limit is on the left side of the turntable (ref. 2).



Operating principle of the standby safety limit switch

When the actual safety limit switches get out of order or the safe loading of the booms, that is the safe lifting radius, is exceeded because of a swing of the boom due to an external overload, the standby safety limit will release and cut the combustion engine. Only the emergency lowering system will work.
In a state of overload the spindle 4 of the standby safety limit switch RK10 will retract. Please observe that the MEWP can be equipped with either a Schmersal or Telemecanique switch.

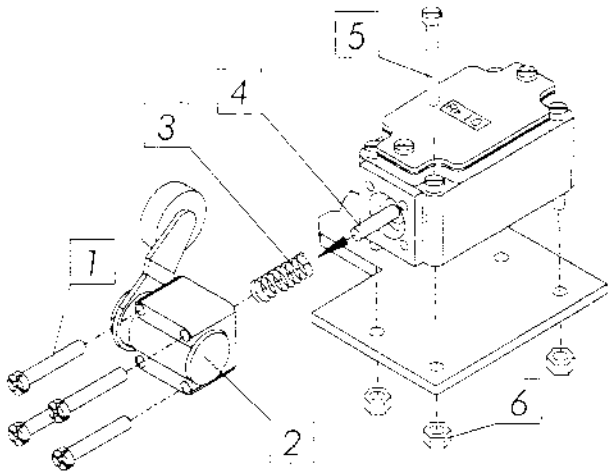
Repairing measures of a released standby safety limit - Schmersal switch

1. Lower the platform to the ground by using the auxiliary lowering system.

2. Annul the state of overload (empty the platform).

3. Investigate the reason for the release of the standby safety limit switch. If the standby safety limit RK10 engages because of any other reason than due to a deliberate external overload, you must call for an expert to examine and repair the MEWP before its next use.

Re-trimming of the switch (RK 10, Schmersal)

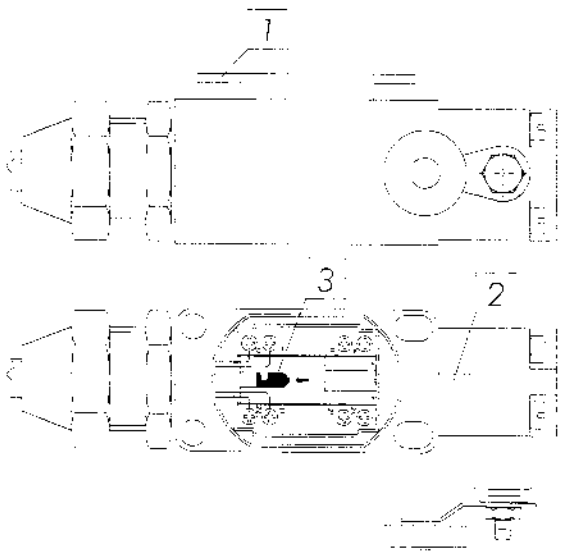


1. Open screws 5 (4pcs) and lift the switch up.
2. Open screws 1 (4pcs) and pull out cover 2.
3. Pull spindle 4 carefully outwards so that it clicks slightly. If the spindle becomes detached, reassemble it properly and make sure that spindle 4 will stay in its outer position.
4. Put spring 3 back and press cover 2 in its place.
5. Attach cover 2 with screws 1.
6. Fix the standby safety limit switch in its place with screws 5 and nuts 6.

Repairing measures of a released standby safety limit switch -Telemeganique switch

1. Use the auxiliary lowering system to lower the platform to the ground.
2. Annul the state of overload (empty the platform).
3. Investigate the reason for the release of the standby safety limit switch.
4. Repair or have repaired the malfunction which has caused the release of the standby safety limit.

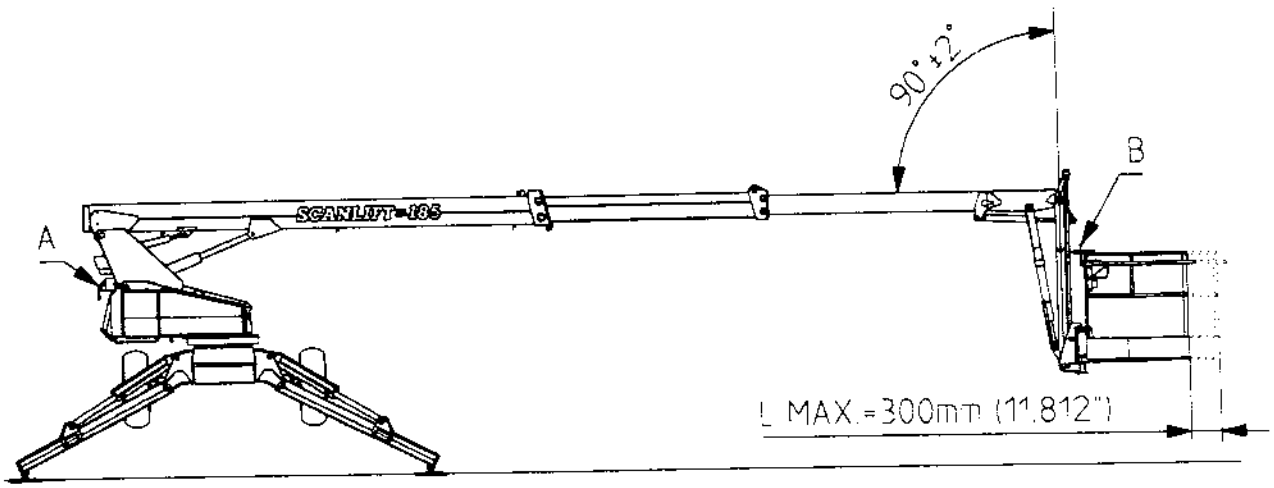
Re-trimming the switch (RK 10 , Telemeganique)



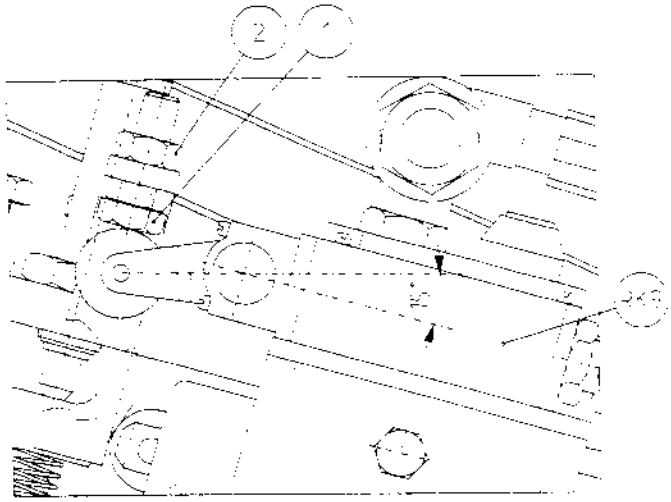
1. Open the cover of the turntable.
2. Open cover 1 of the standby safety limit switch.
3. Trim spindle 2 into operating state by pushing the spindle in the direction of the arrow from hole 3 so that it clicks.
4. Close the cover 1 of the switch.

34.0 CHECKING AND ADJUSTING JIB LOAD CONTROL

1. Support the MEWP on the stabilizers. Boom horizontal. Jib in vertical position (refer to drawing) with empty platform.



2. Check that the roller lever of limit switch RK9 is in an angle of 15 degrees below horizontal plane, while the roller is free (refer to drawing).



3. Extend the booms until load control stops the movement. Guide the boom with the turntable control valve (A).

4. Change boom guidance to platform valve (B).

5. Use the jib boom to guide the platform, and at the same time adjust with screw 1 the platform to stop at L max. = 300mm (0.98 ft).

6. Repeat item 5 at least three times.

Note! The operator must be outside the platform, platform empty. Do not lift or push down the platform while operating.

7. Tighten screw 2. Seal screw 1 and nut 2 with sealing paint.

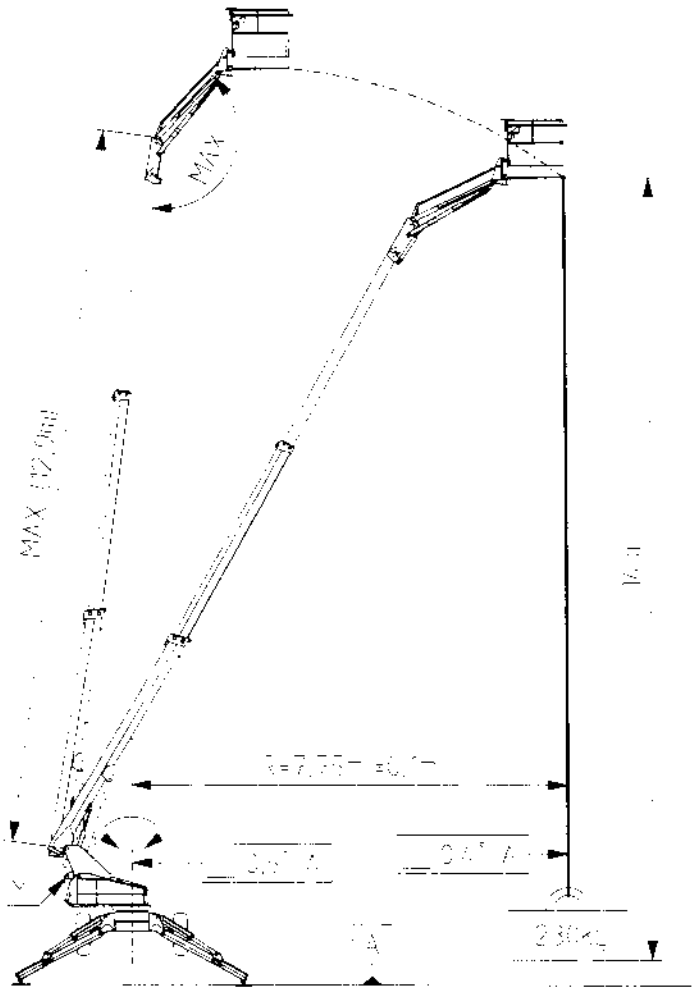
8. Seal lever / nut of the limit switch.

35.0 LOAD CONTROL OF BOOM LOWERING - CHECKING AND ADJUSTING

1. Retract the booms totally.

2. Raise the temperature of hydraulic oil to +30° C (+ 86°F).

3. Attach a chain or cable + weight (length about 14m (45.9 ft) with weight) to the edge of the platform. Total weight of chain and weight 230 kg ± 2 kg (507 lb +4.4 lb).



4. Raise the booms fully and extend to full length. Guide the boom from the turntable control valve (Y).

5. Lower the booms, keep the lowering spindle fully open. Lowering should stop to R=7,75m ± 0,1m (25.4ft ±0.33ft.)

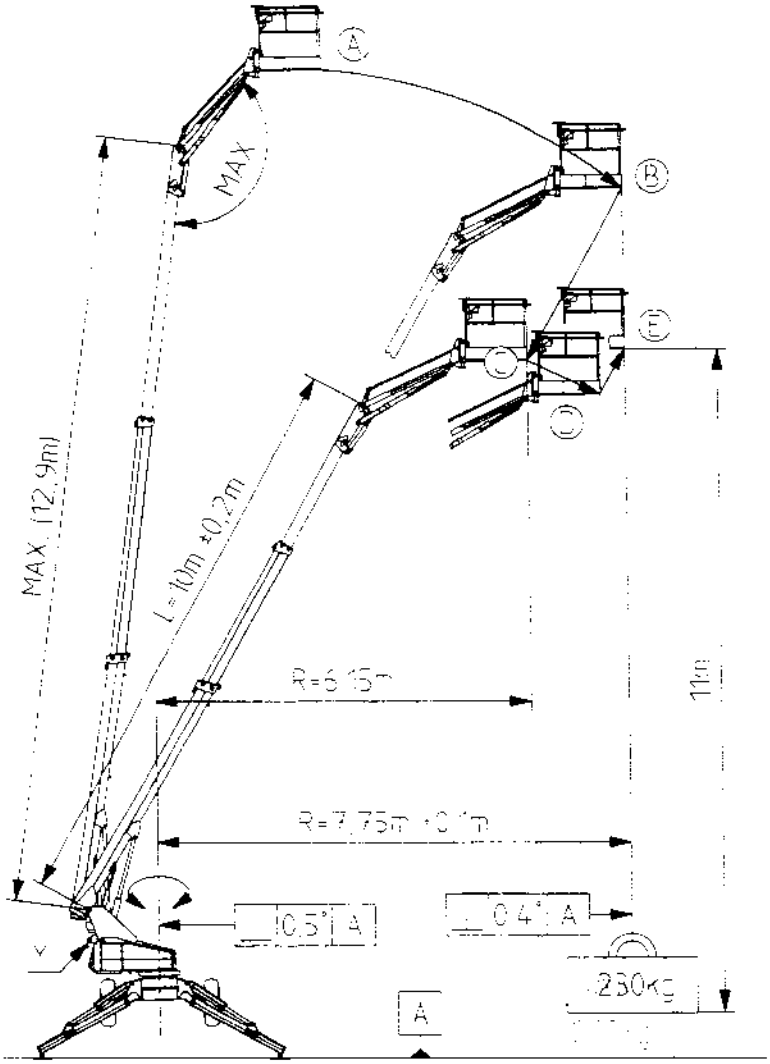
If needed, adjust with the load control lever adjusting screw 1 of boom lowering.

6. Repeat lowering at least three times. Measure radius R each time.

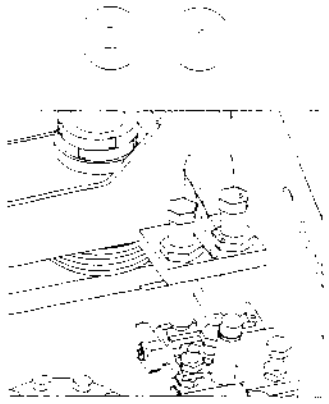
7. Tighten nut 2.

8. Seal screw 1 and nut 2 with sealing paint.

36.0 BOOM EXTENSION LOAD CONTROL - CHECKING AND ADJUSTING

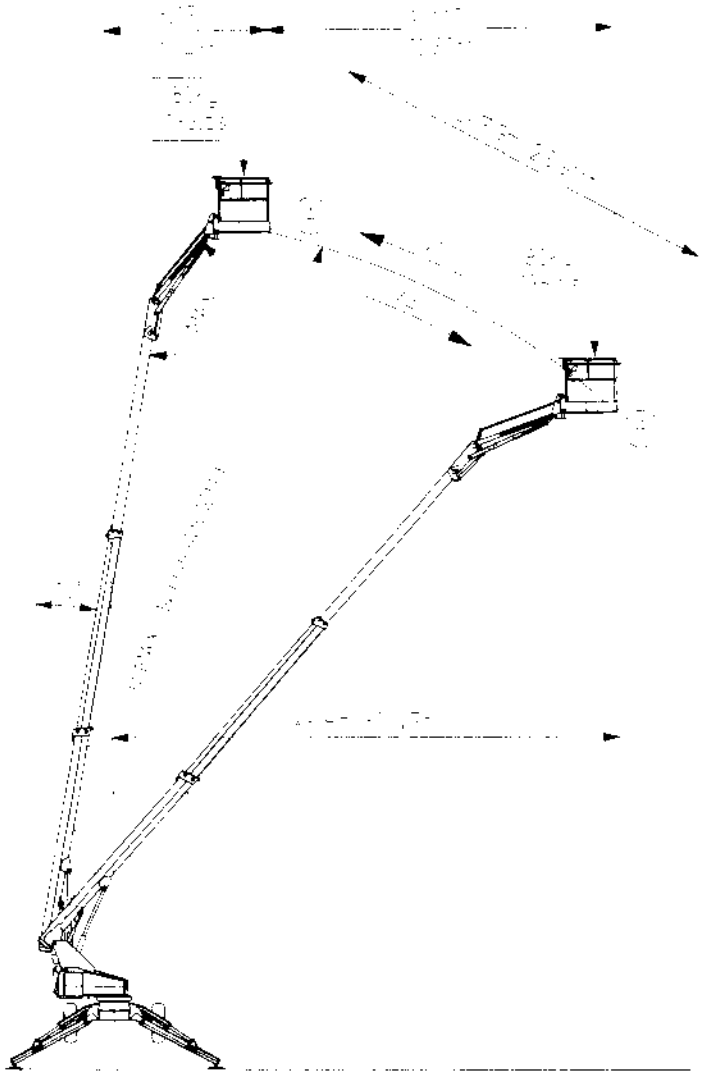


1. Retract the booms fully.
2. Raise the temperature of hydraulic oil to +30°C (86°F).
3. Attach a chain or cable + weight (length about 11m with weight) to the edge of the platform. Total weight of chain and weight 230 kg = 2 kg (507 lb = 4.4 lb).
4. Lift the booms fully and extend to full length. Guide the boom from the turntable control valve (Y).
5. Lower the booms, they will stop at point B.
6. Retract booms about 2.9 m (9.5 ft) to point C.
7. Lower the booms to point D so that the weight will slightly touch the ground.



8. Extend the booms towards point E, holding the boom extension spindle fully open. The platform should stop to measurement R=7,75 m (25.4 ft).
   If needed, adjust with adjustment screw 1.
9. Repeat item 8 at least three times. Always measure radius R.
10. Tighten nut 2.
11. Seal screw 1 and nut 2 with sealing paint.

37.0 MEASURING THE RAISING AND LOWERING SPEED OF BOOMS



- V1 = Raising
- V2 = Lowering
- Min. raising and lowering time = 20s
- L = max. radius with 80 kg (176 lb) platform load.
- V1 max. = 0,4 m/s (1.31 ft/s) (prEN 280)
- V2 max. = 0,4 m/s (1.31 ft/s) (prEN 280)
- Hydraulic oil temperature −30°C (+86°F)

Lowering speed

1. From platform, drive booms and jib fully up with platform load of 80 - 90 kg (176 - 198 lb).

2. Pull the boom lowering spindle fully open, and start the watch. Stop the watch when the boom movement starts to slow at point B.

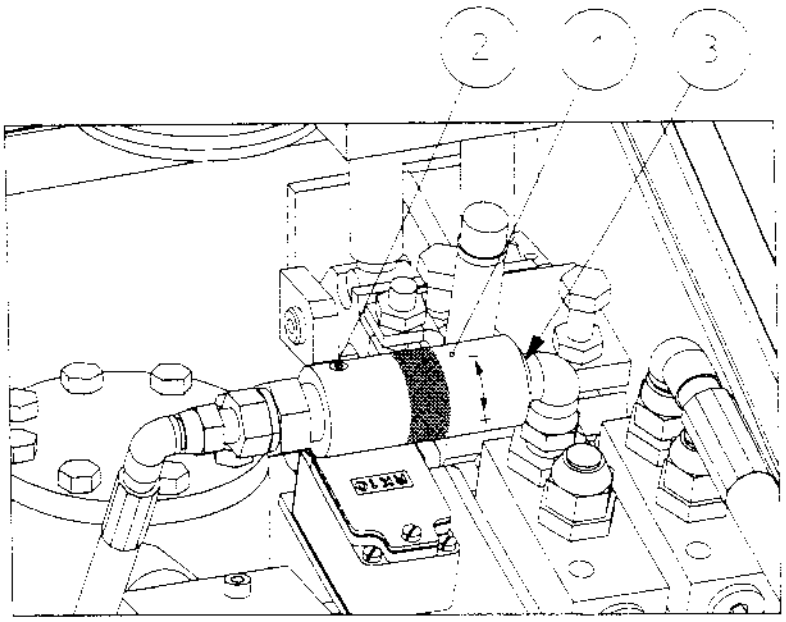
Raising speed

1. The booms are stopped at point B.

2. Push the boom raising spindle fully open, and start the watch. Stop the watch when the boom movement starts to slow at point A.

IF LOWERING OR RAISING SPEED IS LESS THAN 20 S, REFER TO ADJUSTING INSTRUCTIONS.

38.0 ADJUSTING THE RAISING SPEED OF THE BOOMS



1.	Adjustment valve of raising speed
2.	Locking screw
3.	Sealing paint

1. Raise the temperature of hydraulic oil to +30° C (+86°F).

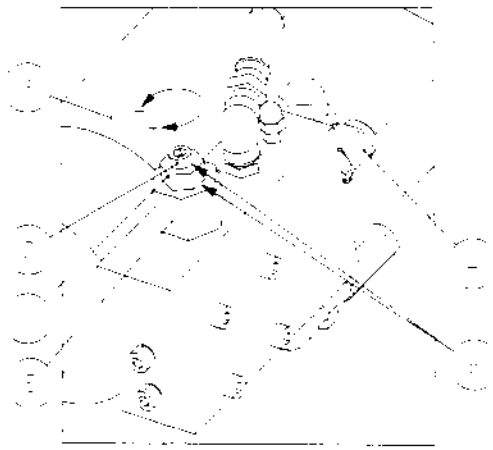
2. Open the locking screw.

3. When the adjusting screw is turned to + direction, the boom raising becomes faster.
When it is turned to - direction, the raising becomes slower.

4. Tighten the locking screws.

5. Seal locking with sealing paint.

39.0 ADJUSTING THE LOWERING SPEED OF THE BOOMS



1	Locking screw
2	Adjusting screw
3	Lifting cylinder
4	Load lowering valve
5	Adjustment valve of lowering speed
6	Sealing paint

1. Raise the temperature of hydraulic oil to +30° C (+86°F).

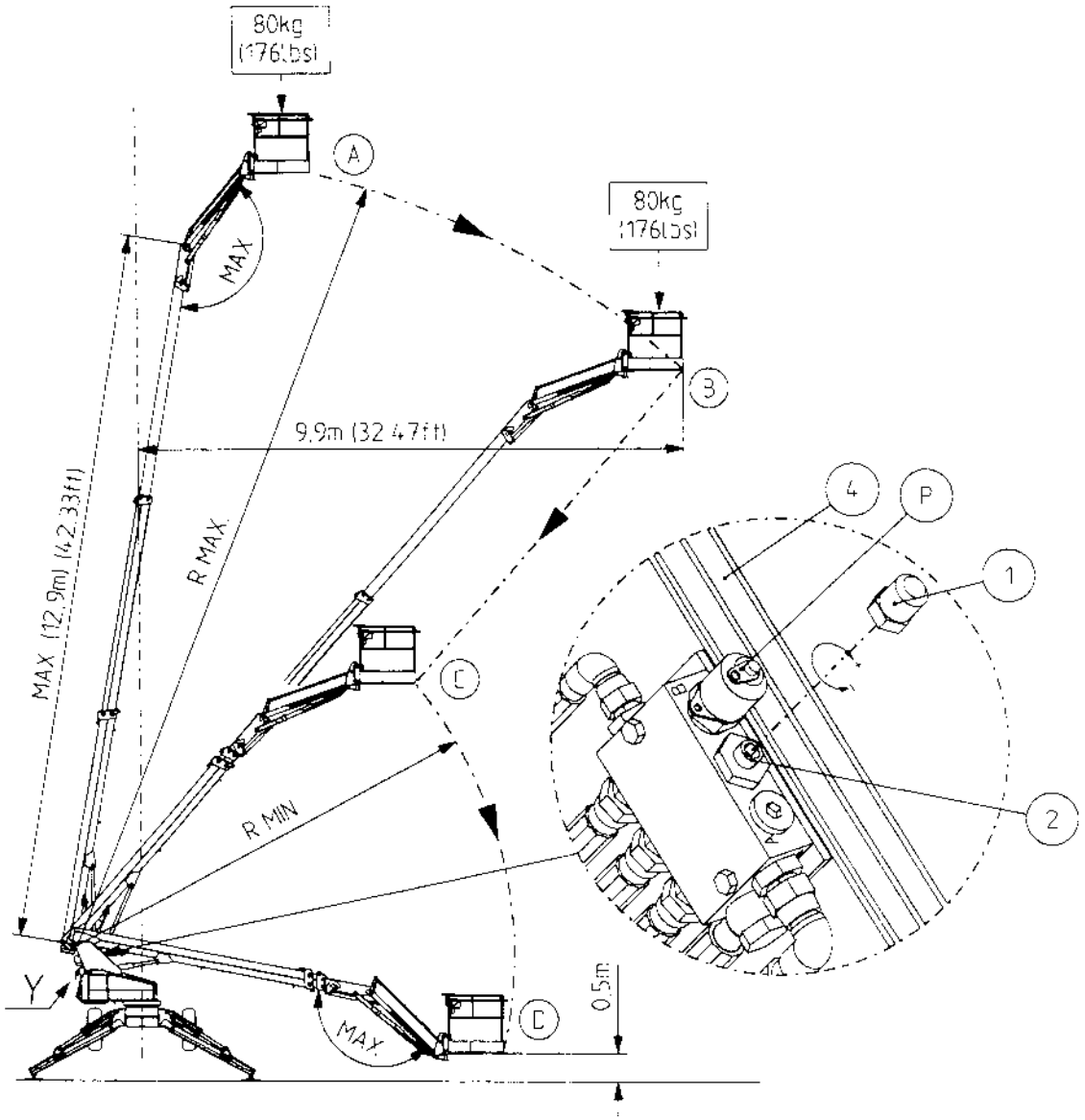
2. Open locking nut 1.

3. Lowering speed is adjusted by turning the hexagon screw.
When adjusting screw is turned to + direction, the boom lowering becomes faster. When it is turned to - direction, the lowering becomes slower.

4. Tighten locking nut 1, while holding the hexagon screw 2.

5. Seal with sealing paint.

40.0 LOWERING THE BOOMS - ADJUSTING THE START OFF



1	Protecting plug
2	Adjustment screw
P	Pressure measuring point
4	Turntable

1. Adjustment is necessary, if start off from position A is too quick, or if the booms do not come down from position C with cold oil.

2. Remove protecting plug 1 and attach pressure gauge to point P.

3. Raise the temperature of hydraulic oil to −30° C (+86°F).

4. Raise booms to position A, fully up.

5. Pull the lowering spindle of turntable control valve Y fully open, in which case the pressure gauge should indicate 68 bar ± 3 bar (968 ± 43 psi).

6. Lower the booms to position B, where the pressure is appr. 66 bar (957 psi).

7. Retract the booms to point C, where the pressure is appr. 69 bar (1001 psi).

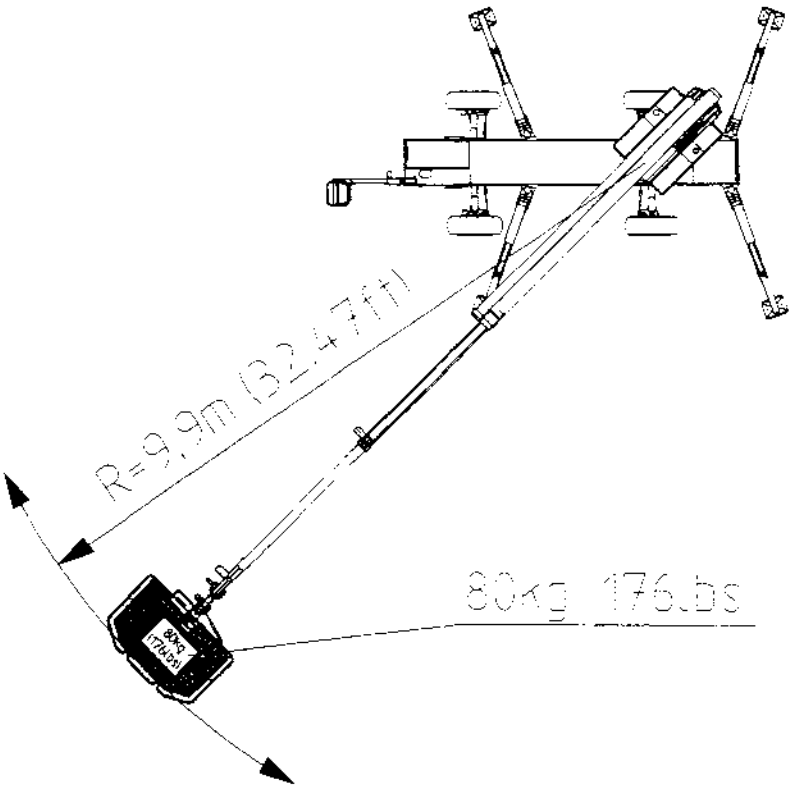
8. Lower the booms to position D, where the pressure is appr. 65 bar (943 psi).

9. When adjustment 2 is turned to direction + the pressure is raised. Turning to direction - reduces the pressure.

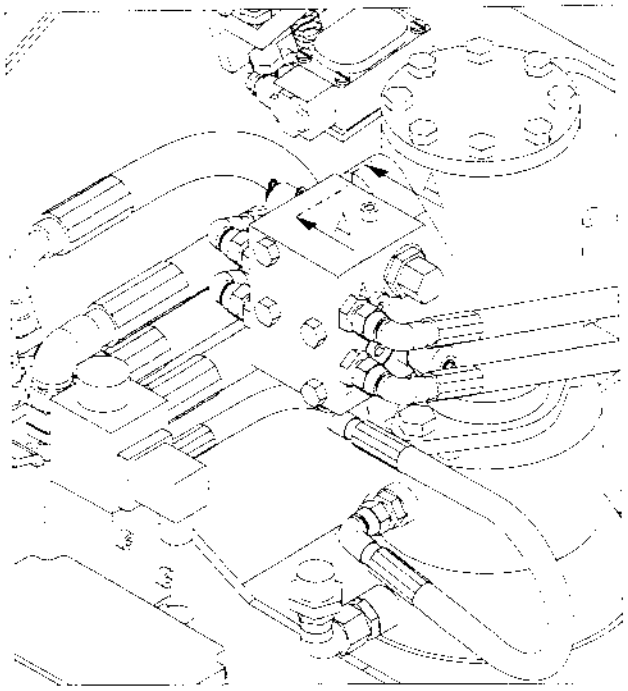
10. Tighten protecting plug 1.

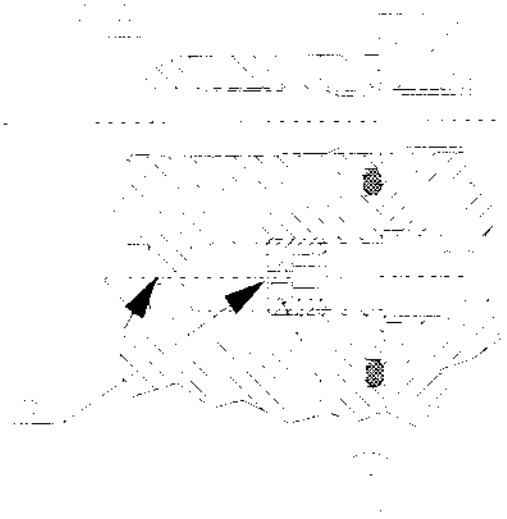
11. Seal with sealing paint.

41.0 MEASURING AND ADJUSTING SLEWING SPEED



- Max. speed = 0,7m / s
- Speed of a full circle = $\frac{9,9m \times 2 \times \pi}{0,7m / s}$ = 89 s / circle
- Hydraulic oil temperature +30°C

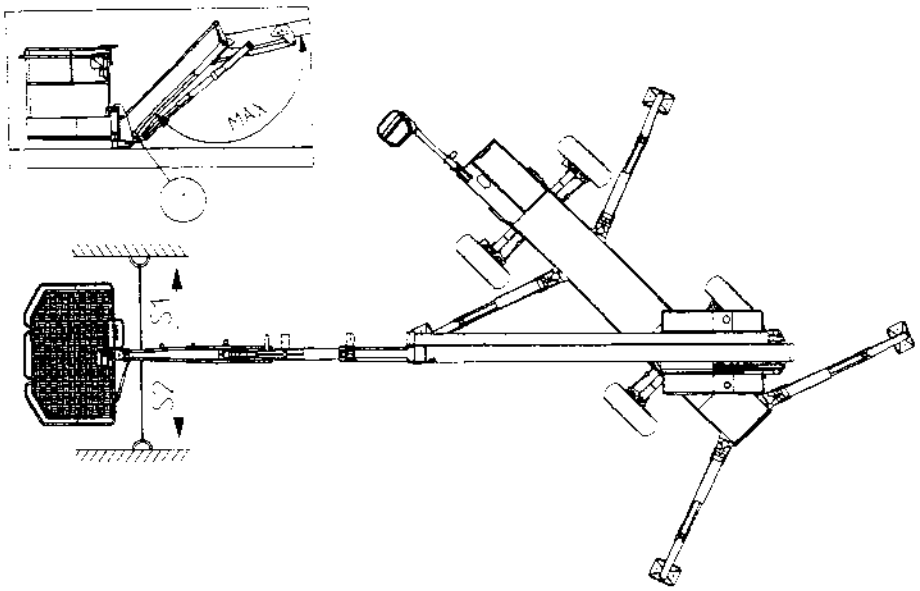




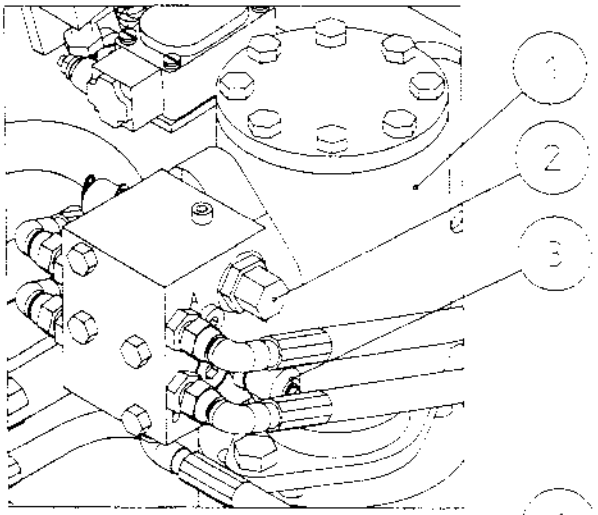
B = *Throttles that determine the slewing speed. Constant Ø1,5mm (0.059 in)*

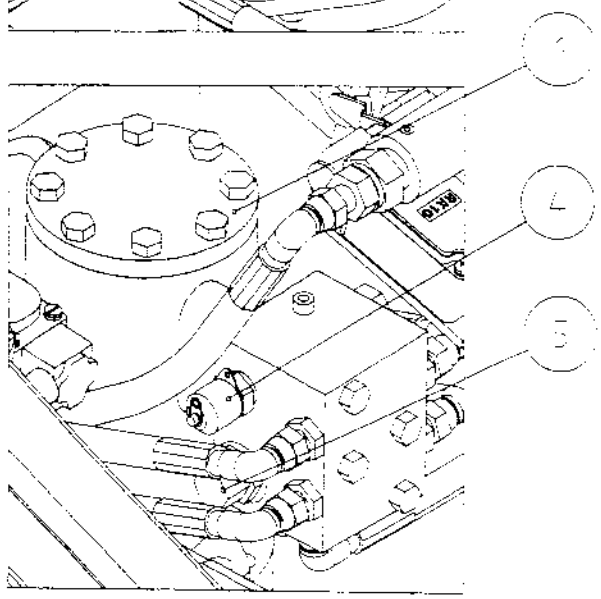
The slewing speed can be reduced by making the hole in part 1 smaller.

42.0 MEASURING AND ADJUSTING SLEWING PRESSURE



1 – Point of binding



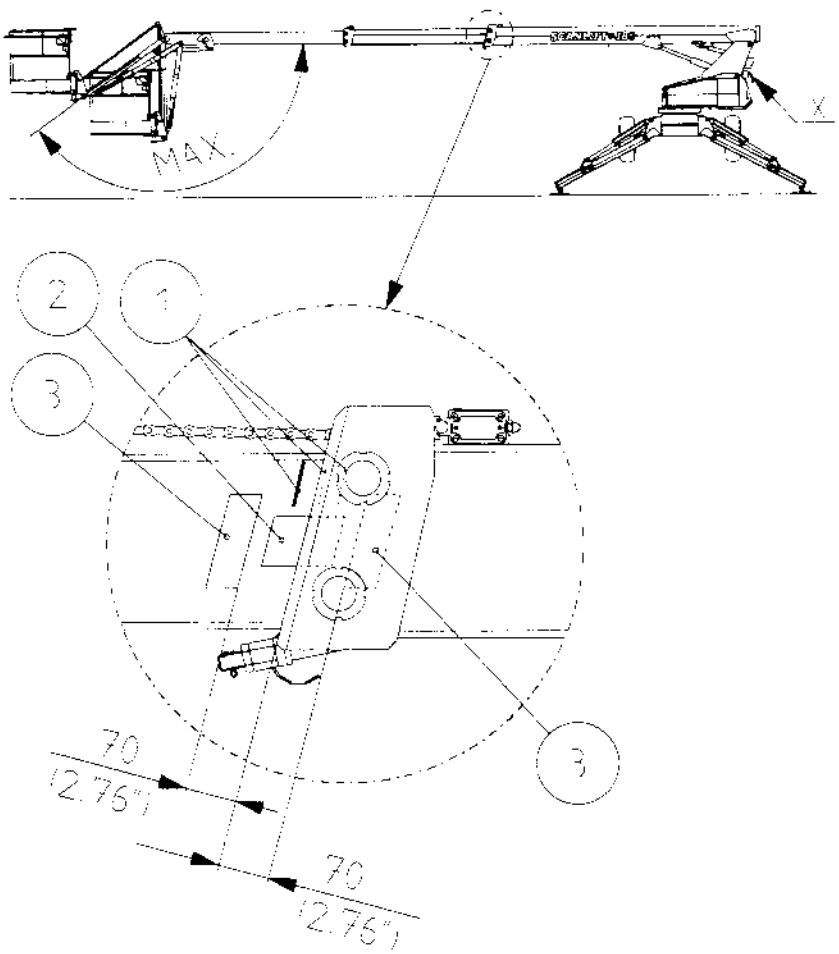


1	Slewing motor
2	Pressure adjustment of direction S2
3	Measuring point MP3 of direction S2
4	Measuring point MP2 of direction S2
5	Pressure control of direction S1

1. Bind the booms according to the drawing.
2. Attach pressure gauge to measuring point MP2.
3. Remove protecting cap of pressure regulating cartridge S1.
4. Slew the booms in direction S1, and adjust pressure to 150 bar (2176 psi). Output 9-10 l/min.
5. Adjust S2 according to items 1-4.
6. Attach protecting caps and seal with sealing paint.

NOTE! DO NOT ADJUST CARTRIDGES S1 AND S2 WHILE UNDER PRESSURE!

43.0 CHECK MARK OF SAFE LIFTING RADIUS



X	Guidance of booms
1	Marks
2	Black tape: 50 x 100mm (1.97" x 3.94")
3	Red paint: 20 x 50mm (0.97" x 1.97")

1. Support the MEWP on the stabilizers with boom horizontal and jib fully out. Platform empty.

2. Raise the temperature of hydraulic oil to −30° C (−86°F).

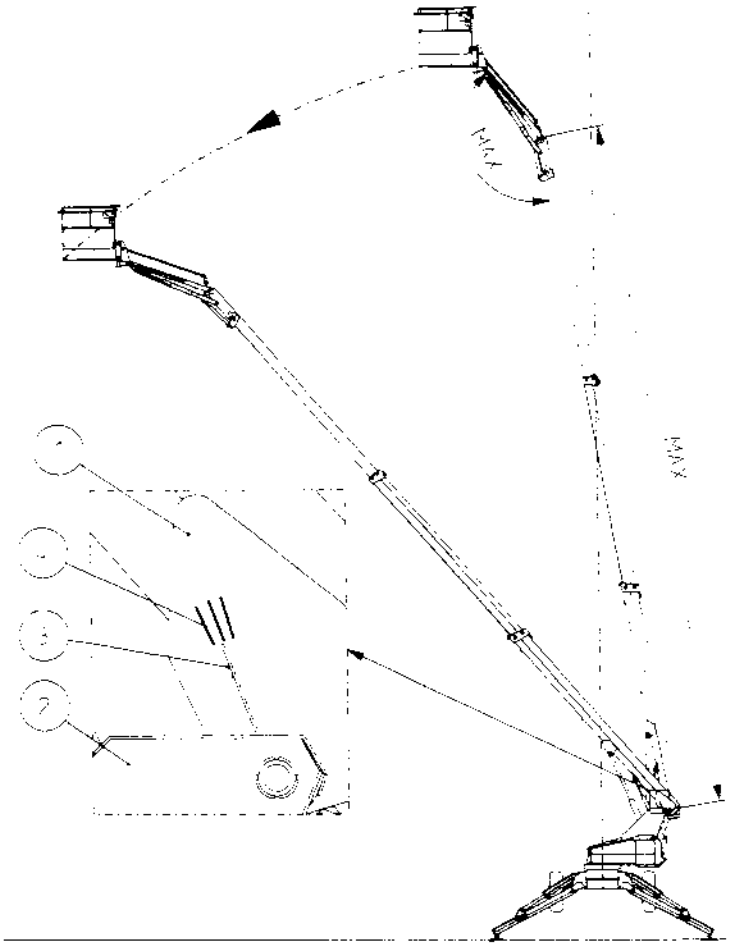
3. Drive booms with the turntable control valve until they stop. Make a mark on the middle boom at the mouth of the lifting boom (see drawing).

4. Retract the booms. Repeat item 3 three times.

5. Retract the booms, lower the jib down to vertical position, extend the booms.

6. Take the average of the three marks, and dimension the marks so that the side slide pads of the lifting boom do not rub them.

44.0 CHECK MARK OF BOOM LOWERING



1	Lifting boom
2	Turntable
3	Indicator
4	Marks

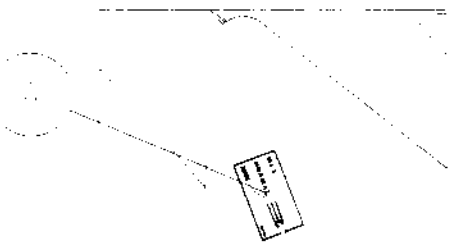
1. Support the MEWP on stabilizers with boom in upper position. Telescope out, platform empty and jib boom in line with the boom.

2. Raise the temperature of hydraulic oil to +30° C (+86°F).

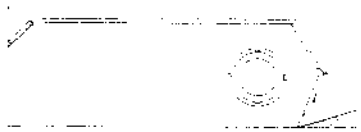
3. From the turntable guiding place, drive the booms downwards with the lifting cylinder until they stop. Make a mark on the lifting boom by indicator 3.

4. Raise the booms. Repeat item 3 three times.

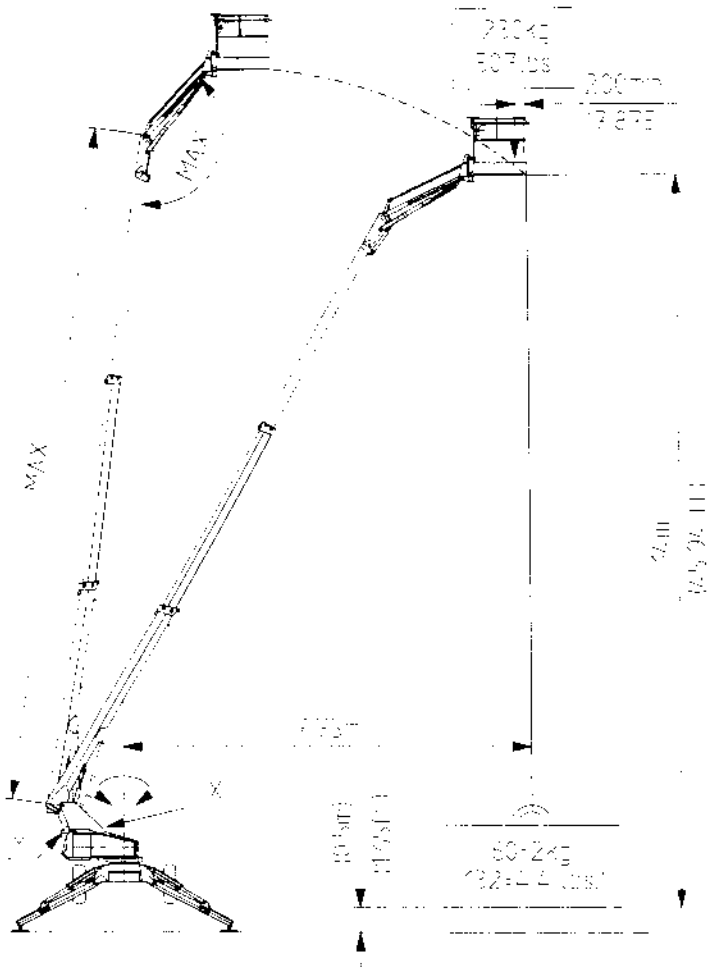
5. Retract the booms, lower jib and lower the booms.



6. Take the average of the three marks. Attach check decal A (item No.: 3260521) to the lifting boom so that the line NORMAL of the decal is by the average mark.



45.0 TEST LOADING



1. Support the MEWP on the stabilizers, jib fully extended and the booms retracted.
2. Raise the temperature of hydraulic oil to +30° C (−86°F).
3. Load the platform with 230 kg (507 lbs), 200mm (7.87 in)from the gate side of the platform.
4. Erect the booms with the turntable control valve (Y) .
5. Extend the booms fully.
6. Lower the booms to the safe limit R=7,75m (25.4 ft).
7. Slew the booms around the tipping centre, full circle in both directions.
8. Erect the booms fully.
9. Retract the booms fully.
10. Lower the platform to the ground.

11. Add a support piece Ø 60-80 mm (Ø2.4-3.1 in) ,thickness 25mm = 0,5mm (0.98in=0.02in) to space L (point X).
12. Attach a chain or wire to the platform.
13. Erect and extend the booms fully, and lower to safe limit R=7,75m (25.4 ft). NOTE! LOAD GUARDS ARE NOT FUNCTIONING!
14. Attach 60 kg (132 lb) of extra weight to the chain or wire so that the weight does not touch the ground.

15. Slew the booms carefully around the tipping centre, full circle in both directions.

16. Remove extra load, as well as platform load.

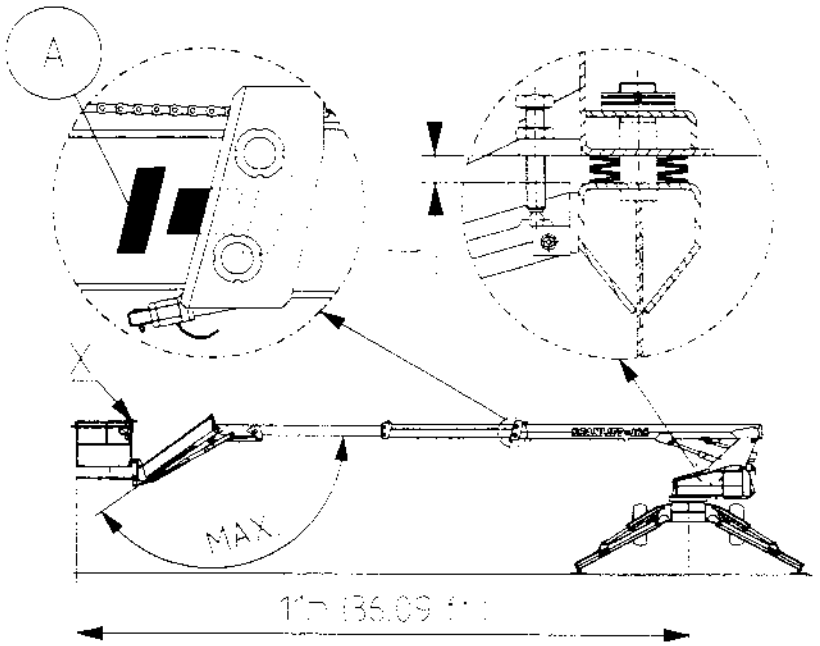
17. REMOVE SUPPORT PIECE FROM POINT X

18. Check carefully for any tears in the MEWP, or permanent deformations.

19. Fill in the test loading record.

20. After test loading, check that the safety limit adjustments have not changed. Adjust, if needed.

46.0 CHECKING THE SPRING PACK OF LOAD CONTROL



1. Support the MEWP on the stabilizers, boom horizontal and jib fully extended, platform empty.

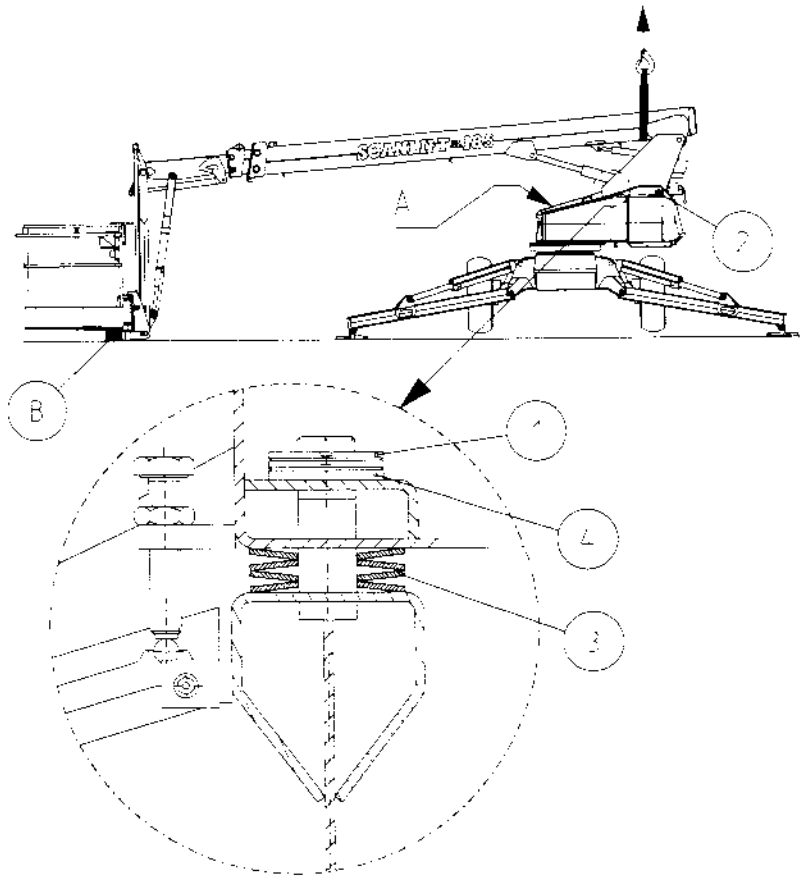
2. Drive the booms out to mark A, guiding from the platform (X), if needed lift the platform.

3. Stop the motor and leave the booms in the position shown in the drawing.

4. Measure the height L of the spring pack , if it is less than 22mm (0.87 in), replace spring packs according to 46.0.

5. The spring packs need to be changed also, if the safe lifting radius becomes considerably shorter. If you attempt to check the lifting radius with mark A, the mark does not come into sight.

47.0 REPLACING THE SPRING PACK OF LOAD CONTROL



A	Cover
B	Supports
1	Nuts
2	Axle
3	Cup springs
4	Stopper

1. *Support the MEWP on the stabilizers, wheels slightly off the ground, booms retracted, platform on the ground, supported from the sides (see drawing).*

2. *Remove cover A.*

3. *Remove nuts 1 (4pcs).*

4. *Remove axle 2, while raising the booms.*

5. *Raise the booms carefully. If needed, disconnect hydraulic hoses. Watch the electric wires while raising.*

6. *Replace cup springs. Use only springs listed in the spare parts list. Install springs according to the drawing.*

7. *Lower the booms. Fit axle 2, and stopper 4. Tighten screws to 1 50-70 Nm. Lock nuts with claw rings, also the nut of axle 2.*

8. *Adjust the load control equipment according to instructions.*

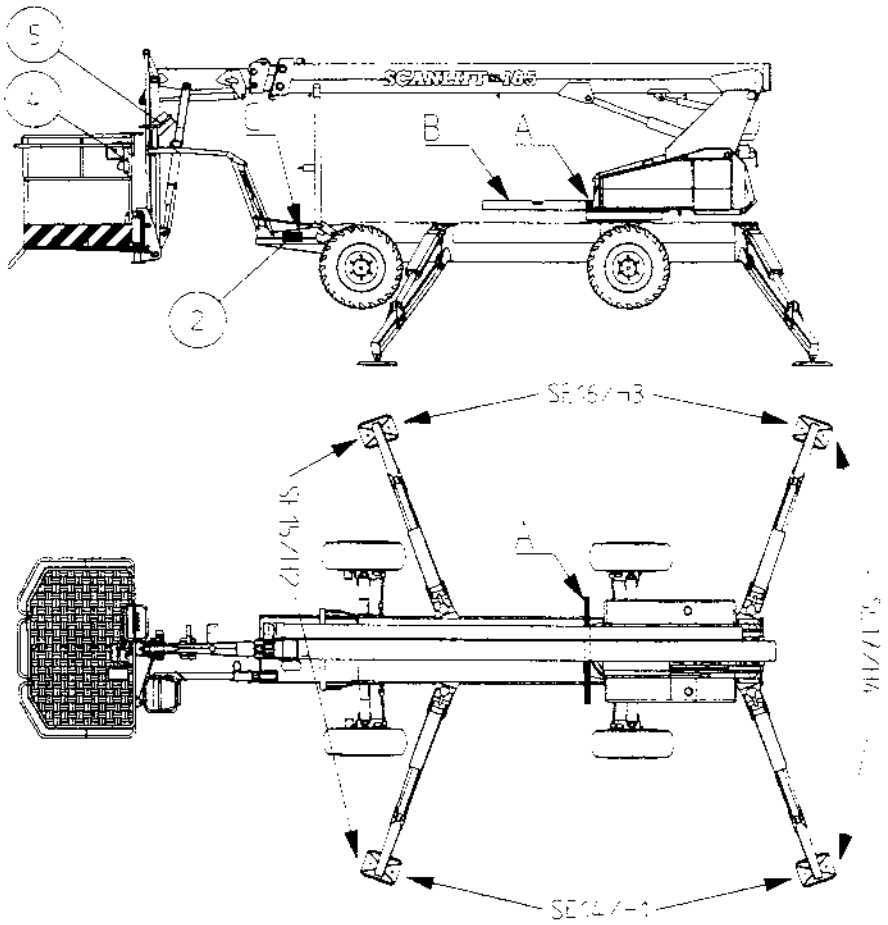
9. *Perform a test drive. Enter the repairs done in the following places of the examination record: notices, target of repair, date and the repairer's signature.*

48.0 ADJUSTING THE HORIZONTAL LEVEL INDICATOR

1. Support the MEWP on the stabilizers.

2. Set a water level at point A, and bring MEWP to level in crosswise direction with an accuracy of ±1,0°.

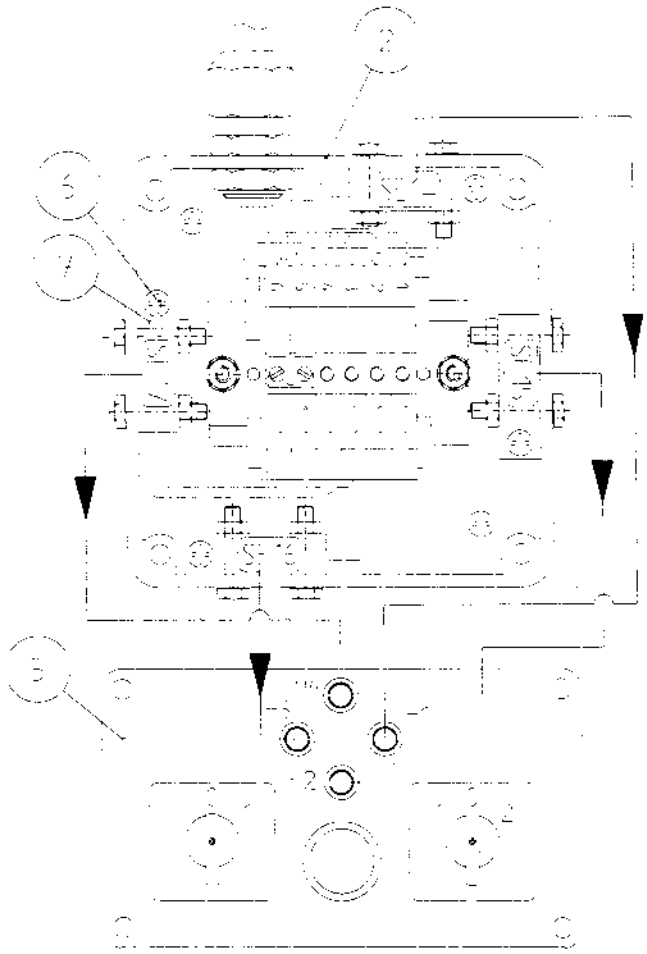
3. Set a water level at point B, and bring MEWP to level in lengthwise direction with an accuracy of ±1,0°.



2	Box 2
4	Box 4
5	Box 5
A, B	Water level
C	Cover

4. Leave the combustion engine running.

5. Open cover C, and cover of box 2.



2	Box 2
5	Box 5
6	Screw 6
SE14-SE16	Mercury switches

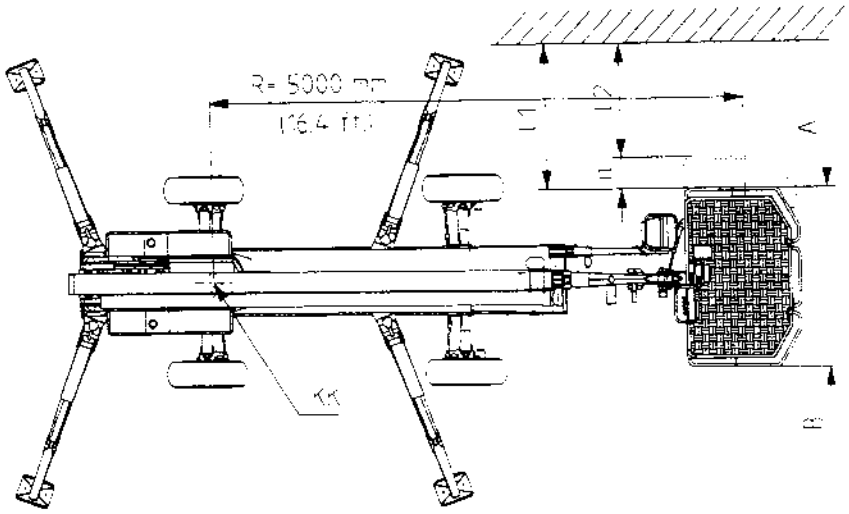
6. Open screws 6 and press switch in point 7 down (box 2), which causes lamp H4 to go out (box 5). Repeat this with all switches SE14-SE17.

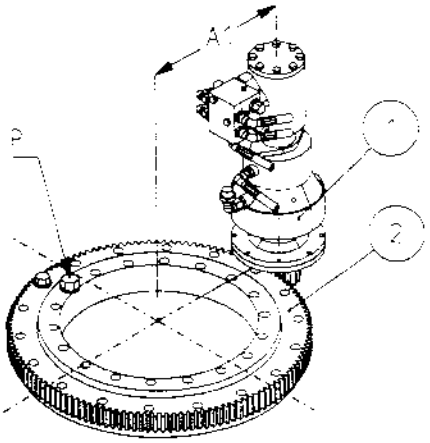
7. Carefully tighten screw 1, which causes lamp H4 to light up. Tighten the screw further 1 ¼ turns. Repeat this with all switches SE14-SE17.

8. Support the MEWP on the wheels with stabilizers off the ground.

9. Level the MEWP with the help of the indicator lamps. Check the position of the MEWP with water level at points A and B. Max. permissible inclination ± 1°. Adjust according to item 7, if needed.

49.0 GAP MEASURING OF SLEW MECHANISM





1	Planet gear
2	Gear ring
KK	Slewing centre

1. *Retract the booms fully and lower the jib.*

2. *Lower the transport support, leave the boom at horizontal.*

3. *Push the platform lightly from direction A, removing any slackness. Measure L1.*

4. *Push the platform analogously from direction B and measure L2.*

5. *L1 - L2 may not exceed 40mm (1.57 in).*

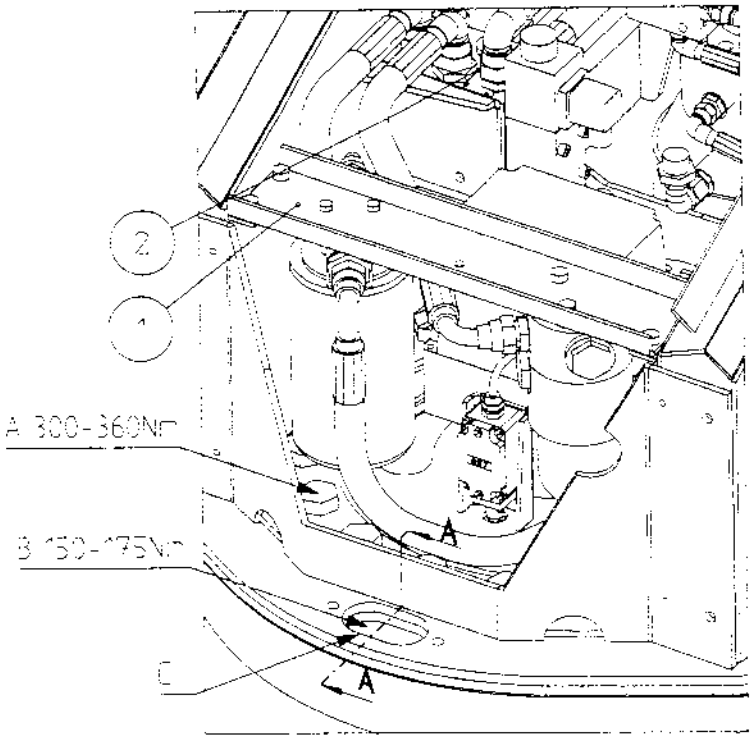
– *When fitting, the gear ring and the gear set are pushed against each other. The axle distance A1 is 328mm +0,02mm / -0mm before tightening bolts B.*

– *The inspection measure of the gear ring toothring over 15 teeth is 200,757mm. Always replace, when the measure is less than 200,0mm.*

– *The inspection measure of the slewing gear cogwheel Z17 over 3 teeth is 34,098mm. Always replace, when the measure is less than 33,35mm.*

6. *Also check the wear of the planet gear.*

50.0 TIGHTNESS OF GEAR RING BOLTS

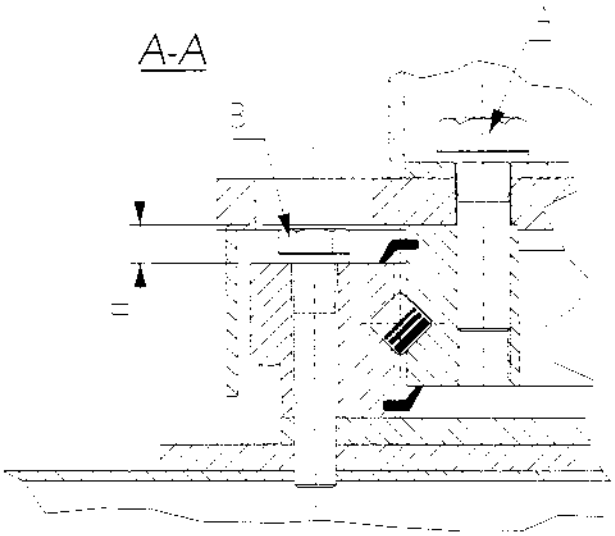


Bolts A of inner frame:

1. Remove filter group 1 and valve segment 2 from their fastenings. The hydraulic hoses need not be removed. Tighten bolts to 300 - 360 Nm with a torque wrench.

Bolts B of outer frame:

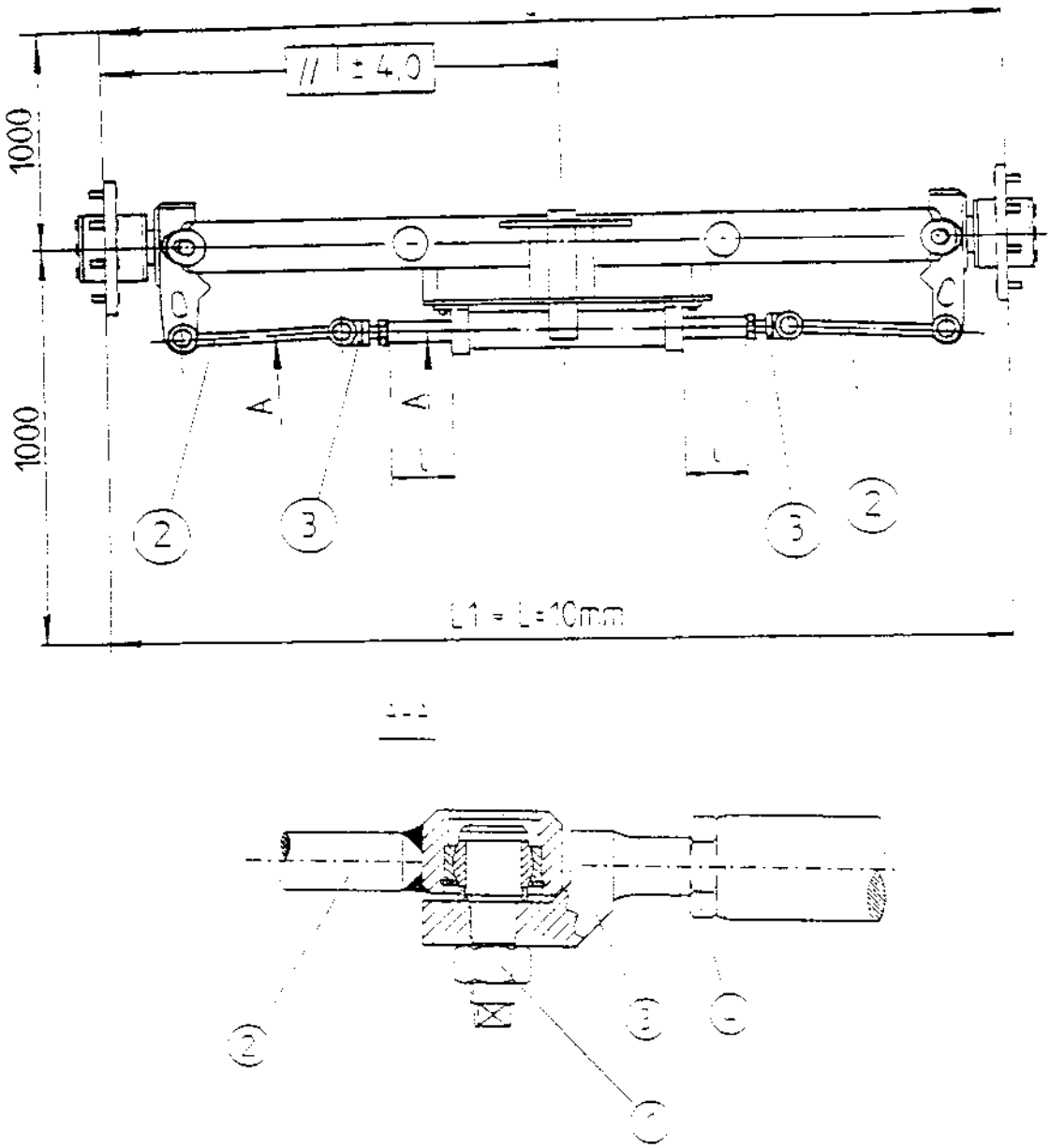
1. The bolts of the outer frame are tightened through opening C, by turning the opening to where the bolts are located. Tension torque 150 - 175 Nm.



51.0 MEASURING THE WEAR OF GEAR RING

If the measure a (profile A-A) is less than 13 mm the gear ring must be replaced.

52.0 ADJUSTING THE PARALLEL POSITION OF THE WHEELS



1. Remove nuts 1 and lift tie rods 2 off connecting pieces 3.

2. Loosen nuts 4.

3. Guide cylinder stems so that measure L is the same on the right and on the left side, with an accuracy of ± 1,5mm (± 0.059 in).

4. Line hubs with an accuracy of ± 4,0mm (± 0.157 in).

5. Turn parts 3 to the closest suitable position. Note measure L1 = L ± 10mm (±0.394 in).

6. Reassemble tie rods 2 with connecting pieces 3. Tighten nuts 1 (196 Nm) and nuts 2 (380 Nm).

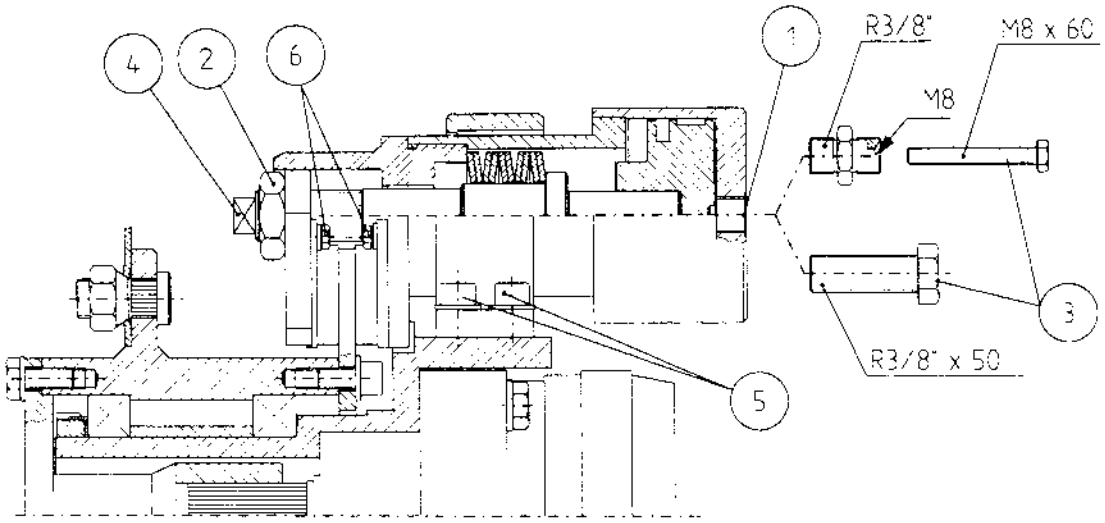
53.0 REPLACING AND ADJUSTING BRAKE PADS

1. Drive MEWP on even and secure surface.

2. Use stabilizers to raise the wheels slightly off the ground and turn off the engine.

3. Remove the wheels from hubs with brakes.

4. Disconnect brake hose from point 1 and plug the hose.



5. Remove nut 2.

6. Fit R3/8" x 50 screw or R3/8" double nipple, with M8 thread inside, as well as M8 x 60 screw at point 1.

7. Tighten screw 3, so that the brake pads become detached from the brake disc.

8. Tighten spindle 4, so that the brake pad becomes detached from the brake disc.

9. Remove screws 5 and set the brake cylinder aside.

10. Remove screws 6 and the brake pads.

11. Fit the brake pads in the opposite order. Items 5-10.

Adjustment of brake pads

1. Drive MEWP on even and steady surface.

2. Use stabilizers to raise wheels slightly off the ground. Leave the engine running.

3. Remove the wheels from hubs with brakes.

4. Turn the selector switch at the chassis steering arms to position FAST DRIVE.

5. Remove nut 2.

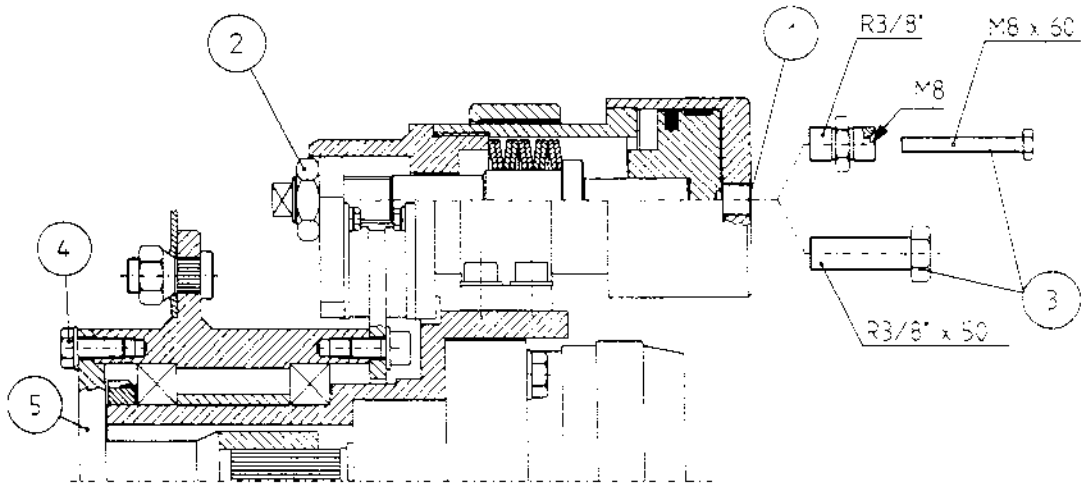
6. Pull the drive lever to the extreme position, towards the platform, so that the wheels start to turn. Keep lever in extreme position.

7. Adjust the gap between brake pad and disc from spindle 4 by turning to measurement 0,8 - 1,0mm. Note that when the gap is measured the other brake pad is touching the disc. Adjust the gap between the brake pad and the disc to be the same in both wheels, to ensure smooth braking.

EXERCISE EXTREME CAUTION WHEN WORKING CLOSE TO ROTATING BRAKE HUB. RISK OF ACCIDENT !

8. Release drive lever and tighten nut 2.

54.0 RELEASING THE BRAKES



1. Disconnect the hydraulic hose from point 1 and plug the hose.

2. Fit R3/8" x 50 screw or R3/8" double nipple, with M8 thread inside, as well as M8 x 60 screw at point 1.

3. Tighten screw 3 so that the brake pads become detached from the brake disc.

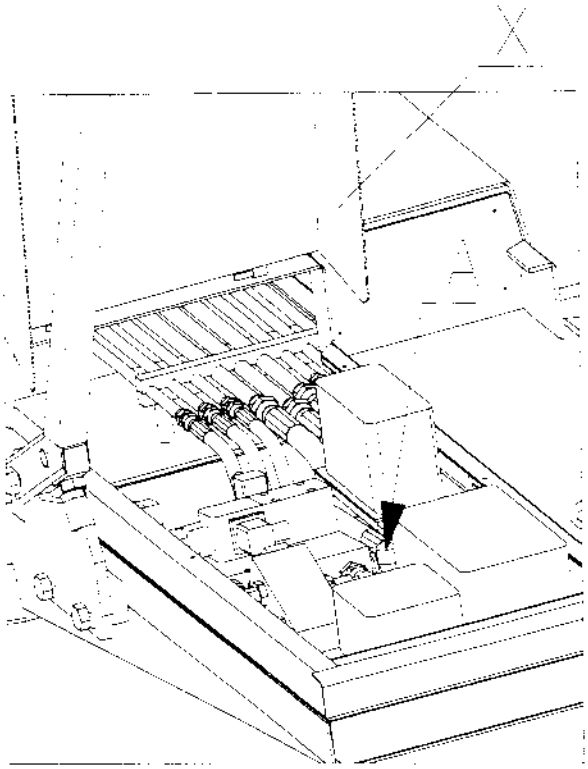
55.0 RELEASING THE HYDRAULIC MOTOR

1. Remove screws 4.

2. Pull axle 5 out, turn the splined shaft outwards and attach with screws 4.

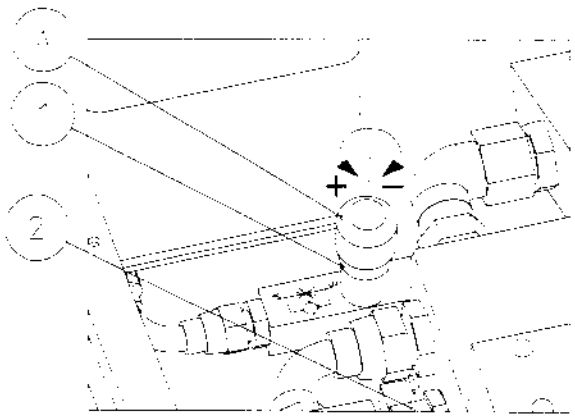
NOTE! IF THE BRAKES AND THE HYDRAULIC MOTORS ARE RELEASED THE PARKING BRAKES OF THE MEWP DO NOT FUNCTION.

56.0 ADJUSTING THE CLOSING TIME OF BRAKES



X	Cover
A	Valve

1. Put the MEWP in transport position.
2. Open cover X.
3. Turn the speed selector switch to position FAST DRIVING.
4. Adjust the combustion engine RPM to max. speed (3000 r/min).
5. Raise the temperature of hydraulic oil to + 30°C (+ 86°F).
6. Check tyre pressure (310 kpa).
7. Select a level surface (concrete, tarmac etc.) for driving.

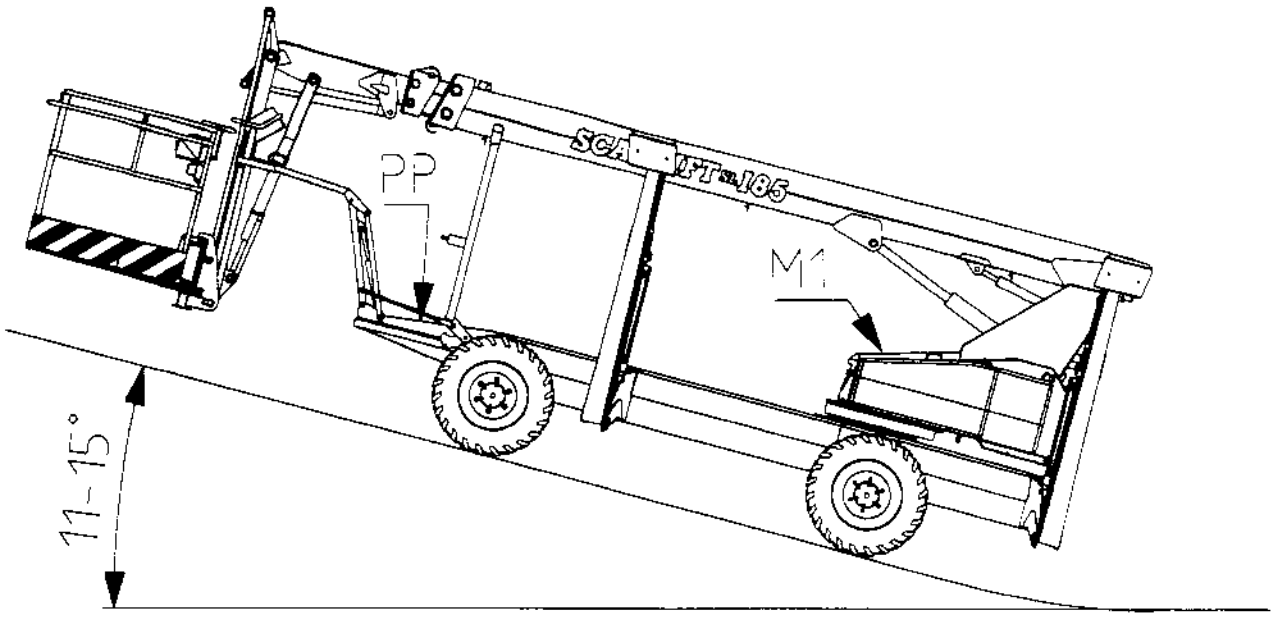


A	Valve
1	Locking screw
2	Pressure regulating cartridge

8. Drive the MEWP at maximum speed (3,6 km/h (2.2 mph)) and let the drive valve spindle move rapidly to middle position. Use valve A to adjust the stopping distance to 0,3m - 0,5m.
9. When the adjusting knob is turned to + direction the stopping distance becomes shorter.

NOTE! IF YOU TURN THE ADJUSTING KNOB TO A FULLY CLOSED POSITION, THE BRAKES DO NOT CLOSE.

57.0 HILL CLIMBING CAPACITY AND TEST OF PARKING BRAKES



1. Raise the temperature of hydraulic oil to + 30°C (+86°F).

2. Select a 11° - 15° hill with even and hard surface (wheels should not sink more than 5mm (0.2 in).

3. Turn the speed selector to SLOW DRIVING.

4. Drive the MEWP on the hill and stop there. The MEWP should not slide more than 0,5 metres (1.64 ft).

5. Continue climbing the hill. If the MEWP does not move, shift the drive lever to the middle position and back, and try again.

6. Try three times according to item 5.

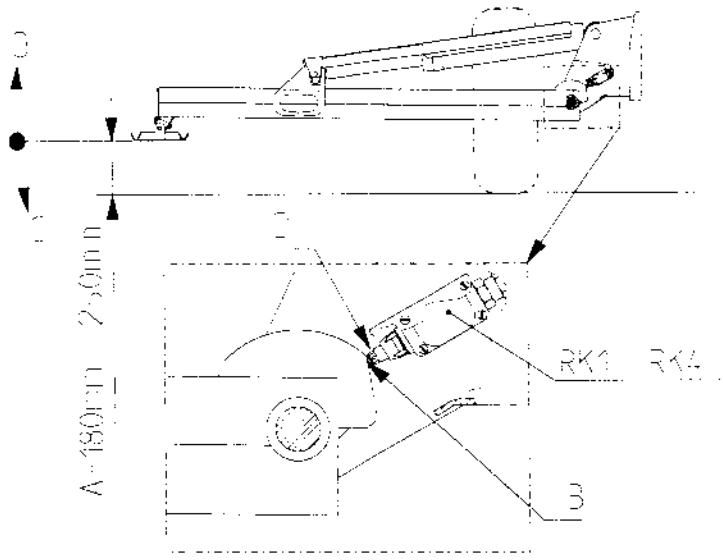
7. Repeat items 4-6 with motor in front.

8. If hill climbing capacity is poor, check pressure from measuring point M1. Pressure should be 248bar - 250bar (3597 - 3626 psi) in a position shown in the drawing. If pressure is lower, check pressure regulating cartridges PP and adjust opening pressure to 260 bar (3771 psi).
   Check also the through-flow of hydraulic motors, which should not be more than 2 l/min per motor, at the pressure of 250 bar (3597 psi).

9. When driving downhill at the speed of 3,6 km/h (2.2 mph)the stopping distance of the MEWP should be 2 metres (6.6 ft).

10. The tractive power of the MEWP on even and level ground is 1270 kg (2800 lb), at the pressure of 250 bar (3636 psi), and roll radius offset of wheels r=355mm (13.98 in).

58.0 OPERATION OF THE STABILIZER LIMIT SWITCH (4pcs)



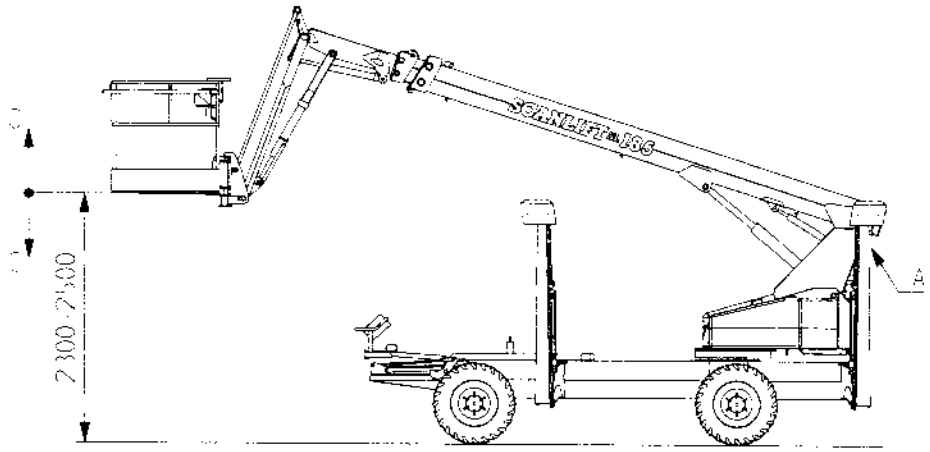
B	Opening point of limit switch
D	Spindle of limit switch
O	Limit switch opens
C	Limit switch closes

1. The limit switch opens when the stabilizer sole rises 180mm - 250mm (7.1-9.8 in) above ground, and MEWP is supported by the wheels. When opened, the limit switch prevents the use of the booms.

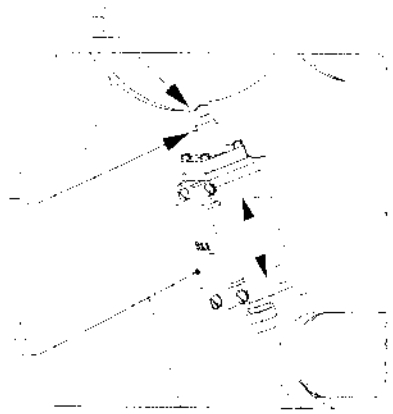
2. In humid and freezing conditions the limit switches RK1 - RK4 may freeze in the open position. Grease the limit switch spindle (point D) with e.g. Molykote separator spray.

3. If gap A is more than 250mm (9.8 in), check the condition of the limit switch.

59.0 OPERATION OF THE LIMIT SWITCH RK 6 FOR HORIZONTAL BOOM POSITION



A	Limit switch RK6
O	Limit switch opens
C	Limit switch closes



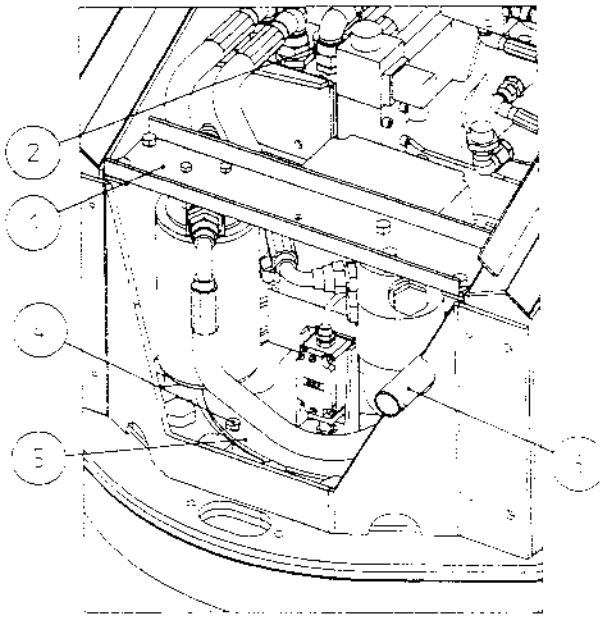
A	Limit switch RK6
B	Point of opening of limit switch
D	Spindle of limit switch

1. Limit switch opens when the platform raises from the ground 2,3m - 2,5m (7.5-8.2 ft), with MEWP supported on the wheels. When open, the limit switch prevents the use of drive, steering and stabilizers.

2. In humid and freezing conditions the limit switch RK6 may freeze in the open position. Grease the limit switch spindle (point D) with e.g. Molykote separator spray.

3. If platform rises higher than 2500 mm (8.2 ft), check the condition of the limit switch. Adjust switch by moving it in C-C direction.

60.0 REPLACING THE HOSES OF THE HD-SPLITTER



1. Stop the engine.

2. Disconnect filter assy 1, valve assy 2 and selector valve 3. It is not necessary to disconnect the hydraulic hoses.

3. Remove the splitter retaining screws 4 (6 pcs).

4. Lift the splitter so much that you are able to replace also the lower hoses.

61.0 FILTER LIST

Hydraulics:		
Filter	Type	Spare part No.*
Return filter	Finn-Filter FF PAVL 3-1003-10 R3/4"	3090195
Return filter cartridge	FFPAVL 1-1003-10	3090420
Pressure filter	FHP 65 1B A10 NAGS	3090488
Pressure filter cartridge	HP-65-1-A10-NA	3090721
Combustion engines:		
Filter	Type	Spare part No.*
KOHLER COMMAND		
Air filter	KOHLER 47 083 03	
Air prefilter	KOHLER 24 083 02	
Air filter + prefilter		3090804
Oil filter	KOHLER 12 050 01	3090702
Fuel filter	KOHLER 25 050 02	3090667
HATZ 1D 80C		
Air filter	HATZ 01078500	3090752
Oil filter	HATZ 03795700	3090750
Fuel filter	HATZ 40089401	3090751
KUBOTA D722		
Air filter	KUBOTA 15372-8745-2	3090830
Oil filter	KUBOTA 15841-3243-0	3090831
Fuel filter	KUBOTA 15231 4356-0	3090832

* Spare part number of KESLA OY

62.0 LIST OF COMPONENTS ACCORDING TO ELECTRIC SCHEME

1.Platform:

Position	Name	Function	Type
KOT4	El. box		
SH2	EMERGENCY STOP switch		SQUARE D9001D3C1R-B-DA11
SK2	Chopper	LPG/petrol	
SP1	Push-button switch	Sound signal	
SP2	Push-button switch	For use of steering arms	
SP4	Pedal switch	Control switch, USA	
SP6	Push-button switch	To operate auxiliary lowering	
SVL2	Ignition lock		HATZ or KOHLER
H8,H9	Function of load control		
R10	Relay	Signal light of load control	
Y4	Solenoid valve	Jib cylinder	
D4	Diode		
D5	Diode		
D6	Diode		
D7	Diode		
A	Sound signal		
Contact box 220V/16A (110V, 16A USA)			

2. Booms:

Position	Name	Function	Type
KOT8	El. box	Connector box for 220V	
RK5	Limit switch for chain of boom extension		Telemecanique XCX-5351H29

3. Turntable:

Position	Name	Function	Type
KOT7	El. box		
SVL1	Ignition lock		HATZ DIESEL
SH1	EMERGENCY STOP switch		SQUARE D9001D3C1R-B DA11
SP7	Push-button switch	Use of auxil. lowering pump	
SPK1	Main current switch		

3. Turntable:

Position	Name	Function	Type
RK6	Limit switch for horizontal position of boom		Telemecanique XCX-9502H29
RK7	Limit switch of slewing		Telemecanique XCX-9502H29
RK9	Limit switch for load control of jib		Telemecanique XCX-5351H29
RK10	Standby limit switch for load control of booms		Telemecanique XCX-5351H29
R1	Relay	Use of hour meter	
R2	Relay	Control of booms	
R3	Relay	Drive control	
R4	Relay	Prevents double starting, only diesel	
R5	Relay	Prevents double starting	
R6	Relay	Starting motor	
R8	Relay	EMERGENCY STOP/motor starting	
R11	Relay	Auxiliary lowering pump	
R12	Relay	Auxiliary lowering pump	
VR	Flashing relay		
Y1	Solenoid valve	HD oil for booms	
Y2	Solenoid valve	HD oil for chassis	
HH	Ignition glow signal light, only diesel		
H5	Flashing light	Oil pressure/Temperature of coolant	
H6	Oil pressure signal light	only diesel	
H7	Charging signal light, only diesel		
H10	Signal light for coolant	Only Kubota Diesel	
tii)	Hour meter	While motor is running	
D1	Diode		
D2	Diode		
D9	Diode		
D10	Diode		
D11	Diode		

3. Turntable:

Position	Name	Function	Type
D3	Diode	Only diesel	
F2	Fuse 10 A	For booms and chassis	
F3	Fuse 10 A	For ignition lock on platform	
F4	Fuse 10 A	For use of steering arms	
F5	Fuse 5 A	For sound signal	
KOT6	El. box	Cylinder distributor	
LR1-7	Cylinder distributor		Behne A4-657-05 6 – PE
B	Battery		12V 55Ah

4. Chassis

Position	Name	Function	Type
KOT1	El. box		
RK3	Limit switch for stabilizer		Telemecanique XCK-S502H29
RK4	Limit switch for stabilizer		Telemecanique XCK-S502H29
Y7	Solenoid valve	Steering	
Y8	Solenoid valve	Steering	
KOT3	El. box	Base, platform side	
RK1	Limit switch for stabilizer		Telemecanique XCK-S502H29
RK2	Limit switch for stabilizer		Telemecanique XCK-S502H29
Y5	Solenoid valve	Cylinder for steering arms	
Y6	Solenoid valve	Cylinder for steering arms	
Y9	Solenoid valve	Travelling speed	
R7	Relay	Guiding of steering arms	
KOT5	El box	Steering arms	
SK3	Chopper	Drive selecting	
SK4	Chopper	Travelling speed selecting	
SP3	Pushbutton switch	Shunting stabilizers	

4. Chassis

H1-H4	Signal light	Horizontal level indicator	
KOT2	El. box	Base, platform side	
SE14-17	Mercury switch	Horizontal level indicator	
VVK	Fault current switch		Neptun 2000 Austria 220 V 1N25 A NO 03 SIF25/2/0,03 (Note! not the USA)

5. Hatz diesel

Position	Name
159	Diode
121	Glow plug
124	Charging adjuster
126	Generator
127	Starting motor
157	Diesel stopper
162	Oil pressure probe

6. Kohler Command

Position	Name	Function	Type
G	Generator		
M	Starting motor		
SP5	Oil pressure probe		
SP6	Pressure probe	Control of gas solenoid	
Y11	Solenoid valve	for LPG	
Y12	Solenoid valve	for petrol (in Kohler carburator)	

7. Kubota D722-E

Position	Name	Function	Type
M	Starting motor	12 V	12 V/ 40 A
G	Charging generator	12V	
SOL1	Starting solenoid	12V	
GP	Glow plug		
S	Stopper	Solenoid	12V
T1	Timer	Control of glow indicator	

7. Kubota D722-E

T2	Timer	Control of stopping solenoid	
FB	Fuse		12 V 15 A
P	Oil pressure probe		
H	Temperature probe		
HH	Glow indicator	box 7, turntable	
H6	Oil pressure signal light	box 7, turntable	
H7	Charging signal light	box 7, turntable	
H10	Overheating signal light	box 7, turntable	