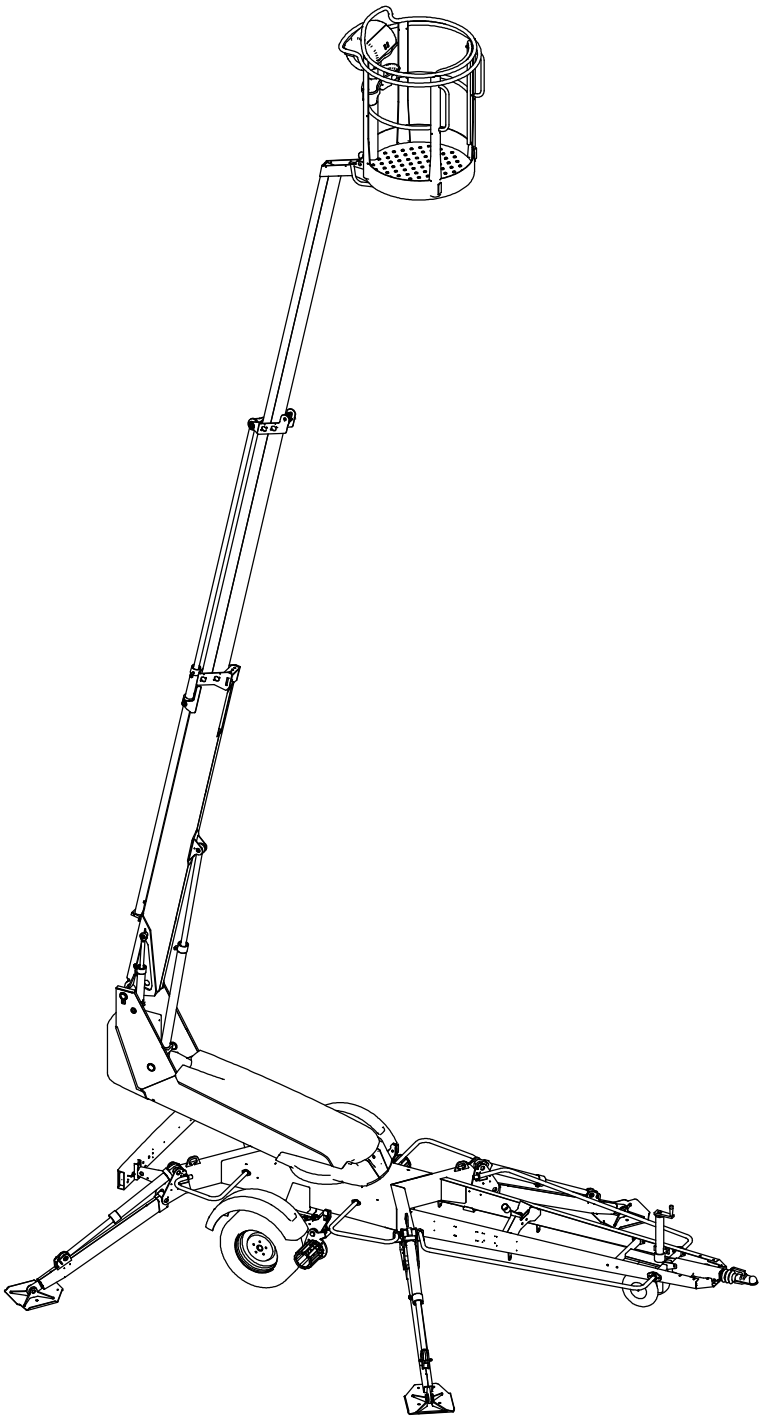
DINO® 120T

OPERATING INSTRUCTIONS



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OPERATING INSTRUCTIONS

Valid from serial number **120003**

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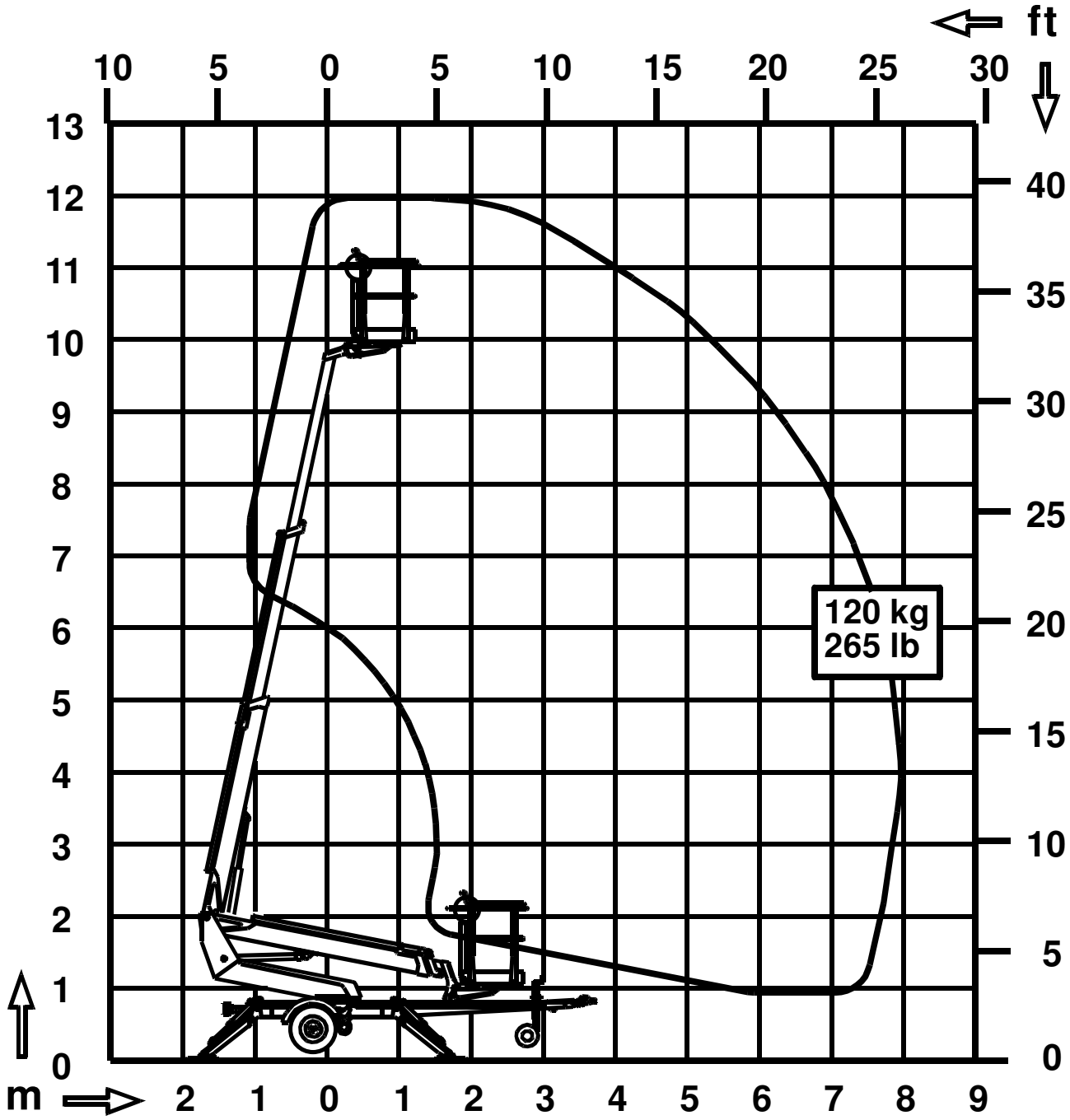
REACH DIAGRAM



TECHNICAL SPECIFICATION

Max. working height	12,0 m
Max. platform height	10,0 m
Max. outreach	7,9 m
Boom rotation	continuous
Turn area	refer to reach diagram
Support width	3,60 m / 3,90 m
Transport width	1.72 m
Transport length	5,52 m
Transport height	1,96 m
Weight	1275 kg
Max. allowed load on platform	120 kg
Max. number of persons + additional load	1 person + 40 kg
Max. allowed sideways load (caused by persons)	200 N
Max. lateral inclination (chassis)	±0,3°
Max. wind speed during operation	12,5 m/s
Min. ambient temperature when working	- 20 °C
Max. support force on the outriggers	9500 N
Platform size	Ø 0,85 m
Gradeability	25%
Power supply: - mains current:	230V / 50Hz / 10A
Socket outlets on the platform	230V / 50Hz / 10A

GENERAL SAFETY REGULATIONS

Make yourself familiar with these operation instructions before using the lift!

Keep these operating instructions in the place reserved for them.
Make sure that all users of the lift are familiar with these instructions.
Advice the new users and strictly follow all instructions given by the manufacturer.

Make sure you clearly understand all instructions relating to the operational safety of the lift.

Always use chocks under the wheels when disconnecting the lift from the car.

Only specially trained personnel who are well familiar with the device and at least 18-years old are allowed to operate the lift

The max. allowed load on the platform is one (1) person and at maximum forty (40) kg of additional load, however, the total load must not exceed one hundred twenty (120) kg.

The platform may only be operated when the chassis is well supported and the wheels are off the ground.

The load-bearing capacity and the gradient of the base must be taken into account when supporting the chassis.

Additional support plates of adequate size must be used under the outriggers when working on soft ground. Only use such additional support plates on which the metallic outriggers will not slide.

The lift may only be moved in the transport position. No persons or load are allowed on the platform during the transportation.

The weather conditions, such as wind, visibility and rain, must always be taken into account so that these factors will not adversely affect the safe performance of the lifting operations.

The use of the lift is prohibited if
- **the temperature drops under - 20 °C** or
- **the wind speed exceeds 12.5 m/s**

Do not use ladders, steps or other similar equipment on the platform.

Never throw any objects from the platform.

The lift must not be used for transferring goods or persons between different floors or working levels.

Always make sure before lowering the platform that the area on the underside is clear of any obstructions.
Avoid damaging the platform by lowering it on the ground or bringing it in contact with any structures.

When working in busy areas the operating range of the lift must be clearly marked either by using warning lights or fencing.
Also observe the regulations of the Road Traffic Act.

Beware of the live aerial power lines in the area - observe the minimum safety distances:

Voltage	**Min. distance below (m)**	**Min. distance at the side (m)**
100 - 400 V hanging spiral cable	0,5	0,5
100 - 400 V open-wire cable	2	2
6 - 45 kV	2	3
110 kV	3	5
220 kV	4	5
400 kV	5	5

Keep the lift clean of any dirt which may impair the safe operation and impede the inspection of the structures

The device must be serviced and inspected regularly.
Only skilled persons who are familiar with the service and reparation instructions are allowed to carry out the service and reparation work.

It is strictly prohibited to use a lift which is out of order.

The device must not be modified without the manufacturer´s consent.

REGULAR INSPECTION

A thorough inspection of the lift must be carried out at least once every twelve (12) months.

The inspection shall be carried out by a technically trained person who is familiar with the operation and structure of the lift.

Draw up a protocol of the inspections and keep it always with the unit stored in the space reserved for it.

Carry out he inspections on regular basis throughout the service life of the lift.

The inspection must be carried out within twelve (12) months from the first or the previous inspection.

If the lift is used under extreme conditions, intervals between the inspections shall be reduced.

The overall operating condition of the lift as well as the condition of the safety-related control devices shall be established in the regular inspections. Particular attention shall be paid to changes which affect the operational safety.

In connection with the regular inspection, it shall be established to what extent the lessons and practical experience gained from the previous inspection can be implemented for even better safety.

ATTENTION! Primarily the national legislation must be followed!

Regular inspections and service measures are described more thoroughly in the chapter "Service- and maintenance".

WORKSITE INSPECTION

1. **General**
   - Is the lift suited for the intended job?
   - Is the performance of the lift sufficient for the job? (reach, loadability etc.)
   - Is the position of the lift safe?
   - Is the lighting on the worksite sufficient?

2. **Documents**
   - Are the Operation and Service Instructions for this lift present? (Manufacturer´s instructions)
   - Are inspections and servicing carried out in accordance with the instructions and have the defects affecting the safety been checked as repaired? (Inspection protocols)

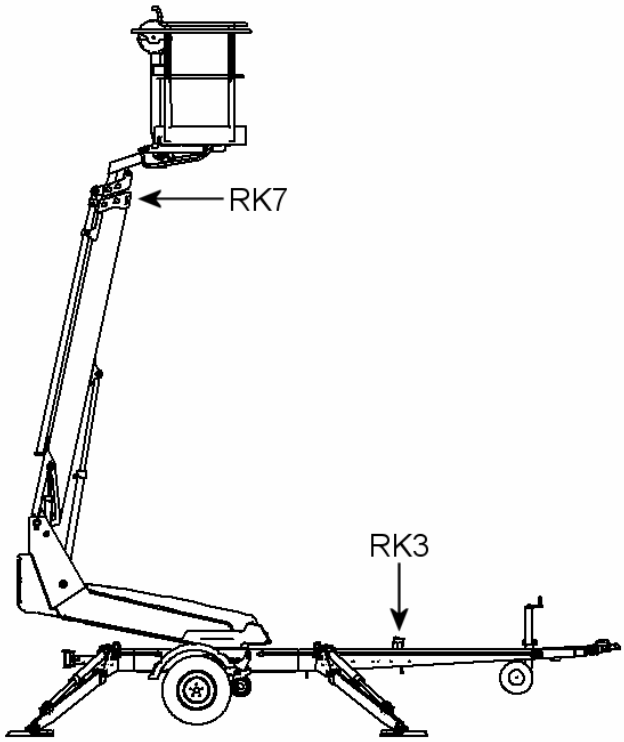
3. **Structure (Visual inspection and operational test)**
   - General condition of the lift
   - Operation and protection of the controls
   - Emergency stop, signal horn and limit switches
   - Electrical appliances and wiring
   - Oil leaks
   - Load markings and signs

4. **Operator**
   - Is the operator old enough?
   - Has the operator received the required training?

5. **Special issues on the work site**
   - Are there any additional regulations relevant to the worksite or the work?

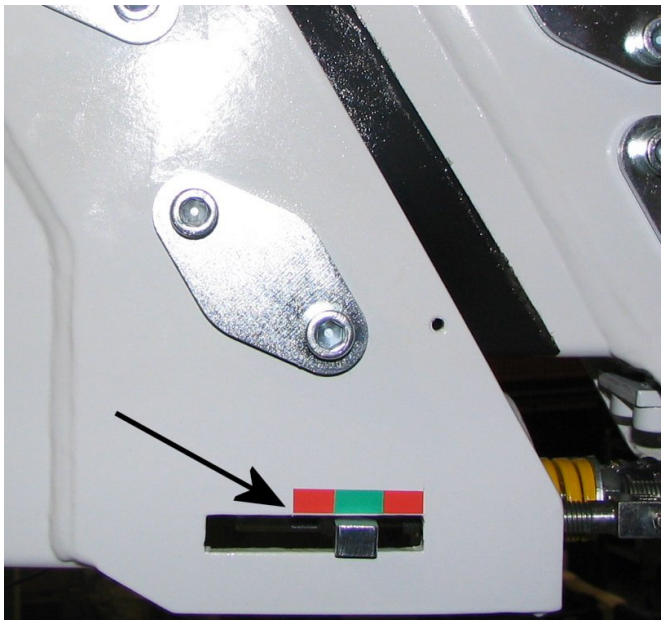
OPERATION OF SAFETY DEVICES

1. Support outriggers
The safety limit switch **RK3** prevents the operation of the outriggers and the driving device when the boom does not rest on the transport support. The switch is located on the tow-bar at the transport support.

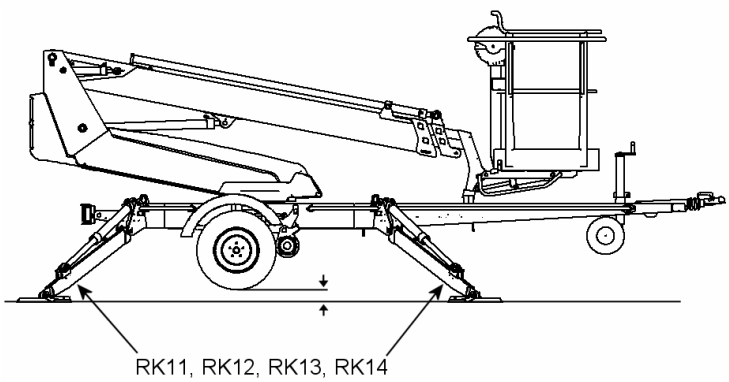


2. Extension chains for the telescope
The safety limit-switch **RK7** prevents the operation of the lift in case of rupture of one of the extraction chains for the telescope. The switch is located at the top end of the outer boom.

3. Retraction chains for the telescope
The lever at the top end of the outer boom indicates possible rupture of one of the retraction chains for the telescope. If the lever is inside the green area, the retraction chains are intact (see adjacent illustration). If the lever is inside the red area, one of the retraction chains has ruptured and the lift must not be used until the chains have been replaced and the required adjustments have been carried out.



4. Lifting of the boom
All the lift's support outriggers must be in the support position before the boom is lifted. Make sure that the wheels are off the ground. The safety limit switches **RK11, RK12, RK13** ja **RK14** are located on the support outriggers.



5. As the emergency stop button is depressed all movements stop and the power unit is turned off. The emergency stop pushbutton must be pulled up before the power unit can be restarted (buttons 5 and 20)

Check operation of the safety devices.

OPERATING CONTROLS

OPERATING CONTROLS ON CHASSIS CONTROL PANEL

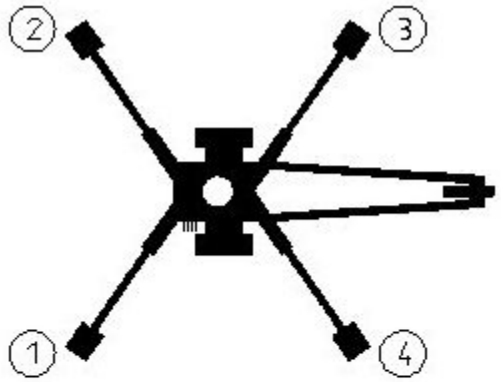
1. Selector switch
   1a - ignition off
   1b -outriggers, hydraulic drive and operating the boom from the chassis panel
   1c -controlling the boom from the platform panel
2. Start button
3. Stop button
4. I/ II - speed (is used simultaneously with the control levers for the boom and the driving device)
5. Emergency stop button
6. Lever for turning
7. Lever for boom system
8. Lever for telescope movement
9. Lever for platform inclination

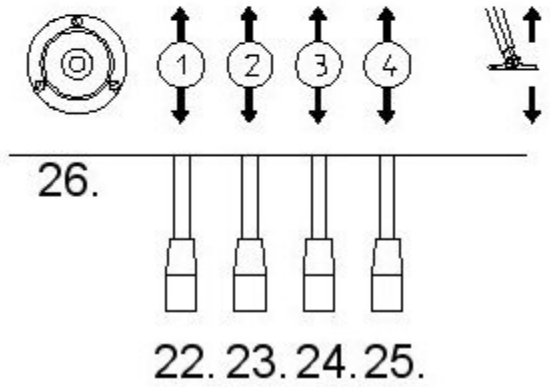
10F. Drive to the front
10B. Drive to the rear
10F+10R Drive to the right (forward)
10F+10L Drive to the left (forward)
10B+10R Drive to the right (backward)
10B+10L Drive to the left (backward)

11. Signal light of the outrigger limit switches
12. Automatic fuse for socket outlets
13. Voltage meter
14. Hour meter

OPERATING CONTROLS OF OUTRIGGERS

22. Rear outrigger, right
23. Rear outrigger, left
24. Front outrigger, left
25. Front outrigger, right
26. Position indicator of chassis



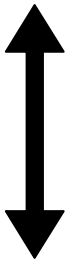


OPERATING CONTROLS ON THE PLATFORM

Close the cover of the chassis control panel before operating the platform controls.

15. Control lever

TELESCOPE IN

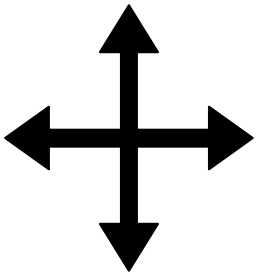


TELESCOPE OUT

16. Control lever

BOOM UP

BOOM TO THE LEFT



BOOM TO THE RIGHT

BOOM DOWN

17. I/ II - speed (is used simultaneously with the control levers for the boom and the levelling of the platform)
18. Control lever for levelling of the platform
19. Sound signal
20. Emergency stop button
21. Socket outlet 230VAC/ (2 pcs.)

MEASURES TO BE TAKEN IF THE LIFT IS AT RISK OF LOSING ITS STABILITY

The reason for the reduced stability can be a fault in the lift, the wind or other lateral force, collapse of the standing base or negligence in providing sufficient support. In most cases a sign of the reduced stability is the inclination of the lift.

1. If there is time, try to find out the reason for the reduced stability and the direction of its effect. Warn other people on the work site using the alarm signal.

2. Reduce the outreach to the side by retracting the telescope. Avoid abrupt movements.

3. Turn the boom away from the danger zone, i.e. to a position where the stability of the lift is normal.

4. Lower the boom.

If the stability has been lost as a result of a fault in the lift, repair such a fault immediately.

Do not use the lift until the fault has been repaired and the condition of the lift has been verified.

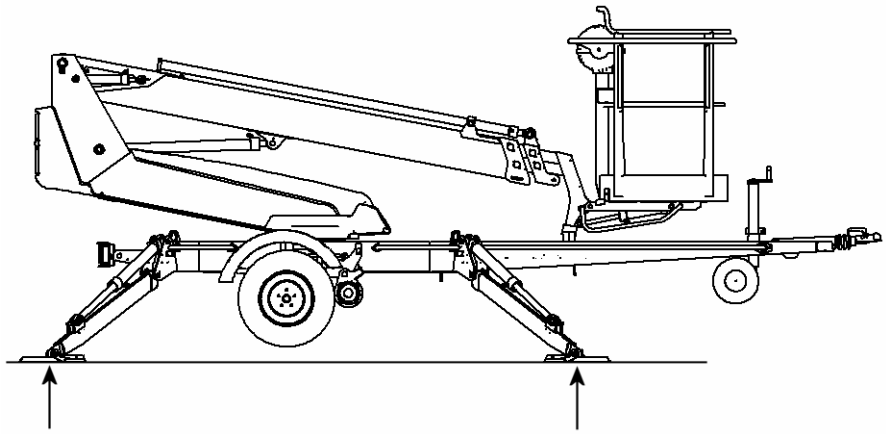
START-UP

1. Ground stability

- make sure that the ground is even and hard enough to support the lift in a steady level position

Soil material	**Density**	**Max. ground pressure P kg/cm²**
Gravel	High density Medium density Loose	6 4 2
Sand	High density Medium density Loose	5 3 1,5
Fine sand	High density Medium density Loose	4 2 1
Sand/ mud	High density (very hard to work) Medium density (hard to work) Loose (easily worked)	1,00 0,50 0,25

- if the ground is soft, use sufficiently large and sturdy additional plates under the support outriggers



- observe the effect of ice, possible rain and inclination of the surface on the support (the support outriggers must not slip on the surface)

- the operation is prohibited if the lift is not properly supported and in a level position

2. Drive or push the lift to the inspected lifting site

- apply the parking brake
- disconnect the lift from the towing vehicle

3. Connection of power supply to the lift

A. Powered by ac-supply. While the mains voltage is plugged in, the12VDC supplied by a separate unit.

- connect the mains cable to the power supply
- for maximum out of the electric motor the voltage must 230 VAC (-10 % +6 %), the frequency must be 50 Hz and rating of the fuse 10A (the length of the connecting cable has some effect)

4. To access the operating controls, open the cover at the rear of the turning device.

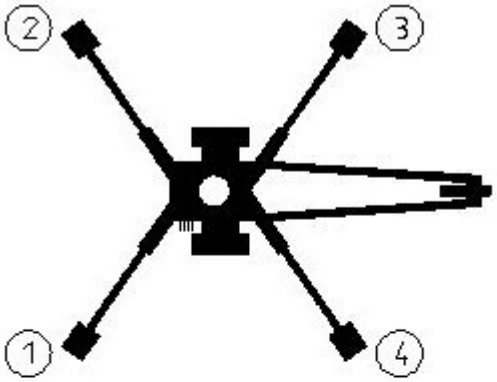
5. Turn the selector switch (1) to position 1b

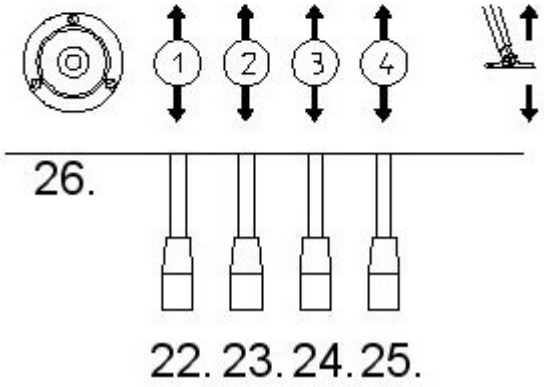
6. Start the engine with button 2 (green)

7. Lower the front support outriggers (on the tow-bar side)

8. Lower the rear support outriggers (do not damage the tow-bar jockey wheel)

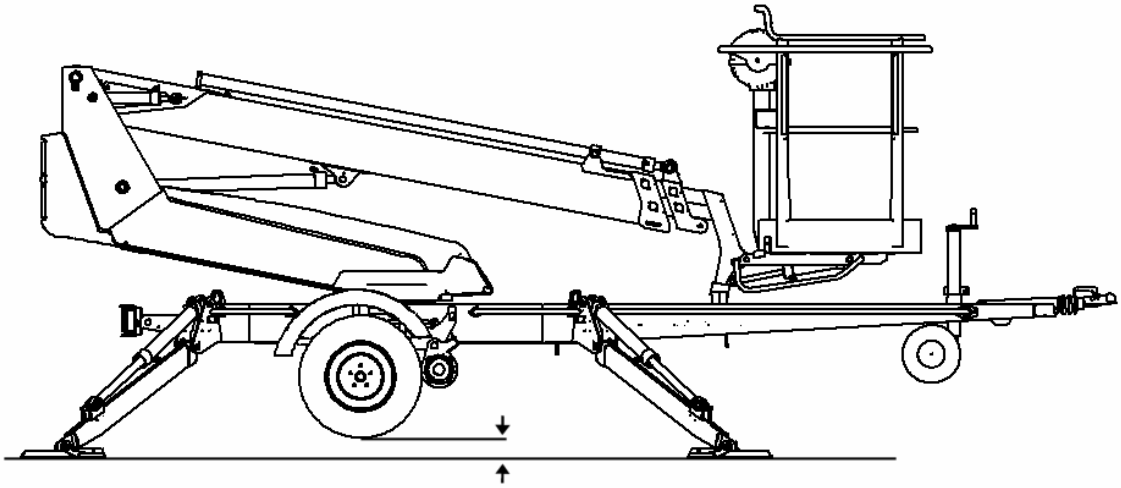
9. Level the chassis with the outriggers with the help of the level gauge (26).





MAKE SURE THAT THE WHEELS ARE CLEARLY OFF THE GROUND

- the (green) signal light 11 on the chassis control panel comes on when all outriggers are in the lower position and the outrigger limit switch circuit is connected
- make sure all outriggers are firmly supported on the ground



OPERATING THE LIFT FROM THE CHASSIS PANEL

10. Turn the selector switch (1) to position 1b

– now you can operate the boom using the levers 6, 7, 8 on the chassis panel and the platform using the lever 9 on the chassis panel. While operating the boom movements, turn lever 4 simultaneously (I/II - speed)

– test the operation of the emergency descent system as follows:

1. Start by lifting the boom about 1 - 2 metres (with lever 7) and continue by extending the telescope 1 - 2 metres (with lever 8) keeping the emergency stop button depressed. The movement should now stop.

2. Open the emergency descent valve for the telescope by turning the lever 27 clockwise and retract the telescope completely by pumping with hand pump 28. The crank for the hand pump is located at the side of the chassis control panel (see adjacent picture).

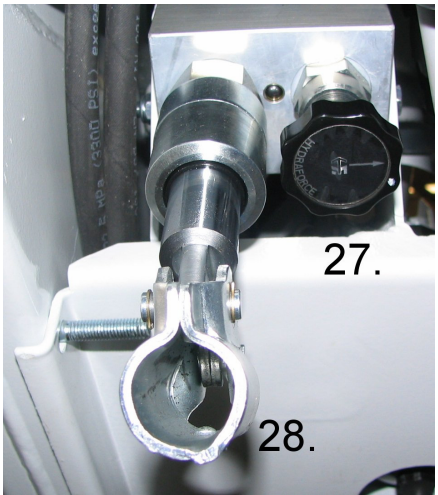
3. Open the emergency descent valve for the boom by turning the lever 27 counter-clockwise and lower the boom by pumping with hand pump 28.

4. Close the emergency descent valve by turning the lever 27 to its centre position

5. Pull up the emergency stop button.

DO NOT DAMAGE THE TOW-BAR JOCKEY WHEEL!

Lock the selector switch (1) in position 1a before working under the boom.
Make sure that neither people nor load are on the platform.



OPERATING THE LIFT FROM THE PLATFORM PANEL

11. Turn the selector switch (1) to position 1c (operating from the platform) and take away the key (see the point "Operating controls on the chassis control panel")

- Now you can operate the boom using levers 15 and 16 on the platform control panel. Simultaneously, turn the switch 17 (I/ II - speed).

Only use the II-speed with short boom and low platform height.

Whenever possible, keep the boom short while lifting and lowering the platform.

DO NOT DAMAGE THE TOW-BAR JOCKEY WHEEL!

IF THE SAFETY DEVICES OR THE EMERGENCY DESCENT SYSTEM ARE NOT WORKING, HAVE THEM REPAIRED BEFORE OPERATING THE LIFT!

12. Refer to the item "Daily inspections" in the task list for servicing

13. With the boom slightly lifted and the telescope extended, make sure that the platform does not lower of itself while the operating controls are not being used.

14. When working under cold weather conditions, let the engine run for a while without load to increase the hydraulic oil temperature. Start the operations by driving the movements carefully without load back and forth from the chassis control panel.

15. Move the platform to the work object

If several control levers are operated simultaneously, only the movement with the least resistance will operate.

ATTENTION!

Lowering the platform to transport position: Always retract the telescope completely before lowering the boom onto the transport support.

DO NOT DAMAGE THE TOW-BAR JOCKEY WHEEL!
DO NOT TAKE ADDITIONAL LOAD IN THE UPPER POSITION!

16. Working a long time in the same position

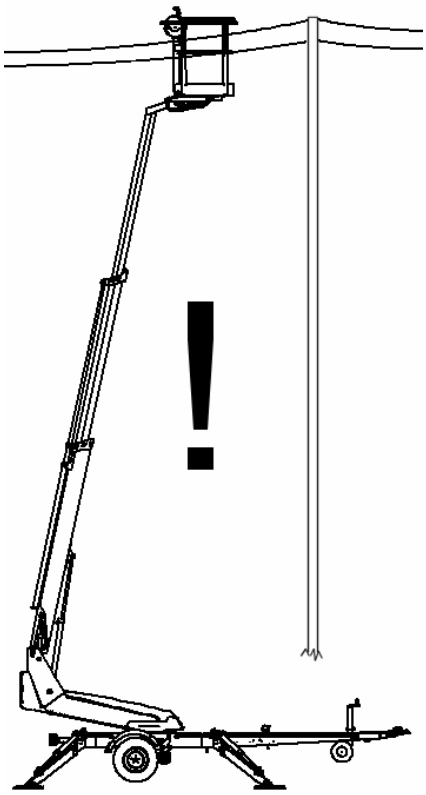
- there are pushbuttons for both stopping and starting the engine on the chassis control panel. When the weather is warm and the platform is kept for a longer period in the same position, it is not necessary to let the engine run continuously.

- when the weather is cold, it is recommended to let the engine run to keep the hydraulic oil warm

- check the stability and condition of the base regularly during the operation, taking into account the weather and ground conditions

The engine is switched off if the key is turned to position 1c and starts automatically when the speed is selected from the platform control panel using the switch 17 but stops again, after a delay of 4 seconds, if the switch is not turned.

17. When moving the platform, remember the following



- be careful of the high voltage power lines
- do not exceed the max. allowed lateral force (200N)
- do not touch open electric wires
- do not throw objects from the platform
- do not damage the lift
- do not take additional load in the upper position
- do not damage other devices
- do not load the platform vertically more than what is allowed

18. When leaving the lift

- drive the lift to a safe position, preferably to the transport position
- switch off the power unit

19. Adjustment of the platform position

From the chassis control centre (LCB)

Carry out the levelling of the platform while the lift is in the support position (the outriggers down). Adjust the platform position with the boom on a level.
No persons allowed on the platform during adjustment.

The position of the platform may be adjusted from the chassis control panel in the following way:

- Turn the selector switch (1) to position 1b
- Turn the selector switch (4) and simultaneously, using the control lever (9), select the desired direction for the correction movement

From the platform (UCB):

The position of the platform may be adjusted from the platform control panel in the following way:

- turn the selector switch (1) to position 1c (operating from the platform)
- turn the selector switch (17) and simultaneously, using the control lever (18), select the desired direction for the correction movement

EMERGENCY DESCENT SYSTEM

Operation:

1. Retracting the telescope
   Open the emergency descent valve for the telescope by turning the lever 27 clockwise and retract the telescope completely by pumping with hand pump 28. . The crank for the hand pump is located at the side of the chassis control panel (see adjacent picture).

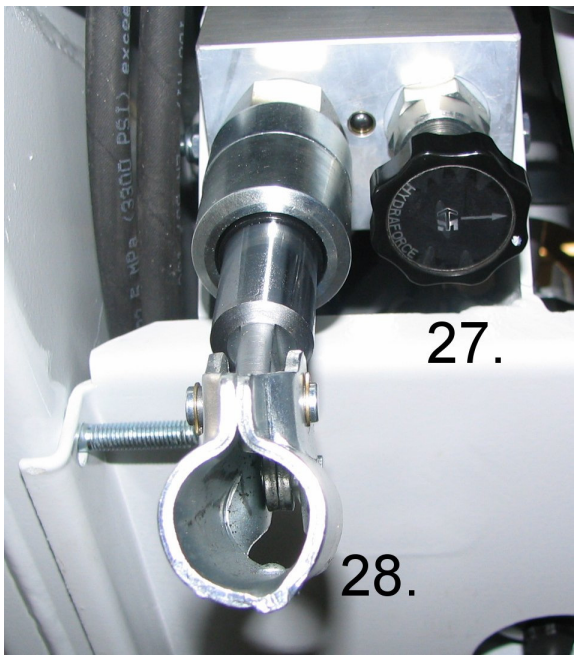
2. Lowering the boom
   Open the emergency descent valve for the boom by turning the lever 27 counter-clockwise and lower the boom by pumping with hand pump 28.

3. Close the emergency descent valve by turning the lever 27 to its centre position

4. The boom can be turned by placing a crank on the worm gear shaft in the opening in the plastic cover of the turning device. The crank for the hand pump is located at the side of the chassis control panel (see adjacent picture).

ATTENTION!

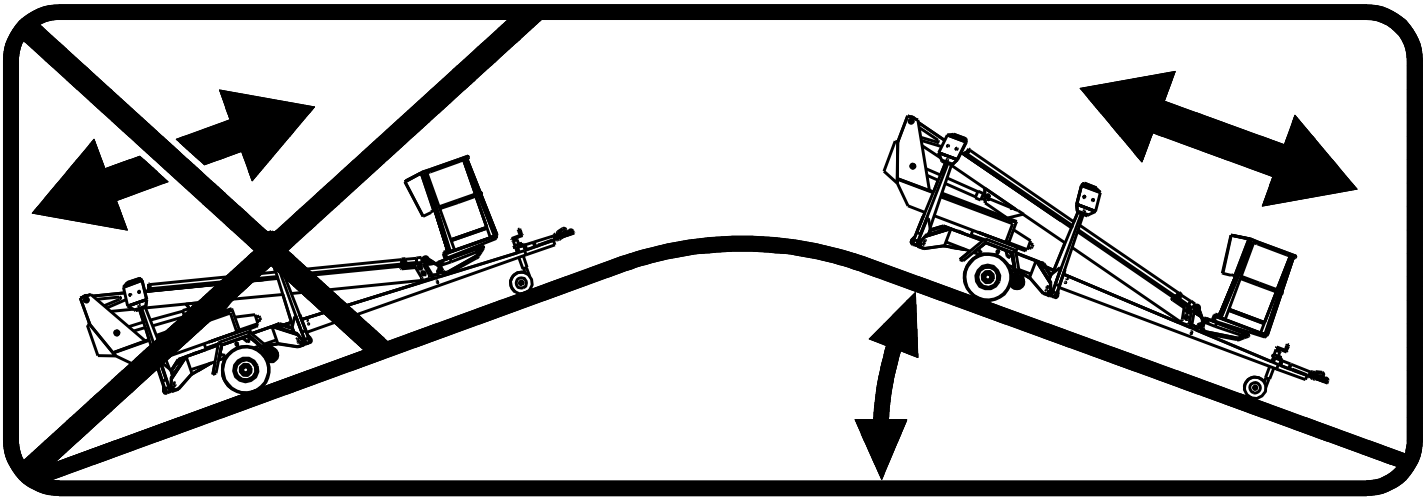
Start by retracting the telescope completely, continue by lowering the boom and finally turn the boom system.



DRIVING DEVICE

The hydraulic driving device is intended for moving the lift within the work area if the towing vehicle cannot be used.

1. Do not drive downhill with the driving device if the inclination of the surface is more than 5 per cent, i.e., more than 1/20 (corresponding to a descent of 0.5 m over a distance of 10 m). If the surface gradient is greater than this, you may lose control of the device.



2. When driving on a slope, the tow-bar must always point towards the descent.
   Never drive with the driving device with the tow-bar pointing towards the ascent.

3. Always place chocks under the wheels before disconnecting the device from the towing vehicle.

4. Always apply the handbrake before disconnecting the device from the towing vehicle.
   Only use the handbrake as a parking brake or for emergency stopping.

5. Never leave the lift on a slope being supported only by the self-braking action of the driving device.

6. When transferring the lift using the driving device:
   - take care not to allow the wheel to roll over your foot
   - look out for sudden sideways movements of the tow-bar
   - be careful not to cause danger to other people and the environment.

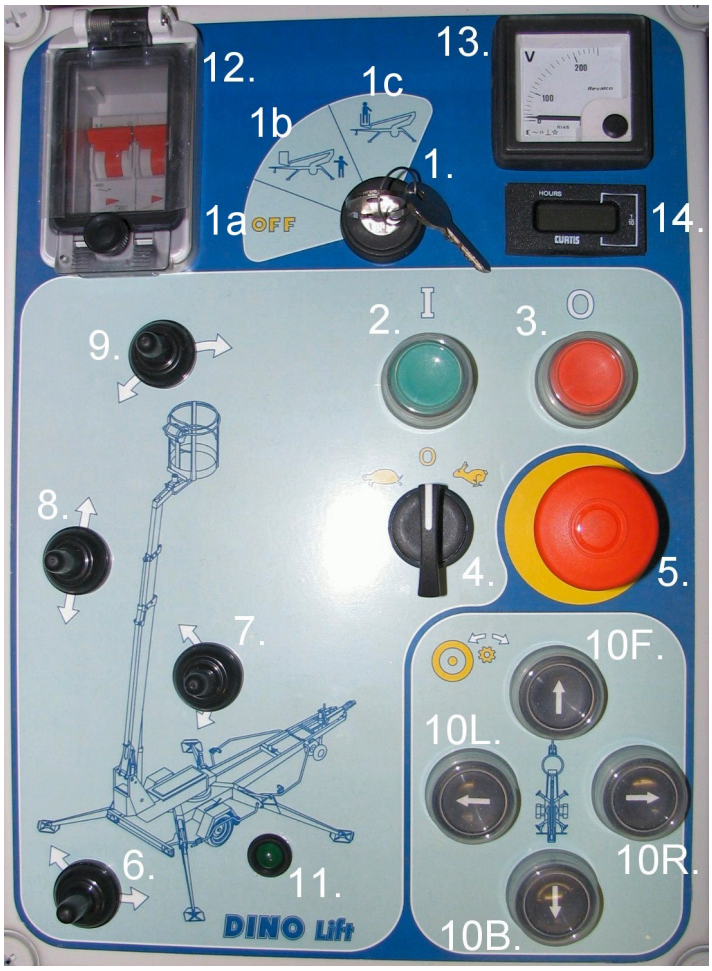
7. Do not move the device on a slope using only hand-power. You may lose control over it and cause an injury.

8. Never park a vehicle combination on a slope.

DRIVING DEVICE

The hydraulic driving device is intended for moving the lift within the work area if the towing vehicle cannot be used.

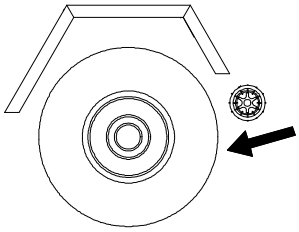
– turn the selector switch 1 to position (1b)



– make sure that the platform is in the transport position and the outriggers are in the upper position

– make sure that the mains cable is long enough to cover the whole travel distance

– press the driving device against the wheel



– release the parking brake

– drive with press buttons:

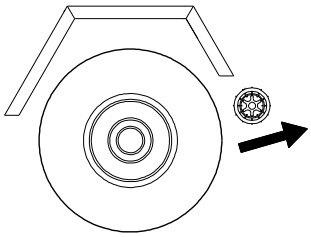
Forward	10F
Backward	10B
To the right (forward)	10F+10R
To the left (forward)	10F+10L
To the right (backward)	10B+10R
To the left (backward)	10B+10L

– while operating the driving device, turn lever 4 simultaneously (I/II - speed)

– do not drive the jockey wheel into obstacles or potholes

– after the driving apply the parking brake

– disconnect the driving device from the wheel



Note!
Be careful not to damage the jockey wheel tube by extending it too much. However, watch out for the brake rods. As the lift is moved with the driving device, the suitable length for the jockey wheel stem can be achieved by adjusting the gap between the brake rod and the tyre to 1 - 3 cm. Thus the wheel can turn freely.

SPECIAL INSTRUCTIONS FOR WINTER USE

- **the lowest allowed operating temperature of the lift is -20 °C.**

- if the temperature is below zero, let the power unit run for a few minutes before starting the movements

- start with a few movements to warm-up oil in the cylinders and to ensure proper operation of the valves

- check that the limit switches and the emergency descent devices are operational and clean (from dirt, snow, ice, etc.)

- protect the control panel and the platform from snow and ice whenever they are not in use

ALWAYS KEEP THE LIFT FREE FROM DIRT, SNOW ETC.

MEASURES TO BE TAKEN AT THE END OF THE WORKING DAY

1. Retract the telescope boom completely.

2. Check that the platform is perpendicular to the boom.

3. Lower the boom/platform onto the support on the tow-bar.
   The limit switch on the transport support prevents operation of the support outriggers if the platform is not down.

4. Close the cover on the platform control panel.

5. Turn the selector switch 1 to position 1a.

6. Disconnect the lift from the power supply.

7. Make sure that the covers are locked.

PREPARING THE LIFT FOR TRANSPORT

1. Retract the telescope boom completely.

2. Check that the platform is perpendicular to the boom.

3. Lower the boom/platform onto the support on the tow-bar and turn the platform floor against the transport support.
   The limit switch on the transport support prevents operation of the support outriggers if the platform is not down.

4. Close the cover on the platform control panel.

5. Turn the selector switch 1 to position 1b.

6. Lift the support outriggers.
   - at first the rear support outriggers (do not damage the rear lights)
   - then the front support outriggers (do not damage the jockey wheel)

7. Apply the parking brake.

8. Make sure that the driving device is disconnected.

9. Turn the selector switch 1 to position 1a and disconnect the lift from the power supply.

10. Make sure that the covers are locked.

CONNECTION TO THE TOWING VEHICLE

1. Lift up and push forward the ball-coupling handle (in the driving direction). Now the ball-coupling is released.

2. Press the ball-coupling onto the tow-ball using only a little force. The connection and locking take place automatically.

ATTENTION! ALWAYS MAKE SURE AFTER THE CONNECTION THAT THE BALL-COUPLING IS PROPERLY LOCKED!

Clean and lubricate the ball-coupling regularly.

3. Connect the emergency stop wires and light plug to the vehicle. Check the cable for chafing and proper operation of the wires.

4. Check the operation of the lights.

5. Carefully release the parking brake and make sure that its locking is in order and that its handle stays in the lower position.

6. Lift up the jockey wheel to the transport position.

NO LOAD ALLOWED ON THE PLATFORM DURING TOWING OF THE LIFT!

In particular, if you are parking or disconnecting the lift from the towing vehicle on a slope, apply the parking brake as firmly as possible. After having applied the parking brake, push the lift backward to make the reverse automatics release the brake shoes. The spring cylinder pulls the parking brake tighter. Thus the brakes of the vehicle are again properly on.
Adjust the brakes according to the service instructions.
Place chocks under the wheels as an additional precaution.
If you leave the lift standing for a longer period of time, for example over the winter, we recommend propping it up to release any load from the wheels.

NOTE!

- Check
  - transport position of the outriggers
  - locking of the ball-coupling
  - operation of the lights
  - parking brake
  - condition and pressure of the tyres
    - rear axle. 270 kPa (2.7 bar)
    - jockey wheel 250 kPa (2.5 bar)
  - safety wires
  - locking of the brakes after transportation
  - attachment of the jockey wheel
  - that the driving device is disconnected from the wheel

INSTRUCTIONS FOR SERVICE AND MAINTENANCE

GENERAL SERVICE INSTRUCTIONS

– carry out the servicing and inspection of the lift in accordance with the instructions

– when it comes to more demanding repair works turn to a specialist or contact the distributor or the manufacturer of the lift

– do not modify the lift without written consent from the manufacturer

– any such faults which may affect the operational safety of the unit must be repaired before the lift is next used

– do not let oil spill on the ground

– keep the lift clean, especially the platform

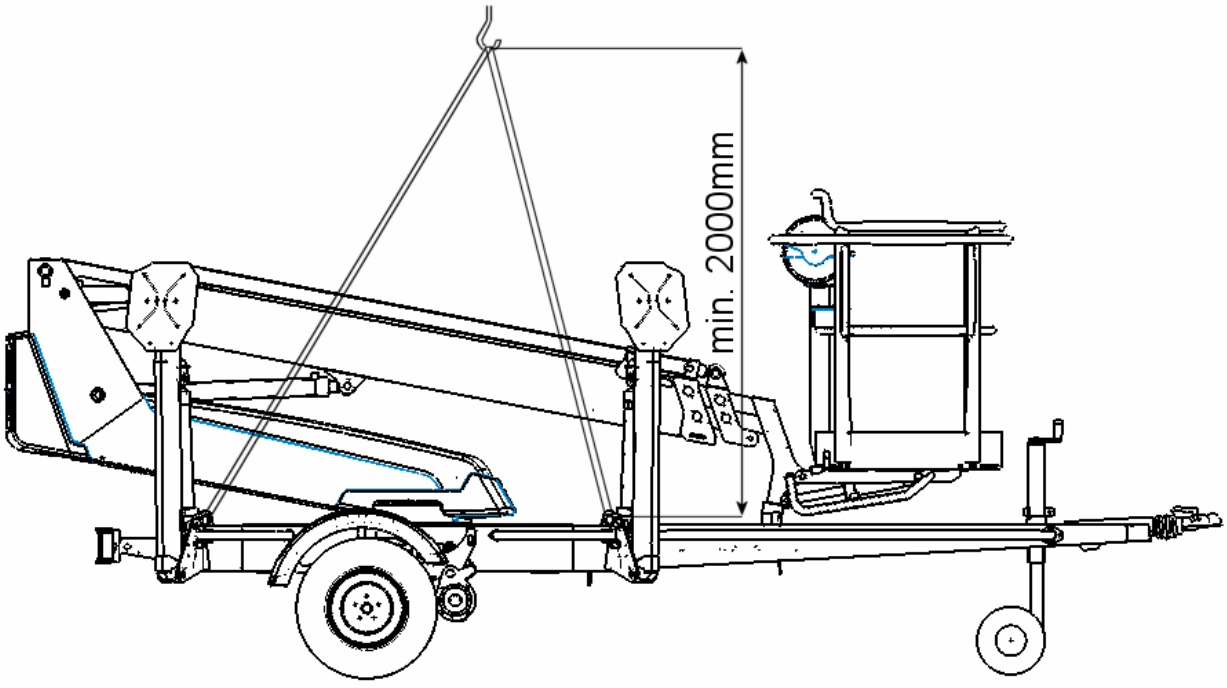
– clean up the lift before service and inspection

– use genuine spare parts

– support the platform, boom system and support outriggers in a position in which the load does not rest on the structure under repair or cause any other danger (e.g. transport position or use of supporting structures)

– the device may be lifted with two slings, each with a load-carrying capacity of at least 1,300 kg or slinging at the four lugs (see picture).

Be careful not to damage the device during the lifting!



SERVICE AND INSPECTION INSTRUCTIONS

1. The first service after 20 hours of operation

- change the pressure filter element
- adjust the brakes according to the instructions under point "Wheel brakes and bearings"
- check the the wheel bolts for tightness after about 100 km of driving (90 Nm)

2. Daily service

- check the oil level in the hydraulics, top up if necessary
- check the hydraulic connections
- check the unit visually
- check the operation of the emergency descent and emergency stop functions
- check the operation of the safety devices (see point "Operation of safety devices")

3. Weekly service

- check the tyre pressure (270 kPa, jockey wheel 250 kPa)
- lubricate the joint pins (refer to the lubrication plan)
- check the sliding surfaces of the telescope and apply silicon if necessary
- check the clearance between the slide pads and surfaces and adjust the pads if necessary

4. Service every six months

- change the hydraulic oil and the filter cartridge.
- check the condition of the brakes
- check the the wheel bolts for tightness (90 Nm)
- grease the gear ring of the turning device

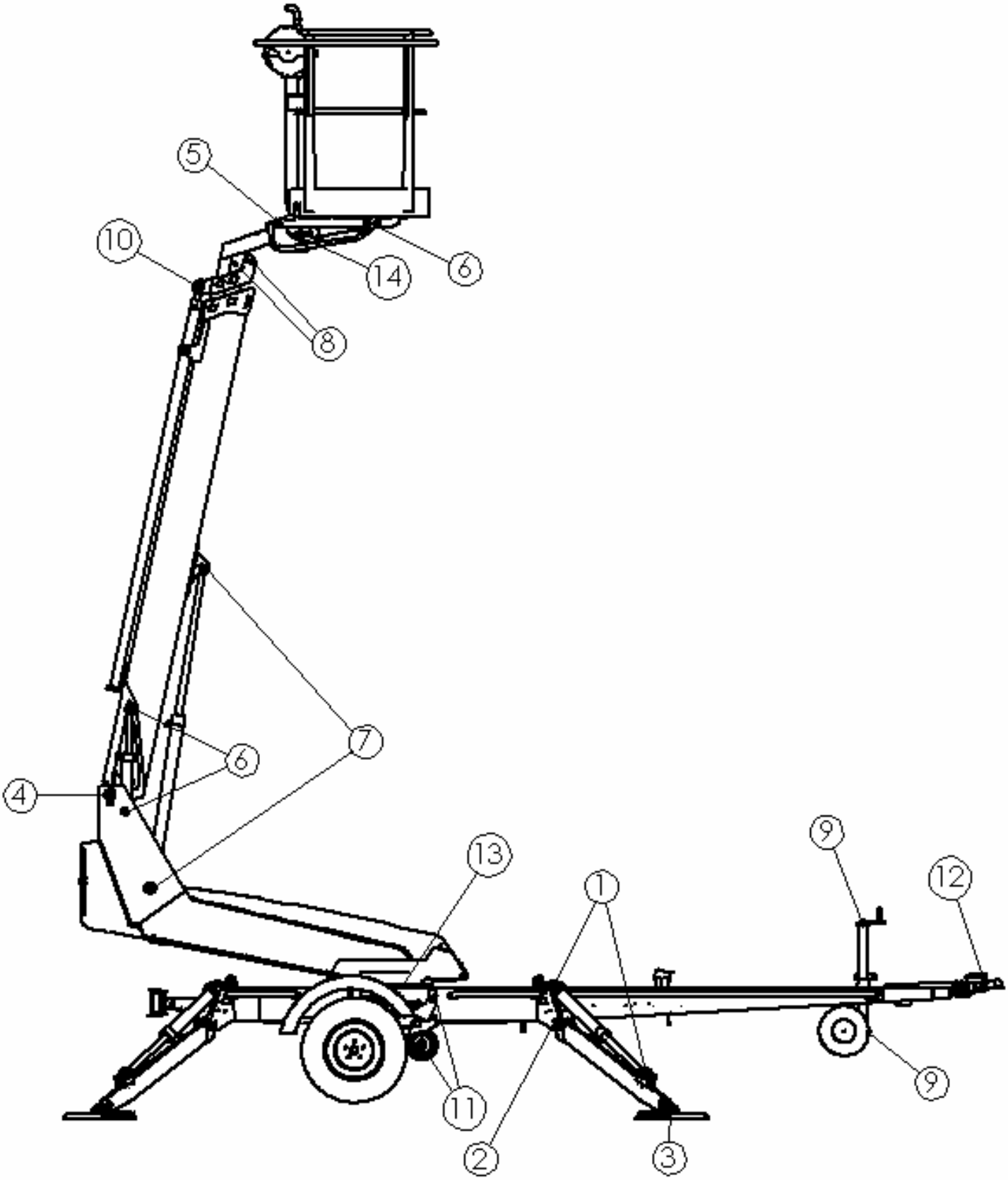
5. Periodic service every 12 months ín accordance with the instructions for regular servicing below in this manual

IF THE LIFT IS OPERATED UNDER DEMANDING CONDITIONS (IN EXCEPTIONALLY HUMID OR DUSTY ENVIRONMENT, CORROSIVE CLIMATE, ETC.), THE INTERVALS BETWEEN THE OIL CHANGES AND THE OTHER INSPECTIONS SHALL BE SHORTENED TO MEET THE PREVAILING CONDITIONS IN ORDER TO MAINTAIN THE OPERATIONAL SAFETY AND RELIABILITY OF THE LIFT.

THE PERFORMANCE OF THE PERIODIC SERVICING AND THE INSPECTIONS IS ABSOLUTELY MANDATORY, BECAUSE THEIR NEGLIGENCE MAY IMPAIR THE OPERATIONAL SAFETY OF THE LIFT.

THE GUARANTEE WILL NOT REMAIN VALID, IF THE SERVICING AND THE PERIODIC INSPECTIONS ARE NOT PERFORMED.

LUBRICATION PLAN



EVERY 50 HOURS

1. Bearings of the outrigger cylinders
2. Bearings of the outriggers
3. Bearings of the outrigger foot plates
4. Bearings of the boom
5. Bearings of the platform
6. Bearings of the levelling cylinders (except the bearing on the rod side of the upper levelling cylinder)
7. Bearings of the lifting cylinder
8. Sliding surfaces/rolls of the telescope
9. Jockey wheel slide and threads

TWICE A YEAR

10. Bearing of the telescope cylinder
11. Driving device
12. Overrun brake - overrun
13. Turning device bearings and gear ring
14. Bearing on the rod side of the upper levelling cylinder

Lubricant Esso Beacon EP2 or equivalent.

Moving parts of the mechanism of the outrigger limit switch system must be lubricated every 50 hours.

If necessary, apply a thin grease film on moving parts of the ball coupling.

Always lubricate the lift and apply a protective grease film immediately after the washing.

Lubricate the visible parts of the Flyer-chains for the boom twice a year. Use Master chain lubricant 1-4014 or equivalent.

LOAD HOLDING AND LOAD REGULATION VALVES

Check of operation

1. To check the tightness of the outrigger cylinder load holding valves measure the height position of the chassis from the floor separately at each outrigger. After a few minutes, measure the height again.

2. To check the tightness of the load regulation valves on the boom cylinder drive the boom to a position in which its movement can be reliably measured. Observe the possible movement of the boom in a few minute's time.

3. To check the tightness of the load regulation valve on the telescope cylinder extend the telescope and stop the movement at any position, measure the stroke and observe in a few minutes time that the stroke does not change. (Note! Drive the boom to an almost vertical position).

4. To check the tightness of the load regulation valve on the platform levelling system, put a load of 80 - 120 kg on the platform and measure the distance from the rear edge of the platform to the floor. Observe for a few minutes that its height position does not change.

Service instructions

1. Disconnect and clean the valve

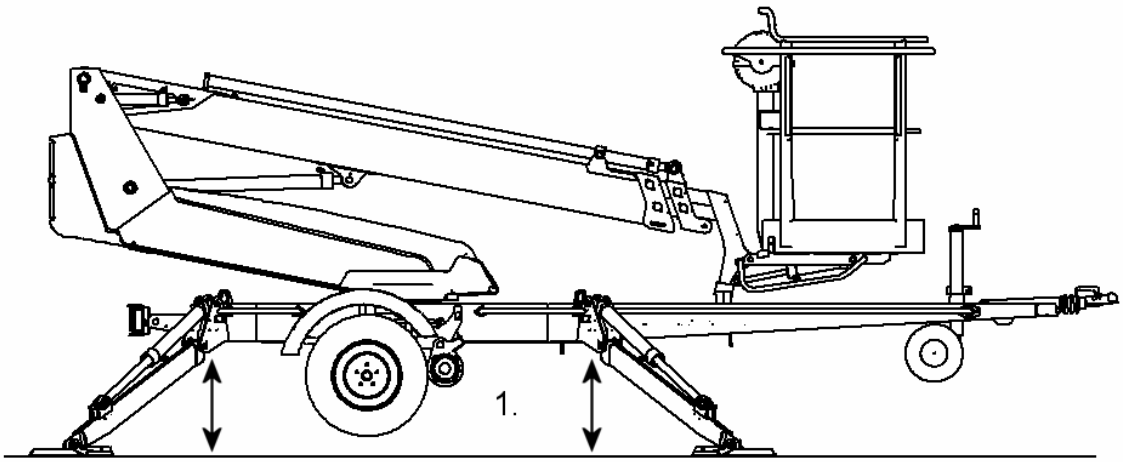
2. Check the O-rings and replace, if necessary.

3. Put the valves carefully in place

4. Replace the valve, if necessary

5. Do not change the settings of the valves

Support the platform, boom system and outriggers in a position, in which the load does not rest on the repaired structure. Make sure to relieve the residual pressure from the cylinders.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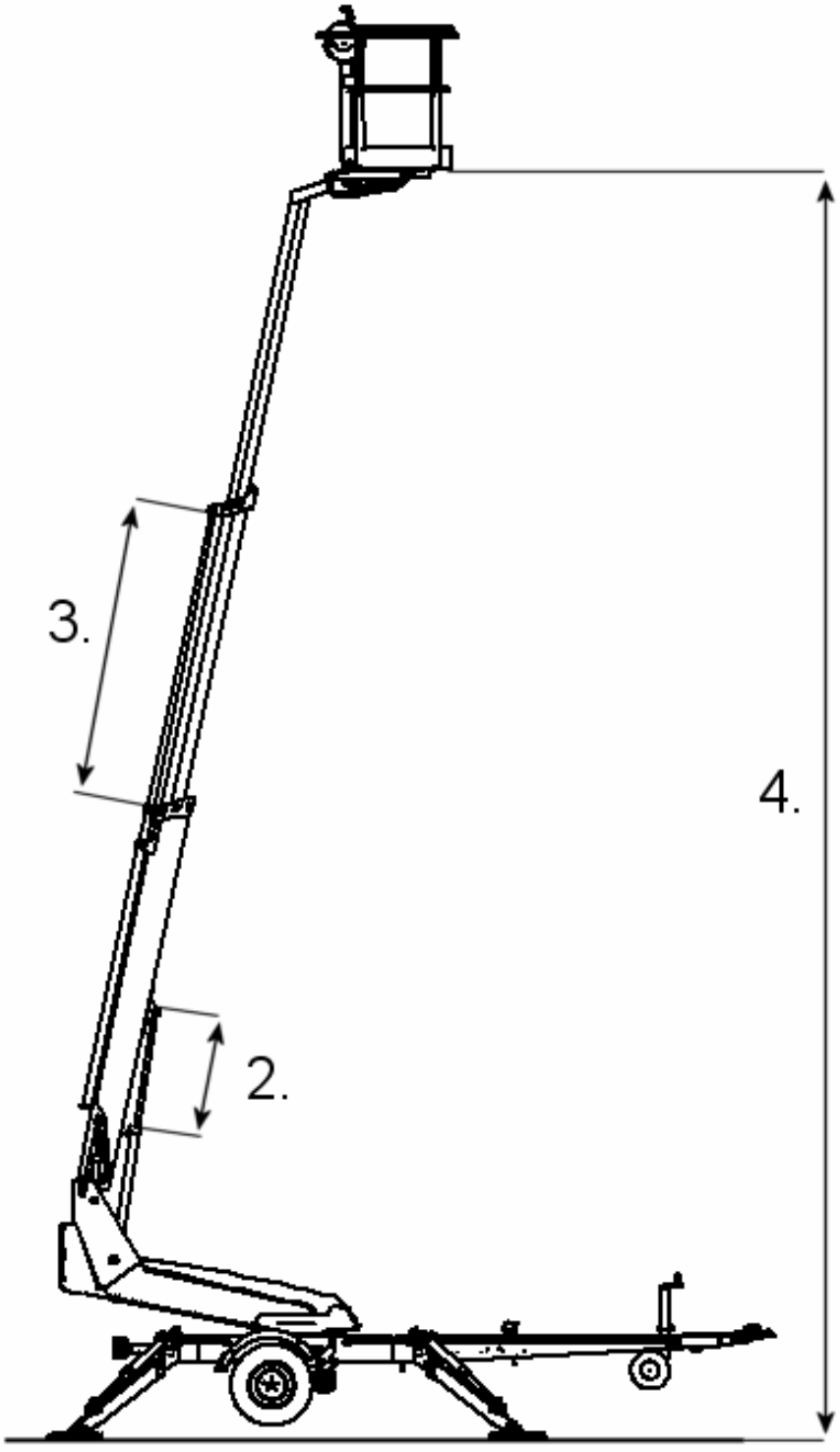
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WHEEL BRAKES AND BEARINGS

Adjustment of the brakes

Jack up the lift until the wheels rise off the ground and support it in this position.

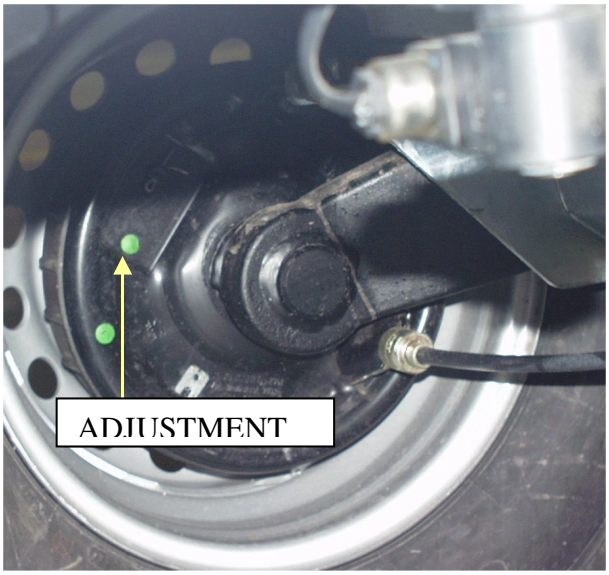
Make sure that the wheels can rotate freely.

The brake rods must be slack (with the handbrake released).

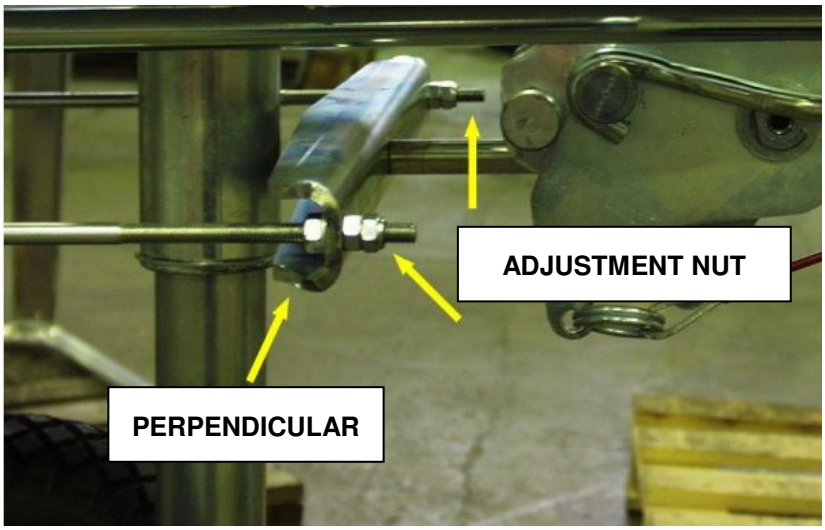
Check the attachment of the brake rods.

Turn the adjustment wheel behind the hole shown by the arrow until the wheel can no longer be turned by hand.

Turn the bolt counter-clockwise until the wheel may be turned freely.



Adjust the braking force with the nuts keeping the brake balancer perpendicular to the tow-bar so that both wheels will brake.



Tightening the brake system too much causes overheating of the brakes during transportation and increases the required towing force.

We recommend performing a braking test after the adjustment. Check the flawless operation by braking 2-3 times in the course of the test run.

Adjustment of the bearing clearance

The wheel bearings are lubricated for life and do not require any service.
(The bearings do not require any lubrication and they cannot be adjusted)

Service intervals

500 km	(running in)
5 000 km	adjustment of the brakes, lubrication of the moving parts of the overrun
13 000 - 15 000 km	or every six months: a) check the brake linings for wear b) check the operation of the overrun brake c) lubricate the sliding parts of the overrun brake

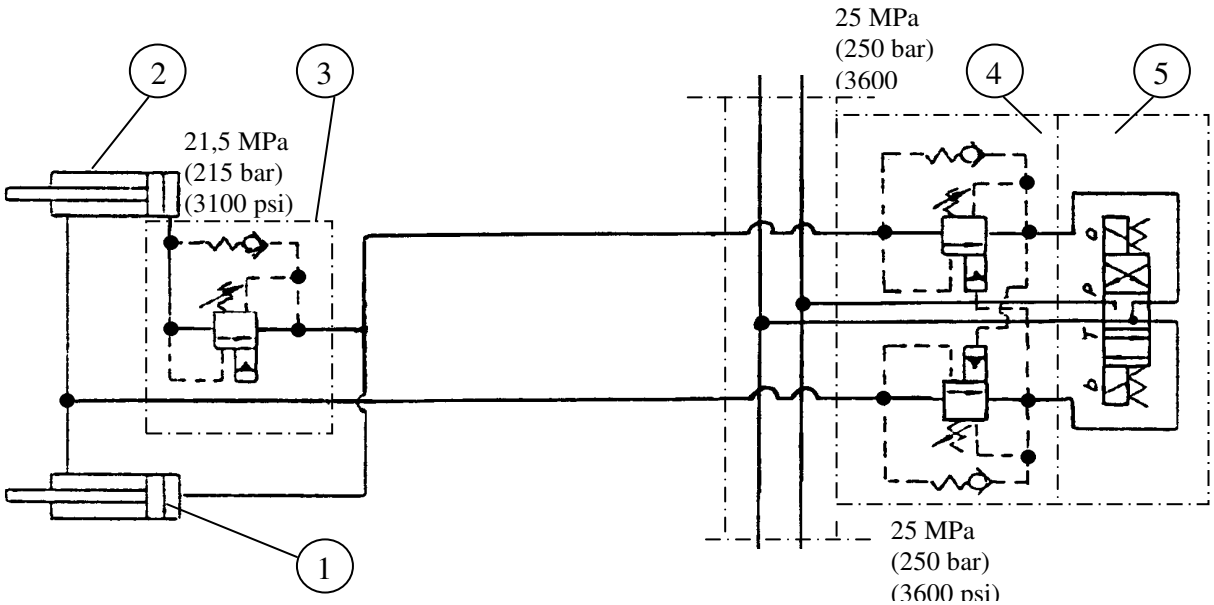
The service-life of the double row angular contact compact bearings is long and they are maintenance-free. Therefore, the bearings very rarely break under normal operating conditions. If a bearing failure, due to exceptional operating conditions, occurs, replace the entire brake drum assembly with the pressed-in bearings and locking nut.

ATTENTION!
Assign a specialized workshop for the work.

Turn the wheels at least once every 3 months to keep the lubricating film intact.

LEVELLING SYSTEM OF THE PLATFORM

- A so-called Slave Cylinder System is applied for levelling of the platform:
  - the slave cylinder under the platform is controlled by a master cylinder
  - the platform keeps its level position only if the valves in the system are tight
  - the levelling system comprises the following parts:



1. Master cylinder
2. Slave cylinder
3. Load regulation valve
4. Double load regulation valve
5. Electric directional valve

- If the platform, viewed by the operator, drifts forwards, the reason can be:
  1) a leak in the slave cylinder double load regulation valve (on the piston rod side) in the direction of the electric directional valve (which is not tight)
  2) an internal leakage in the cylinder

- If the platform, viewed by the operator, drifts backwards, the reason can be:
  1) a leak in the load regulation valve (4) on the piston (bottom) side of the slave cylinder in the direction of the electric directional valve (5) (which is not tight)
  2) an internal leakage in the cylinder

The leak will cause drifting of the platform until the load regulation valve (3) under the platform id closed. The closing is caused by dropping of the pressure on the piston rod side to the opening ratio, which is 5:1

If the valves are not tight, refer to the service instructions in the chapter "load holding and load regulation valves"

Settings of the load regulation valves:

- the opening pressure of the double load regulation valves (4) is 25 MPa (250 bar)
- the opening pressure of the load regulation valve (3) under the platform is 21.5 MPa (215 bar)

Do not change the preset values.

REGULAR SERVICING

The lift shall be serviced regularly at intervals of 11 - 12 month.

Under demanding conditions where moist, corrosive substances or corrosive climate may speed up the deterioration of the structure and induce malfunctions, the inspection must be performed more often and the influence of corrosion and malfunctions must be reduced by using appropriate protective means.

Only technical specialists who are familiar with the structure and the operation of the lift are allowed to maintain the lift.

We recommend turning to the service staff of the dealer.

SCHEDULE FOR REGULAR SERVICING

1. Clean the lift thoroughly before the service

The hydraulic and electric appliances must not be dismantled if they are not clean. Any contaminants in the system may cause malfunctions later on. Wash the lift externally.

ATTENTION! Be careful not to direct the high pressure water jet straight to the electric appliances, such as the control panels on the chassis and on the platform, relays, solenoid valves and limit switches.

- use pressure air to dry the electric devices, hydraulic connectors etc.before opening them
- apply appropriate moisture repellent to the electric appliances after the drying
- always protect the piston rods with e.g. CRC3-36 anti-corrosive agent after washing with a solvent

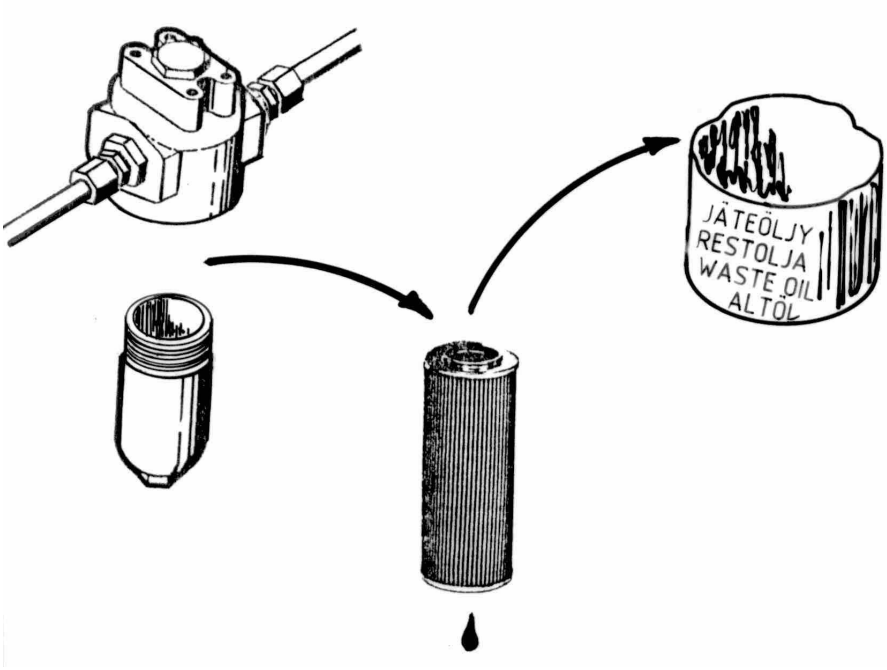
REMEMBER CLEANLINESS!

2. Change the hydraulic oil and replace the filter
(protect your skin against the hydraulic oil)

– remove the plug and drain the oil tank with the cylinders of the lift completely retracted

– clean and rinse the oil tank with suitable agent

– replace the pressure filter



– install the drain plug

– refill the tank with fresh oil, the volume required for change is about 20 litres (factory filling **Mobil DTE 11M**)
  - The viscosity class of the hydraulic oil must be **ISO VG15** and the oil must meet the requirements according to DIN 51524- HLP. Material Safety Sheet EXXON MOBIL n:o 603100-60.

– never mix different oil sorts

– as required, top up hydraulic oil to the level with the upper mark on the dipstick while the lift is in the transport position

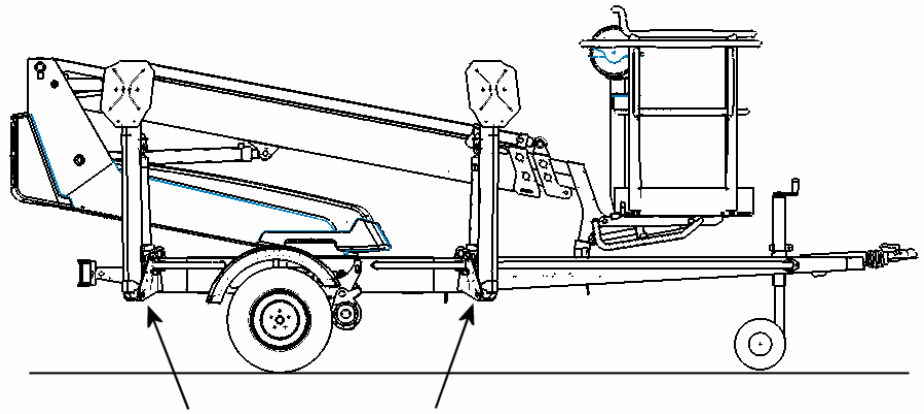
3. Check the hydraulic hoses and pipes

Replace any externally damaged hoses or clashed pipes. Check the connections.

4. Inspect joints of the support outrigger

– lower the outriggers slightly

– swing the outriggers back and forth in the horisontal plane and check the joints for play

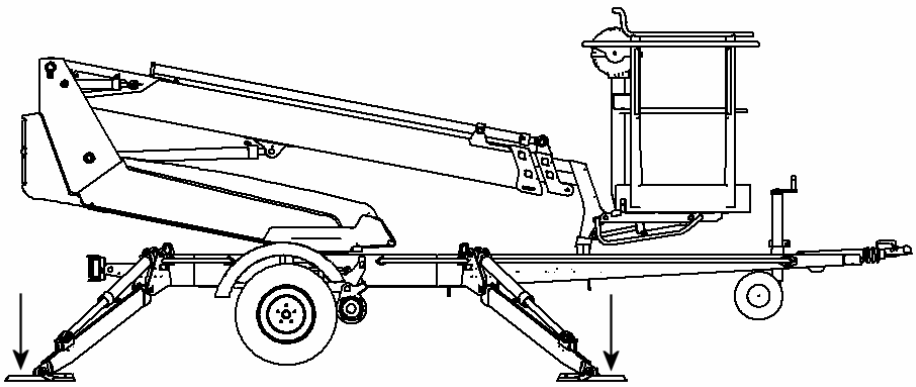


– check the operation and condition of the limit switch mechanisms on the outriggers

– replace any worn out parts

– lubricate the joints (refer to the lubrication plan)

Lower the outriggers to support position.



5. Inspect the cylinders, and lubricate the joint bearings (refer to the lubrication plan).

– drive the lift cylinder to its upper position from the chassis control panel and inspect the condition of the piston rod and tightness of the connections

– drive the lift cylinder to its lower position from the chassis control panel and inspect the connections for tightness

– retract and extend the telescope cylinder from the chassis control panel and inspect the condition and tightness of the cylinder

– lubricate the joints of the lifting, telescope and levelling cylinders

– inspect the outrigger cylinders and lubricate their joints

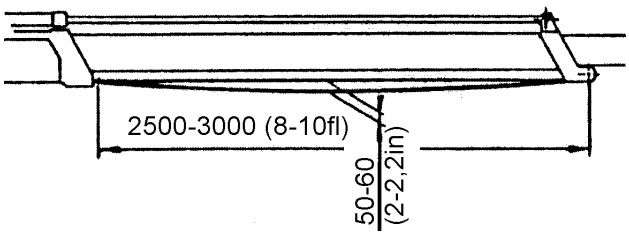
6. Inspection of the boom and the chassis

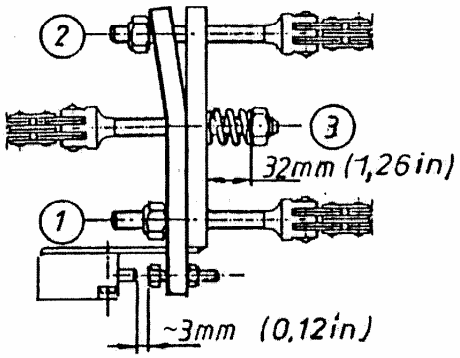
– extend the telescope and inspect the platform and its attachment and the boom

– inspect the boom joints and play of the sliding pads, readjust if necessary. Lubricate the sliding surfaces

– check the condition, locking and adjustment of the Flyer-chains

– secure the attachment to the boom of the unloaded flyer-chain by pulling the chain by hand with the boom fully extended





- inspect the turning device and
  its attachment, lubricate the turning bearing and the gear ring (4 nipples)

ATTENTION! Excess grease pressure may press out the turning bearing seal.

– check the turning bearing play
  Max. allowed axial play is about 1 mm.

– check the attachment bolts of the turning device for tightness: 150 Nm (M12)

If you have to turn open or tighten the attachment bolts, do not forget to use bonding adhesive (tighten crosswise)

– check the chassis and the welded seams on it; especially around the turning device and attachment points of the outriggers

– inspect the outriggers.

– check the tow-bar, in particular its attachment to the chassis

– lubricate the bearings of the boom and outrigger joints

7. Check the overrun

– attachment of the overrun

– clearance

– condition of the tow-ball-coupling

– condition of the locking device

– check that the overrun brake mechanism moves freely:

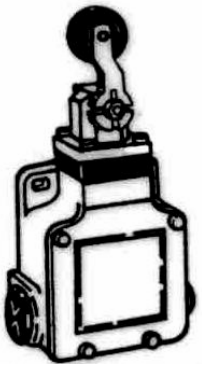
- stop the lift
- push in the tow-ball-coupling with its push rod
- the push rod and the tow-ball-coupling must return to their initial outer position of themselves following the action of the gas cushion of the hydraulic absorber

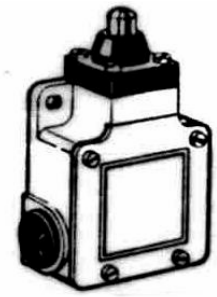
8. Inspection of the axle and suspension

– check the attachment of the axles

– check condition of the rubber absorbers and torsion arms.

9. Inspection of the safety devices





– check the attachment and the external condition of the limit switches

– from the tow-bar (transport position of the platform, RK3)

– support outriggers (RK11, RK12, RK13 and RK14)

– boom (RK7)

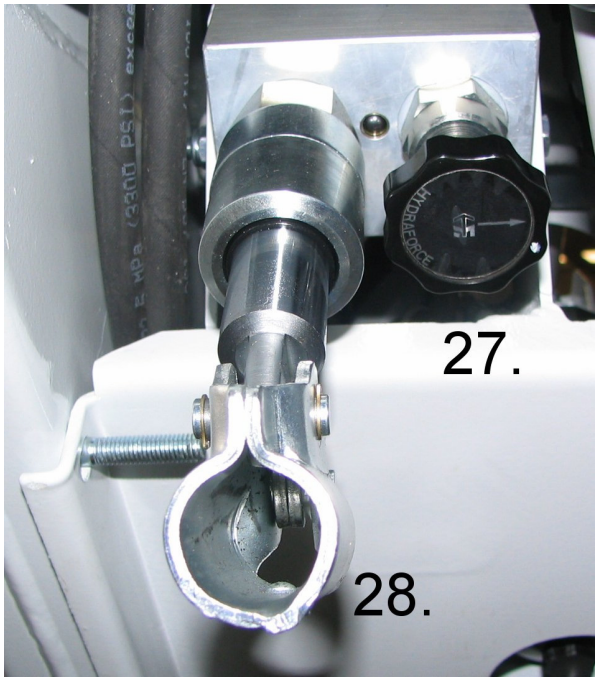
– check the condition of the retraction chains (see point "Operation of safety devices")

10. Operation of the safety devices while they are controlled from the chassis control panel

- lift the platform slightly up from the transport position
- the outriggers must not operate in any position of the selector switch

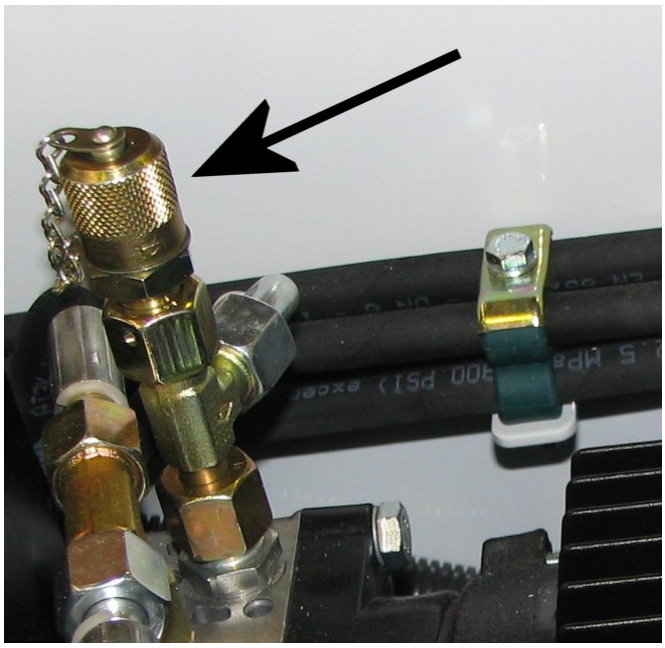
- while the support outriggers are in their upper position
- the boom must not operate in any position of the selector switch

- lift the boom and test the following:
    1. emergency stop (5)
    2. emergency descent; retract the telescope by turning the emergency descent lever (27) clockwise and pumping with the hand pump (28)
    3. emergency descent; lower the boom by turning the emergency descent lever (27) counter-clockwise and pumping with the hand pump (28)
    4. close the emergency descent valve by turning the lever 27 to its centre position



11. Measuring the pressure

- connect the pressure gauge to the measuring point



– the max. pressure of the warm (40 - 60 °C) oil is 21 -21.5 MPa (210 -215 bar)

– the turning pressure is 6 MPa (60 bar)

– if you have to readjust the pressure, secure the new setting with a seal.

12. Check the operating controls on the platform

– check the overall condition of the electric appliances inside the box and spray with moisture repellent, if necessary
– check the cables
– test the sound signal (19) and the emergency descent (20)
– test all movements

13. Warning signs and adhesives

- make sure that all warning signs and adhesives are legible, replace if necessary

14. Inspect the brakes and the driving device

– remove the wheels

– clean the brake system and check the settings

– check the free movement of the brake shoes the operation of their return springs

– replace any worn out linings

– check the condition of the driving device and lubricate the joints

– put the wheels in place and tighten the wheel bolts
Re-check the tightness of the wheel bolts after about 100 km drive (90 Nm).

– check the tyre pressure: 270 kPa (2.7 bar) on the rear axle
250 kPa (2.5 bar) on the jockey wheel

– check the free movement of the overrun brake and the parking brake

– check the safety wires

15. Check the condition of the lights and the reflectors

16. Repeat the anti-corrosion treatment using e.g. Tectyl 210R anti-corrosion agent

17. Test-run with a load of 120 kg following the loading instructions.
Check the structures after the test-run.

18. Draw up a test protocol, save your own copy and give the other copy to the customer

INSPECTION INSTRUCTIONS

All lifting equipment and lifting gear used at a construction site must always be inspected before use. The lifts and related lifting gear used on a work site shall be subjected to a regular maintenance inspection; if possible once a week. (VNp 629/94, 11§, 12§, 13§ ja 14§)
Keep a journal of any notable shortcomings and defects observed and advise the foreman of them.

FIRST INSPECTION

The initial inspection and test loading of the Dino access platforms is performed by the manufacturer. A protocol which accompanies the lift is drawn up of the inspection.

DAILY INSPECTION (START-UP INSPECTION)

To be always performed at a new work site and in the beginning of every working day.
The inspection is performed by the user.
In the inspection attention shall be paid to the following issues:

– establish the load-bearing capacity of the ground (see point "Start-up and ground stability")

– verify the standing stability of the lift

– control the due operation of the position indicator

– test the operation of the emergency stop system both from the platform and the chassis control panels.

– test operation of the emergency descent system

– test the alarm signal

– check signal light for outrigger limit-switches (11)

– check the operation and cleanliness of the lights and reflectors

– check the condition of the operating controls and test all work movements

– check the condition of the access routes, the platform gate and the handrails

– check the limit switches, which prevent the operation of the boom movements (refer to the service instructions)

– check the limit switch, which prevents the operation of the outrigger (refer to the service instructions)

– check the hydraulic system for tightness

– test the brakes

– check the unit visually

– observe the location of nearby power lines (see point "General safety regulations")

– check the condition of the retraction chains (see point "Operation of safety devices")

MONTHLY INSPECTION (MAINTENANCE INSPECTION)

The inspection shall be performed by a person who is well familiar with the lift. Task list for inspection:

- perform the measures of the A2478daily inspection
- check the attachment points of the boom and the platform
- check the operation and condition of the platform levelling system
- perform visual inspection of the load-bearing structures
  - chassis
  - turning device
  - telescope (fully extended)
  - support outriggers and their joints
- welded seams for cracks, corrosion or breaches
- are the possible repair weldings duly executed
- check that the platform does not "drift" (refer to the service instructions)
- check that the outriggers do not "drift" (refer to the service instructions).
- hydraulic oil level
- check the electro-hydraulic rotating adaptor for leaks and seizures
- check the tyres and the tyre pressure
- check the wheel bolts and rims
- check the turning gear play
- check the operation of the driving device
- check the condition and attachment of the electric wires
- check the condition of the overrun
- make sure that all signs, warnings and pictorials for operating controls and control equipment are in place, in good condition and clean.
- check that the lift is clean all over

ANNUAL INSPECTION (REGULAR INSPECTION)

The inspection shall be performed by a skilled technician or an expert inspection body with documented evidence of competence according to requirements presented under point "Inspections" . In the inspection special attention has to be paid to the condition of the steel structures, the safety devices and the operating system.

Clean the lift before the inspection

The inspection incorporates the following measures and checks:

- perform the measures of the daily and monthly inspection

- inspect thoroughly the hydraulic system

  - power unit
    - connect the pressure gauge to the measuring point in the hydraulic system
    - operate the "telescope in" movement at the speed-II at its end position to make the oil flow through the relief valve
    - observe the pressure reading in the gauge; when the oil is warm the pressure should be 21 - 21,5 MPa (210 -215 bar)

  - load-holding check-valves on the outriggers
    - lift the device off the ground with the outriggers and measure the distance to the chassis at each outrigger
    - step on the platform and extend the telescope keeping the boom level
      Turn the boom round a few times, stop at the initial position and check that the distance between the ground and the outriggers has not changed.
    - lift the outriggers from the ground and leave them in this position for about 10 minutes
      Observe that the outriggers do not lower of themselves.

  - load-holding check-valve on the lift cylinder
    - lift the boom from the chassis control panel to an angle of about 45° and extend the telescope
      Observe about 10 minutes that the boom does not lower of itself.

  - load regulation valve of the telescope cylinder
    - lift the boom from the chassis control panel and extend the telescope slightly; leave it in this position for about 5 minutes
    - make sure that the telescope does not retract of itself

  - load regulation valve of the levelling system
    - put a load of about 80 kg on the platform
    - lift and lower the boom 4 - 5 times
    - make sure that the position of the platform does not change

  - electric directional valves
    - operate all boom and turning movements and check that they all work properly and that the movements stop as soon as the levers are released

- manually operated directional valves
    - check that the valves of the support outriggers and the driving device work properly and no movements are executed when the spools are in the neutral position

- electro-hydraulic rotary adaptor
    - check the adaptor for tightness
    - check that the lever arm neither seizes nor is loose

- cylinders
    - lower the outriggers to support position and check the condition of piston rods and wiper rings
      Check the cylinders for external oil leaks.
    - lift the boom to its upper position and check the condition of the piston rod and the wiper ring of the lift cylinder
    - check the condition of the piston rod and wiper ring of the master cylinder in the slave cylinder system.
    - lower the boom and check the condition of the piston rod and wiper ring of the slave cylinder under the platform

- hoses
    - check the hoses for leaks and chafing

- pipes
    - check that there are no dents, leaks, trace of corrosion or chafing at the clamps
      Check that the pipes are properly fastened.

- connections
    - check the hose and pipe connections for leaks

- inspect thoroughly the electric system
    - check that the control panel boxes are dry, clean and tight.
    - check the condition of the cable connections and their protection against moisture
    - check the condition and attachment of the limit switches
    - check the limit switch lead-throughs for tightness
    - check the connections of the electric valves
    - check the connections of the solenoid valves
    - perform visual inspection of all electric wiring
    - check the condition of the mains cable plug
    - check the condition of the electric motor.
    - check the operation of the fault current switch

- check the attachment points of the hydraulic cylinders
    - check the condition of the bearings and pins of the outrigger cylinders and the locking of the pins
    - check the condition of the lifting cylinder bearings and pins and the locking of the pins
    - check the condition of the telescope cylinder bearings and pins and the locking of the pins
      Check the condition of the gas springs
    - check the condition of the master and slave cylinder bearings and pins and the locking of the pins

- check the condition of the boom joint
    - check the bearing and the pin of the boom joint and the locking of the pin

- check the support outriggers and their footplates
    - check the mechanical structure of the outriggers and the welded seams
      The structures must not show signs of deformations or cracks No fractures or cracks allowed in the welded seams.
    - check the footplates for deformations, cracks or breaches
      Also check that the footplate can turn freely on its joint.

- inspect the boom.
    - extend the telescope and check that there are no permanent deformations, dents or traces of substantial wear in the boom
    - also check the welded seams for wear, cracks or breaches
    - check the boom attachment for cracks or breaches
    - check the condition of the platform brackets
    - check the locking of the platform pin
    - check the condition and attachment of the flyer-chain, the locking of the pins and the tightness of the spring
    - check the condition of the cable chain, its clamp brackets as well as the tightness of the screw connections
    - check the play and attachment of the gliding surfaces on the boom.

- inspect the platform
    - general condition
    - check that the platform does not show signs of deformations, substantial wear or buckles
    - check that the handrails, the steps, the gate and the attachment of the gate are in order
    - check the condition of the platform floor plate
    - check the platform carrier for notable buckles or deformations

- check all protective covers
    - check the condition of the slave cylinder guard
    - check the condition of the boom end cover, turning device covers, chassis control panel cover, safety device cover, platform control panel cover and the rear light cover

- perform visual inspection of all screw connections

- inspect the turning device
    - general condition
    - check the play and attachment of the angular gear
    - check the condition of the gear ring
    - check the play of the turning gear
    - check the attachment screws of the turning bearing for tightness to 150 Nm (M12)
    - check the attachment of the turning motor

- check the condition of the chassis
    - general condition
    - check the attachment of the tow-bar to the chassis
    - check the condition of the overrun and its attachment to the chassis.
    - check the axle and its attachment to the chassis
    - check the attachment and condition of the brake wires and rods
    - check the rims, the tightness of the wheel bolts, the tyres and the tyre pressure
    - check the condition of the driving device, attachment of the parts and condition of the covers for electric components
    - check the condition of the transport support of the boom

- perform a test run, test all operating controls, control the outreach with a load of 120 kg on the platform

- also check the operation of the limit switches during the test run (refer to the service instructions)
    - the limit switches on the outriggers, which prevent the operation of the boom movements
    - the limit switches on the tow-bar, which prevent the use of the outriggers

- after the test-loading and test drive make sure that the steel structures or other loaded parts do not show signs of structural defects, such as fractures or dangerous permanent deformations

- draw up a protocol of the regular inspection with following articles:

    1. inspection form
    2. data of repair welds
        a) date of repair
        b) repaired by whom
        c) what was repaired

- as the machine is ready for operation after the annual inspection, mark the inspection date on the inspection plate affixed to the lift

EXTRAORDINARY INSPECTION (INSPECTION AFTER AN EXCEPTIONAL SITUATION)

The inspection is required if the lift has been damaged in a manner which may affect its load-bearing capacity or safe operation.

- thus the lift shall be inspected according to the instructions for the start-up inspection
- perform a test-loading with an overload of 25 % and a stability test of the lift
- a protocol shall be drawn up for the inspection

TEST LOADING INSTRUCTIONS FOR REGULAR INSPECTION

1. Place the lift on an even surface with good carrying capacity. Drive the outriggers to their lowest position (the minimum support width).

2. Turn the boom to the side from the tow-bar and lower it on the ground.

3. Put a weighed load of 120 kg onto the platform.

4. Lift the boom to as high as it goes and extend the telescope to its full length (maximum lifting height).

5. Lower the boom to a horizontal position (maximum outreach).

6. Turn the boom round over 360° and establish the standing stability.

7. Retract the telescope and lower the boom.

After the above mentioned test loadings and the subsequent inspection have been completed without finding any defects in the structure or stability of the lift, the lift may be used provided that the reach and platform load restrictions, presented in the reach/platform load chart of this manual, are observed.

The max. allowed platform load is 120 kg

- in conjunction with the first, i.e. start-up inspection, the lift shall be subjected to a test loading with an overload of 25% and after that the supporting structures shall be thoroughly inspected

- In conjunction with the annual inspection the lift shall be subjected to a regular inspection, a test-run and a test loading with maximum permissible load and a thorough inspection of the supporting structures

- the first inspection shall be recorded in the start-up inspection protocol - the test runs shall be recorded in the protocols for the annual and regular inspection

FAULT FINDING

FAULT	REMEDY

1. The electric motor does not start from the start button although the selector switch is in position 1b or 1c

Emergency stop button is stuck.	Pull up the button and re-start the engine with the start button.
One of the fuses F1, F2 or F3 has blown.	Replace the fuse (10A).
No mains supply (230VAC) to the selector switch.	Check the extension cords, possible distribution boards and fuses.
The fault current safety switch has tripped.	Reset the fault current safety switch.
Voltage supply to the switch OK, but no transmission forward.	Check the operation of the selector switch and replace it, if necessary.
The power supply voltage both comes to the selector switch and is fed further.	Check the operation of the engine control contactor and thermo-relay as well as the operation of the relays which control the operation of the contactors.
Telescope chain limit switch RK7 has disconnected the contactor circuit.	Check the operation of the RK7 and readjust as instructed under point "Inspection of the boom and the chassis".

2. None of the platform movements operate though the electric motor is running and the selector switch is in position 1b or 1c

Green signal light for outriggers is not lit.	Check operation of the safety limit switches RK11, RK12, RK13 and RK14.
The green signal light for the outrigger limit switches is lit, but the boom movements do not operate.	Check the operation of the safety relay SR2 for the outrigger circuit.

Check, whether the fault is in the electric system or in the hydraulic system.

3. Support outriggers do not move

Boom does not rest on the transport support.	Drive the boom onto the transport support.
The selector switch is in wrong position.	Turn the selector switch to position 1b.
Limit switch on the boom support is not closed.	Drive the boom onto the transport support and check the operation of the limit switch RK3.

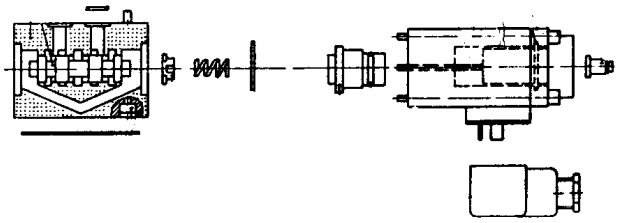
FAULT	REMEDY

4. The power supply to the lift is not switched on although the selector switch is in position 1b or 1c

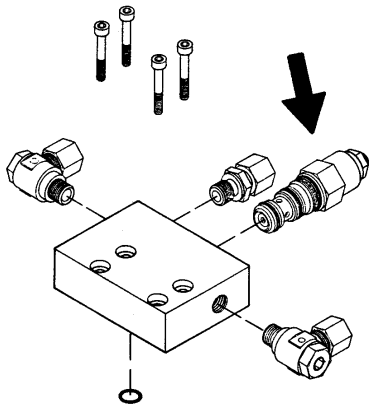
Activation of power supply not completed.	Press the start button to activate the power supply.
One of the fuses F1, F2 or F3 has blown.	Change the fuse an press the start button.

Check, whether the fault is in the electric system or in the hydraulic system.

5. Disturbance of platform movements - only one of the movements is operational

Irregular and indefinite malfunctions. 	Make sure that the hydraulic oil and the filter have been changed. Thoroughly clean the solenoid valve spools and housings (requires utmost cleanliness - not all contaminants can be spotted with the naked eye). Also temporary contact failures in the joysticks may cause malfunctions. Spray with moisture repellent.

6. Boom drifts slowly downwards

"lock valve" i.e. the pressure activated check valve is leaking. 	Remove and clean the valve. Check the condition of the o-rings. Install the valve carefully - the correct tightening torque is 60 Nm. If necessary, replace the valve.

FAULT	REMEDY

7. Boom cannot be lifted

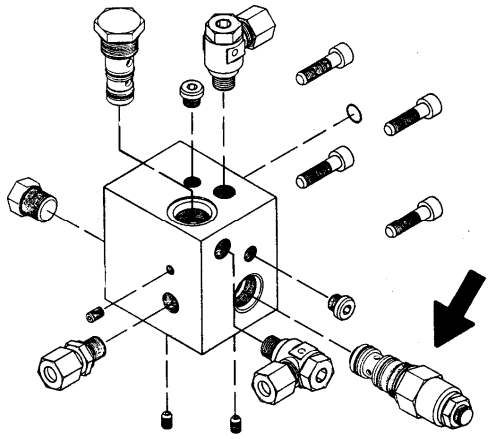
	Refer to item 5. Electric valve open. Remedy as instructed above in conjunction with the seizure of the electric valve spool.
Lifting of the boom makes the lift turn.	Solenoid valve is stuck in turning position. Wash carefully the spool and the block.

8. Telescope movement does not operate

	Refer to item 5. Check that the solenoid valve of the telescope is not stuck in the centre (open) position.

FAULT	REMEDY

9. Telescope slowly retracts



Load regulation valve is leaking.	For remedy, refer to item 6 (lock valve).

10. Platform drifts backwards

Double load regulation valve on the bottom side is leaking.	For remedy, refer to item 6 (lock valve).
Load regulation valve under the platform is leaking.	For remedy, refer to item 6 (lock valve).

11. Platform drifts forward

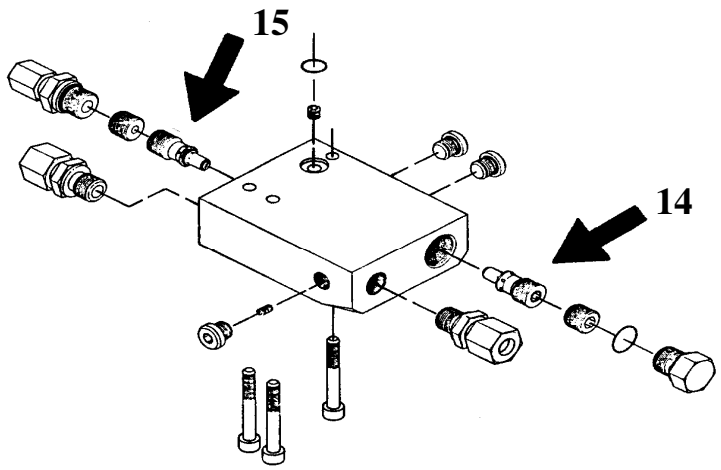
Double load regulation valve on the rod side is leaking.	Measures as above.

12. Support outriggers do not operate though the selector switch is in position 1b

Boom does not rest on the transport support.	Drive the boom onto the support.
Electric valve for movement of boom/outriggers does not operate (jams in the centre position).	For remedy, refer to item 5.

13. Outrigger does not stay in the support position (see illustration)

The load regulation valve on the bottom side is leaking.	For remedy, refer to item 6 (lock valve). Tightening torque 55 Nm.



FAULT	REMEDY

14. Outrigger does not stay in the transport position (see illustration)

Load regulation valve on the rod side is leaking.	Measures as above.

15. Driving device does not operate though the selector switch is in position 1b

Boom does not rest on the transport support.	Drive the boom onto the support.
Electric valve for movement of boom/outriggers does not operate (jams in the centre position).	For remedy, refer to item 5.

16. Too low braking force

Too much play in the brake system.	Adjust the brake system (see point "Adjustment of the brakes").
Brake linings not yet run-in.	Pull the parking brake lever slightly and drive 2 - 3 kilometres.
Brake-shoes "glazed", dirty or oil on the friction surfaces.	Replace the brake-shoe sets. Clean the friction surfaces of the brake drum.
Overrun brake jams.	Lubricate.
Brake rod jammed or bent.	Repair.
Brake wires rusty or broken.	Replace wires.

17. Braking uneven and jerky

Too much play in the brake system.	Re-adjust the brake system (see point "Adjustment of the brakes").
Shock absorber of the overrun device faulty.	Replace the shock absorber.
Reverse automatics - brake-shoe jams in the carrier.	Replace the brake-shoe in the carrier.

18. The brakes drag (only one of the wheels brakes)

Brake units wrongly adjusted.	Readjust the brake units according to instructions. Also refer to point 17 for possible cause.

19. Lift brakes as the engine speed is decreased

Shock absorber of the overrun device faulty.	Replace the shock absorber.

20. Reversing forced or impossible

Brakes have been adjusted too tight.	Adjust the brake system (see point "Adjustment of the brakes").

FAULT	REMEDY

21. Wheel brakes overheat

Brake system wrongly adjusted.	Adjust the brake system (see point "Adjustment of the brakes").
Wheel brakes dirty.	Clean the wheel brakes.
Overrun brake - force transmission lever jams.	Dismantle, clean and lubricate the transmission rod.
Parking brake not completely released.	Release the parking brake completely.

22. Ball-coupling is not locked

Inner parts of the ball-coupling dirty.	Clean and lubricate.
Tow-ball of the towing vehicle too large.	Measure the tow-ball. According to DIN74058 the diameter of the ball must be max. 50 mm and min. 49.5 mm. If the measure is different or the ball is nor perfectly spherical, it must be replaced.

Always, when you change brake-shoes, replace all shoes on the axle.
Always when assembling the brakes make sure to install the springs, the brake-shoes and the expander in the right way.
When adjusting the brakes, turn the wheels forward (in driving direction)!

Naturally the possible reasons for malfunctions are many, but the following are the most common:

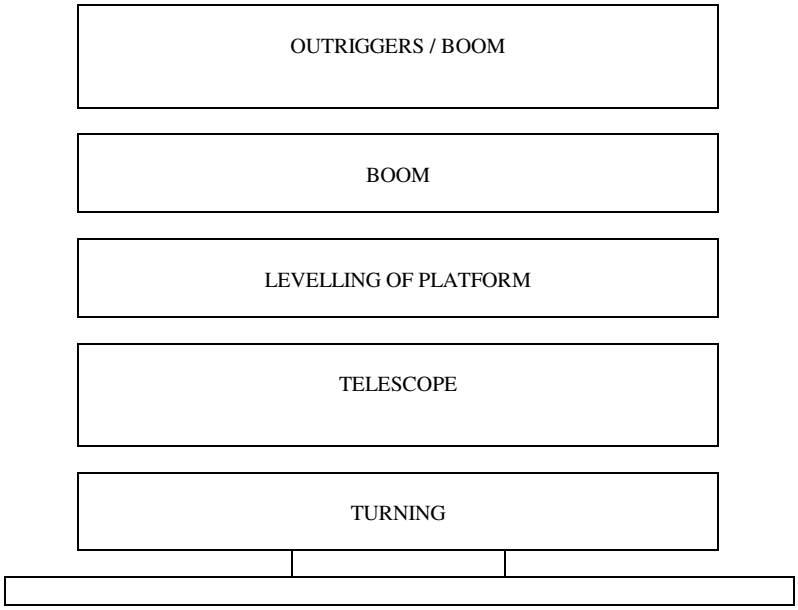
- low supply voltage (long and thin supply cable)
- contaminants in the hydraulic system
- loose electric connection or a contact failure caused by moisture

KEEP THE LIFT CLEAN AND PROTECT IT AGAINST MOISTURE

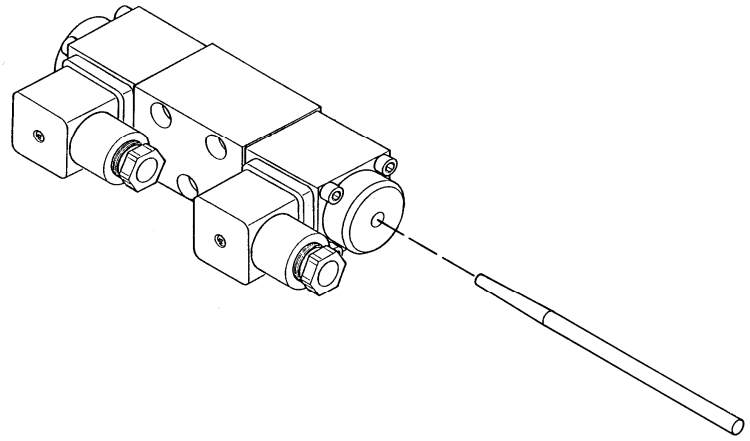
GENERAL INFORMATION OF HYDRAULICS

The movements require simultaneous operation of two electric valves, i.e:

- change-over valve and boom
- change-over valve and platform
- change-over valve and telescope
- change-over valve and turning



Press the pin at the end of the electric valves.



If the movements operate, the fault is in operating controls of the electric system or the valve spools are dirty, which causes jamming (refer to fault finding scheme, item 4).

If none of the movements operate, the fault is in the hydraulic system.

Notes

ELECTRIC COMPONENTS
120001 ->

CHASSIS CONTROL CENTRE (LCB), RELAYS

K1: START CONTACTOR (M1) OF THE ENGINE
Control circuit fuse F1 10A

K2: AUXILIARY RELAY FOR EMERGENCY STOP SWITCH
Switches off the mains supply (230VAC).
Control circuit fuse F1 10A

K23: DEAD-MAN-SWITCH RELAY
Switches off power supply to the selector switch for the boom unless the speed selector and the boom movement are activated.

K34: TIME-DELAY RELAY FOR ELECTRIC MOTOR
Switches off the electric motor in 4 seconds after the operation from the platform panel has been finished.

K53: TIME-DELAY RELAY FOR SWITCHING ON THE II-SPEED
Switches on the II-speed with a delay of 1 second after activation of the movement.

SR2: SAFETY RELAY WHICH MONITORS THE OPERATION OF OUTRIGGERS
The safety relay resets as soon as all outrigger safety limit switches (RK11, RK12, RK13 and RK14) have closed. After that it is possible to operate the boom.

SR4: SAFETY RELAY FOR EMERGENCY STOP CIRCUIT

CHASSIS CONTROL CENTRE (LCB), SWITCHES

S1: LOCKING EMERGENCY STOP SWITCH.
Stops all other functions except the emergency descent and the sound signal, which remain operational.

S2: START SWITCH
Controls the contactor of the electric motor and start solenoid of the combustion engine if the combustion engine is used.

S3: STOP SWITCH
Disconnects the control voltage from the control contactor of the electric motor and the stop relay of the combustion engine.

S16: TURNING OF THE BOOM TO THE RIGHT - LEFT
Non-locking lever switch (chassis control panel).

S17: BOOM UP-DOWN
Non-locking lever switch (chassis control panel).

S18: TELESCOPE IN-OUT
Non-locking lever switch (chassis control panel).

S20: PLATFORM LEVELLING FORWARD-BACKWARD
Non-locking lever switch (chassis control panel).

CHASSIS CONTROL CENTRE (LCB), OTHER ITEMS

F1: 10 A FUSE FOR START CIRCUIT AND EMEREGENCY DESCENT CIRCUIT

F2: 10A FUSE FOR CONTROLLING THE BOOM MOVEMENTS

F3: 10A FUSE FOR CHASSIS AND SELECTOR VALVES

F11: 10A FUSE FOR SOCKET OUTLETS

H3: GREEN LED SIGNAL LIGHT
Indicates the operation of the outrigger limit switches RK11-RK14.

HM1: HOUR METER
Measures the running hours of the machine.

Q1: TURN SWITCH WITH KEY
Selector switch for choice of operating location.
1a = Off
1b = chassis control panel
1c = platform control panel

U1: VOLTAGE METER
When the control voltage is switched on, the voltage meter reading indicates the value of alternating voltage.

PLATFORM CONTROL CENTRE (UCB), SWITCHES

DMK: DEAD-MAN-SWITCH

JST: JOYSTICK
Movements of right-hand joystick: boom up - down and turn right - left)
Movements of left-hand joystick: telescope out - in.

S4: LOCKING EMERGENCY STOP SWITCH
Stops all other functions except the emergency descent and the sound signal, which remain operational.

S10: SOUND SIGNAL SWITCH

S12: PLATFORM LEVELLING FORWARD-BACKWARD
Control switch, non-locking lever switch.
The levelling is operated by pressing the button S29 and tuning the lever switch S12.

PLATFORM CONTROL CENTRE (UCB), OTHER ITEMS

PR: SOCKET OUTLET ON THE PLATFORM 230VAC 16A.

LIMIT-SWITCHES

RK3: LIMIT SWITCH FOR THE BOOM SUPPORT

Prevents the operation of the outriggers and the driving device if the boom does not rest on the support in the transport position.

RK7: SAFETY LIMIT SWITCH FOR THE TELESCOPE CHAIN.

Operation of the safety limit switch stops the electric motor. The limit switch switches off the control voltage to the contactor K1 after which only the emergency descent unit will operate.

RK11 - RK14 **:** LIMIT SWITCHES ON THE OUTRIGGERS

The limit switch closes as soon as sufficent force is exerted on the outrigger.
Prevents the operation of the boom unless the outriggers are not firmly supported on the ground and all limit switches are not closed.

OTHER MARKINGS

J1: PLUG

M1: ELECTRIC MOTOR 230VAC 1.5kW

PL: ROTARY ADAPTOR

The electric circuits between the chassis and the turning device go through the electric rotary adaptor.

T1: POWER SUPPLY

Feeds the 12 VDC control voltage to the system as the machine is being powered by AC-supply.

VVK: FAULT CURRENT SWITCH 25A 30 ms.

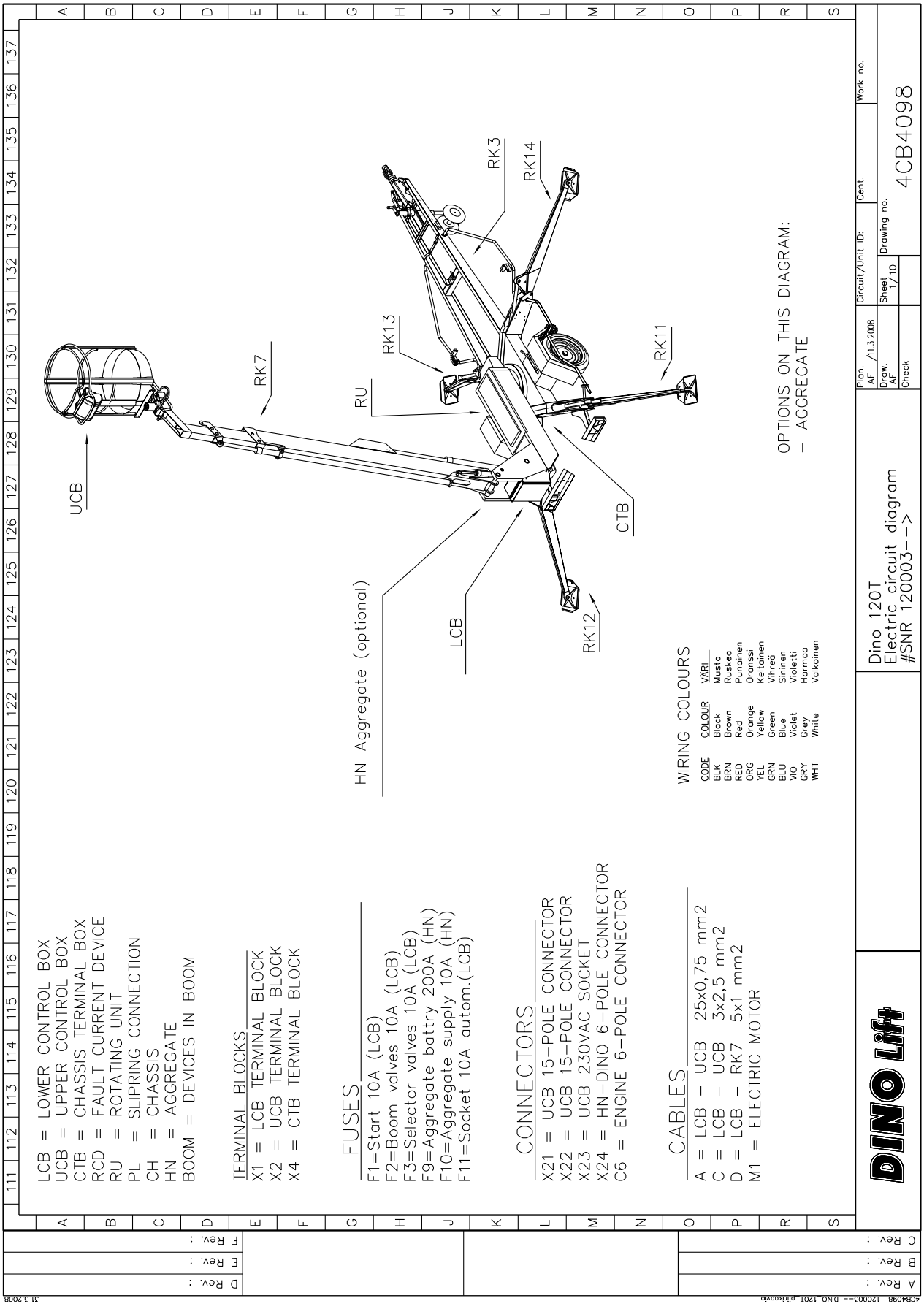
ÄM1: SOUND SIGNAL

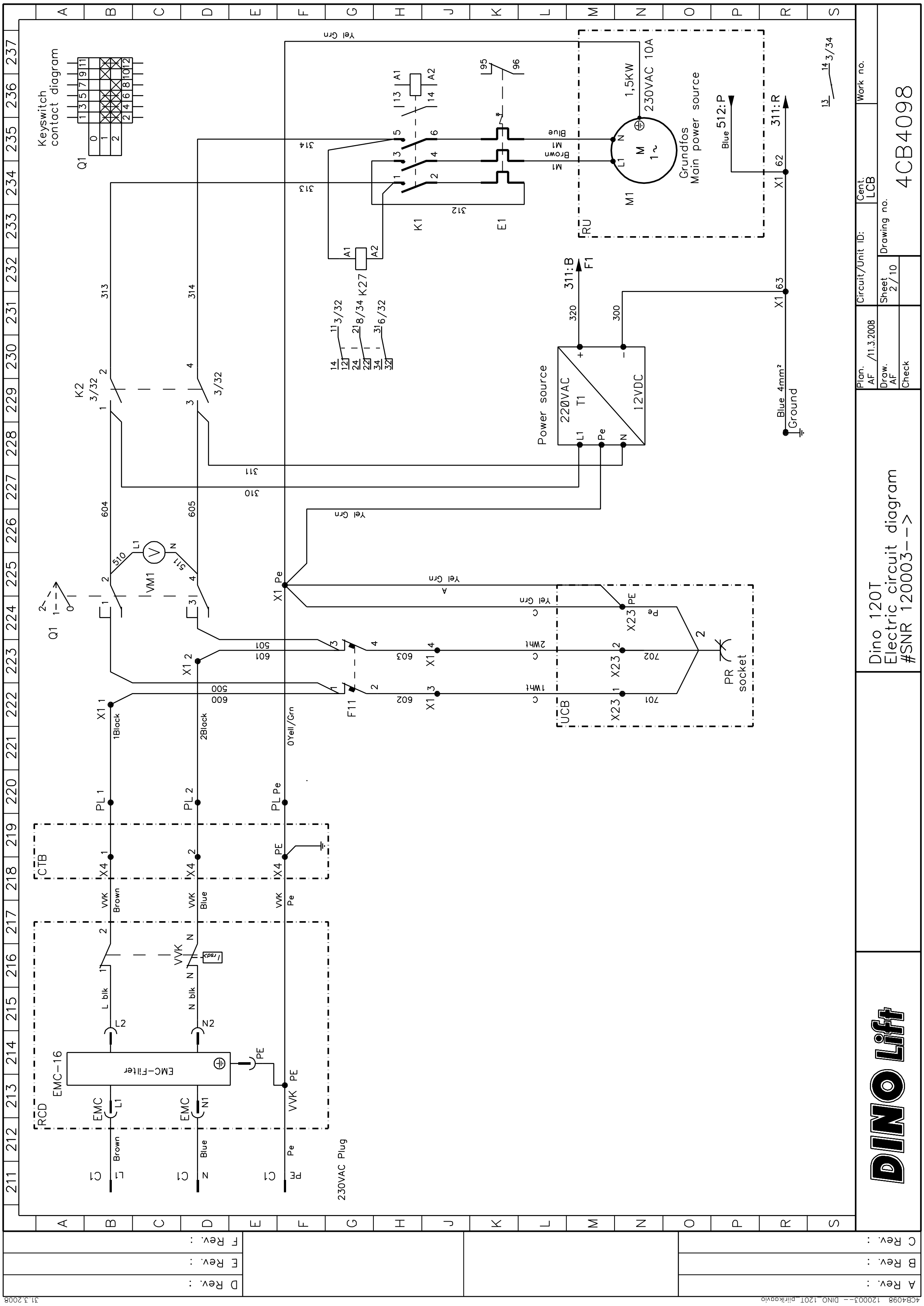
ELECTRIC COMPONENTS 120T 120003 ->

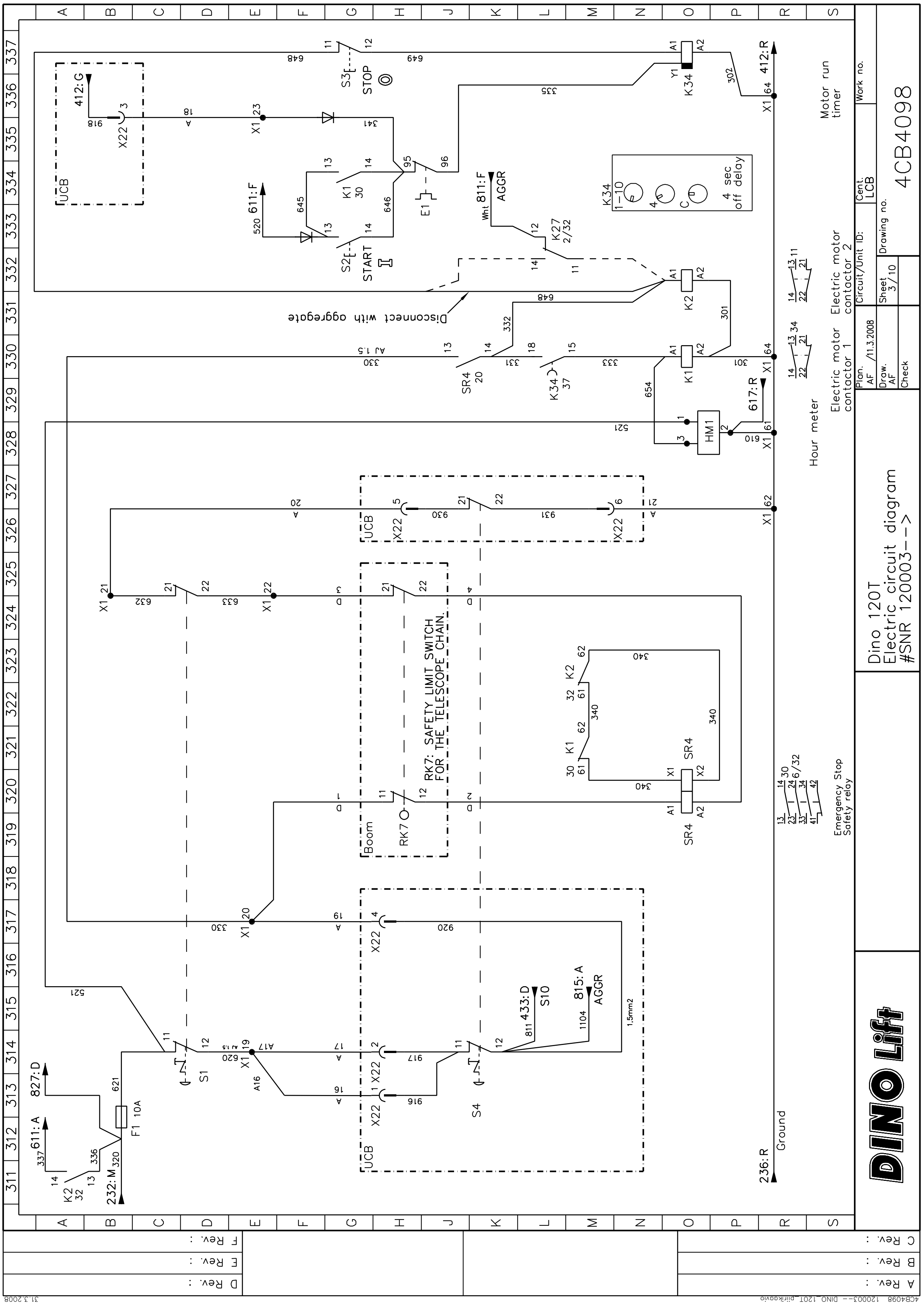
ID	POSITION	DESCRIPTION	DESCRIPTION OF OPERATION
C1	CH	Plug	1-phase plug for 230VAC supply voltage
E1	LCB	Thermorelay	230VAC for electric motor
EMC-16	CTB	Interference elimination filter	230VAC for supply voltage
F1	LCB	10A Fuse	Emergency stop circuit
F11	LCB	10A Fuse	Automatic fuse for socket outlets on platform
F2	LCB	10A Fuse	Control of boom movements
F3	LCB	10A Fuse	Safety and selector boom/chassis
H3	LCB	Signal light	Support outrigger circuit, green
HM1	LCB	Hour meter	Electric motor, hours of operation
K1	LCB	Contactor	230VAC, electric motor
K17	HN	Relay	12VDC, control of exciting current for power unit
K2	LCB	Contactor	Emergency stop
K20	HN	Relay	12VDC, control of power unit choke
K23	LCB	Relay	12VDC, Dead-man-switch operation
K27	LCB	Relay	Selection of 230VAC/power unit operation
K34	LCB	Relay	Time-delay relay for 230VAC power unit operation with platform control
K41	HN	Relay	Prevention of power unit usage while 230VAC supply voltage is connected, 12VDC
K42	HN	Relay	Starting of power unit, 12 VDC
K53	LCB	Relay	Time-dealy relay for switching on the II-speed, 12VDC
M1	RU	Electric motor	230VAC
PL	RU	Rotary adaptor	Rotary adaptor between the superstructure and the chassis
PR	UCB	Socket outlet	230VAC on platform
Q1	LCB	Key-switch	Main switch and choosing the operating location
RK11	CH	Limit switch	Support outrigger
RK12	CH	Limit switch	Support outrigger
RK13	CH	Limit switch	Support outrigger
RK14	CH	Limit switch	Support outrigger
RK3	CH	Limit switch	Boom support
RK7	BOOM	Limit switch	Supervision of boom chains
S1	LCB	Mushroom-shaped button	Emergency stop
S10	UCB	Pushbutton	Sound signal
S12	UCB	Lever switch	Levelling of the platform
S15	LCB	Turn switch	Speed selector and dead-man-switch
S16	LCB	Lever switch	Turning the boom
S17	LCB	Lever switch	Lifting the boom
S18	LCB	Lever switch	Telescope
S2	LCB	Pushbutton	Motor start, 230VAC
S20	LCB	Lever switch	Levelling of the platform
S23	UCB	Turn switch	Speed selector and dead-man-switch
S24	LCB	Pushbutton	Control of driving device
S25	LCB	Pushbutton	Control of driving device

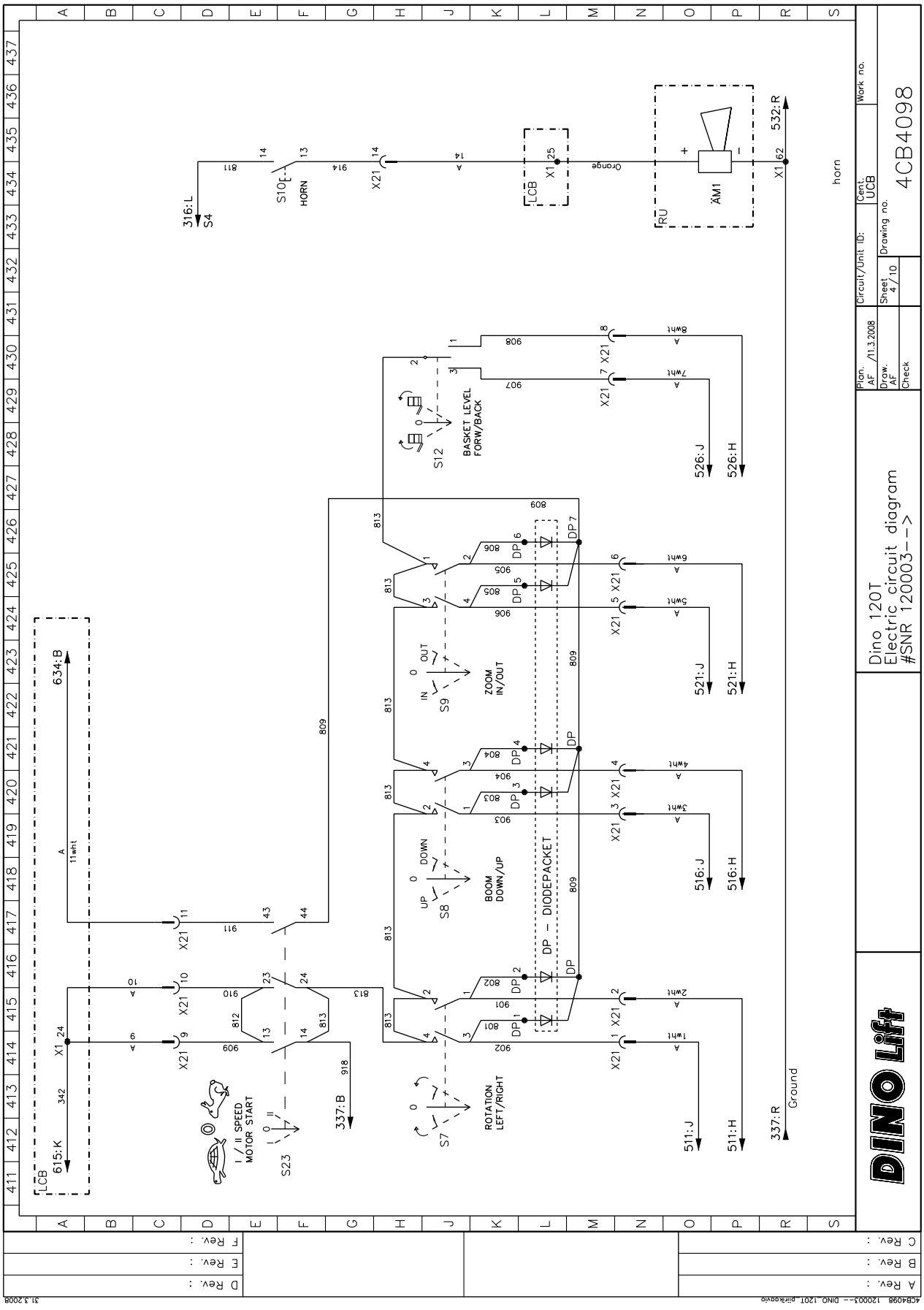
S26	LCB	Pushbutton	Control of driving device
S27	LCB	Pushbutton	Control of driving device
S3	LCB	Pushbutton	Motor stop, 230VAC
S4	UCB	Mushroom-shaped button	Emergency stop
S40	HN	Pushbutton	Honda-engine choke
S41	UCB	Pushbutton	Honda-engine choke
S5	UCB	Turn switch	Honda-engine start/stop
S6	HN	Turn switch	Honda-engine start/stop
S7, S8	UCB	Joystick	Turning and lifting the boom
S9	UCB	Joystick	Telescope
SR2	LCB	Safety relay	Boom movements
SR4	LCB	Safety relay	Emergency stop circuit
T1	LCB	Power source	230VAC/12VDC-chopper
VM1	LCB	Voltmeter	230VAC
VVK	CTB	Fault current switch	230VAC for supply voltage
X21	UCB	Multipoint connector	Platform control panel
X22	UCB	Multipoint connector	Platform control panel
ÄM1	RU	Sound signal	Warning signal activated from platform

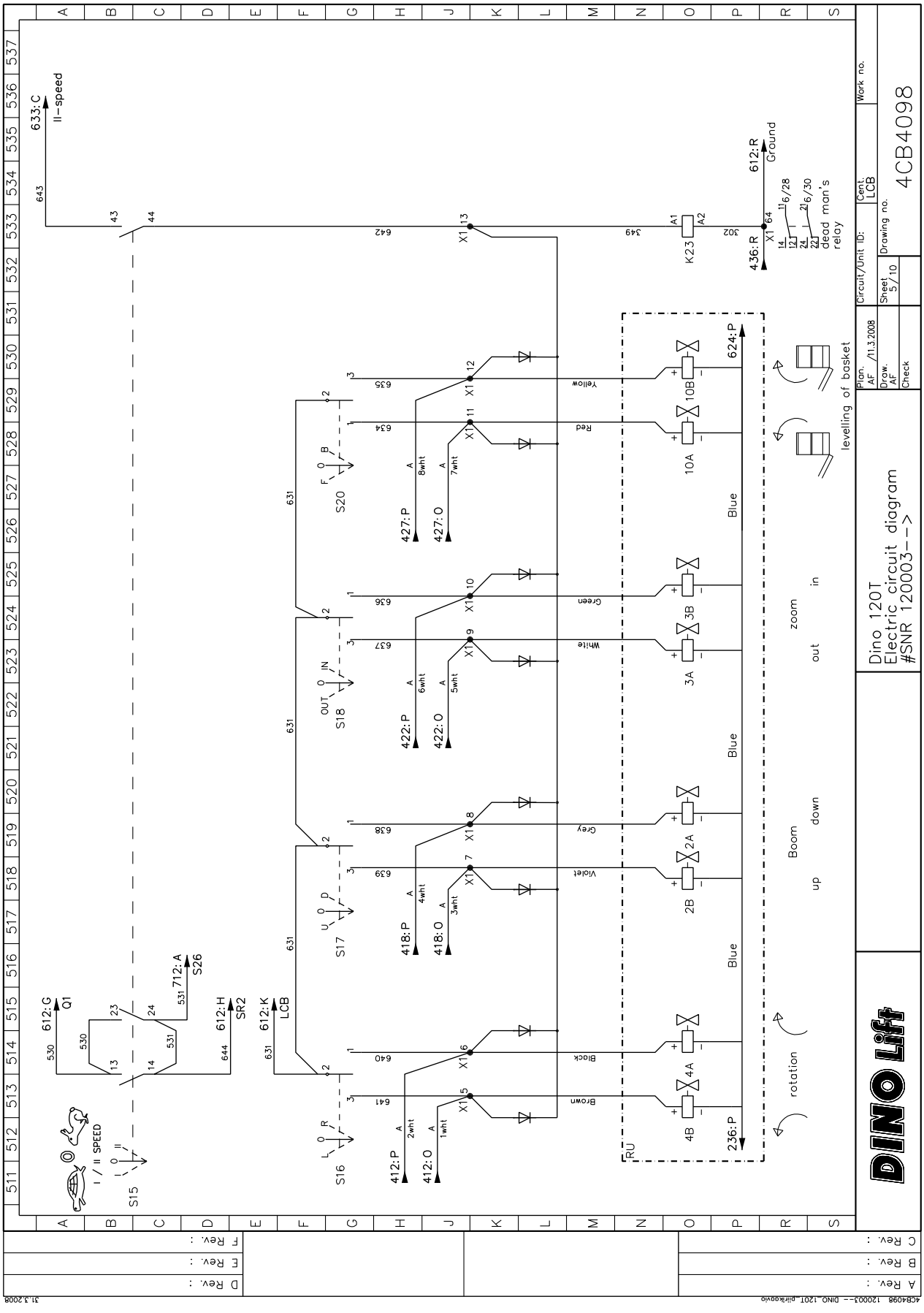
ELECTRIC DIAGRAM 120T 120003 ->

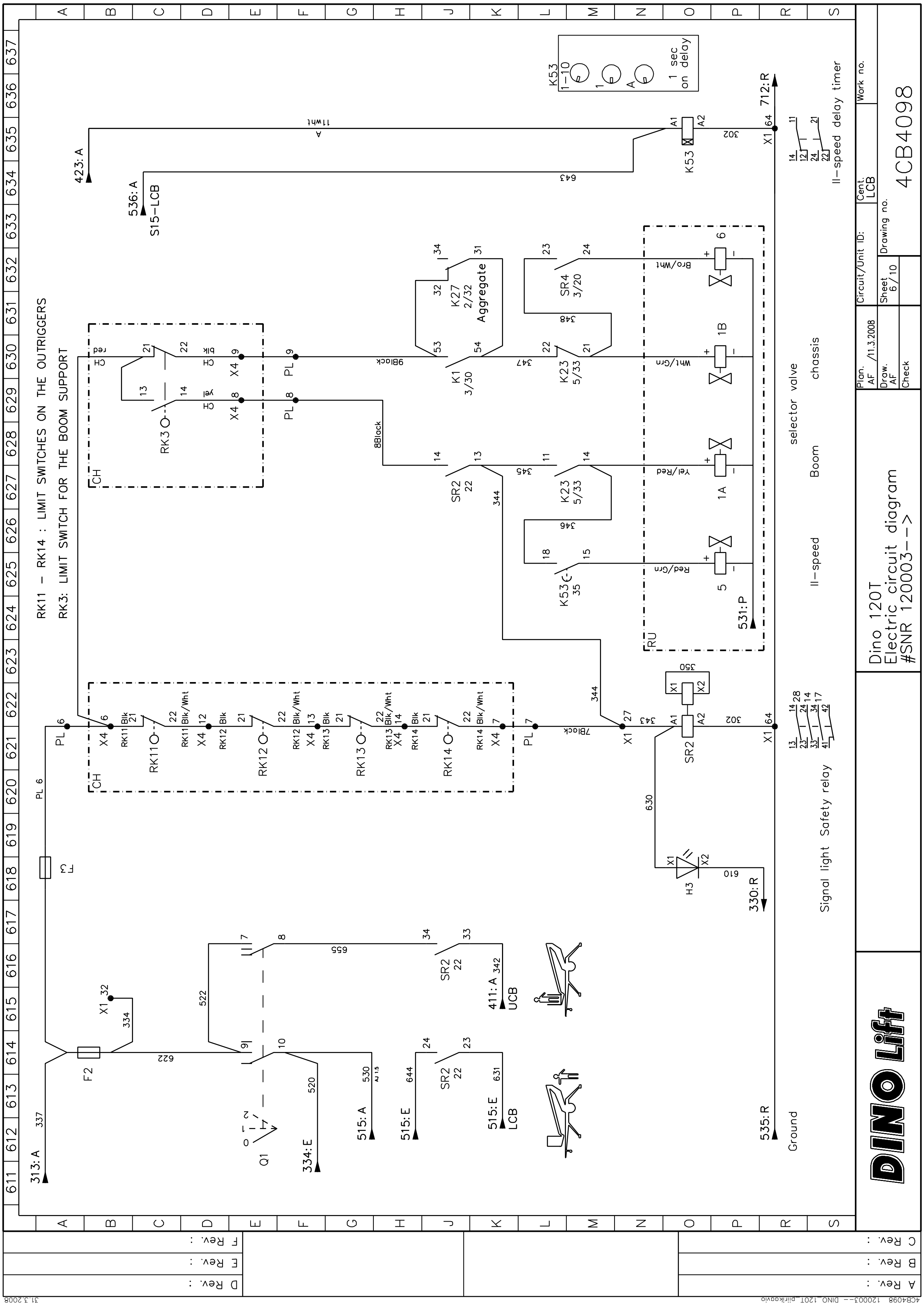


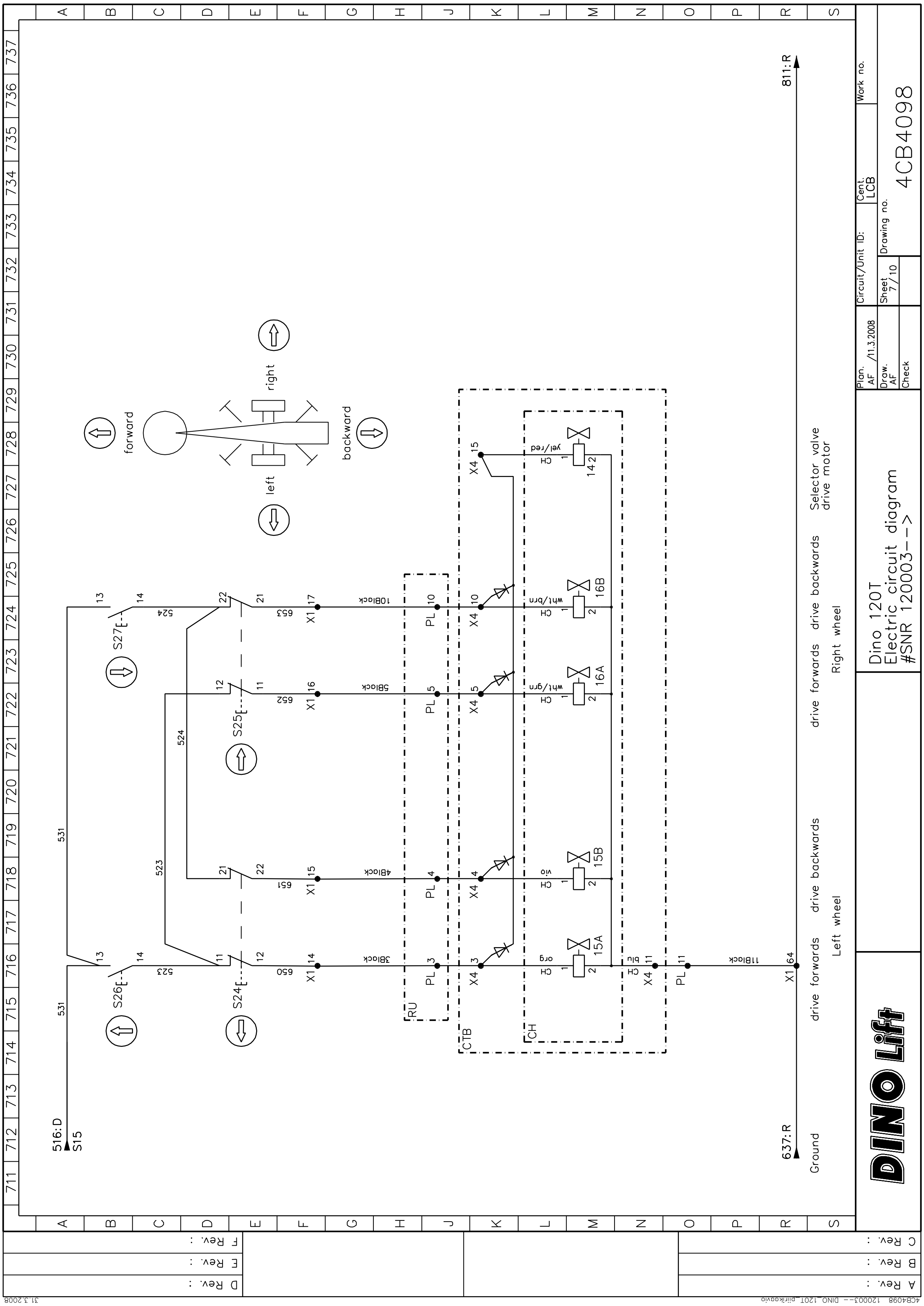

Dino 120T
Electric circuit diagram
#SNR 120003-->
4CB4098
Keyswitch contact diagram
Power source
Grundfos Main power source
230VAC Plug

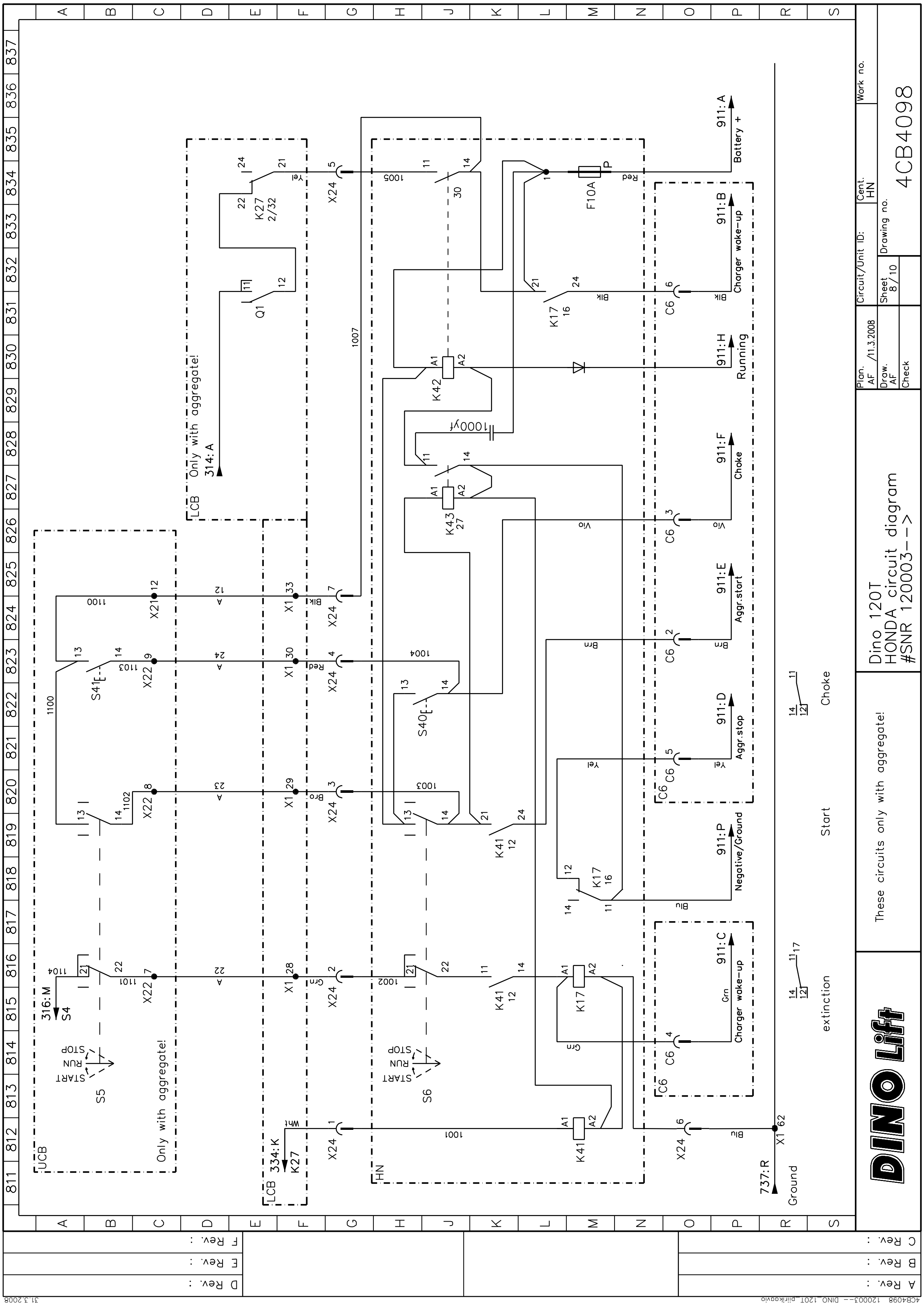

Dino 120T
Electric circuit diagram
#SNR 120003-->
4CB4098
Motor run timer
Electric motor contactor 2
Electric motor contactor 1
Hour meter
Emergency Stop
Safety relay
RK7: SAFETY LIMIT SWITCH FOR THE TELESCOPE CHAIN.
Disconnect with aggregate
START
STOP
4 sec off delay
Ground

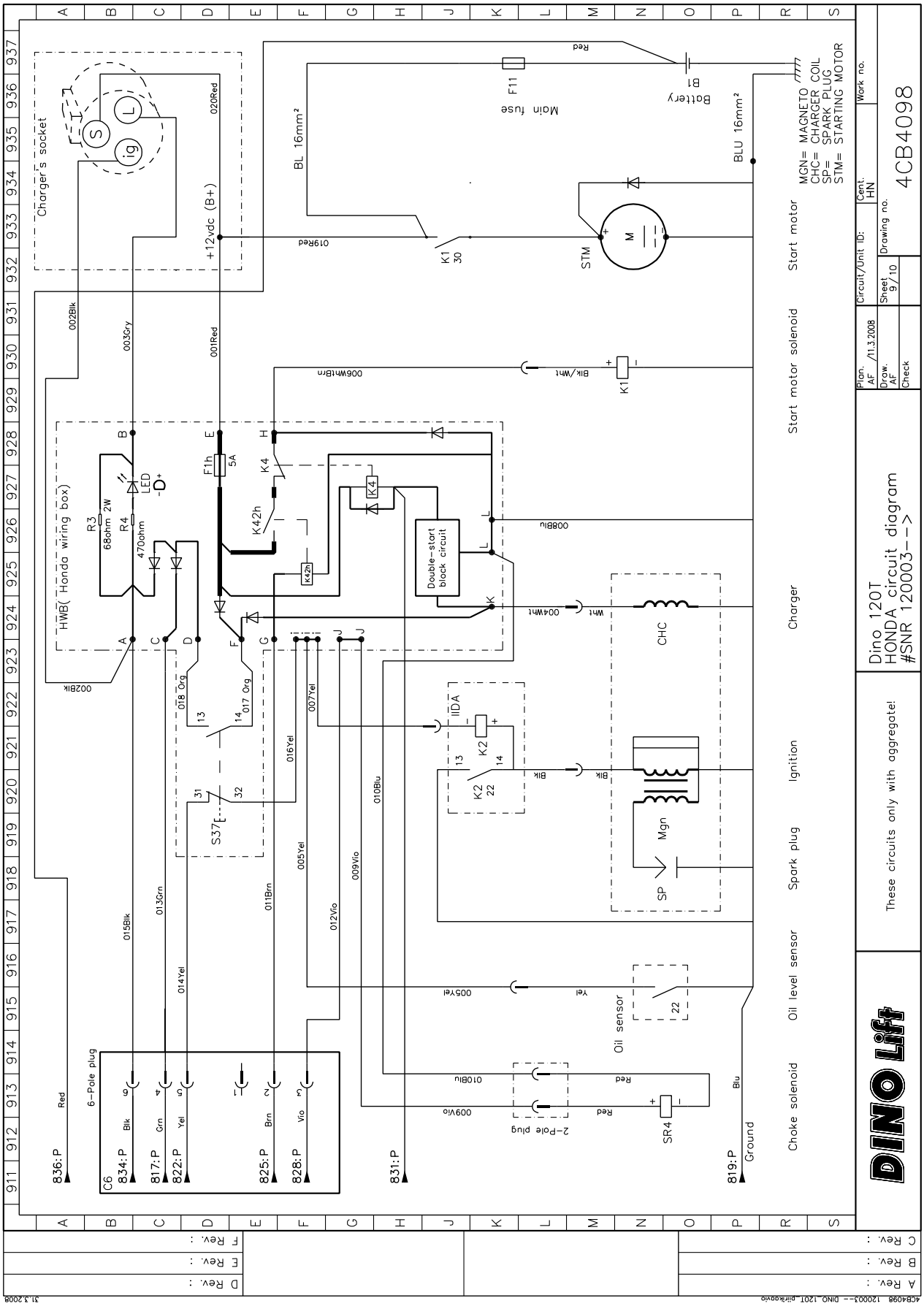

Dino 120T
Electric circuit diagram
#SNR 120003- - >
4CB4098
DINO Lift
horn
Ground
HORN
BASKET LEVEL FORW/BACK
ZOOM IN/OUT
BOOM DOWN/UP
ROTATION LEFT/RIGHT
I / II SPEED MOTOR START
DP - DIODEPACKET
LCB
RU
ÄM1

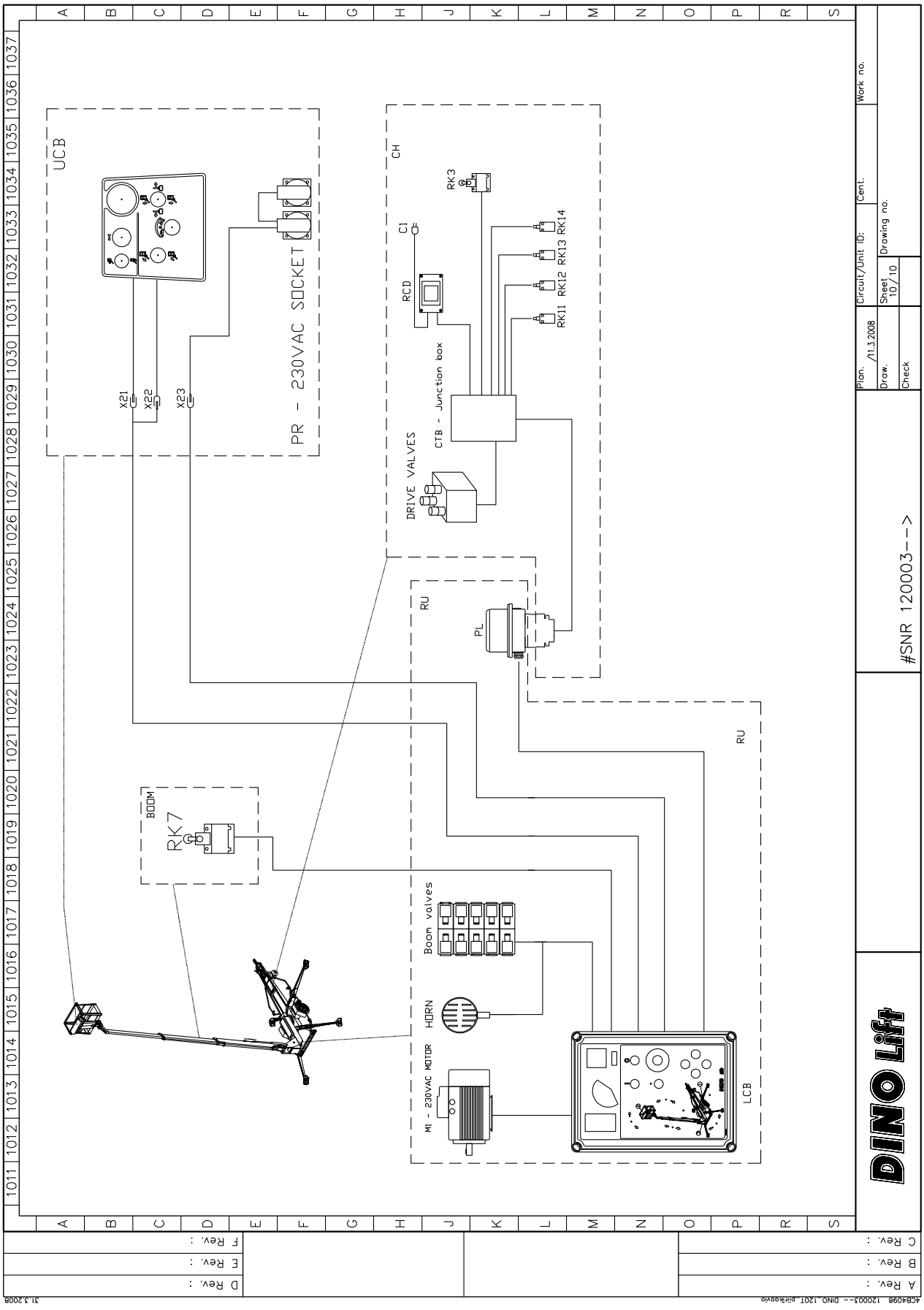

633:C
II-speed
612:R
Ground
436:R
dead man's relay
K23
levelling of basket
624:P
236:P
RU
Blue
Yellow
Red
Green
White
Grey
Violet
Black
Brown
10B
10A
3B
3A
2A
2B
4A
4B
S20
S18
S17
S16
S15
S26
SR2
LCB
Q1
427:P
427:O
422:P
422:O
418:P
418:O
412:P
412:O
zoom in
zoom out
Boom up
Boom down
rotation
I / II SPEED
Dino 120T
Electric circuit diagram
#SNR 120003-->
4CB4098
DINO Liff


Dino 120T
Electric circuit diagram
#SNR 120003-->
4CB4098
Sheet 6/10
Cent. LCB
Plan. AF /11.3.2008
Draw. AF
Check
RK11 - RK14 : LIMIT SWITCHES ON THE OUTRIGGERS
RK3: LIMIT SWITCH FOR THE BOOM SUPPORT
II-speed delay timer
K53 1-10
1 sec on delay
K27 2/32 Aggregate
selector valve
II-speed
Boom
chassis
Signal light
Safety relay
Ground
A Rev. :
B Rev. :
C Rev. :
D Rev. :
E Rev. :
F Rev. :


Dino 120T
Electric circuit diagram
#SNR 120003-->
4CB4098
Sheet 7/10
Drawing no.
Work no.
Cent. LCB
Circuit/Unit ID:
Plan. AF /11.3.2008
Draw. AF
Check
drive forwards
drive backwards
Left wheel
Right wheel
Selector valve
drive motor
Ground
forward
backward
left
right
516:D
S15
637:R
811:R
S24
S25
S26
S27
RU
CTB
CH
15A
15B
16A
16B
14 2
A Rev. :
B Rev. :
C Rev. :
D Rev. :
E Rev. :
F Rev. :


Dino 120T
HONDA circuit diagram
#SNR 120003-->
4CB4098
These circuits only with aggregate!
Only with aggregate!
Battery +
Charger wake-up
Running
Choke
Aggr.start
Aggr.stop
Negative/Ground
Ground
Start
extinction


Charger's socket
+12vdc (B+)
Main fuse
Battery
MGN= MAGNETO
CHC= CHARGER COIL
SP= SPARK PLUG
STM= STARTING MOTOR
Start motor
Start motor solenoid
Charger
Ignition
Spark plug
Oil level sensor
Choke solenoid
Ground
HWB(Honda wiring box)
Double-start block circuit
6-Pole plug
2-Pole plug
Oil sensor
These circuits only with aggregate!
Dino 120T
HONDA circuit diagram
#SNR 120003-->
4CB4098
DINO Liff

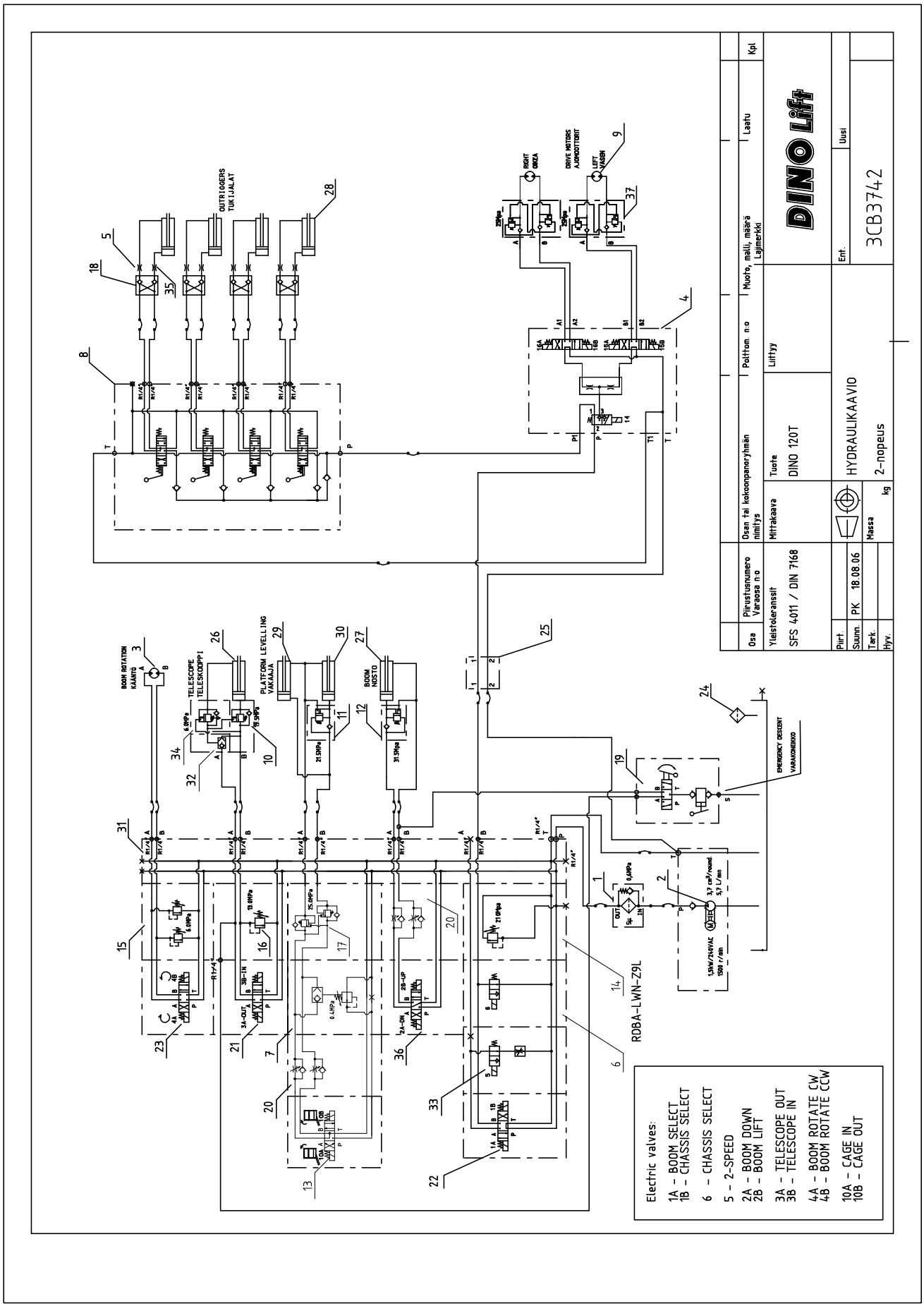

UCB
PR - 230VAC SOCKET
X21
X22
X23
CH
RK3
C1
RCD
RK11 RK12 RK13 RK14
CTB - Junction box
DRIVE VALVES
RU
PL
RU
BOOM
RK7
Boom valves
HORN
M1 - 230VAC MOTOR
LCB
#SNR 120003-->
DINO Lift
Plan. /11.3.2008
Draw.
Check
Circuit/Unit ID:
Cent.
Work no.
Drawing no.
Sheet 10/10
A Rev. :
B Rev. :
C Rev. :
D Rev. :
E Rev. :
F Rev. :

Notes

HYDRAULIC COMPONENTS 120001 ->

Part no.	Item no.	Description	Qty/pcs.
1	47.171	Pressure filter	1
2	47.2397	Power unit 1,5 kW240VAC	1
3	47.2273	Hydraulic motor (turn)	1
4	47.2953	Driving device valve (option)	1
5	47.2659	Flow control valve	4
6	47.2987	Solenoid valve	1
7	47.2928	Priority valve	1
8	47.2720B	Manually operated directional valve	1
9	47.2398	Hydraulic motor	2
10	47.2722	Load regulation valve	1
11	47.2722	Load regulation valve	1
12	47.2722	Load regulation valve	1
13	47.2630	Solenoid valve	1
14	47.2740	Pressure limiting valve	1
15	47.2749	Pressure limiting valve	1
16	47.2808	Pressure limiting valve	1
17	47.2769	Double load regulation valve	1
18	47.377	Check valve, pressure activated	8
19	47.2990	Emergency descent valve	1
20	47.2930	Check valve, pressure activated	2
21	47.2713	Solenoid valve	1
22	47.379	Solenoid valve	1
23	47.378	Solenoid valve	1
24	47.190	Breather valve R1/2"	1
25	4CB1944	Rotary adaptor (hydraulic part)	1
26	2CB3945	Cylinder (telescope)	1
27	2CB3938	Cylinder (lift)	1
28	2CB3775	Cylinder (outrigger)	
29	DL10.007	Cylinder (master)	1
30	DL10.005	Cylinder (slave)	1
31	47.2667B	Group plate	1
32	47.2972	Counter check valve	1
33	47.2714	VALVE GROUP	1
34	47.2969	Load regulation valve	1
35	47.2576	Flow control valve	4
36	47.2989	Solenoid valve	1
37	47.2858	Double load regulation valve	2

HYDRAULIC DIAGRAM 120003->



Notes