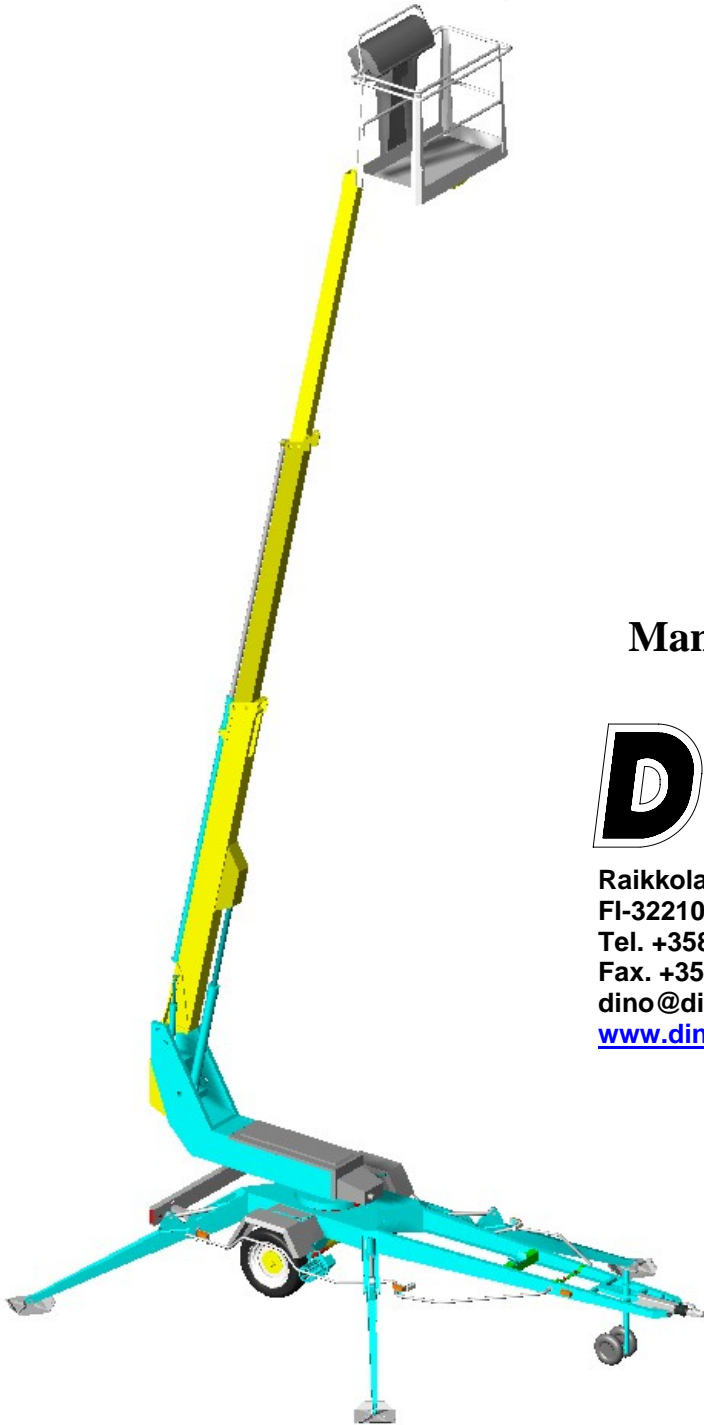


DINO[®] 150TB

OPERATING INSTRUCTIONS



Manufacturer:

DINO Lift[®]

Raikkolantie 145
FI-32210 LOIMAA
Tel. +358 2 762 5900
Fax. +358 2 762 7160
dino@dinolift.com
www.dinolift.com

Dealer:

DINO 150TB

DINO 150TB

ORIGINAL OPERATING INSTRUCTIONS

Valid from serial number

150005→

TABLE OF CONTENTS

1	EU DECLARATION OF CONFORMITY	6
2	REACH DIAGRAM	7
3	DIMENSION DRAWING	8
4	TECHNICAL SPECIFICATION	9
4.1	EXAMPLE OF THE MACHINE'S NAMEPLATE.....	9
4.2	GENERAL DESCRIPTION OF THE MACHINE.....	10
4.3	DESCRIPTION OF THE MACHINE'S INTENDED USE	10
5	GENERAL SAFETY REGULATIONS	11
5.1	!! INSTRUCTIONS FOR SAFE OPERATION!	13
6	INSPECTIONS	14
7	WORKSITE INSPECTION	15
8	OPERATION OF SAFETY DEVICES	16
9	OPERATING CONTROLS	18
9.1	OPERATING CONTROLS ON CHASSIS CONTROL PANEL.....	18
9.2	OPERATING CONTROLS OF OUTRIGGERS	20
9.3	OPERATING CONTROLS ON THE PLATFORM.....	21
10	MEASURES TO BE TAKEN IF THE LIFT IS AT RISK OF LOSING ITS STABILITY	23
11	START-UP	25
11.1	OPERATING THE LIFT FROM THE CHASSIS PANEL.....	28
11.2	OPERATING THE LIFT FROM THE PLATFORM PANEL.....	29
12	EMERGENCY DESCENT SYSTEM	34
13	DRIVING DEVICE	35
14	DRIVING DEVICE	36
15	SPECIAL INSTRUCTIONS FOR WINTER USE	37
16	MEASURES TO BE TAKEN AT THE END OF THE WORKING DAY	38
17	PREPARING THE LIFT FOR TRANSPORT	39
18	CONNECTION TO THE TOWING VEHICLE	40
19	INSTRUCTIONS FOR SERVICE AND MAINTENANCE	41
19.1	GENERAL SERVICE INSTRUCTIONS.....	41
19.2	MAINTENANCE OF THE BATTERIES	42
19.3	SERVICE AND INSPECTION INSTRUCTIONS.....	43
19.4	LUBRICATION PLAN	44
19.5	LOAD HOLDING AND LOAD REGULATION VALVES	46
19.6	LONG-TERM STORAGE.....	46
19.7	WHEEL BRAKES AND BEARINGS.....	48
19.8	LEVELLING SYSTEM OF THE PLATFORM	50
19.9	REGULAR SERVICING.....	51

DINO 150TB

19.9.1	TESTING THE LOAD LIMIT SWITCHES RK4 AND RK 5	58
19.9.2	ADJUSTMENT OF THE OVERLOAD LIMIT SWITCHES.....	60
20	INSPECTION INSTRUCTIONS	64
20.1	FIRST INSPECTION.....	65
20.1.1	SAMPLE OF INSPECTION PROTOCOL FOR THE ACCESS PLATFORM	65
20.2	DAILY INSPECTION (START-UP INSPECTION)	67
20.3	MONTHLY INSPECTION (MAINTENANCE INSPECTION).....	68
20.4	ANNUAL INSPECTION (REGULAR INSPECTION)	69
20.5	EXTRAORDINARY INSPECTION	72
20.6	TEST LOADING INSTRUCTIONS FOR REGULAR INSPECTION	73
21	FAULT FINDING.....	74
22	GENERAL INFORMATION OF HYDRAULICS.....	80
23	ELECTRIC COMPONENTS DINO 150TB 1941->.....	82
23.1	CHASSIS CONTROL CENTRE (LCB), RELAYS.....	82
23.2	CHASSIS CONTROL CENTRE (LCB), SWITCHES	84
23.3	CHASSIS CONTROL CENTRE (LCB), OTHER ITEMS	85
23.4	PLATFORM CONTROL CENTRE (UCB), RELAYS	86
23.5	PLATFORM CONTROL CENTRE (UCB), SWITCHES.....	86
23.6	PLATFORM CONTROL CENTRE (UCB), OTHER ITEMS.....	87
23.7	LIMIT SWITCHES.....	87
23.8	OTHER MARKINGS	88
24	ELECTRIC COMPONENTS 1941->	89
25	ELECTRIC DIAGRAM 150005->	92
26	HYDRAULIC COMPONENTS 150005->.....	105
27	HYDRAULIC DIAGRAM 150005->	106

1 EU Declaration of Conformity

EU Declaration of Conformity

Dinolift Oy
Raikkolantie 145
FI-32210 Loimaa,

which has authorised the **Chief Engineer Mr. Seppo Kopu** to draw up the Technical Construction File

declares that

DINO 150 TB Access Platform no YGC 0D150T X X XXXXXX

complies with the provisions of the Machine Directive 2006/42/EC and its amendments as well as the national decree, through which they have been brought into effect as well as the regulations of the Low Voltage Directive 2000/14/EC and the EMC Directive 2004/108/EC.

Notified body nr. 0537,

VTT
P.O.Box 1300
FI-33101 Tampere
FINLAND

has granted the certificate no. 174/524/09

In designing the machine, the following harmonized standards have been applied:

SFS-EN 280/A1+A2; SFS-EN 60204-1/A1

Loimaa
(place)

20.11.2012
(date)

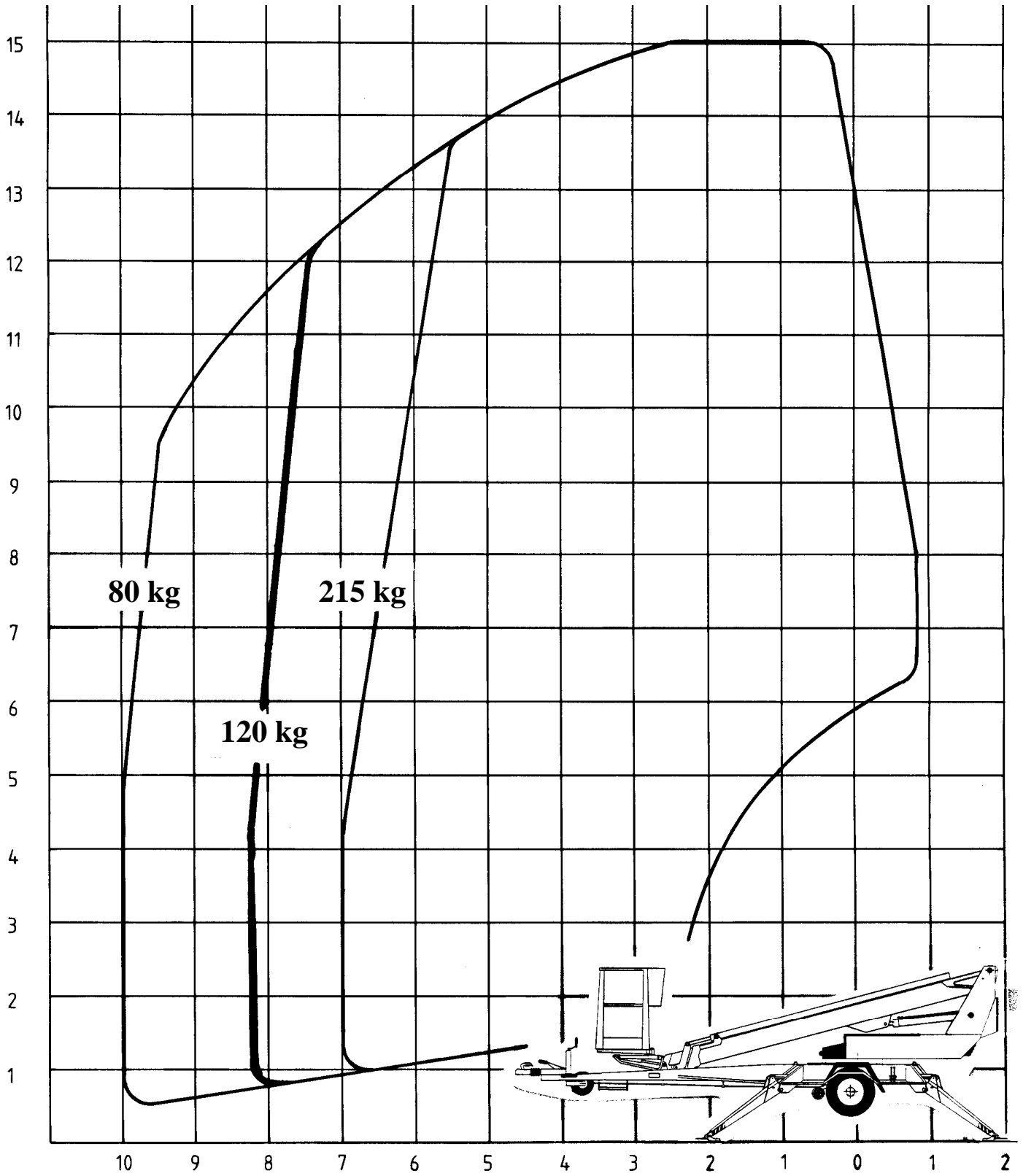
(signature)

Seppo Kopu

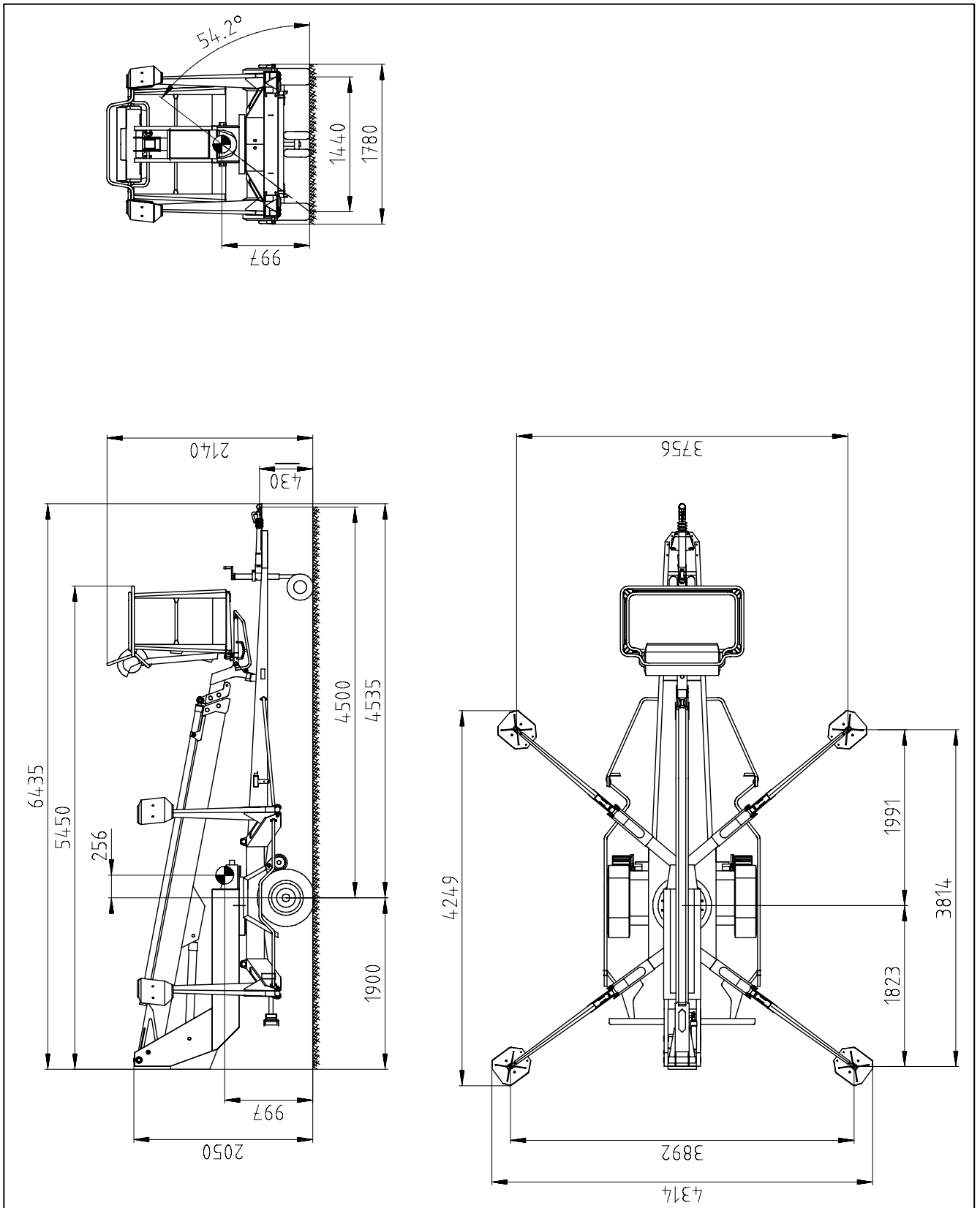
Chief Engineer

(name in block letters, position)

2 REACH DIAGRAM



3 DIMENSION DRAWING



4 TECHNICAL SPECIFICATION

Max. working height	15.0 m
Max. platform height	13.0 m
Max. outreach	10.0 m
Boom rotation	continuous
Platform rotation	90°
Turn area	refer to reach diagram
Support width	3.88 m
Transport width	1.78 m
Transport length	6.35 m
Transport height	2.00 m
Weight	1,820 kg
Max. allowed load on platform	215 kg
Max. number of persons + additional load	2 persons + 55 kg
Max. allowed sideways load (caused by persons)	400 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	12,800 N
Platform size	0.7 x 1.3 m
Gradeability	25 %
Power supply:	
- powered by batteries: 235Ah	24V/ 2kW / Batteries 4x6V
- Sound pressure level	73 dB
- mains current, recharging batteries:	230V / 50Hz / 10A
- Sound pressure level	73 dB
Socket outlets on the platform	230V / 50Hz / 10A

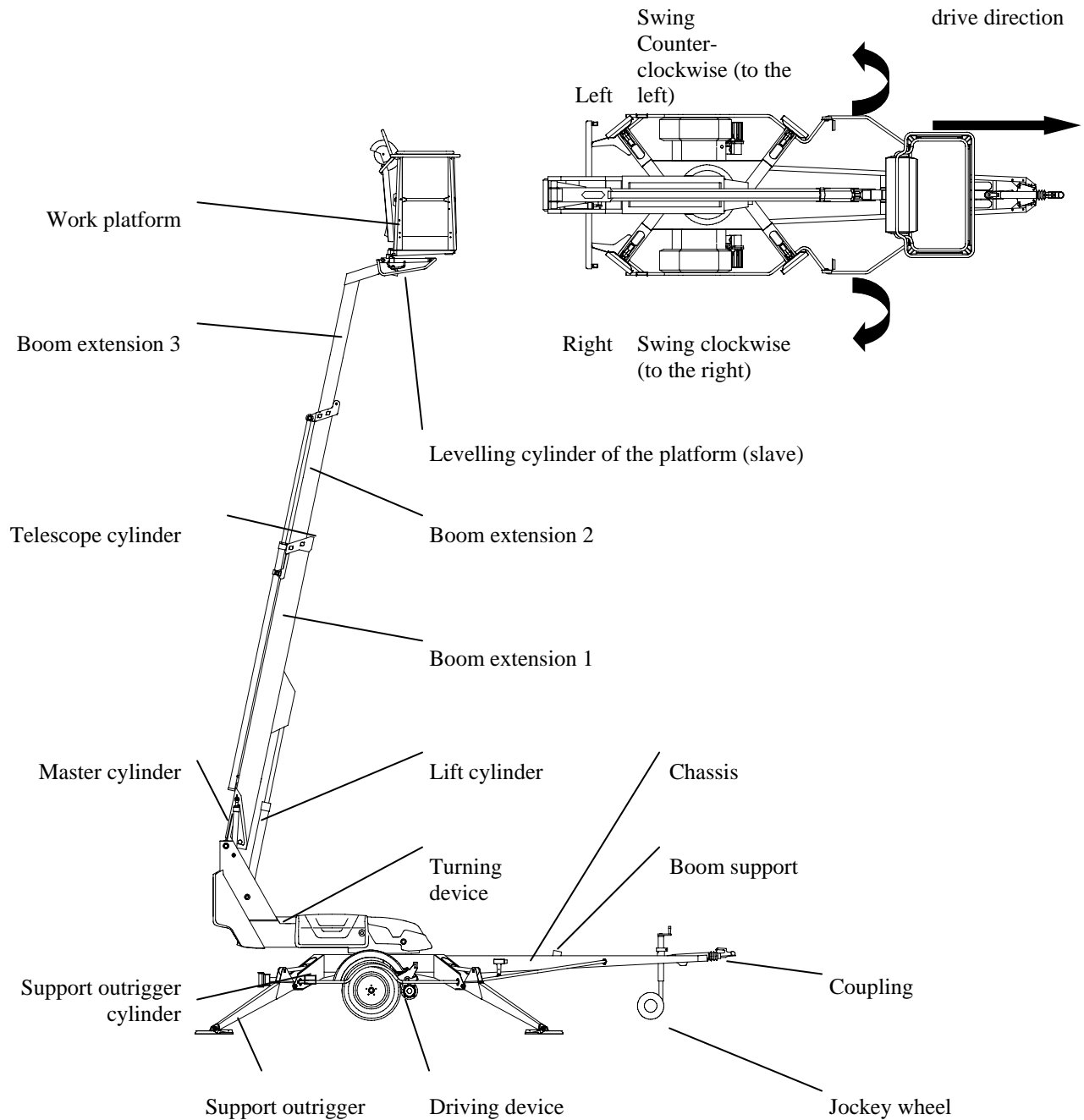
4.1 Example of the machine's nameplate

Type	DINO	Manufacturer	DINO Lift®
Year of manufacture		Address of manufacturer	Raikkolantie 145 32210 Loimaa FINLAND
Number of manufacture			CE
Weight kg		Max. load	215 kg
Max. load of persons	2	Additional load	55 kg
Max. side force	400 N	Max. inclination of chassis	0,3°
Voltage	230 V	Frequency	50 Hz
Min. operating temperature	-20 °C	Max. wind force	12,5 m/s

54.516

4.2 General description of the machine

The denominations of the machine's essential parts and concepts, which are used later in these instructions, are described on this page.



4.3 Description of the machine's intended use

The Access Platform is exclusively intended for transferring people and tools and acting as a work platform to the limit of its load-bearing capacity and reach (refer to the table of Technical Specifications and Reach Diagram).

The intended use also covers:

- Following all the instructions in the Operating Instructions
- Performance of the inspections and maintenance operations

5 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.
Advise 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 with **authorisation in writing from the employer** who are well familiarised with the device and at least 18-years old are allowed to operate the lift

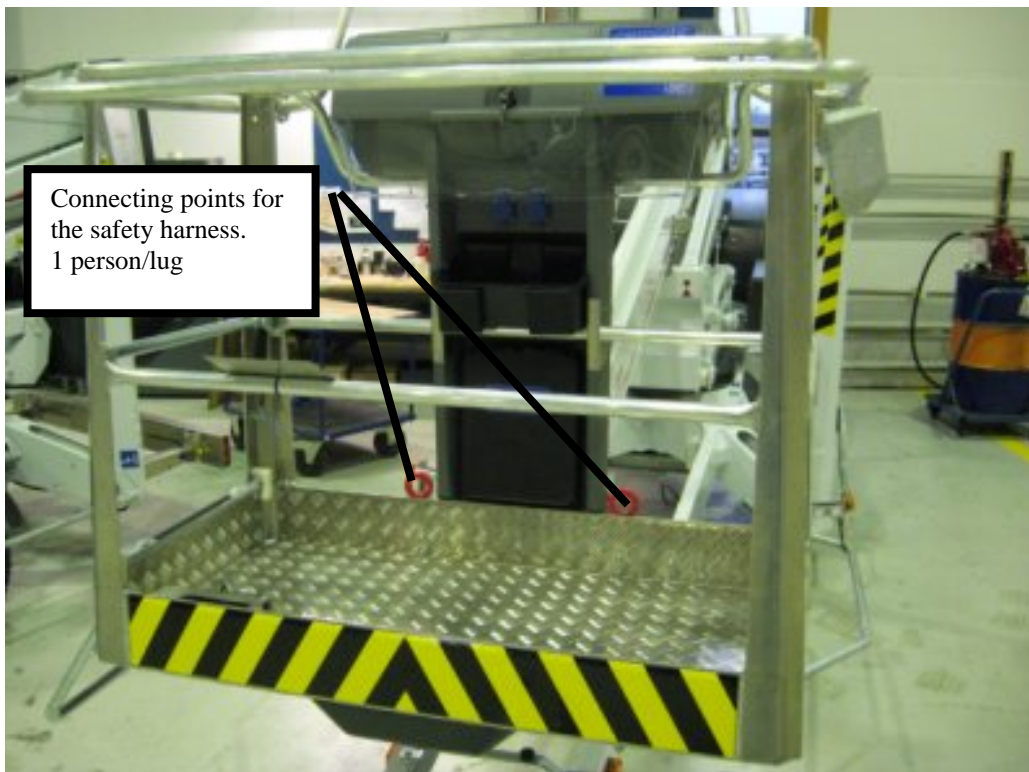
- The max. allowed load on the platform is two (2) persons and at maximum fifty five (55) kg of additional load, however, the total load must not exceed two hundred fifteen (215) kg.
- The platform may only be operated when the chassis is well supported and the wheels are off the ground.
- The load-bearing 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 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 lift may only be moved in the transport position. No persons or load are allowed on the platform during the transportation.

The use of the lift is prohibited if

- **the temperature drops under -20 ° C or**
- **the wind speed exceeds 12.5 m/s**

USE THE SAFETY HARNESS!



DINO 150TB

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.

Never disable the operation of any safety device.

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 operator must be given instructions and consent from the manufacturer for all such specific work methods or conditions, which the manufacturer has not explicitly defined

The device must neither be altered without the manufacturer's consent nor be used under conditions which do not meet the requirements set by the manufacturer.

5.1 !! Instructions for safe operation!

- **Use a safety harness while on the platform.**
- **Use hearing protectors when operating the power unit (optional) from the chassis panel. Sound pressure level 92 dB.**
- **Never load the platform while in the upper position.**
- **The lift must not be used when the temperature is below -20°C and the wind speed exceeds 12.5 m/s.**
- **Beware of live power lines within the work area.**
- **The lift MUST NOT be used as a crane.**
- **Always ensure the load-bearing capacity of the standing surface.**
- **Ensure the unobstructed range of movement before operating the outriggers.**
- **While in the support position, ensure that the wheels are off the ground.**
- **Always verify the horizontal position of the machine.**
- **Ensure that the outriggers cannot slide while on a gradient.**
- **Always ensure that the work area is clear of outsiders. Danger of getting squeezed between rotating and fixed structures.**
- **Stepping on or off the platform in motion is prohibited.**
- **The maximum-allowed gradient during transfers is 5°. During transfer in rough terrain, try to stay above the machine.**
- **While operating the boom from the control panel on the turning device, beware of getting pressed against the outriggers or other structures that do not turn with the boom.**
- **When the boom is in its lowest positions, make sure it cannot clash during rotation with structures that do not turn with the boom.**
- **Before operating, always ensure that the safety devices and the emergency descent system are in working order.**
- **Do not take tools/material of large surface area onto the platform. The increase in wind load may jeopardize the stability of the device.**
- **Always keep the lift free from dirt, snow and ice.**
- **Ensure that the lift is inspected and serviced, before use.**
- **Never use a defective lift.**
- **Never use a lift alone. Make sure, there is always someone on the ground, who can call for help in case of an emergency.**

6 INSPECTIONS

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 the 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.

NOTE! Primarily the national legislation must be followed!

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

7 WORKSITE INSPECTION

1. General information

- 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?

8 OPERATION OF SAFETY DEVICES

1. Support outriggers

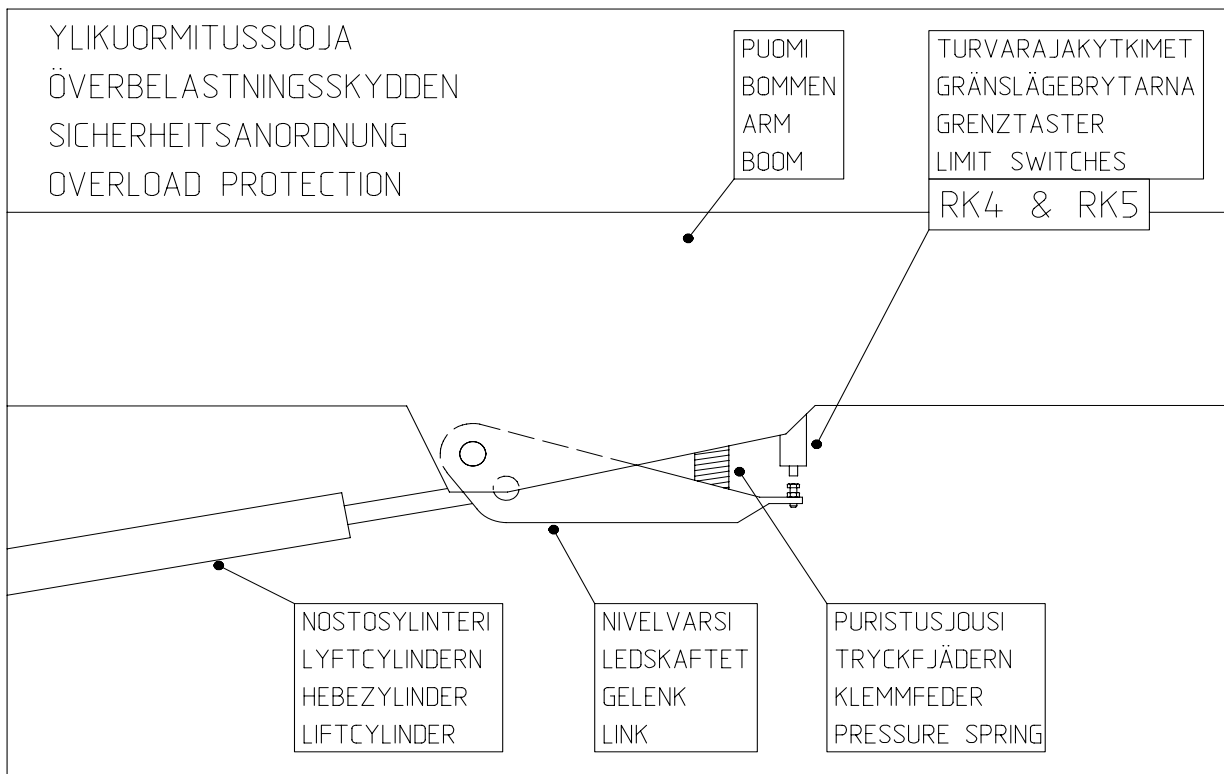
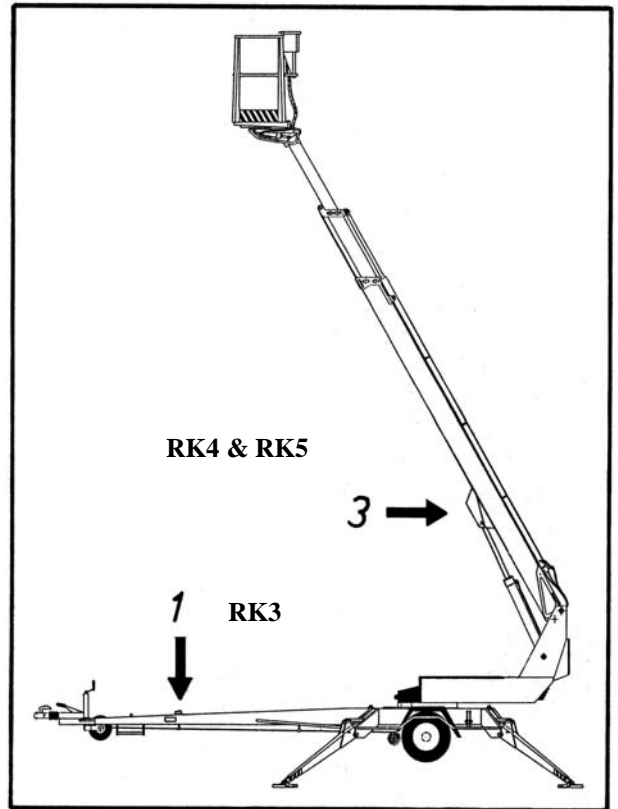
The safety limit switch **RK3** prevents the operation of the outriggers and the driving device when the boom does not rest on the transport support. The switch is located on the tow-bar at the transport support.

2. Overload protection switches

The safety limit switches prevent overloading of the lift. At a predetermined position the overload limit switch **RK4** stops extension of the telescope and lowering of the boom.

The overload limit switch **RK5** backs up if the RK4 for some reason does not work.

The green light in the platform control centre is lit when the platform is inside the allowed operating range. The red light comes on as the RK4 stops the movement. When the red light is on, the lift can be operated in the direction where it stays inside the allowed outreach area. The safety limit switch RK5 backs up the operation of the RK4 by switching on the buzzer on the platform.

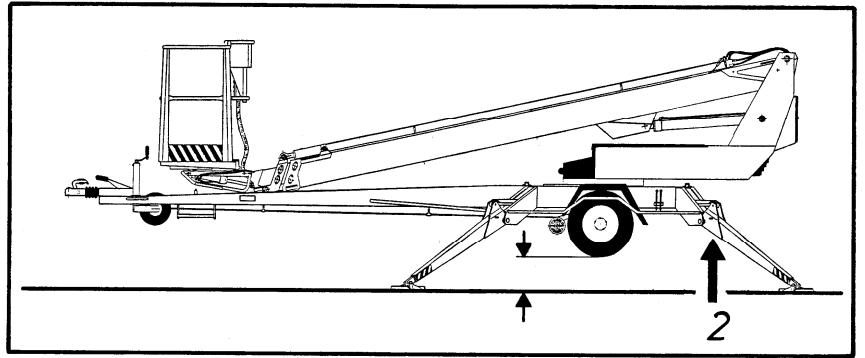


DINO 150TB

3. 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.



RK11, RK12, RK13, RK14

4. 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 is started (buttons 4)



Ensure the operation of the safety devices - do not lock the chassis panel cover with key while the lift is in operation.



9 OPERATING CONTROLS

9.1 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. Pushbutton, retraction of telescope
3. I/ II - speed (is used simultaneously with the control levers for the boom and the driving device)
4. Emergency stop button
5. Lever for turning
6. Lever for boom system
7. Lever for telescope movement
8. Lever for platform inclination
9. Signal light for outreach limit
- 10F. Drive to the front
- 10B. Drive to the rear
- 10F. Drive to the right (forward)
- 10F. Drive to the left (backward)
- 10B 44Ah Drive to the right (backward)
- 10B+10L Drive to the left (backward)
11. Signal light for the outrigger limit switches
12. Automatic fuse for socket outlets
13. Voltage meter
14. Battery voltage / Hour meter / Display of error codes for engine controller



DINO 150TB

Battery gauge (14)

1. As the current is switched on using the key switch, the operating hours of the motor are displayed on the gauge for 5 seconds.
2. During normal operation, the state of charge of the batteries is displayed in per cents.
3. If the motor controller observes malfunction, an error code is displayed.



The LED signal lights in the gauge indicate the current mode of the display

Left LED green	LED at the centre yellow	Right LED red
ON - operating hours are displayed	ON - state of charge of the batteries is displayed in % Flashes – state of charge below 10 %	Flashes - error code

Error codes

CODE xx	DESCRIPTION	REMEDY
11	Internal current measurement error in the controller.	Switch off the current and retry
12	Error in the internal safety circuit for the controller.	Switch off the current and retry
13	Malfunction or short circuit of motor connections	Check the power cables and wiring of the motor.
14	Locking/malfunction in the directional switch circuit	Check fuses, control circuit for the controller and wiring.
21	Motor revolutions adjusted to too high value	Check joystick and wiring of the control circuit.
22	<i>Emergency reverse - not in operation</i>	<i>Controller incorrectly programmed</i>
23	Locking/malfunction in the revolution control circuit	Check fuses, control circuit for the controller and wiring.
24	Motor revolutions adjusted to too low value	Check joystick and wiring of the control circuit.
31	Excess current or short circuit in the main contactor spool	Check the main contactor, replace as required
32	Tip of main contactor shorted out	Check the main contactor, replace as required
33	<i>Field coil of the engine broken - not in use</i>	<i>Controller incorrectly programmed</i>
34	Control circuit for the main contactor spool broken	Check whether the connector for the main contactor is loose
41	Low battery voltage < 17VDC	Recharge the batteries immediately
42	Excess voltage > 30VDC	Check operation of the battery charger
43	Temperature too high > 85 °C or too low < -25 °C	Check ambient temperature
44	Locking/malfunction in the selector switch	Check fuses, control circuit for the controller and

Capacity of the batteries is affected by the operating temperature.

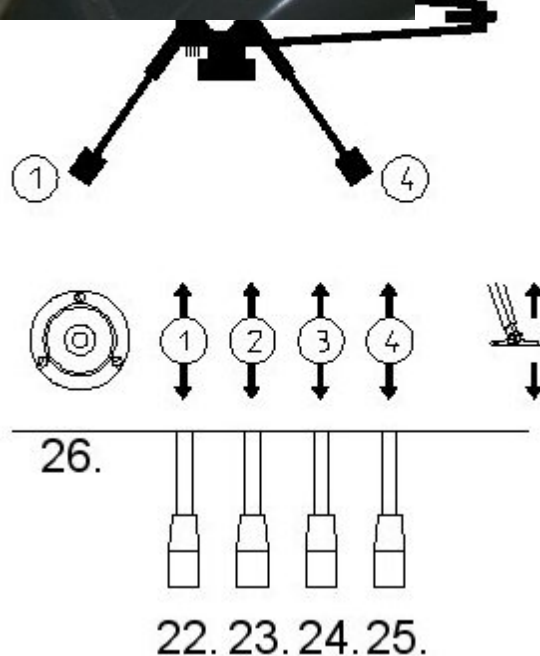
100 % is reached at the temperature of 30 °C, at 0 °C the capacity is 80 % of normal, at -20 °C the capacity is 50 % of normal

Note! When the charger is connected, the display immediately shows 100 % even if the batteries are not fully charged. Always keep the charger connected for a sufficiently long time irrespective of the readout on the display!



9.2 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



9.3 OPERATING CONTROLS ON THE PLATFORM

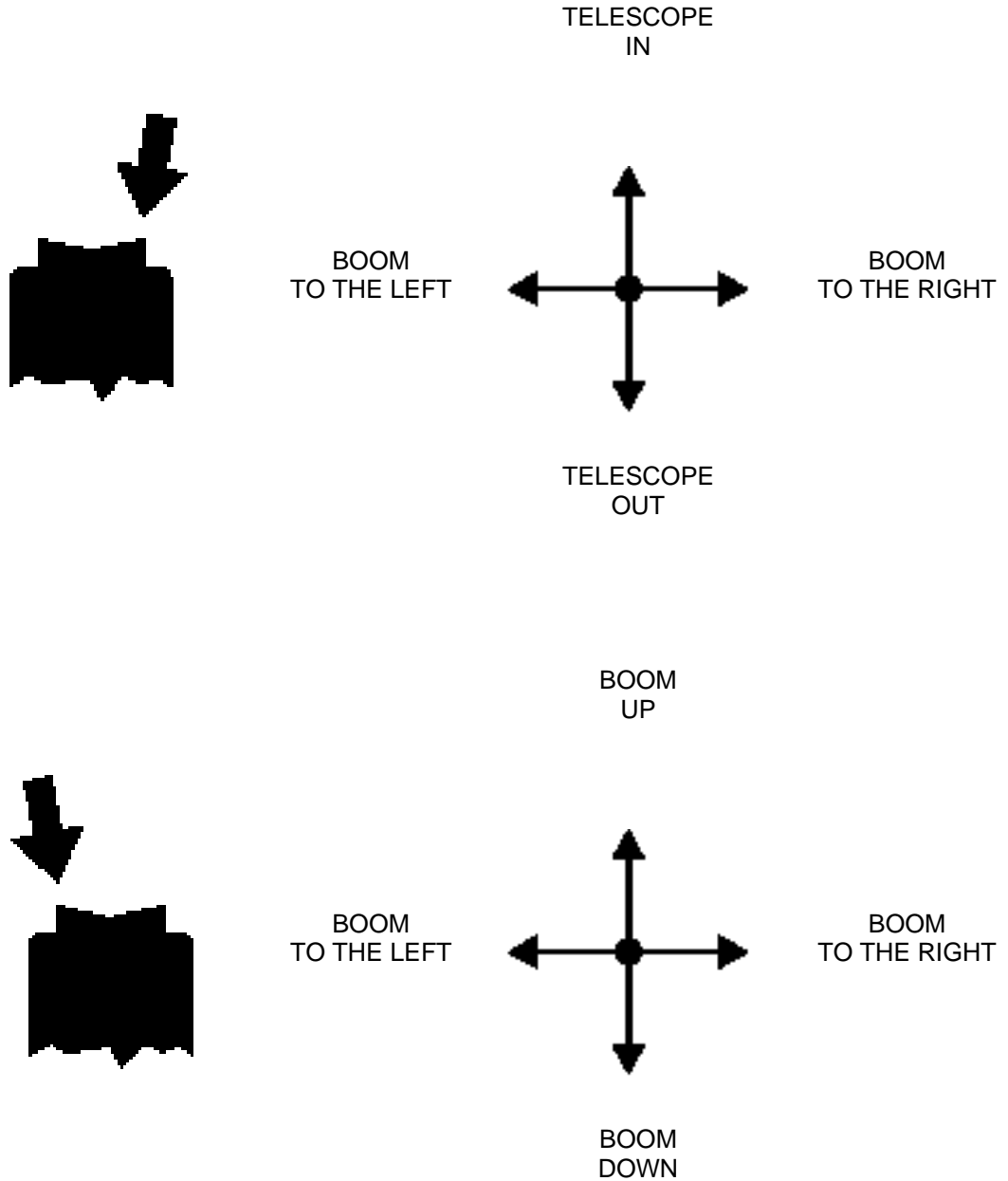
1. Turn the selector switch (1) to position 1c

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

The cover must not be locked while the lift is in operation.

The motor starts and stops automatically, as the movement is activated

1. Control lever



DINO 150TB



2. Signal lights

- green inside the outreach range
- red at the border of the outreach range

3. Retracting the telescope

4. Emergency stop

- push to stop
- pull to reset

5. Socket outlet 230VAC/ (2 pcs.)

6. Control lever for turning of the platform

7. Platform swing fuse

8. Levelling of the platform

9. Lever for levelling of platform (is used simultaneously with pushbutton 8)

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

Reduced stability can be caused by 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 one sign of reduced stability is the inclination of the lift.

WHEN AT RISK OF LOSING THE STABILITY

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. If possible, reduce the load from the platform in a safe manner.
3. Reduce the outreach to the side by retracting the telescopic boom using the emergency descent system. Avoid abrupt movements.
4. Turn the boom away from the danger zone, i.e. to a position where the stability of the lift is normal.
5. 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.

IN CASE OF OVERLOADING

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. If possible, reduce the load from the platform in a safe manner.
3. Reduce the outreach to the side by retracting the telescopic boom using the emergency descent system.
4. The green light becomes illuminated when the overload situation is reset. After this the machine may be operated normally.

IN CASE THE POWER SUPPLY IS INTERRUPTED (power unit/combustion engine)

1. Lower the boom using the emergency descent system (see point “Emergency descent system”)
2. Establish the reason why the energy supply was interrupted.

IN CASE OF MALFUNCTION, WHEN EVEN THE EMERGENCY DESCENT SYSTEM IS NOT OPERATIONAL

1. If the emergency descent system does not operate, try to warn other personnel present on the site so that they can call for help so that the power supply required for normal operation can be resumed or make the emergency descent system operational by, for example, changing the battery so that the person on the platform can be lowered safely.

DINO 150TB

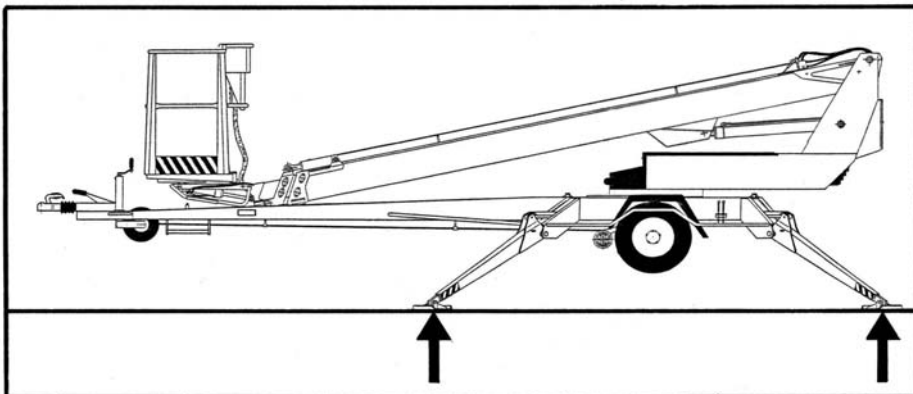
Always check the condition of the emergency descent system battery before putting the lift into operation (see point "Operating from the chassis panel").

11 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/cm ²
Gravel	High density	6
	Medium density	4
	Loose	2
Sand	High density	5
	Medium density	3
	Loose	1,5
Fine sand	High density	4
	Medium density	2
	Loose	1
Sand/ mud	High density (very hard to work)	1,00
	Medium density (hard to work)	0,50
	Loose (easily worked)	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

Connection of power supply to the lift

1. Turn on the current using the main switch at the battery housing on the left-hand side



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

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

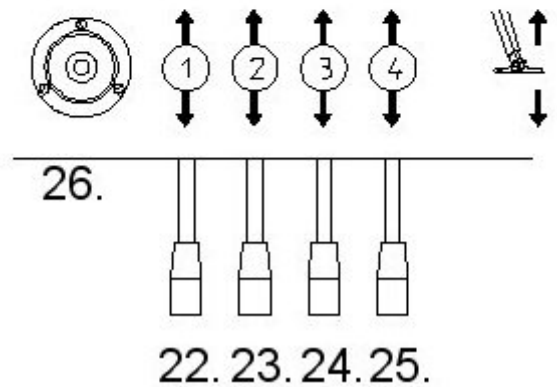
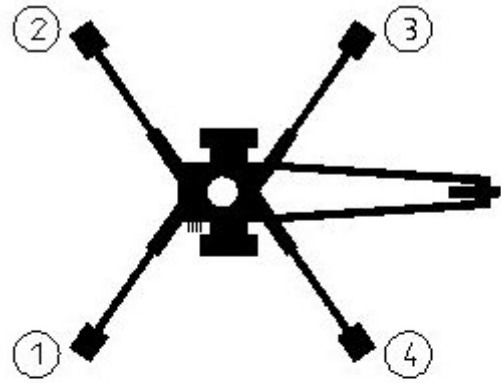
4. If you wish to operate the support outriggers, start the motor by pushing the green button on the battery housing on the right-hand side. The motor will run only as long as the button is kept depressed. The motor starts and stops automatically whenever the boom system or the driving device is being operated.



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

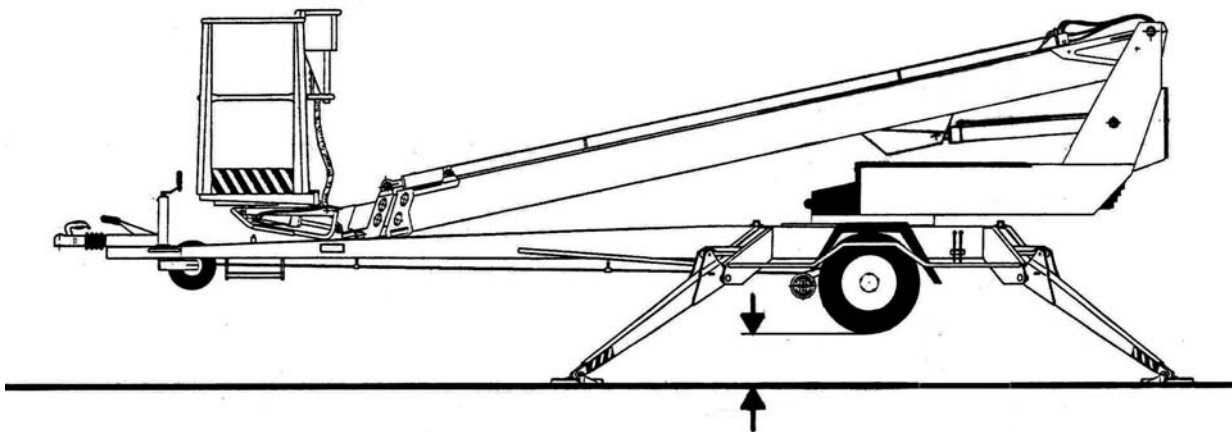
6. Lower the rear support outriggers (do not damage the tow-bar jockey wheel)

7. 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



11.1 OPERATING THE LIFT FROM THE CHASSIS PANEL

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

Now you can operate the boom using the levers 5, 6 and 7 in the chassis panel and the platform using the lever 8. While operating the boom movements, turn lever 3 simultaneously (I/II - speed).

The motor starts and stops automatically, as the movement is activated



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

1. Start by lifting the boom about 1–2 metres (with lever 6) and continue by extending the telescope 1–2 metres (with lever 7) 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

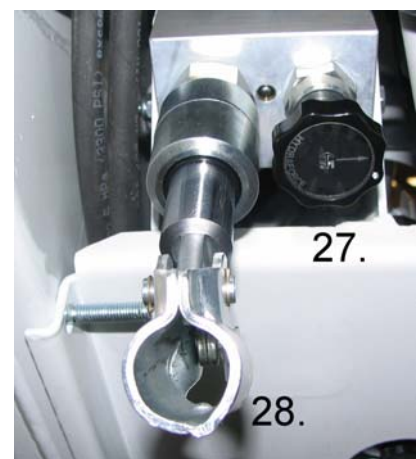
5. Pull up the emergency stop button.



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.





11.2 OPERATING THE LIFT FROM THE PLATFORM PANEL

3. Turn the selector switch (1) to position 1c and take away the key
Do not lock the chassis control panel cover with the key.

- Now you can operate the boom with the lever on the platform control panel. Start by pushing the rocker switch at the end of the control lever and then move the lever carefully in the desired direction of motion. The motor starts and stops automatically, as the movement is activated.
- Whenever possible, keep the boom short while lifting and lowering the platform.

DO NOT DAMAGE THE TOW-BAR JOCKEY WHEEL!

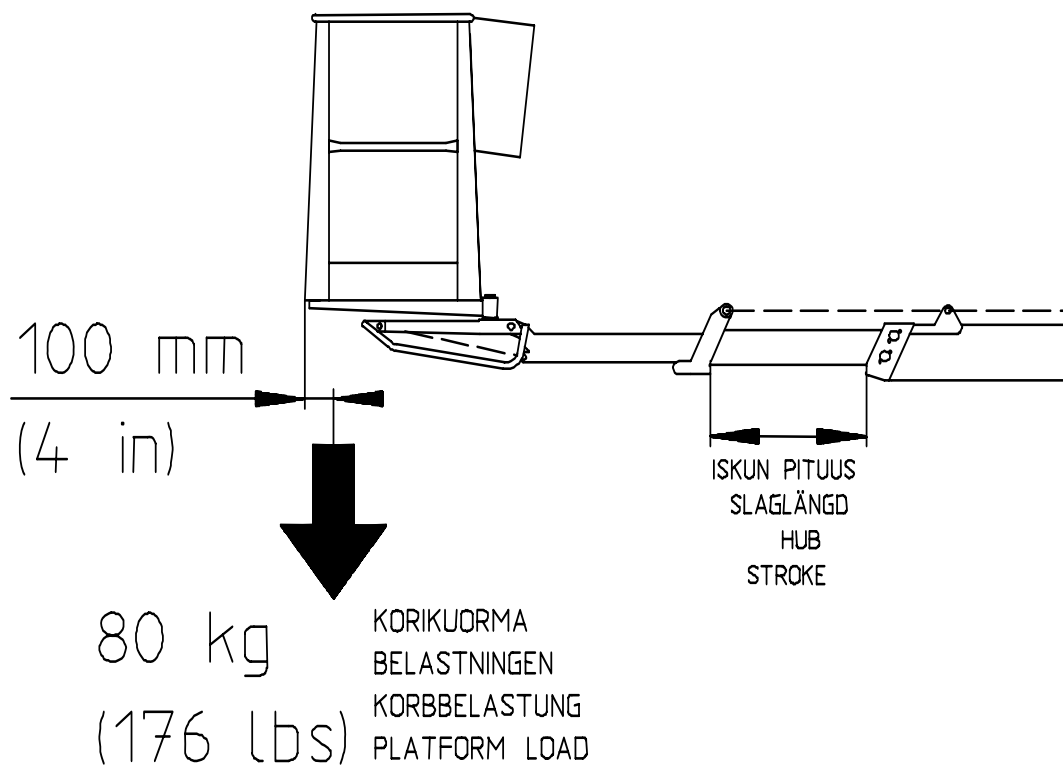
The speed of the platform movements can be adjusted steplessly using the control lever.

4. Test the operation of the overload limit switch RK4

- platform load about 80 kg
- drive the boom to a horizontal position
- extend the telescope

As the movement stops the red overload light (2) must light up.

- compare the outreach with the outreach diagram in this manual (the distance to the outer face of the platform = outreach - 0.5 metres)



11.2.1.1 12A. Measures to be taken after overloading has occurred

(The overload limit switch RK5 switches off the electric circuit of the operating controls and switches on the buzzer on the platform)

- retract the platform to inside the operating range of the RK4 by pushing the "telescope in" -button (2 or 3) (the green light lights up)
- after this the lift may be operated normally

"Telescope in" pushbutton (2 or 3) automatically starts the electric motor.

WARNING!

Do not add load (e.g. another person) onto the platform while the red overload light (2) is lit.

Example: A person, who is working alone on the platform, extends the telescope, or an empty platform is driven from the chassis control panel to the maximum reach keeping it close to the ground. If the overload signal light now lights up, the telescope must be retracted before loading the platform further.

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

5. Refer to the item "Daily inspections" in the task list for servicing.
6. 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
7. 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.

8. Move the platform to the work object

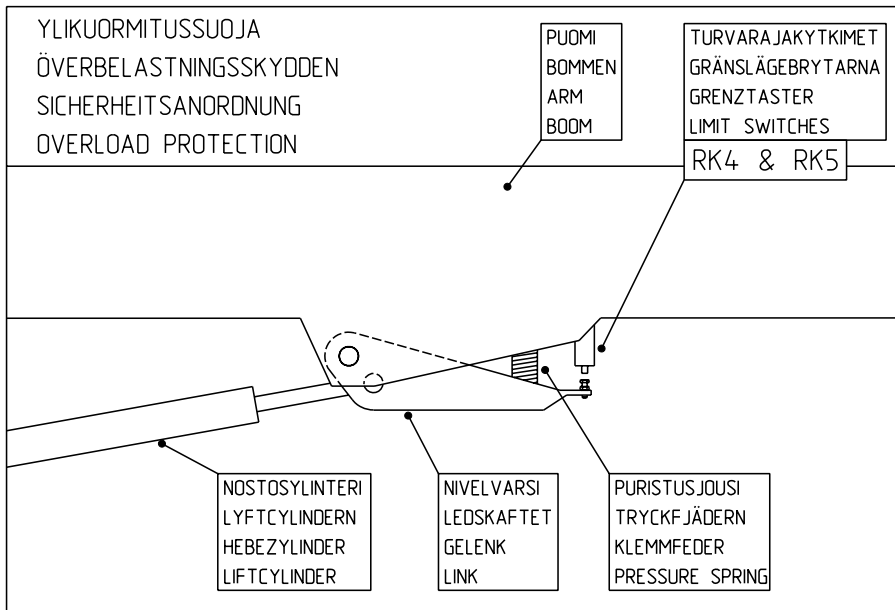
The platform movements can be operated with continually adjustable speed from the platform control panel (not from the chassis control panel). Only one movement can be operated at a time. If several control levers are operated simultaneously, only the movement with the least resistance will operate.

NOTE!

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

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

9. Observe when lifting the platform



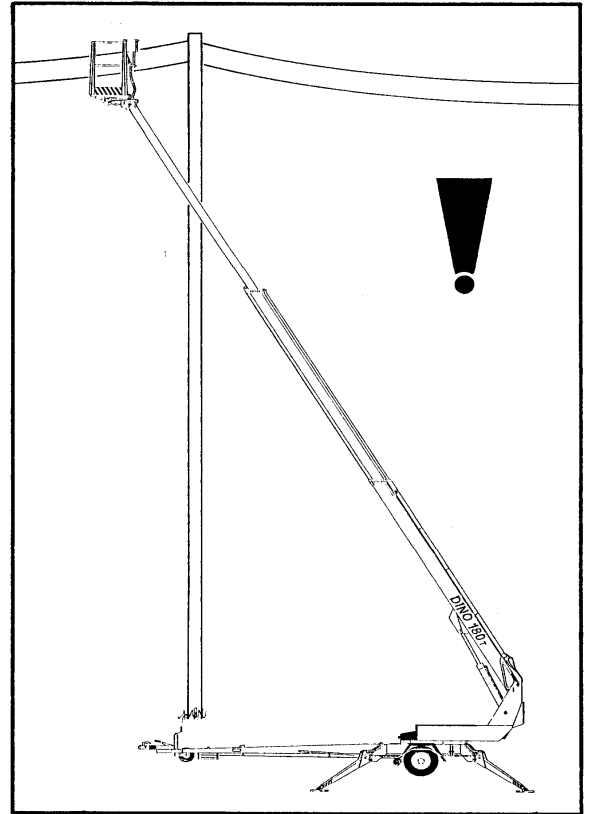
- the operating range of the platform depends on the load (see Technical Data) and is monitored by the safety limit switches RK4 and RK5, which are located under the protecting cover
The limit switches must not be adjusted or modified. The inspection and adjustment may only be carried out by an authorized serviceman.

10. Working a long time in the same position

- when the weather is cold, let the engine run once in a while 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

11. When moving the platform, remember the following

- be careful of the high voltage power lines
- do not exceed the max. allowed lateral force (400N)
- 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



12. When leaving the lift

- drive the lift to a safe position, preferably to the transport position
- switch off the power unit
- prevent unauthorized use of the lift by locking the control centre cover

13. Adjustment of the platform position

From the chassis control centre (LCB)

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 (3) and simultaneously, using the control lever (8), select the desired direction for the correction movement.

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



12 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

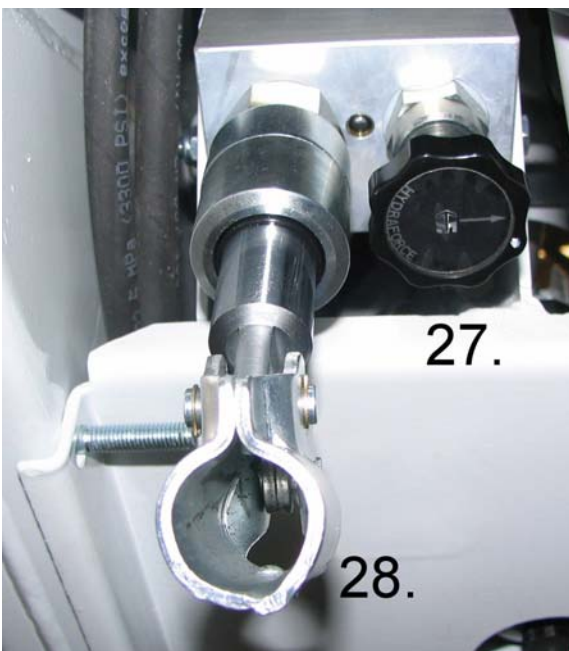
Open the emergency descent valve for the boom by turning the lever 27 counter-clockwise and lower the boom by pumping with hand pump 28.

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).

NOTE!

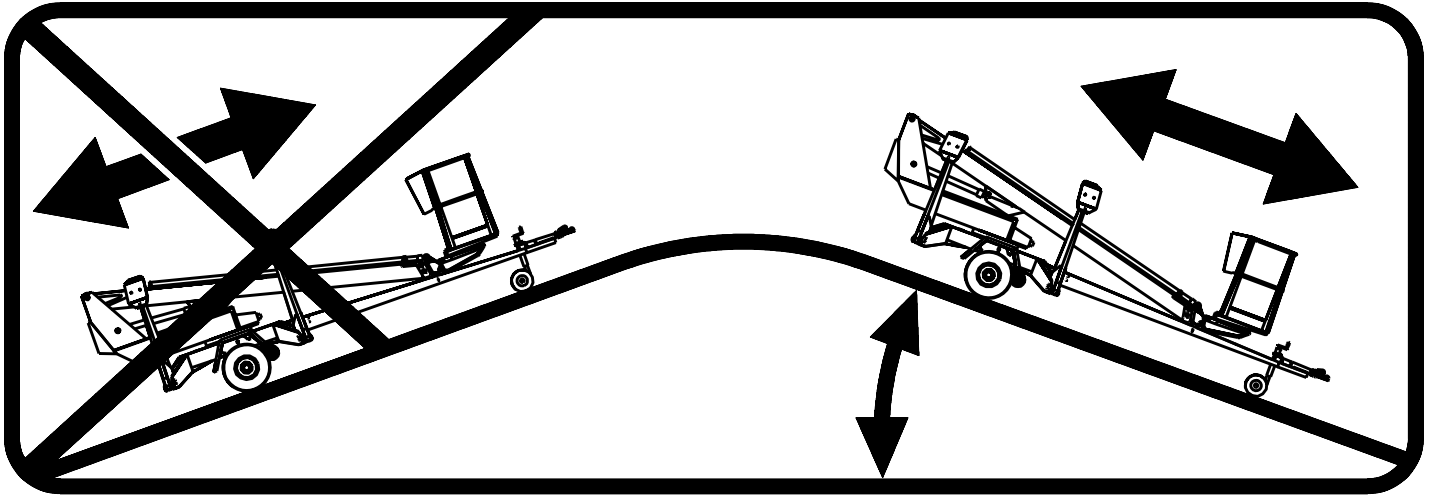
Start by retracting the telescope completely, continue by lowering the boom and finally turn the boom system.



13 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.

14 DRIVING DEVICE

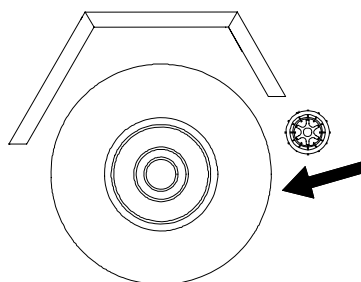
The hydraulic driving device is intended for moving the lift within the work area if the towing vehicle cannot be used.

- 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
- press the driving device against the wheel

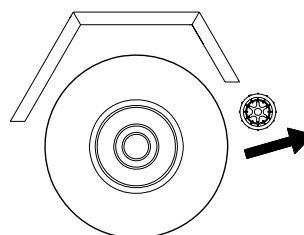


DINO 150TB

- release the parking brake
- drive with press buttons:

Forward	10F
Backward	10B
To the right (forward)	10F.
To the left (forward)	10F.
To the right (backward)	10B 44Ah
To the left (backward)	10B+10L

- while operating the driving device, turn lever 3 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.

15 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
- ensure that the batteries are charged, flat batteries freeze easily

ALWAYS KEEP THE LIFT FREE FROM DIRT, SNOW ETC.

16 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 to position 1a.
6. If you want to charge the battery, connect the mains cable and turn the mains switch to position 0, otherwise disconnect the lift from the mains supply and turn the mains switch to position 0.
7. Make sure that the covers are locked.

With respect to the operation and durability of the batteries, it is beneficial to connect them for recharging at the end of each workday, irrespective of their remaining level of charge. Keeping the batteries in storage without charging them first shortens their service life and flat batteries also freeze easily.



17 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.
 - 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 to position (1b), "outriggers".
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 to position 1a and disconnect the lift from the power supply.
10. Turn the mains switch to position 0.
11. Make sure that the covers are locked.



18 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 towball using only a little force. The connection and locking take place automatically.

NOTE! 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.

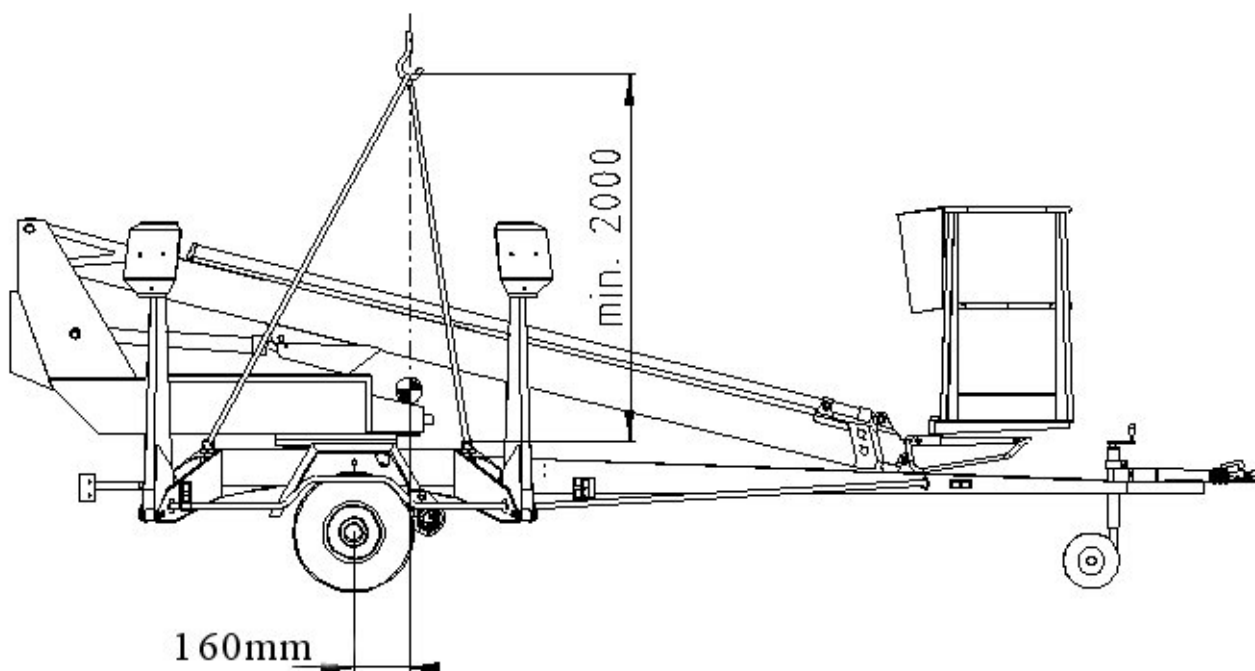
NOTE!

- 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. 450 kPa (4.5 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

19 INSTRUCTIONS FOR SERVICE AND MAINTENANCE

19.1 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 1,800 kg or slinging at the four lugs (see picture)
Be careful not to damage the device during the lifting!



19.2 MAINTENANCE OF THE BATTERIES

Note! Remember, when you handle the batteries:

The electrolyte is very corrosive - always use protective clothing and eye protectors

During charging the batteries hydrogen gas is generated - do not light open fire, danger of explosion

Always keep the batteries well charged

- Keeping batteries discharged is extremely harmful. Modern chargers do not charge batteries excessively.
- Make sure the user is aware that the batteries must be plugged in for charging every night, although they were not totally flat.
- Plug in a rental machine for charging over night immediately after it is returned.

Do not allow the batteries to freeze

- A fully charged battery stands out for frost, a flat battery does not.
- Make sure the batteries are charged, if they are kept outdoors in the winter.



Make sure the level of electrolyte in the battery is correct

- Top up distilled water only after the charging is finished. Correct level of the electrolyte is 3 mm below the edge of the mark.
 - If the level is too high, the liquid will spume out from the plugs during charging.
 - If the level is too low, the upper edges of the elements will corrode.
- If the level of the electrolyte is so low, that the tops of the elements are not submerged, top up water as much as is required to cover the elements. After that, charge the batteries and recheck the electrolyte level after the charging is finished.
- Do not add into the battery acid, but only distilled water.

Check the batteries regularly

- Keep the batteries clean externally. You can wash the batteries with warm water and a brush. Make sure the plugs for the cells are closed so that washing water cannot enter the cells.
- Check the condition and attachment of the cables and the tightness of the connectors regularly.
- Check that the batteries do not show cracks or leaks.

Test the condition of the batteries regularly

- Specific weight of the liquid
 - 1,277 = Battery 100 % charged
- Battery voltage
 - 29.6V = Charging voltage
 - 25.46V = Voltage of batteries that are 100 % charged. Charger disconnected, the voltage has been stabilizing for a few hours
 - 20.88V = voltage of 0 % charged batteries. Movements "Boom up" and "Telescope out" impeded.
 - about 17V = All movements impeded

If maintained well, the batteries will last 4-5 years of normal operation. Incorrect use shortens their service life rapidly.

19.3 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 (see 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

3. Weekly service

- check level of the electrolyte in the batteries (see point "Maintenance of the batteries")
- check the tyre pressure (450 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
- put a load of about 80 kg onto the platform and drive the boom to level position

Continue by extending the telescope until the red signal light lights up and the movement stops. Measure the stroke in accordance with the instructions and compare it with the setting of the outreach limit RK4. If the stroke exceeds the allowed value, contact the service person. (See point "Inspection and adjustment of the overload limit switches")

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

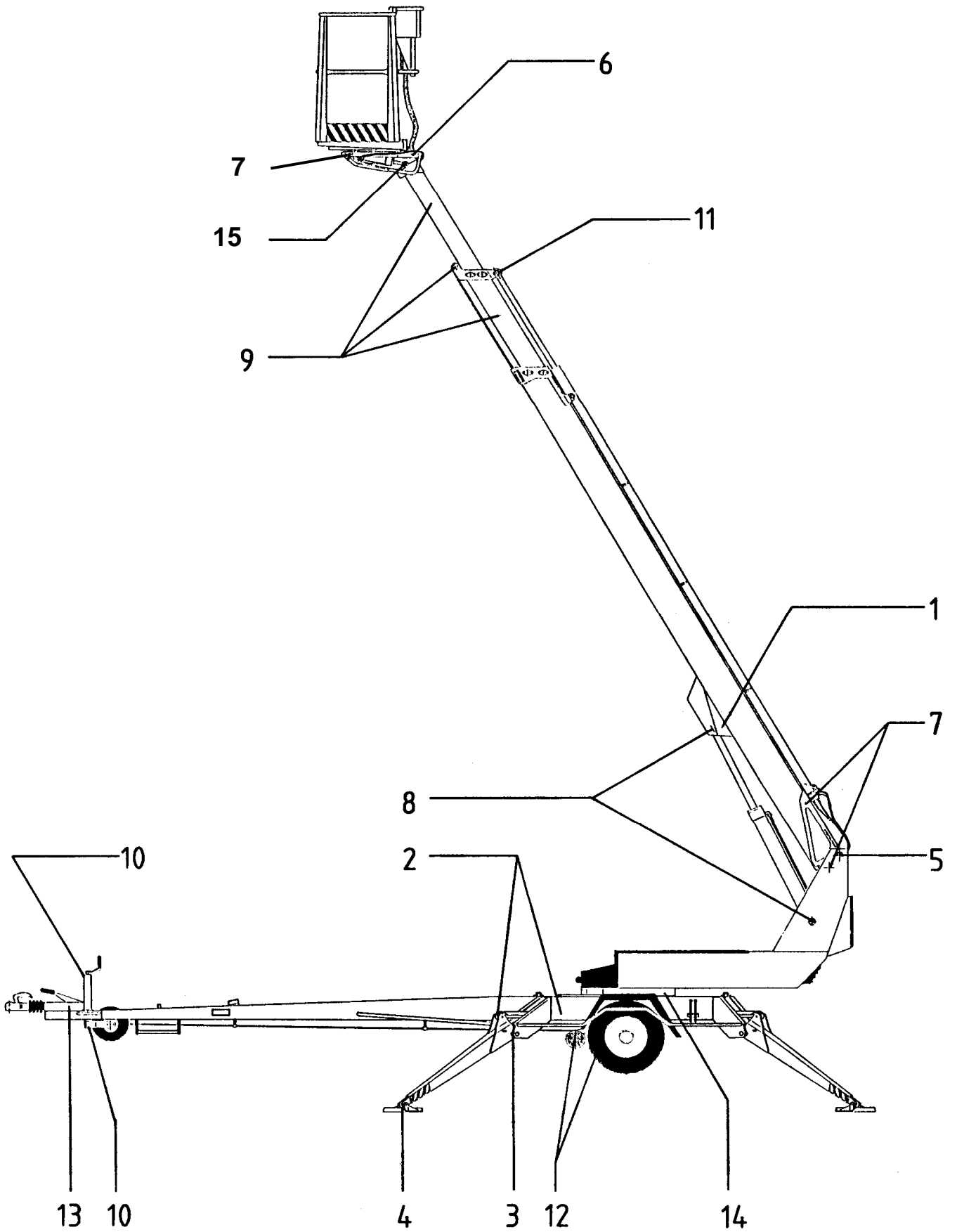
5. Periodic service every 12 months in accordance with the instructions for regular servicing below in this manual

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.

19.4 LUBRICATION PLAN



EVERY 50 HOURS

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

TWICE A YEAR

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

Lubricant Esso Beacon EP2 or equivalent.

The overload protection device joint (point 1) must absolutely be lubricated regularly and **always immediately after the lift has been washed.**

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.

*Remove the crescent-shaped covers from the underside of the lift in order to enable lubrication of the turning bearing nipples (4 pieces).

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

19.5 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 100 - 200 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

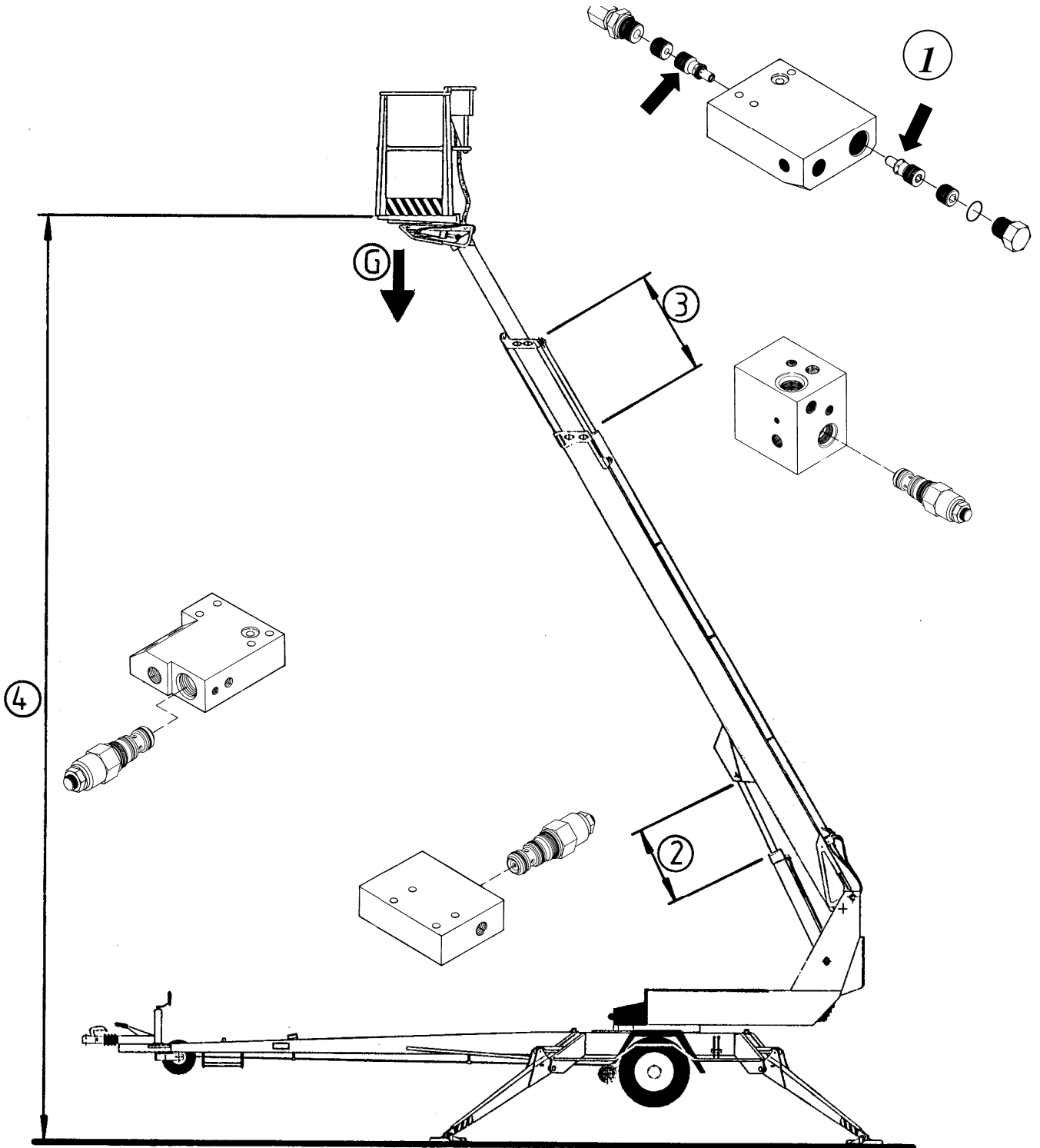
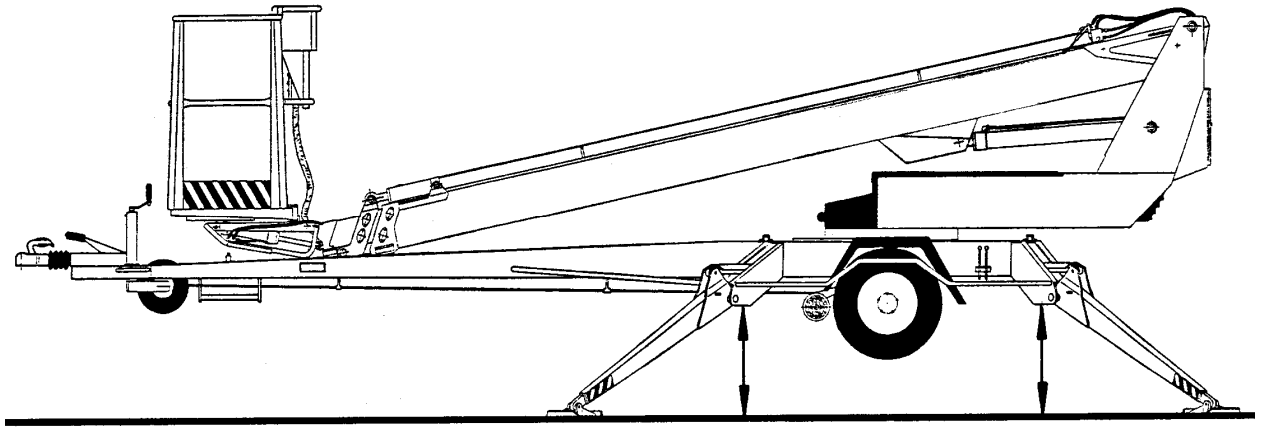
Support the platform, boom system and outriggers in a position, in which the load does not rest on the repaired structure. Make sure to relieve the residual pressure from the cylinders.

19.6 LONG-TERM STORAGE

Clean the machine carefully, lubricate it and apply protective grease to it before putting it into storage for a longer period of time. Repeat the cleaning and lubrication procedures while resuming the operation.

The periodic inspections must be executed following the steps described in the instructions.

DINO 150TB



19.7 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.

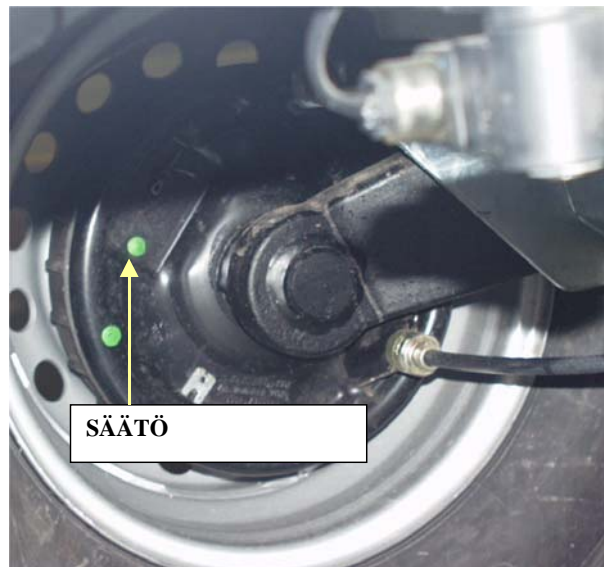
The brake rods must be slack (with the handbrake released).

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.

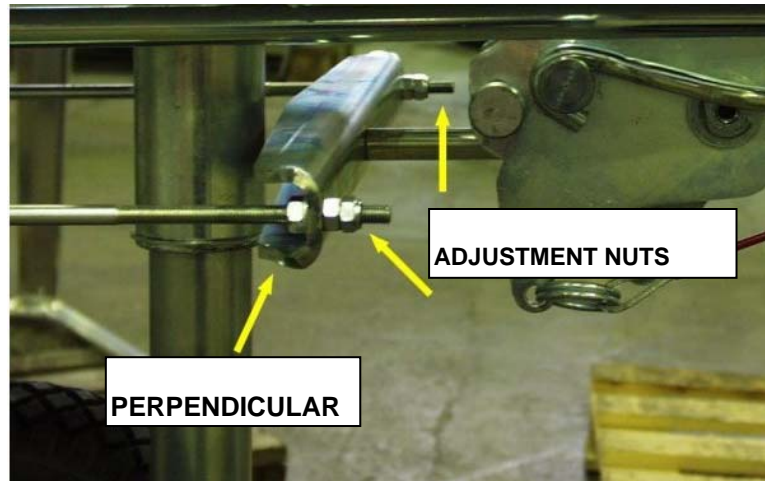
Turn the bolt counter-clockwise until the wheel may be turned freely.



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.

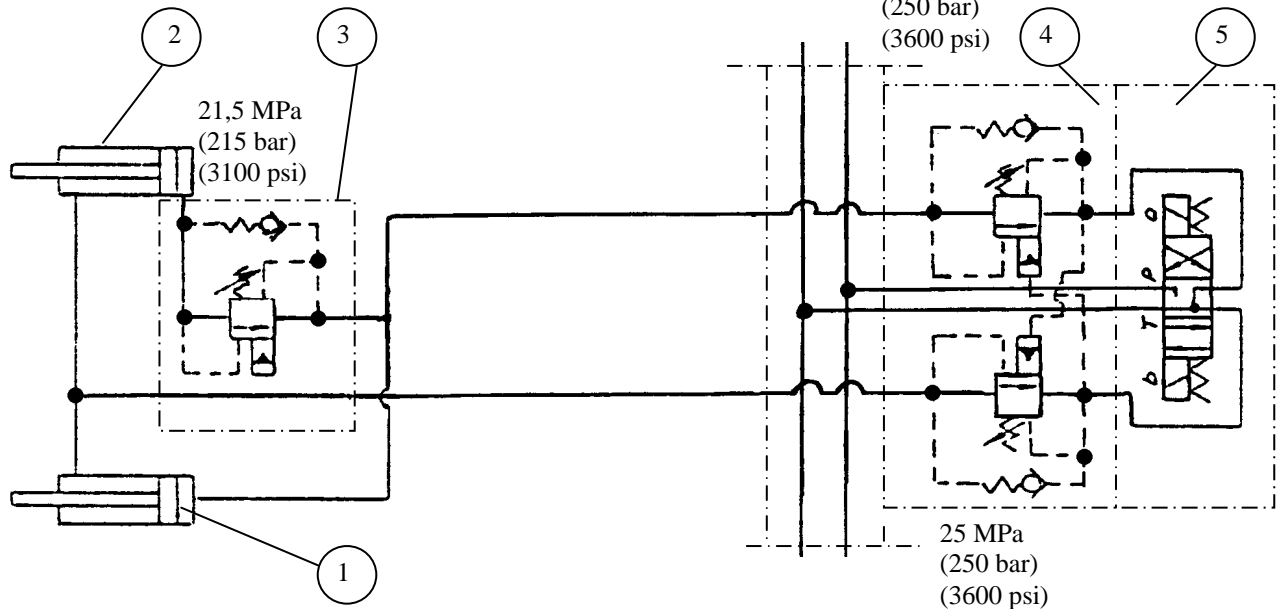
NOTE!

Assign a specialized workshop for the work.

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

19.8 LEVELLING SYSTEM OF THE PLATFORM

1. 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 is 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.

19.9 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.

NOTE!

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.

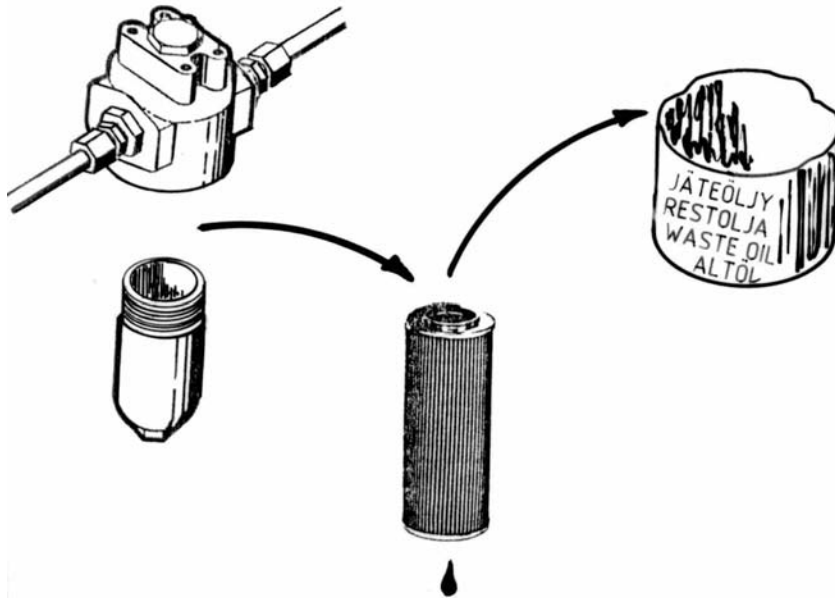
- use pressure air to dry the electric devices, hydraulic connectors etc.before opening them
- apply appropriate moisture repellent to the electric appliances after the drying
- always protect the piston rods with e.g. CRC3-36 anti-corrosive agent after washing with a solvent

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 EAL 32)

The viscosity class of the hydraulic oil must be **ISO VG32** or **ISO VG15** and the oil must meet the requirements according to DIN 51524- HLP. Material Safety Sheet EXXON MOBIL n:o 581017-60.

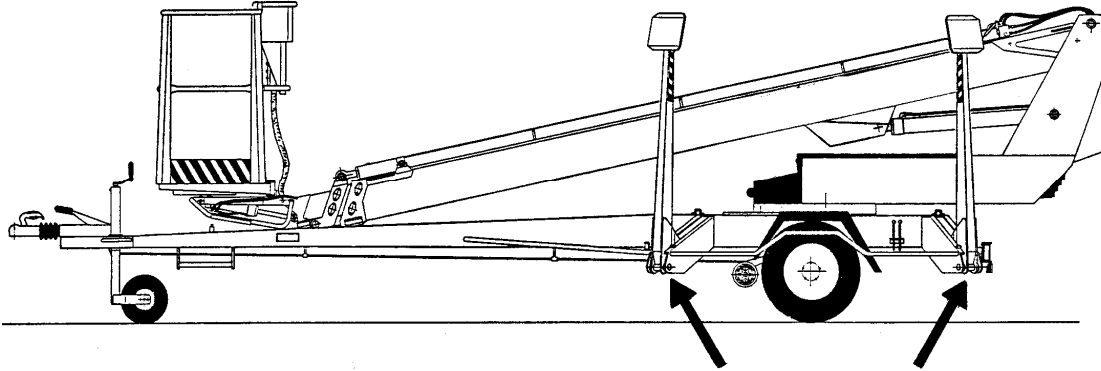
- never mix different oil sorts
- as required, top up hydraulic oil to the level with the upper mark on the dipstick while the lift is in the transport position

3. Check the hydraulic hoses and pipes

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

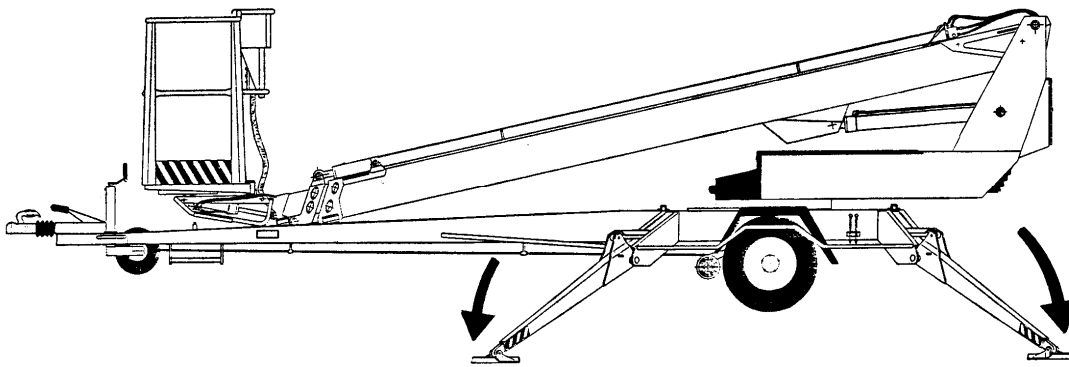
4. Inspect joints of the support outrigger

- lower the outriggers slightly
- swing the outriggers back and forth in the horizontal 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.

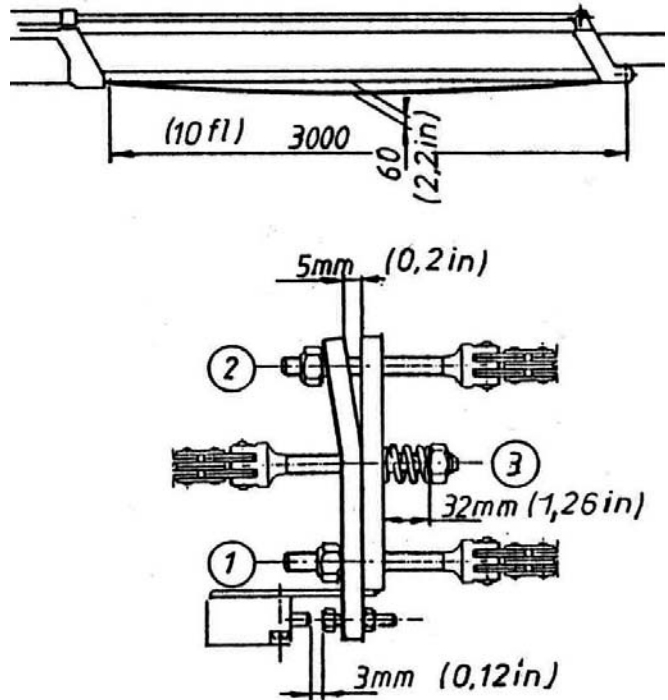


5. Inspect the cylinders, and lubricate the joint bearings (refer to the lubrication plan).

- 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-chain
- 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
Remove the crescent-shaped covers from the underside of the lift in order to enable lubrication of the turning bearing nipples (4 pieces).

NOTE! 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:

280 Nm (M16)
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

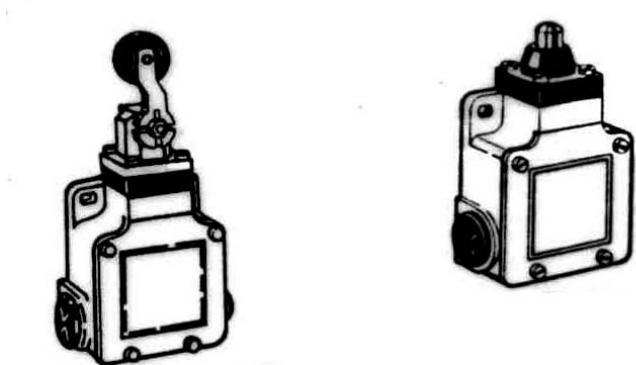
- attachment of the overrun
- clearance
- condition of the towball-coupling
- condition of the locking device
- check that the overrun brake mechanism moves freely:
 - stop the lift, as instructed (see point "Preparing the lift for transport")
 - push in the towball-coupling with its push rod
 - the 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)
- safety device (RK4 and RK5)
- support outriggers (RK11, RK12, RK13 and RK14)
- boom (RK7 and RK8)

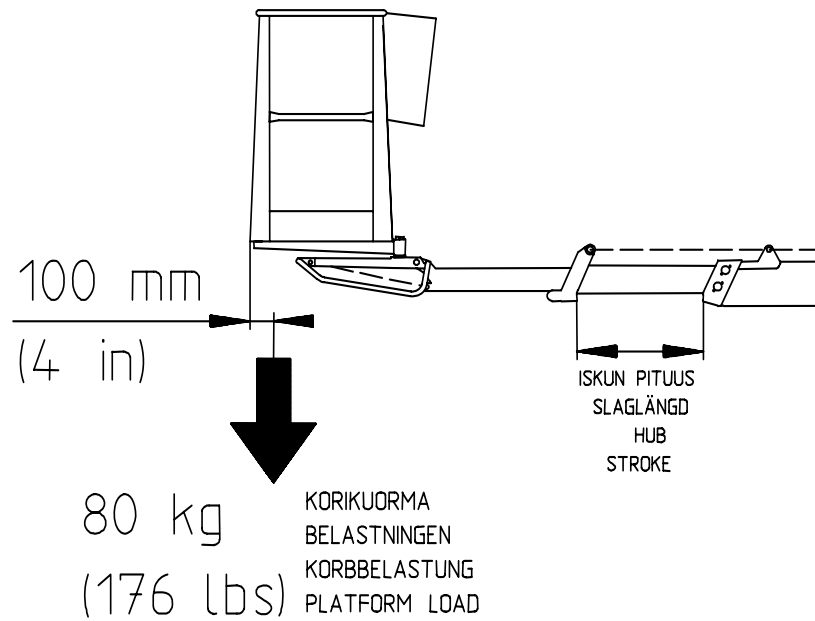
10. Operation of the safety devices while they are controlled from the chassis control panel

- lift the platform slightly up from the transport position
- the outriggers must not operate in any position of the selector switch
- lift the boom and test the following:
 1. emergency stop (4)
 2. telescope in (2)
 3. boom down (3 and 6)

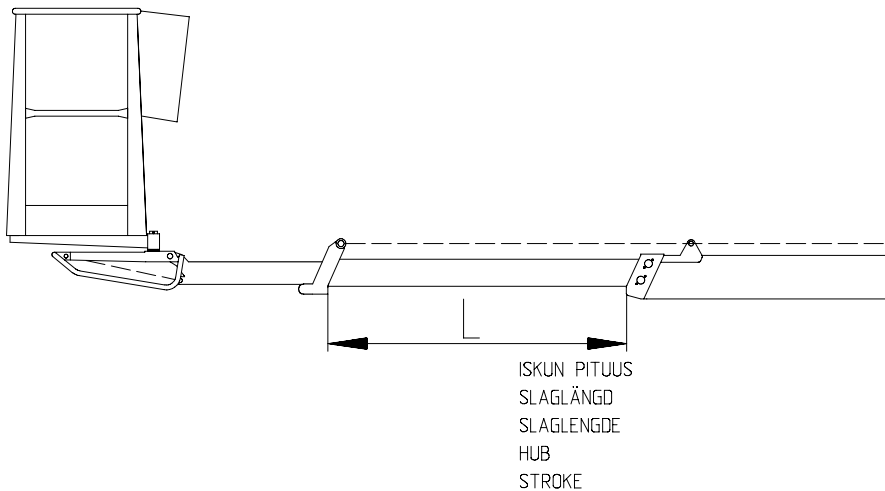


- bring the boom to the transport position and lift the outriggers with the driving device connected.
- the boom must not operate in any position of the selector switch
- disconnect the driving device and lower the outriggers (bring the lift to a level position)
- put a load of about 80 kg onto the platform

DINO 150TB



- lift the boom and extend the telescope
The movement stops as soon as the red outreach limit signal light lights up (at max. outreach).

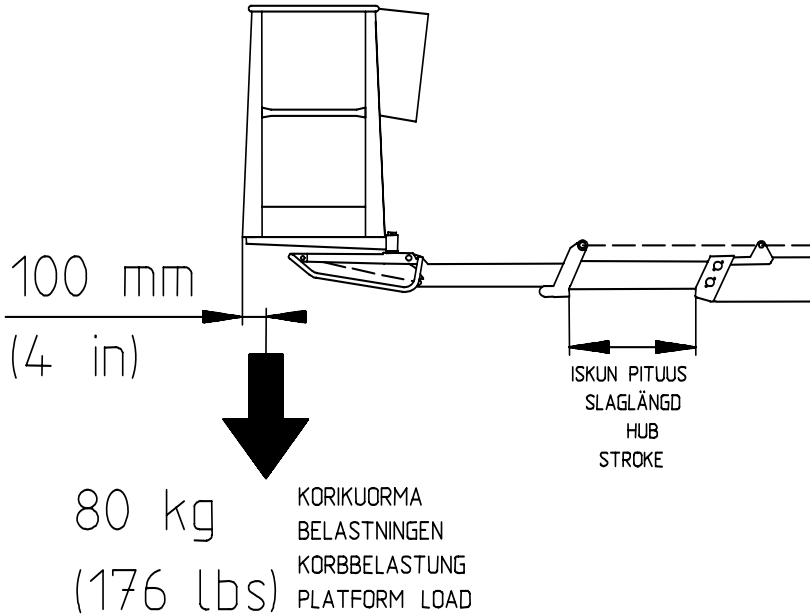


Now:

- the lifting of the boom should be operational - the lowering of the boom must NOT be operational
- the retraction of the telescope should be operational - the extension of the telescope must NOT be operational

19.9.1 TESTING THE LOAD LIMIT SWITCHES RK4 AND RK 5

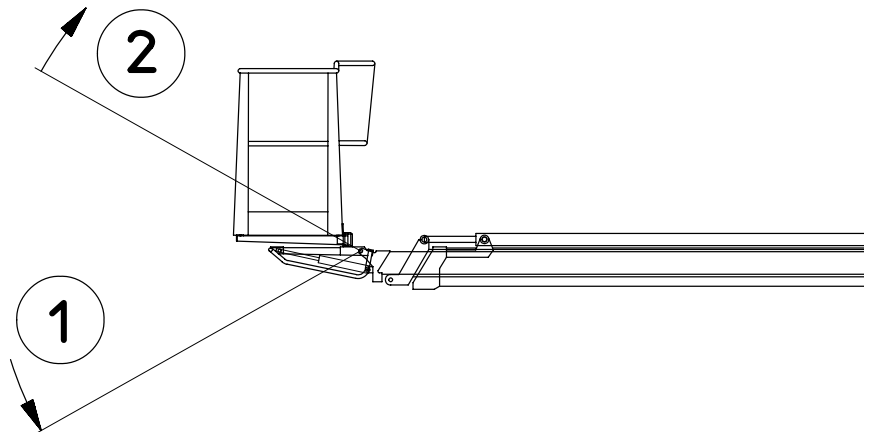
Put a carefully weighed load (80 kg) on the platform. Place it at a distance of 100 mm from the rear edge of the platform.



Drive the boom to a horizontal position from the chassis control panel.

Lift and lower the rear edge of the platform using the position control.

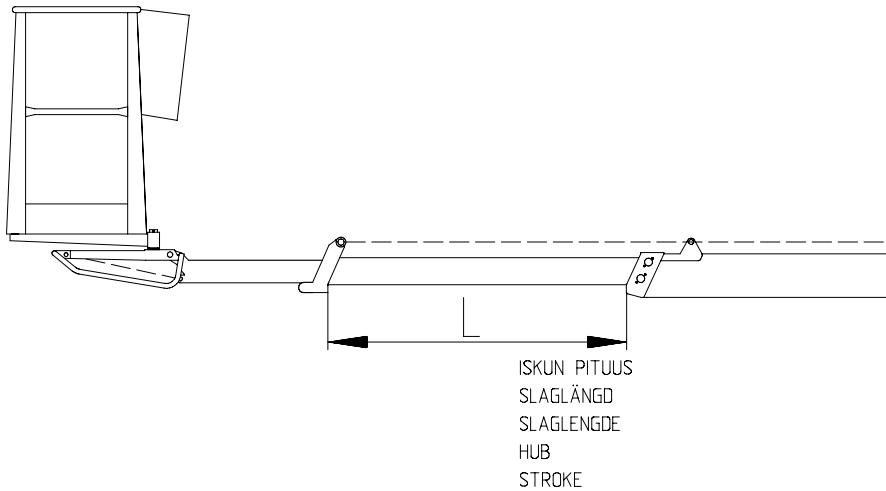
1. Lowering the rear edge of the platform
2. Lifting the rear edge of the platform



Drive the platform with the position control to a horizontal position so that that the last stage of the adjustment procedure is lifting of the rear edge.

DINO 150TB

Extend the telescope until it stops. (Do not correct the position of the platform).



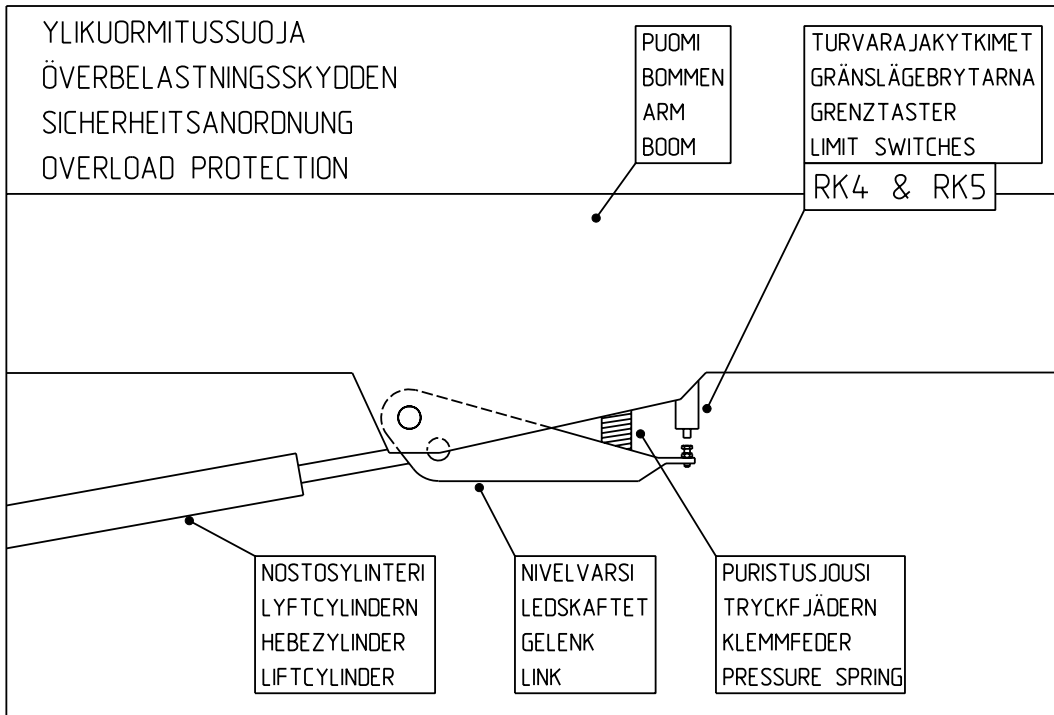
Measure the length of the protruding part of the telescope extension(L). The length shall be 2,900 mm \pm 50 mm.

Make sure that a red signal light on the platform is flashing.

- the second safety limit switch (RK5) backs up if the first switch outreach limit switch (RK4) fails
- disable the RK4 by connecting two jumper leads in the lower control centre for measurement:
 - Terminal block 45 -> connector 14 of the safety relay SR3
 - Connector X1 of the safety relay SR3 -> connector X2 of SR3
- retract and extend the boom and measure the length of the telescope extension's protruding part
The length shall be 3,200 mm \pm 50 mm.
- if the protruding part is too long, adjust the limit switches and secure their position with a seal

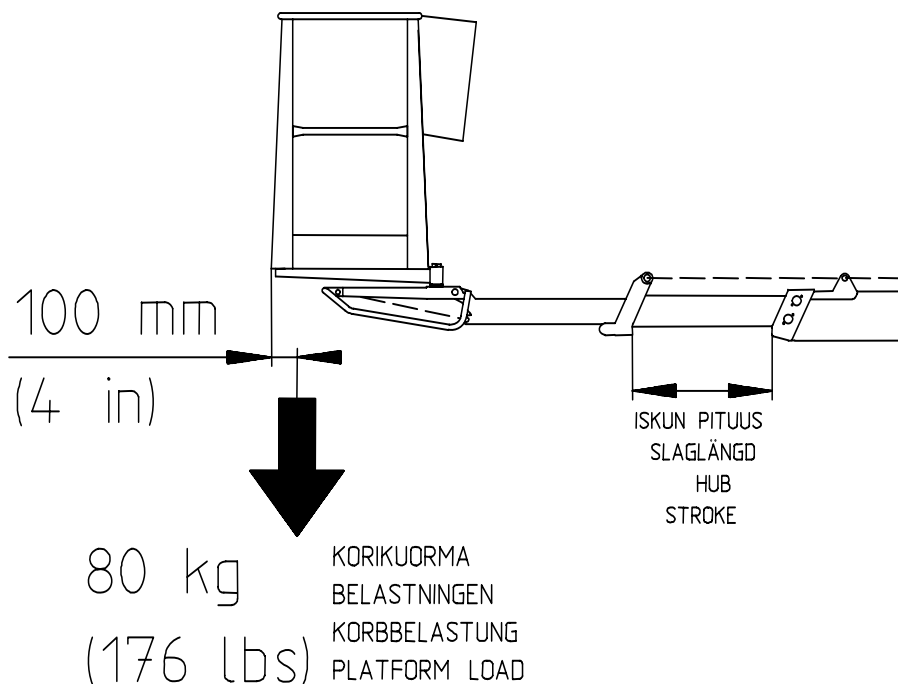
NOTE! Remember to resume the operation of the RK4 by removing the jumper leads.

19.9.2 ADJUSTMENT OF THE OVERLOAD LIMIT SWITCHES



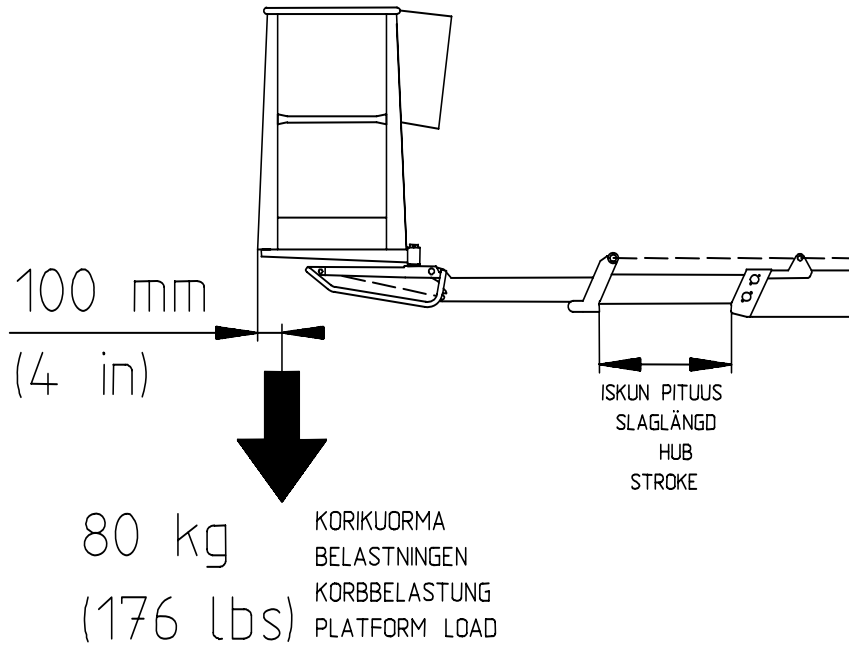
Always check the operation of both limit switches in connection with the service.

- put a load of 80 kg onto the platform
- drive the boom to a horizontal position
- drive the platform with the position control to a horizontal position so that that the last stage of the adjustment procedure is lifting of the rear edge



Adjustment method I:

- make sure that the RK5 with certainty will trip before the RK4 by adjusting the RK4
- extend the boom and measure the length of one protruding part of the telescope extension



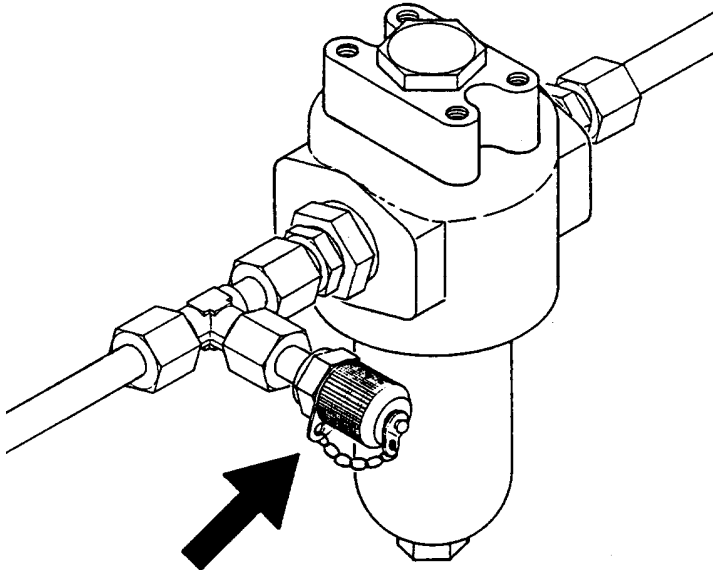
(stroke)

- the measure shall be 3,200 mm \pm 50 mm.
- tighten the locking of the adjustment screw and check once more the settings
- set RK4 to trip earlier than RK5
- extend the boom and measure the stroke
- the measure shall be 2,900 mm \pm 50 mm.
- tighten the locking of the adjustment screw and check once more the settings
- apply a safety wire to the adjustment screws in such a manner that it will not be possible to unscrew the screws away from the limit switches
- apply a seal on the wire
- put the cover in place

The 2nd alternative for securing the RK5 when the securing wire is in place is described in this manual

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 and the tightness of the cable clamps
- test the sound signal and the emergency stop
- test all movements
- test the operation of the overload limit switches before lifting the boom

20.1 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.

20.1.1 SAMPLE OF INSPECTION PROTOCOL FOR THE ACCESS PLATFORM

	TEST CERTIFICATE	DATE:
www.dinolift.com		
START-UP TESTS:		
Inspection place: <u>Dinolift Oy</u>		Inspector's signature: <u>Hämäläinen Pekka NT0152</u>
BASIC KNOWLEDGE		
Manufacturer: <u>Dinolift OY</u>	Place of manufacture: <u>Finland</u>	
Address: <u>Raikkolantie 145</u> <u>32210 LOIMAA</u>		
Importer: _____		
Type of lift:	<input checked="" type="checkbox"/> Boom platform	<input type="checkbox"/> Scissor platform
	<input type="checkbox"/> Car	<input type="checkbox"/> Self propelled
	<input type="checkbox"/> Articulated boom	<input checked="" type="checkbox"/> Telescope boom
	<input type="checkbox"/> Scissor	<input type="checkbox"/> Fixed mast
Outriggers:	<input checked="" type="checkbox"/> Hydraulic turning	<input type="checkbox"/> Hydraulic pushing
		<input type="checkbox"/> Mechanical
		<input type="checkbox"/> Mast platform
		<input checked="" type="checkbox"/> Trailer mounted
		<input type="checkbox"/> Articulated telescope boom
		<input type="checkbox"/> Telescope mast
TECHNICAL SPECIFICATION		
Machine and type:	<u>DINO 150 TB</u>	Max. platform height: <u>13m</u>
Number of manufacture	<u>YGC 0D150T X X XXXXXX</u>	Max. outreach: depend on load: <u>Depend on load</u>
Year of manufacture	<u>2009</u>	
Max. lifting capacity:	<u>215 kg</u>	Boom rotation: <u>Continuous</u>
Max. person number:	<u>2</u>	Support width: <u>3,80 m</u>
Max. additional load:	<u>55kg</u>	Transport width: <u>1,78 m</u>
Power supply:	<u>24 VDC</u>	Transport length: <u>6,43 m</u>
Lowest temperature:	<u>-20 °C</u>	Transport height: <u>2,14 m</u>
Weight:	<u>1840 kg</u>	Basket size: <u>0,7x1,3 m</u>
Inspection points: (Y = meet standards N = do not meet standards)		
	Y N	Y N
A. STRENGTH		
1. Certificate of material	<input checked="" type="checkbox"/> <input type="checkbox"/>	6. Plate for supports <input checked="" type="checkbox"/> <input type="checkbox"/>
2. Certificate of strength	<input checked="" type="checkbox"/> <input type="checkbox"/>	7. Safety colours <input checked="" type="checkbox"/> <input type="checkbox"/>
B. STABILITY		D. SAFETY REQUIREMENTS
1. Certificate of stability test	<input checked="" type="checkbox"/> <input type="checkbox"/>	1. Indicating device for horizontal position <input checked="" type="checkbox"/> <input type="checkbox"/>
2. Working space diagram	<input checked="" type="checkbox"/> <input type="checkbox"/>	2. Locking device and lockings <input checked="" type="checkbox"/> <input type="checkbox"/>
C. GENERAL REQUIREMENTS		3. Stop device for lifting <input checked="" type="checkbox"/> <input type="checkbox"/>
1. User's manual	<input checked="" type="checkbox"/> <input type="checkbox"/>	4. Stop for opening of support <input checked="" type="checkbox"/> <input type="checkbox"/>
2. Place for safekeeping for user's manual	<input checked="" type="checkbox"/> <input type="checkbox"/>	5. Safety distances <input checked="" type="checkbox"/> <input type="checkbox"/>
3. Machine plate - checking plate	<input checked="" type="checkbox"/> <input type="checkbox"/>	6. Position of working face <input checked="" type="checkbox"/> <input type="checkbox"/>
4. Load plate	<input checked="" type="checkbox"/> <input type="checkbox"/>	7. Structure of working face <input checked="" type="checkbox"/> <input type="checkbox"/>
5. Warning plate	<input checked="" type="checkbox"/> <input type="checkbox"/>	8. Emergency descent system <input checked="" type="checkbox"/> <input type="checkbox"/>
		9. Limit devices <input checked="" type="checkbox"/> <input type="checkbox"/>

DINO 150TB

E. ELECTRIC APPLIANCES		G. SAFETY DEVICE	
1. Electric appliances	<input checked="" type="checkbox"/> <input type="checkbox"/>	1. Safety limit switch	<input checked="" type="checkbox"/> <input type="checkbox"/>
		2. Sound signal	<input checked="" type="checkbox"/> <input type="checkbox"/>
F. CONTROL DEVICES		H. LOADING TEST	
1. Protections	<input checked="" type="checkbox"/> <input type="checkbox"/>	1. Loading = 323 kg	<input checked="" type="checkbox"/> <input type="checkbox"/>
2. Symbols / directions	<input checked="" type="checkbox"/> <input type="checkbox"/>	3. Work movements	<input checked="" type="checkbox"/> <input type="checkbox"/>
3. Placings	<input checked="" type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>
4. Emergency stop	<input checked="" type="checkbox"/> <input type="checkbox"/>		<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/> <input type="checkbox"/>		
FAILINGS AND NOTES _____			
Failings have been repaired. Date: _____ Signature: _____			

Dinolift Oy
Raikkolantie 145
FIN-32210 LOIMAA, FINLAND
Tel. +358 - 2 - 7625 900, Fax +358 - 2 - 7627 160, e-mail: dino@dinolift.com

20.2 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 at the lifting site (see the table "maximum permissible ground pressure for different soil materials" for guidelines)
- 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 the warning and signal lights
- 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 operation of the overload limit switches (see point "Inspection and adjustment of the overload limit switches")
- check the operation of the limit switches, which block the boom movements (see point "Regular servicing").
- check the limit switch, which prevents the operation of the outriggers (see point "Regular servicing").
- 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 level of the electrolyte in the batteries once a week (see point "Maintenance of the batteries").

20.3 **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 daily 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 and attachment of the batteries
- 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

20.4 ANNUAL INSPECTION (REGULAR INSPECTION)

The inspection shall be performed by a skilled technician or an expert inspection body with documented evidence of competence (see point “Periodic inspection”). 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
 - make the oil flow through the relief valve by driving one of the movements against the end stop
 - 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

DINO 150TB

- 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

DINO 150TB

- 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 that the lock of the gate and the gas spring 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 support outrigger cylinder guards
 - 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 tightening torque of the turning bearing's attachment screws (M16 280 Nm, M12 150 Nm)
 - check the attachment of the turning motor

DINO 150TB

- 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 the operating controls, control the outreach in accordance with the instructions
(See point “Inspection and adjustment of the overload limit switches”)
- also check the operation of the limit switches during the test run (refer to the service instructions)
 - the overload limit switches on the safety devices
 - 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

20.5 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

20.6 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 215 kg on the platform (I).
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 until the safety device stops the movement.
6. Turn the boom round over 360°.
7. Retract the telescope and lower the boom to a horizontal position.
8. Extend the telescope until the safety limit switch RK4 stops the movement. Establish the standing stability in this situation by turning the lift round over 360°.
9. Carry out the same procedure with a platform load of 120 kg (II).
10. Compare the outreach with the reach diagram, and as necessary, readjust according to the instructions for "adjustment of the overload limit switches".

After the above mentioned test loadings (case I and case II) and the subsequent inspection have been completed without finding any defects in the structure or stability of the lift, the lift may be used inside the permitted operating range presented in the reach/platform load diagram of this manual.

The max. allowed platform load is 215 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

21 FAULT FINDING

FAULT	REMEDY
-------	--------

1. The electric motor does not start, although the selector switch is in position 1b or 1c and one of the movements is operated or the start button at the battery housing on the left-hand side is depressed

Mains switch turned off.	Turn on the mains switch.
Emergency stop button, either on the platform or in the chassis control centre is stuck in the lower position.	Lift the button and start the engine.
No power supply to the main centre - no readout in the battery gauge.	Check the fuse F3 (10A glass tube fuse in the main centre). Check the fuse F12 (15A automatic fuse in the left battery housing) Check the fuse FG (150A megafuse in the left battery housing)
Power supply to the main centre OK - the battery gauge readout is between 100 % - 1 %.	Check the fuse F1 (10A glass tube fuse in the main centre). Check the fuse F4 (10A glass tube fuse in the main centre).
Power supply to the main centre OK - the battery gauge readout is 0 %.	Batteries are flat -> recharge batteries by connecting the mains cable.
Telescope chain limit switch RK7 has disconnected the emergency stop circuit.	Check the operation of the RK7 and readjust according to the instructions. (See point "Periodic inspection").
Voltage supply to the switch OK, but no transmission forward.	Check the operation of the selector switch and replace it, if necessary.
Power input to the selector switch and output from the switch are OK.	Check the operation of the engine solenoid and the governing relays.

2. "Boom up" and "Telescope out" movements are not operational, although the electric motor starts normally as other movements are operated

Battery voltage low, lifting movements are impeded.	Recharge the battery by connecting the mains cable.
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3. None of the platform movements operate though the electric motor is running and the selector switch is in position 1b or 1c

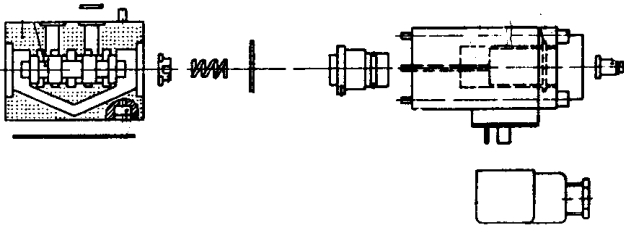
Green signal light for outriggers is not lit.	Check operation of the safety limit switches RK11, RK12, RK13 and RK14.
Overloading of the boom has occurred.	Retract the platform with the buttons 2 or 3 inside the designated operating range of the platform (the green light in the platform control panel lights up).

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

FAULT	REMEDY
-------	--------

4. 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.

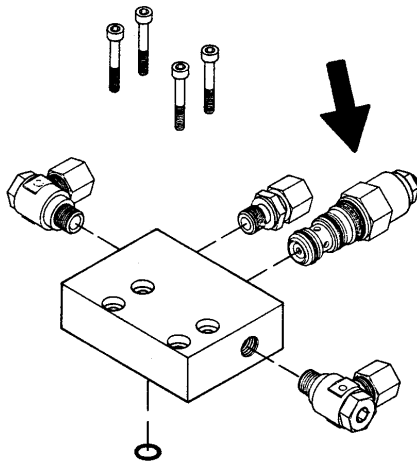
Spray with moisture repellent.

Lifting or lowering of the boom and extension of the telescope are not operational, red light on the platform is lit and the buzzer in the chassis control panel is audible.

Overloading of boom has occurred; retract the telescope and retry (automatic reset).

5. 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.

DINO 150TB

FAULT	REMEDY
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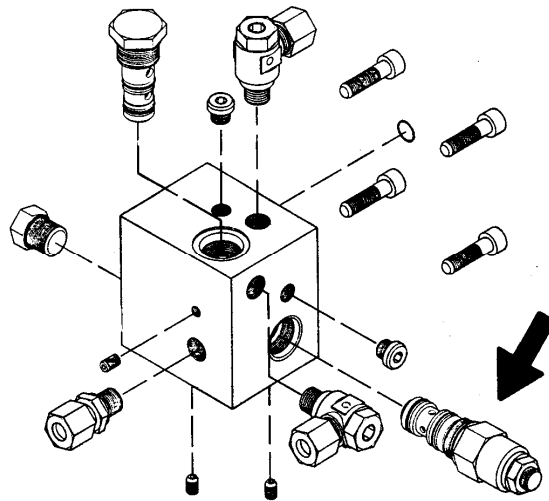
8. Boom cannot be lifted

	<p>Refer to item 4.</p> <p>Electric valve open.</p> <p>Remedy as instructed above in conjunction with the seizure of the electric valve spool.</p>
The lift turns as the lifting movement is activated.	<p>Solenoid valve is stuck in turning position.</p> <p>Wash carefully the spool and the block.</p>

11. Telescope movement does not operate

	<p>Refer to item 4.</p> <p>Check that the solenoid valve of the telescope is not stuck in the centre (open) position.</p>
--	---

10. Telescope retracts slowly



The load regulation valve leaks.	For remedy, refer to item 5 (lock valve).
----------------------------------	---

11. Platform drifts backward

Double load regulation valve on the bottom side is leaking.	For remedy, refer to item 5 (lock valve).
Load regulation valve under the platform is leaking.	For remedy, refer to item 5 (lock valve).

DINO 150TB

FAULT	REMEDY
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12. Platform drifts forward

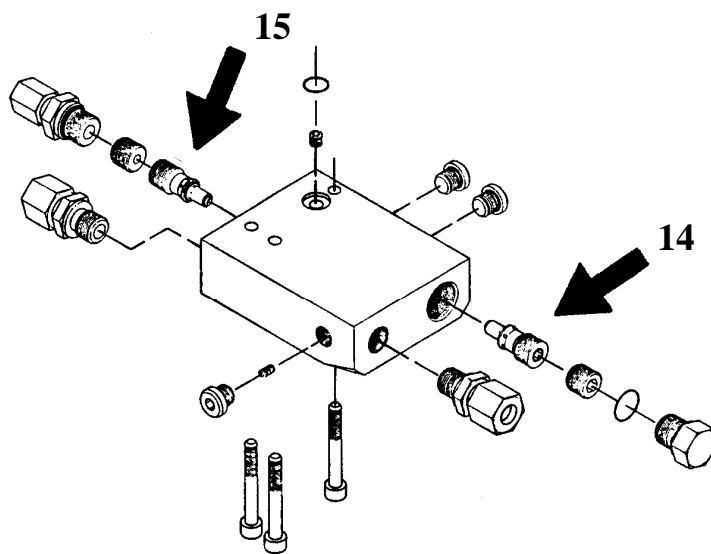
Double load regulation valve on the rod side is leaking.	Measures as above.
--	--------------------

13. 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 4.

14. 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 5 (lock valve). Tightening torque 55 Nm.
--	--



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

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

16. 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 4.

DINO 150TB

FAULT	REMEDY
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17. Too low braking force

Too much play in the brake system.	Adjust the brake system (see point "Wheel brakes and bearings").
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.

18. Braking uneven and jerky

Too much play in the brake system.	Adjust the brake system again (see point "Wheel brakes and bearings").
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.

19. 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.
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20. Lift brakes as the engine speed is decreased

Shock absorber of the overrun device faulty.	Replace the shock absorber.
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21. Reversing forced or impossible

Brakes have been adjusted too tight.	Adjust the brake system again (see point "Wheel brakes and bearings").
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22. Wheel brakes overheat

Brake system wrongly adjusted.	Adjust the brake system (see point "Wheel brakes and bearings").
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.

DINO 150TB

FAULT	REMEDY
25. 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 not 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:

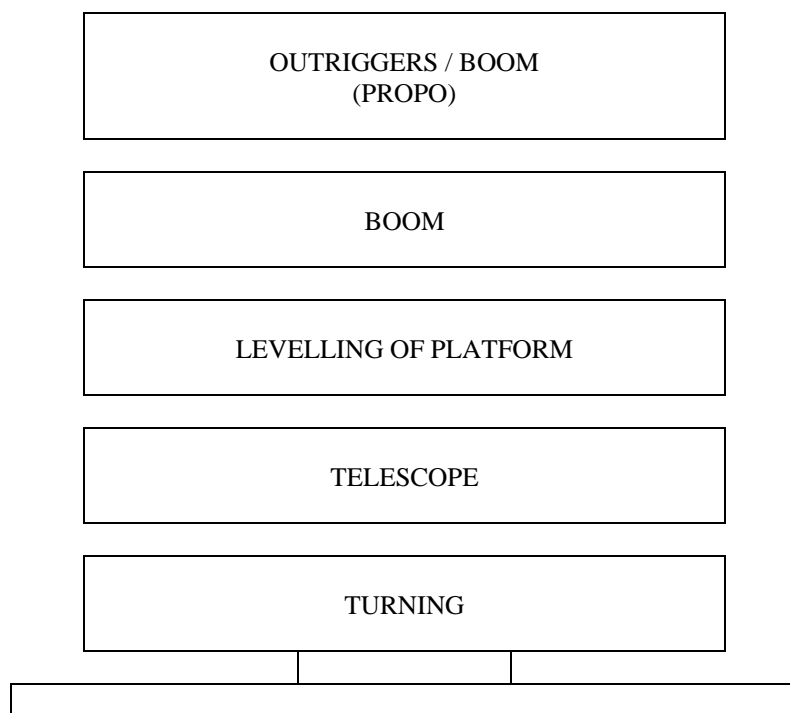
- batteries are flat (low voltage)
- contaminants in the hydraulic system
- loose electric connection or a contact failure caused by moisture

KEEP THE LIFT CLEAN AND PROTECT IT AGAINST MOISTURE

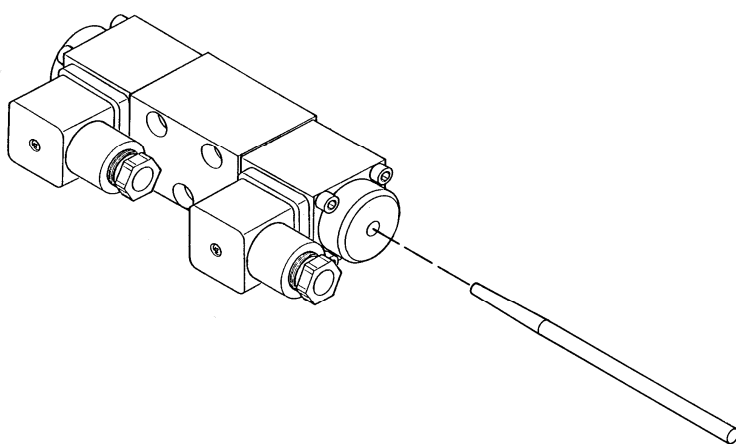
22 GENERAL INFORMATION OF HYDRAULICS

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

23 ELECTRIC COMPONENTS**DINO 150TB****1941->****23.1 CHASSIS CONTROL CENTRE (LCB), RELAYS**

K1: START CONTACTOR (M1) FOR THE ENGINE - in the battery housing on the left-hand side
Control circuit fuse F3 10A

K2: AUXILIARY RELAY FOR EMERGENCY STOP BUTTON
Control circuit fuse F1 10A

K3: TURNING THE BOOM TO THE LEFT
Control circuit fuse F9 1.6A (Platform control panel) and F4 10A (Chassis control panel)

K4: TURNING THE BOOM TO THE RIGHT
Control circuit fuse F9 1.6A (Platform control panel) and F4 10A (Chassis control panel)

K5: BOOM DOWN
Control circuit fuse F9 1.6A (Platform control panel) and F4 10A (Chassis control panel)

K7: BOOM UP
Control circuit fuse F9 1.6A (Platform control panel) and F4 10A (Chassis control panel)

K9: TELESCOPE IN
Control circuit fuse F9 1.6A (Platform control panel) and F4 10A (Chassis control panel)

K10: TELESCOPE OUT
Control circuit fuse F9 1.6A (Platform control panel) and F4 10A (Chassis control panel)

K15: LEVELLING THE PLATFORM
Levelling the platform backward
Control circuit fuse F9 1.6A (Platform control panel) and F4 10A (Chassis control panel)

K16: LEVELLING THE PLATFORM
Levelling the platform forward
Control circuit fuse F9 1.6A (Platform control panel) and F4 10A (Chassis control panel)

K17: CENTRE POSITION ACTIVATION OF THE JOYSTICK
Switches off the voltage from the joysticks's micro-switches if the dead-man-switch DMK has not been pressed while the joystick is in the centre position.

K19: BASIC SPEED WHEN CONTROLLED FROM THE CHASSIS
Connects the speed control for the engine controller for operation from the chassis.

K20: FUNCTION RELAY FOR OUTREACH LIMIT SWITCH RK4
Switches off the "Boom down" and "Telescope out" movements immediately upon operation of the K21. Reconnection delay is about 1,5 sec. Control circuit fuse F3 10A

K21: FUNCTION RELAY FOR OUTREACH LIMIT SWITCH RK4
Switches off the "Boom down" and "Telescope out" movements immediately as the RK4 operates. No delay.
Control circuit fuse F3 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.

K24: CENTRE POSITION ACTIVATION OF THE JOYSTICK

Pressing the dead-man-switch DMK breaks the control voltage from the spool of the relay K17 which would otherwise disconnect the control voltage from the micro-switches on the joystick.

K391: CHANGE-OVER RELAY FOR OPTIONAL FUNCTIONS

As the relay is active the in-out movements of the telescope are switched over to the joystick movements in the Y-direction. As the relay is not active lifting-lowering movements of the boom are switched over to the joystick movements in the Y-direction

SR2: Safety relay monitoring the operation of the 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.

SR3: SAFETY RELAY WHICH MONITORS THE OVERLOADING OF BOOM

Safety limit-switch RK5 controls the operation of the safety relay.

Overloading of the boom: SR3 is disconnected. The safety relay is automatically reset upon return to the normal outreach range. The delay adjusted with the capacitors affects the tripping moment of the SR3.

If the RK5 fails: SR3 is disconnected. The safety relay is not automatically reset but the due operation of the electric equipment must be checked. The delay adjusted with the capacitors affects the tripping moment of the SR3.

SR4: SAFETY RELAY FOR EMERGENCY STOP CIRCUIT

Safety relay for emergency stop, stops the motor and disconnects the control voltage from the boom/chassis selector valve. The relay trips, if the emergency stop button S1 or S4 or the chain limit switch RK7 cuts off the control circuit for the relay.

23.2 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 – in the battery housing on the right-hand side

Starting the electric motor for operation of the support outriggers

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).

S23: SELECTOR SWITCH FOR THE SPEED OF BOOM MOVEMENTS

Position 0: boom movements impeded

Position 1: slow boom movements

Position 2: full-speed boom movements

S32: TELESCOPE IN

Non-locking button switch. After the SR3 has tripped, the telescope can be retracted by depressing the button.

Q1: TURN SWITCH WITH KEY

Selector switch for choosing the operating location.

1a = Off

1b = chassis control panel

1c = platform control panel

23.3 CHASSIS CONTROL CENTRE (LCB), OTHER ITEMS

F1: 10 A FUSE FOR EMERGENCY STOP CIRCUIT

F2: 10A FUSE FOR SELECTOR VALVES AND LIMIT SWITCHES FOR OUTRIGGERS

F3: 10 A FUSE FOR ENGINE CONTROLLER AND OUTREACH LIMITS

F4: 10 A FUSE FOR CONTROL LEVERS AND JOYSTICK AND DRIVING DEVICE ON THE CHASSIS AND PLATFORM CONTROL PANELS

F11: 10A FUSE FOR SOCKET OUTLETS

H3: YELLOW LED SIGNAL LIGHT

Indicates the operation of the outrigger limit switches RK11-RK14.

H4: RED LED SIGNAL LIGHT

Indicates the tripping of the SR3.

HM1: BATTERY VOLTAGE/HOUR METER/DISPLAY OF ERROR CODES FOR ENGINE CONTROLLER

U1: VOLTAGE METER

As the control voltage is connected the voltage meter indicates the alternating voltage reading.

23.4 PLATFORM CONTROL CENTRE (UCB), RELAYS

K50: CONTROL RELAY FOR SIGNAL LIGHTS WHICH INDICATE THE STATE OF LOADING OF THE PLATFORM

The relay is controlled by the closing point of the limit switch RK4.

K51: PLATFORM TURN TO THE LEFT

Controlled by the non-locking lever switch S36.

The control movement is stopped by the inductive end limit switch RK9 of the linear motor.

K52: PLATFORM TURN TO THE RIGHT

Controlled by the non-locking lever switch S36.

The control movement is stopped by the inductive end limit switch RK10 of the linear motor.

23.5 PLATFORM CONTROL CENTRE (UCB), SWITCHES

DMK: DEAD-MAN-SWITCH

JST: JOYSTICK

As the right side of the rocker switch is depressed, the movements are: boom up - down and turn right - left)

As the left side of the rocker switch is depressed, the movements are: telescope out - in and articulated arms up - down.

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.

S29: SELECTOR SWITCH FOR LEVELLING OF PLATFORM

Non-locking button switch.

Switches on the control voltage to button switch S12 as the switch is depressed.

S31: TELESCOPE IN

Non-locking pushbutton for retraction of the telescope.

S36: PLATFORM TURN TO LEFT AND RIGHT

Non-locking lever switch.

Controls the relays K14 and K15.

23.6 PLATFORM CONTROL CENTRE (UCB), OTHER ITEMS

H1: GREEN LED SIGNAL LIGHT

The platform inside the operating range.

H2: RED LED SIGNAL LIGHT

The platform at the border of the operating range.

F9: JOYSTICK FUSE 1.6A

F10: AUTOMATIC FUSE FOR PLATFORM TURN 4A

PR: SOCKET OUTLET ON THE PLATFORM, 230VAC 10A, automatic fuse in the main centre cover

ÄM2: BUZZER

Indicates the operation of the safety limit switch RK5 and the emergency stop switches S1 and S4.

23.7 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.

RK4: SAFETY LIMIT SWITCH FOR THE ADJUSTED OPERATING RANGE

The operation of the limit switch stops the "boom down" movement and the "telescope out" movement.

RK5: BACKUP LIMIT SWITCH FOR THE SAFETY LIMIT SWITCH RK4.

Trips after the preset delay (2 seconds) the safety relay SR3 which controls the sound signal AM2 and switches off the control voltage to the selector valve for the boom.

RK7: SAFETY LIMIT SWITCH FOR THE TELESCOPE CHAIN.

Controls the emergency stop safety relay SR4. Launches the emergency stop procedure as soon as the limit switch SR4 opens

RK8: "TELESCOPE IN THE INNER POSITION" SAFETY LIMIT SWITCH

The limits switch closes as the telescope movement is completely retracted.

If the RK4 or RK5 has failed the boom cannot be lowered until the telescope movement has been completely retracted and the tips of the limit switch RK8 have closed.

RK9: INDUCTIVE LIMIT SWITCH

Limits turning of the platform to the left by disconnecting the control voltage circuit for the relay K51.

RK10: INDUCTIVE LIMIT SWITCH

Limits turning of the platform to the right by disconnecting the control voltage circuit for the relay K52.

DINO 150TB

RK11 - RK14 : LIMIT SWITCHES ON THE OUTRIGGERS

The limit switch closes as soon as sufficient 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.

RK16: INDUCTIVE LIMIT SWITCH

Retards the lifting and lowering movements of the boom and the turning movement, if the length of the boom is about m.

23.8 OTHER MARKINGS

A1: SPEED CONTROL FOR THE ELECTRIC MOTOR M1 – in the battery housing on the right-hand side

FG: 150A MAIN FUSE FOR THE BATTERIES – in the battery housing on the left-hand side

F12: 15A SUPPLY FUSE FOR THE MAIN CENTRE – in the battery housing on the left-hand side

G1-G4: BATTERIES 24VDC (4x6VDC 225AH)

J1: PLUG

M1: ELECTRIC MOTOR 24VDC 2kW

M3: MOTOR FOR PLATFORM TURN

PL: ROTARY ADAPTOR

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

SPV: MAIN SWITCH – in the battery housing on the left-hand side

Disconnects the positive pole of the battery unit from the system. Battery T1 remains connected, the batteries can be charged while the mains switch is open.

T1: BATTERY CHARGER

Charge voltage 29,6VDC.

Maintenance charge voltage 26,6VDC.

Charges the battery if the mains supply is connected.

The signal light for the charger is lit during charging operation.

The batteries can be charged even during operation of the lift.

VVK: FAULT CURRENT SWITCH 25A 30 ms.

ÄM1: SOUND SIGNAL

24 ELECTRIC COMPONENTS

1941->

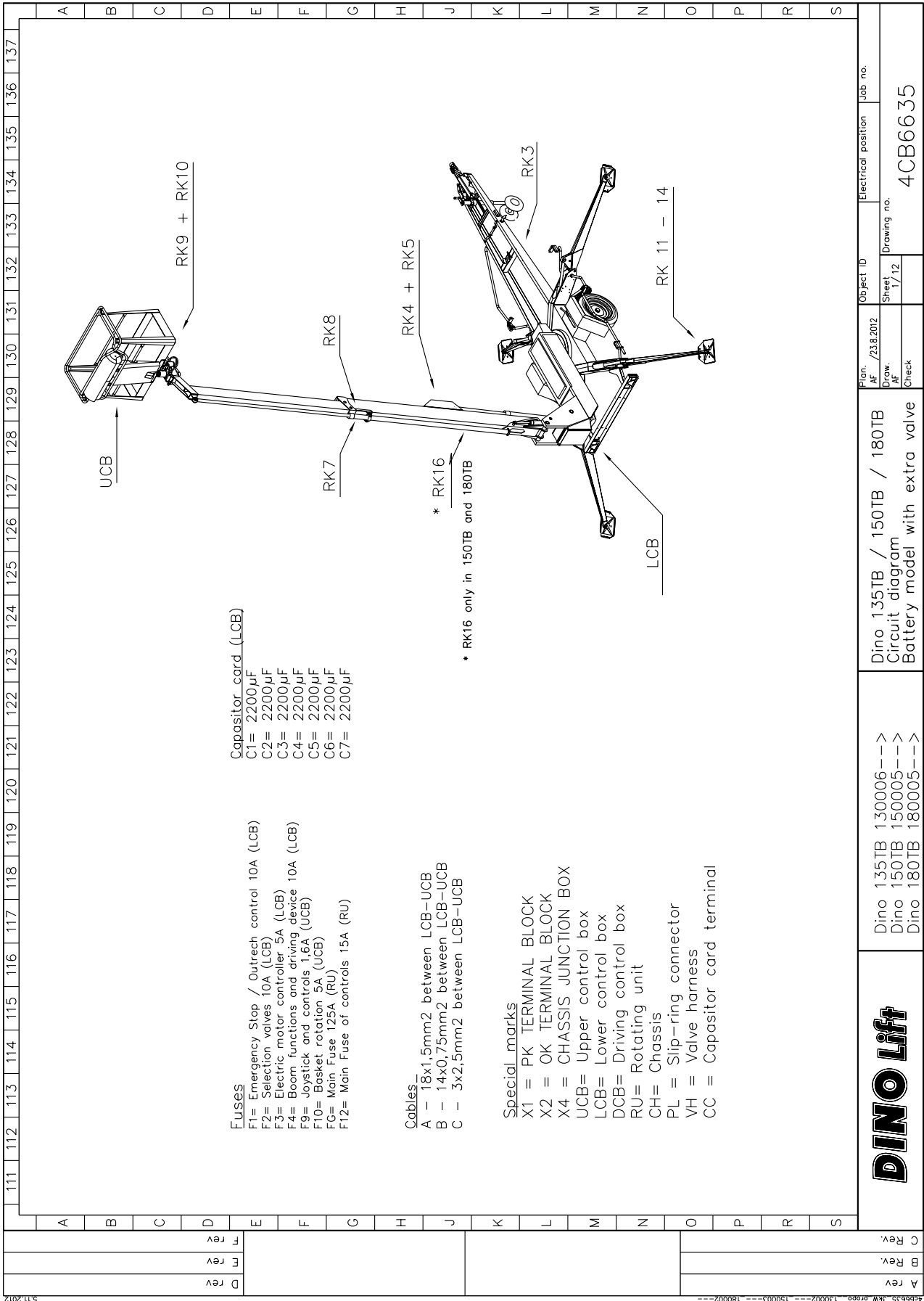
ELECTRIC ID:	LOCATION	DESIGNATION	DESCRIPTION OF OPERATION
C1	CH	Plug	1-phase plug for 230VAC supply voltage
G1-G4	Ako Akv	Battery unit	4 pcs. of 6V 225Ah powerdrive batteries, combined voltage 24V
T1	RU	Battery charger	Charging of batteries 230VAC -> 24V/60A
A1	Ako	Engine controller	Speed control for DC electric motor
HM1	LCB	Battery/Hour meter	Charging of batteries/Operating hours of electric motor
K1	Akv	DC-Contactor	Motor control/Emergency stop
SPV	AKv	Mains switch	Switches off the main current, the charger remains connected
RK3	CH	Limit switch	Boom support
RK4	BOOM	Limit switch	Outreach limit
RK5	BOOM	Limit switch	Outreach limit, backs up the RK4
RK8	BOOM	Limit switch	Telescope fully retracted
PL	RU	Rotary adaptor	Rotary adaptor between the superstructure and the chassis
FG	Akv	150A Fuse	Main battery fuse
F1	LCB	10A Fuse	Emergency stop circuit
F2	LCB	10A Fuse	Engine controller
F3	LCB	10A Fuse	Safety and selector boom/chassis
F4	LCB	10A Fuse	Controlling the boom movements
F10	UCB	10A Fuse	Automatic fuse for turning the platform
F11	LCB	Fuse 10A / 230VAC	Automatic fuse for socket outlets on platform
F12	Akv	15A Fuse	LCB supply fuse
H1	UCB	Signal light	Inside the outreach range, green
H2	UCB	Signal light	Outreach range exceeded, red
H3	LCB	Signal light	Support outrigger circuit, green
H4	LCB	Signal light	Outreach range exceeded, red
PR	UCB	Socket outlet	230VAC on platform
JST	UCB	Joystick	Joystick for boom movements on the platform
S1	LCB	Mushroom-shaped button	Emergency stop
S2	Ako	Pushbutton	Starting of 24VDC motor
S4	UCB	Mushroom-shaped button	Emergency stop
S10	UCB	Pushbutton	Sound signal
S12	UCB	Lever switch	Levelling of the platform
S16	LCB	Lever switch	Turning the boom
S17	LCB	Lever switch	Lifting the boom
S18	LCB	Lever switch	Telescope
S20	LCB	Lever switch	Levelling of the platform
S23	LCB	Turn switch	Speed selector and dead-man-switch
S24	LCB	Pushbutton	Control of driving device

DINO 150TB

S25	LCB	Pushbutton	Control of driving device
S26	LCB	Pushbutton	Control of driving device
S27	LCB	Pushbutton	Control of driving device
S29	UCB	Pushbutton	Dead-man-switch, levelling the platform / turning
S31	UCB	Pushbutton	Retracting the telescope
S32	LCB	Pushbutton	Retracting the telescope
S36	UCB	Lever switch	Turning the platform
K2	LCB	Relay, 3-points	Emergency stop
K20	LCB	Relay, 4-points	Blocking "Telescope out" movement
K21	LCB	Relay, 4-points	Blocking "Boom down" movement
K24	LCB	Relay, 4-points	Boom, dead-man-function
K3	LCB	Relay, 1-points	Turning the boom
K4	LCB	Relay, 1-points	Turning the boom
K5	LCB	Relay, 1-points	Lowering the boom
K7	LCB	Relay, 1-points	Lifting the boom
K9	LCB	Relay, 1-points	Telescope
K10	LCB	Relay, 1-points	Telescope
K15	LCB	Relay, 1-points	Levelling of the platform
K16	LCB	Relay, 1-points	Levelling of the platform
K17	LCB	Relay, 1-points	JST centre-position control
K23	LCB	Relay, 1-points	Chassis, dead-man-function
K50	UCB	Relay, 1-points	Signal lights for outreach limit
K51	UCB	Relay, 1-points	Turning the platform
K52	UCB	Relay, 1-points	Turning the platform
K19	LCB	Relay, 2-points	Basic speed, LCB
K391	LCB	Relay, 2-points	JST chang of operation
K6	LCB	Relay, 1-points	Blocking of lifting movement when battery voltage is low
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
VVK	CTB	Fault current switch	230VAC for supply voltage
ÄM1	RU	Sound signal	Warning signal activated from platform
ÄM2	UCB	Sound signal	Sound signal for outreach limit
SR2	LCB	Safety relay	Boom movements
SR3	LCB	Safety relay	Control of outreach limit
SR4	LCB	Safety relay	Emergency stop circuit
VM1	LCB	Voltmeter	230VAC
RK7	BOOM	Limit switch	Supervision of boom chains

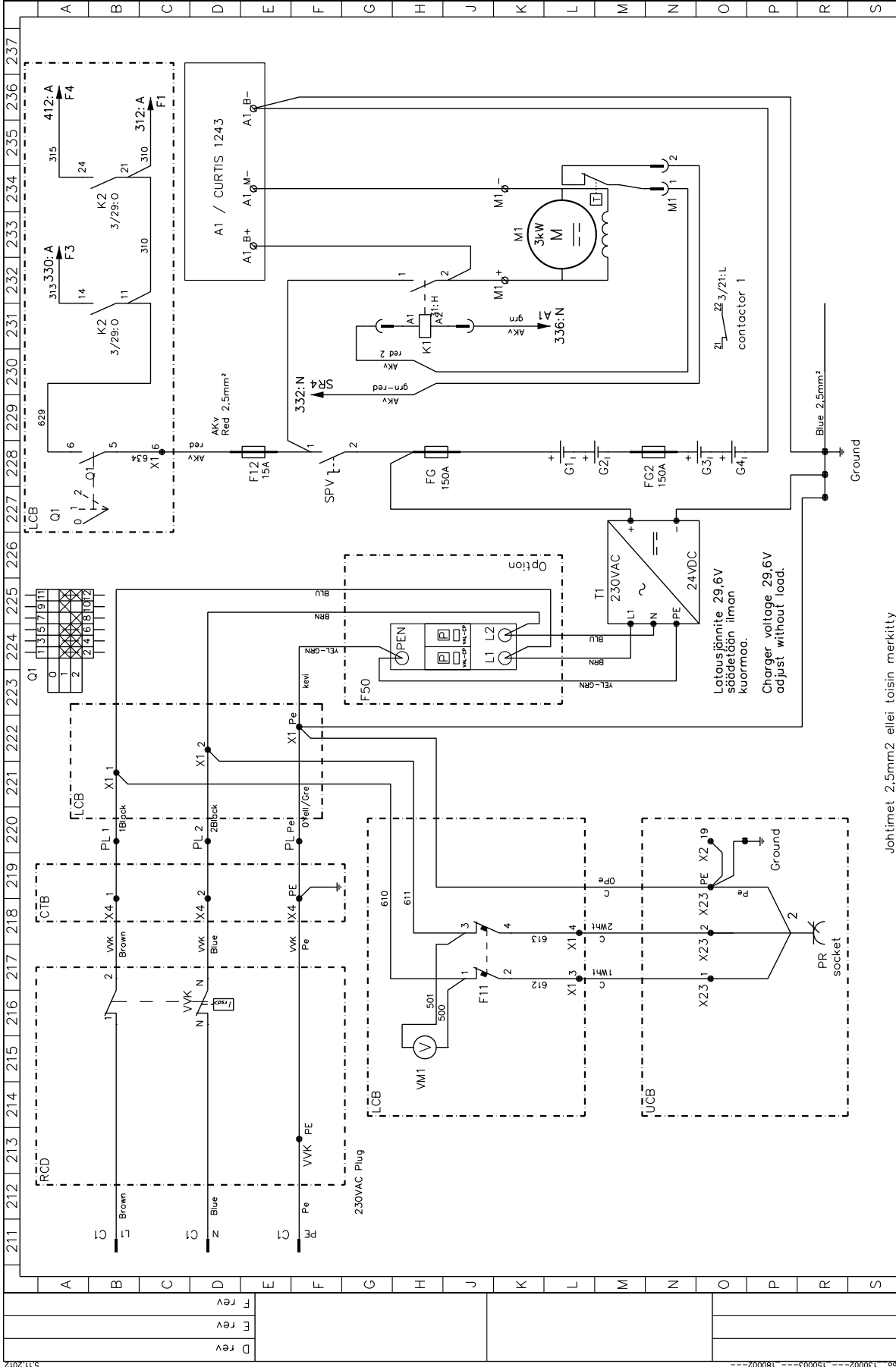
DINO 150TB

M3	BASKET	Linear motor	Turning the platform
RK9	BASKET	Limit switch	Limit, platform turn
RK10	BASKET	Limit switch	Limit, platform turn



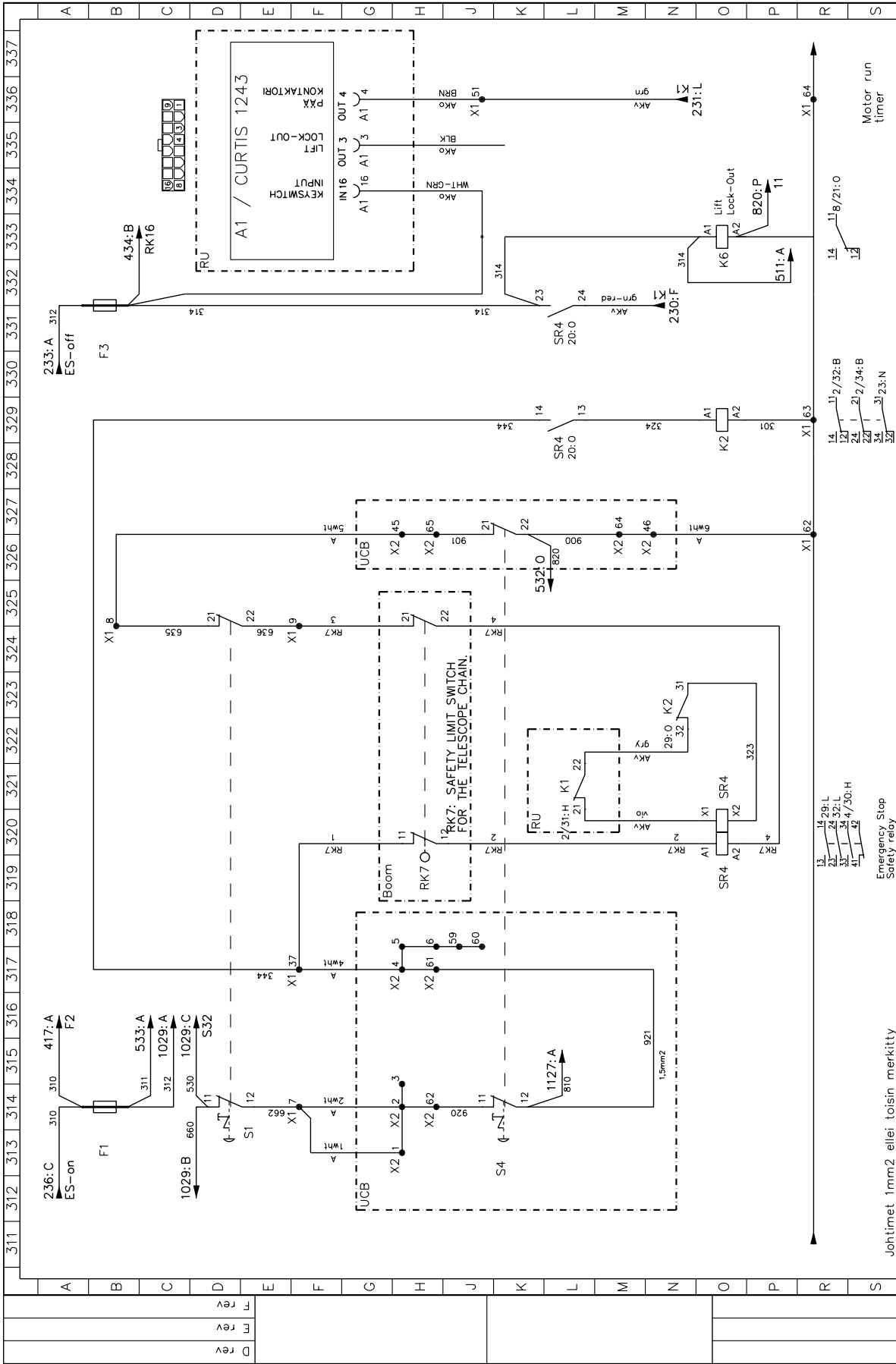
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Draw. AF	Sheet 1/12	Drawing no.	4CB6635
Check			
Dino 135TB / 150TB / 180TB Circuit diagram Battery model with extra valve			
Dino 135TB 130006--> Dino 150TB 150005--> Dino 180TB 180005-->			
DINO lift			
A Rev			
B Rev			
C Rev			

DINO 150TB



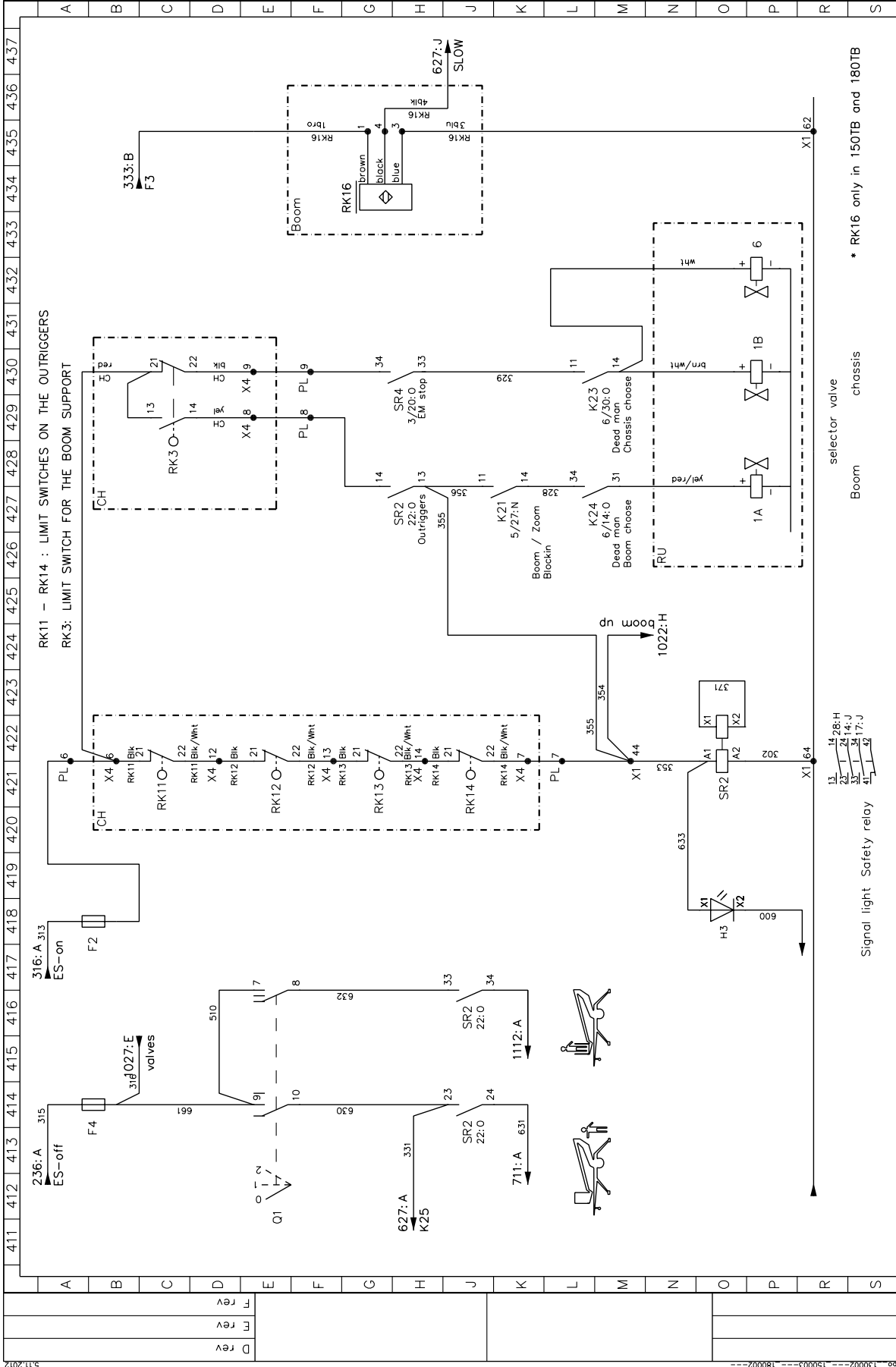
	Johtimet 2,5mm2 ellei toisin merkitty	Dino 135TB / 150TB / 180TB Circuit diagram Akkukone	Object ID AF / 23.8.2012	Electrical position RU	Job no. 4CB6635
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DINO 150TB



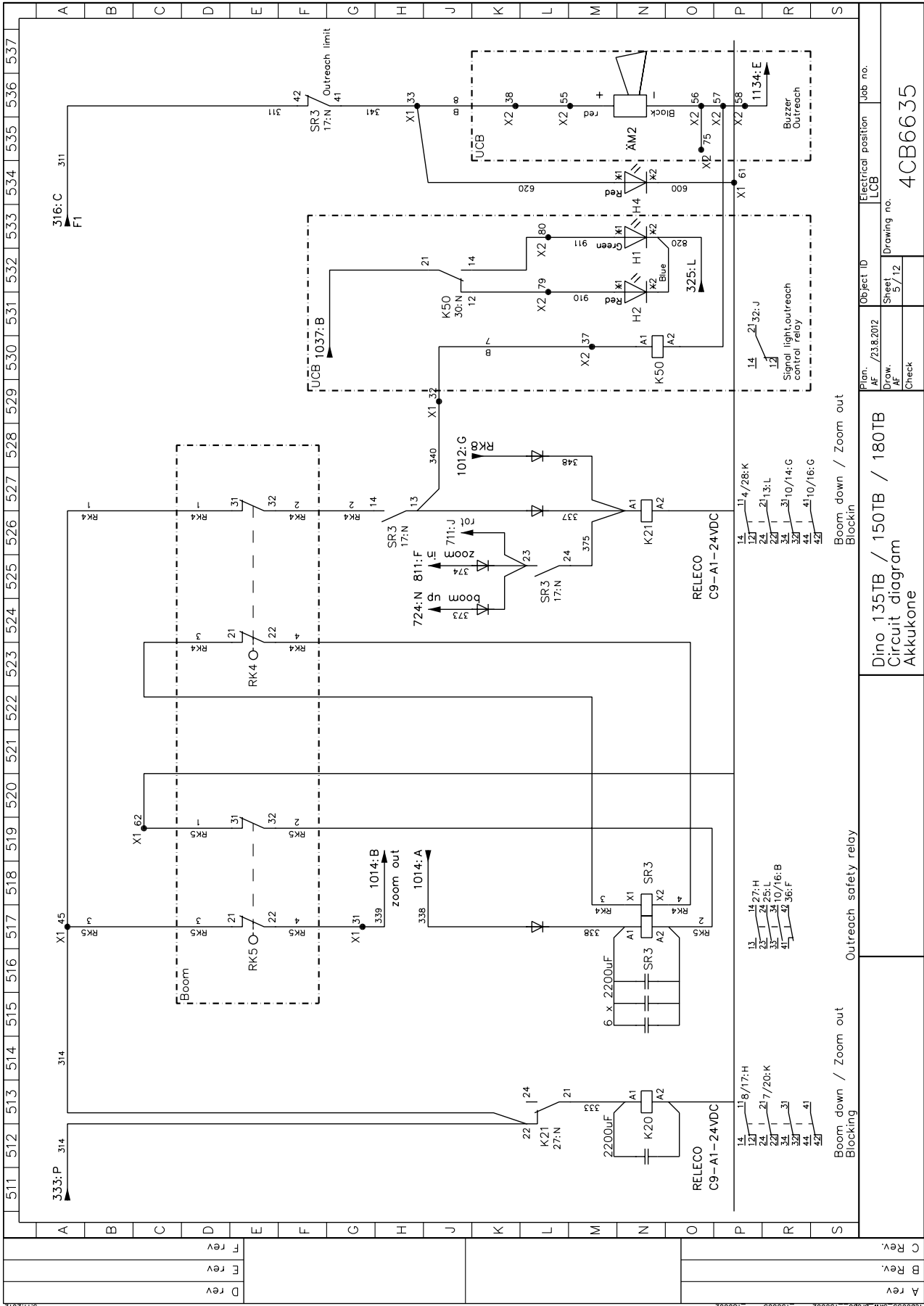
A rev	B rev	C rev		
D rev		E rev		F rev
Jobtimet 1mm2 ellei toisin merkitty Emergency Stop Safety relay				
Dino 135TB / 150TB / 180TB Circuit diagram Akkukone			Object ID AF / 23.8.2012	Electrical position LCB
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Job no. AF		Check		Job no. 4CB6635

DINO 150TB



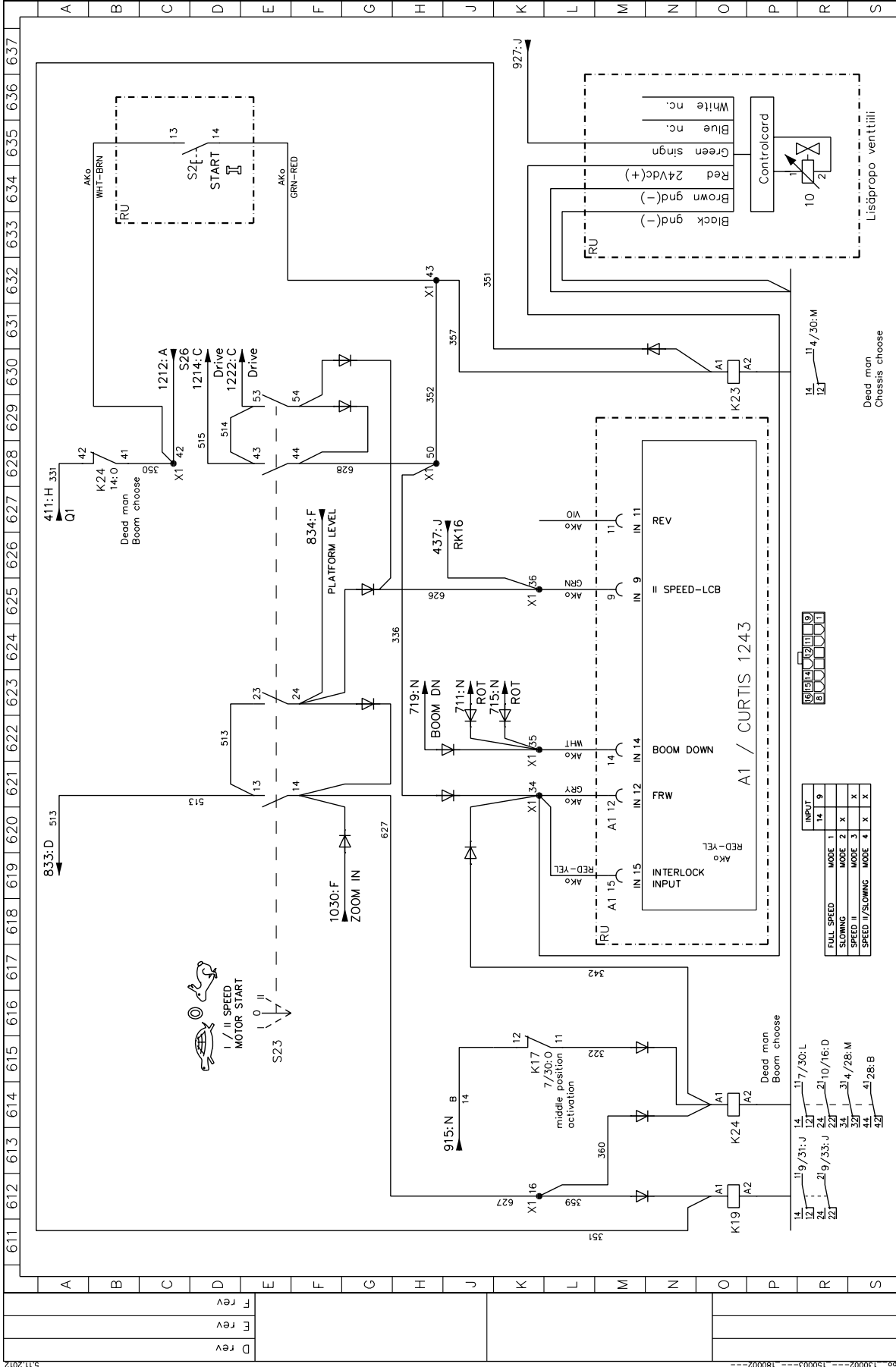
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DINO 150TB



A Rev	B Rev	C Rev	Object ID	Electrical position	Job no.
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			Sheet	Drawing no.	4CB6635
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Boom down / Zoom out Blocking			Boom down / Zoom out Blocking		
Outreach safety relay			Dino 135TB / 150TB / 180TB Circuit diagram Akkukone		

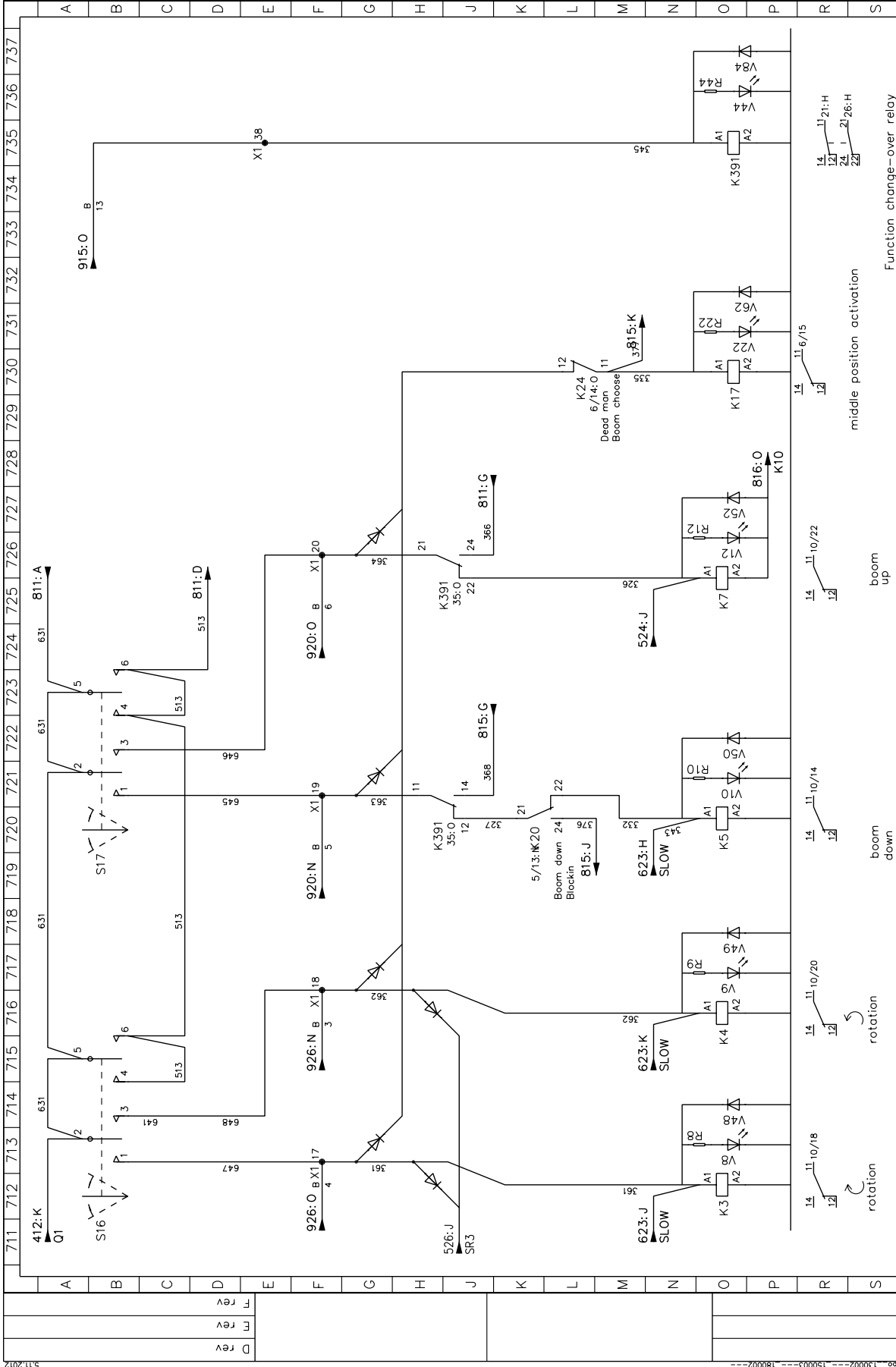
DINO 150TB



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DINO 135TB / 150TB / 180TB Circuit diagram Akkukone				

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DINO 150TB



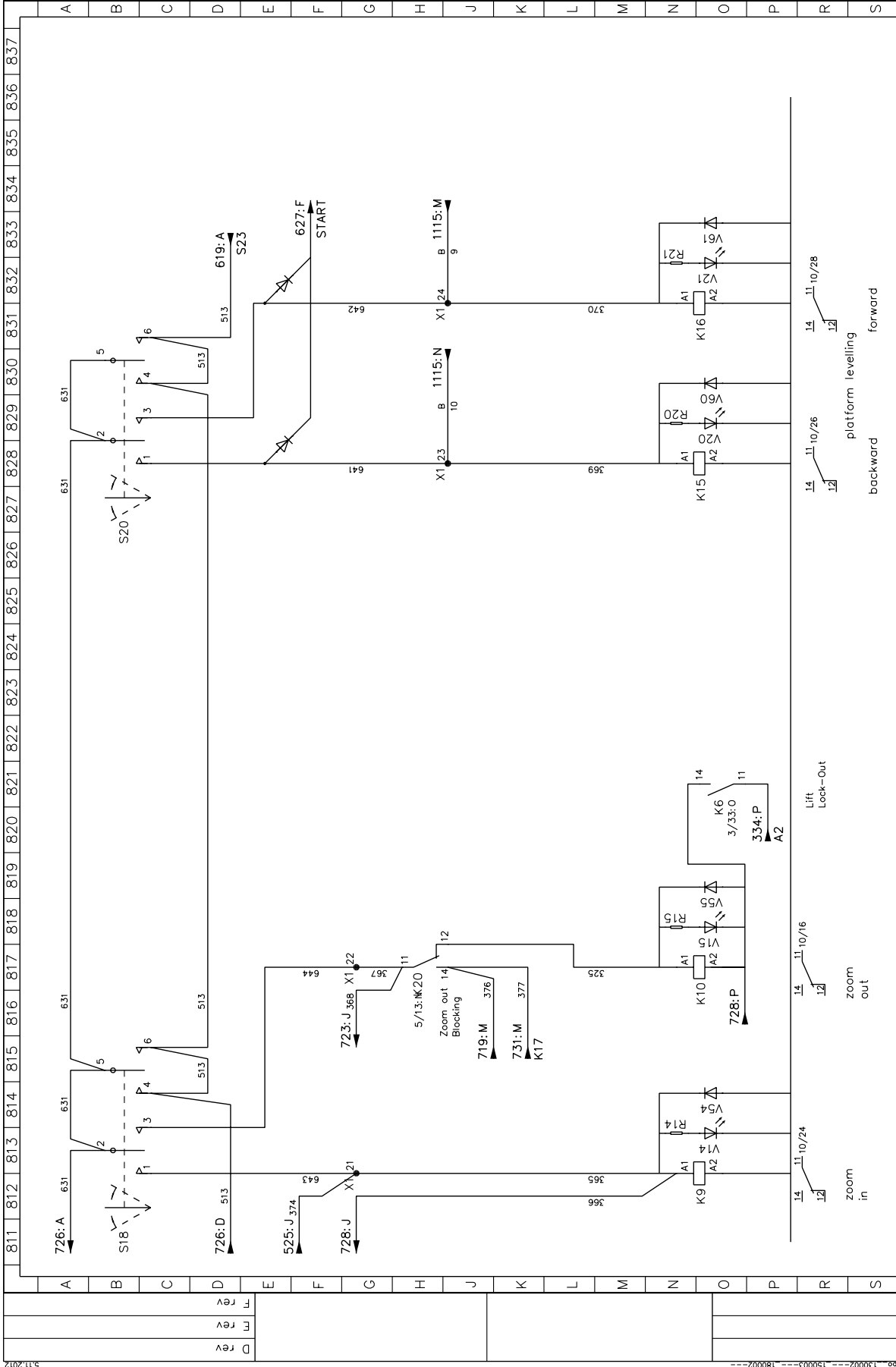
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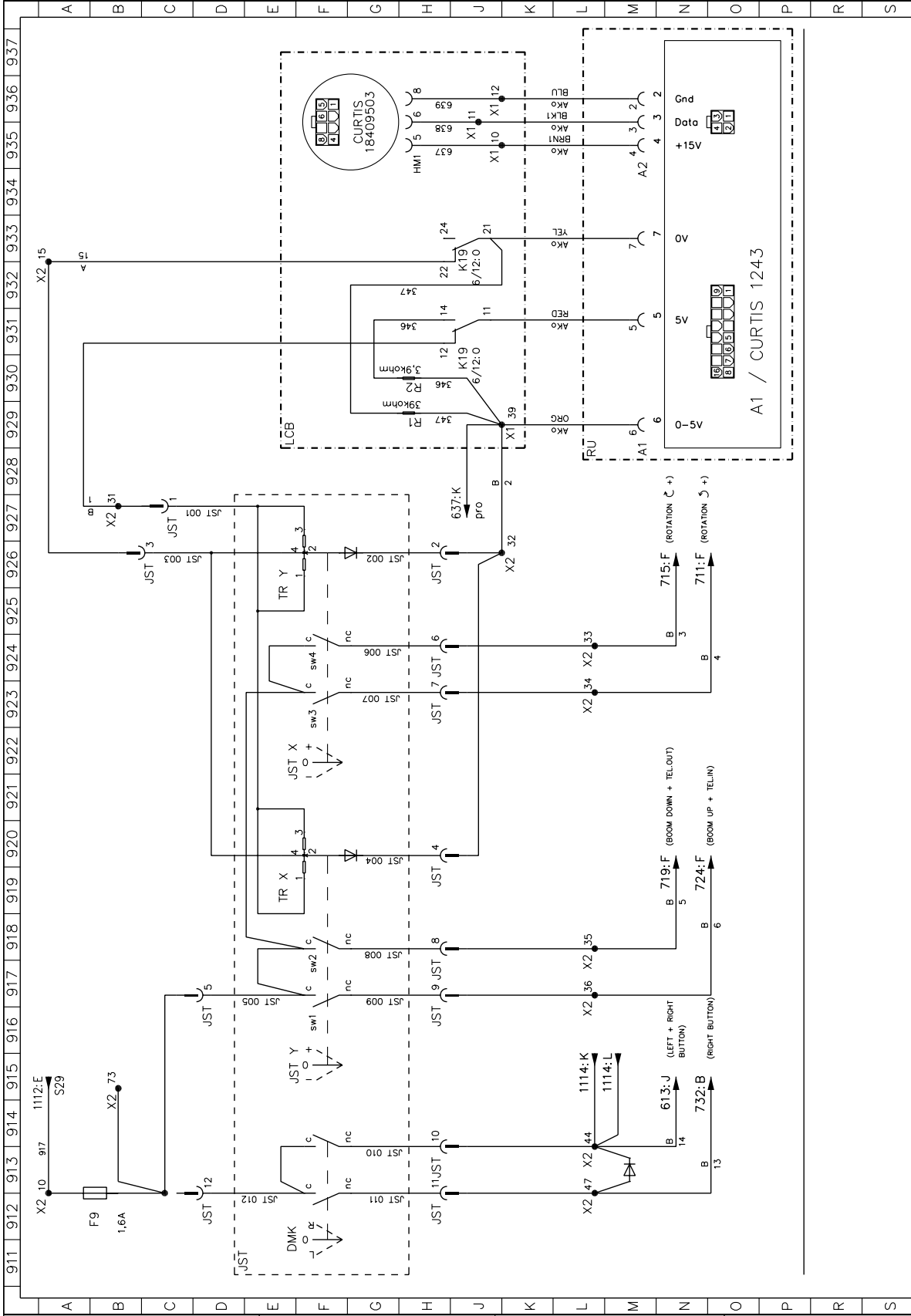
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A rev		Object ID	Job no.
B rev		Plan. AF / 23.8.2012	LCB
C rev		Drawing no.	4CB6635
		Sheet 8/12	
		Check	

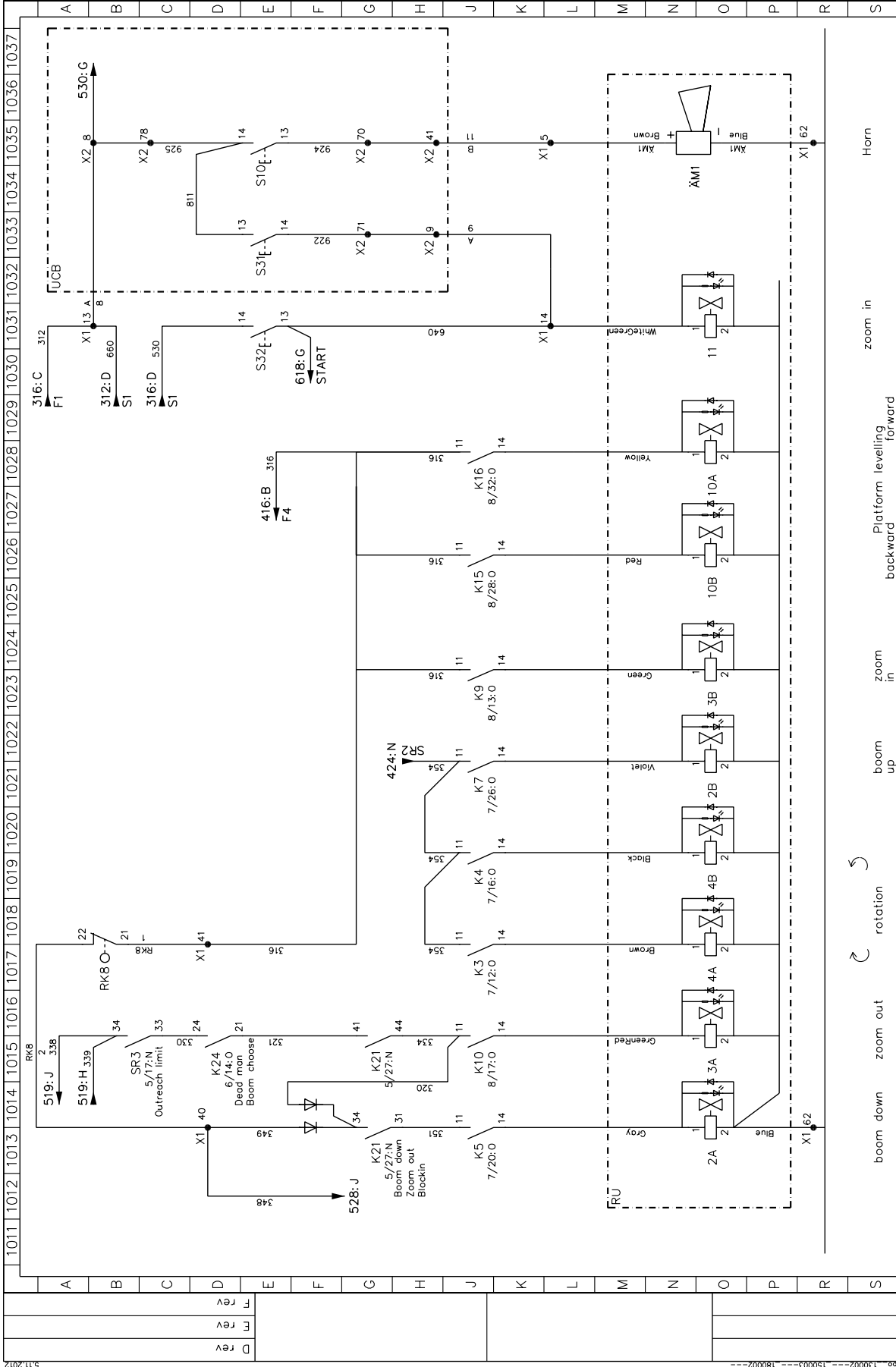
4466535 *K*W r2999 1300022 150003 1800022 5.11.2012

DINO 150TB



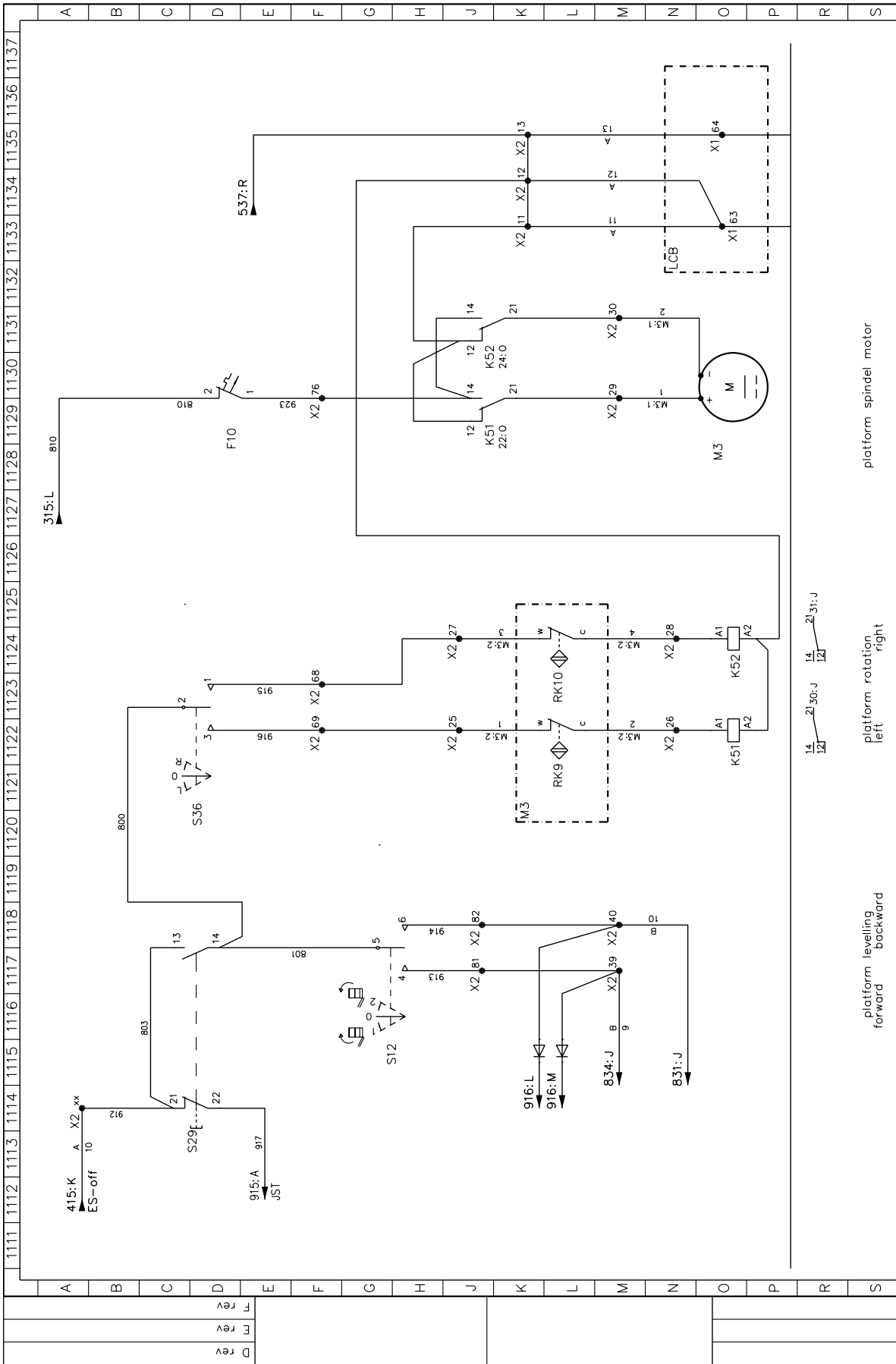
A Rev	B Rev	C Rev		
Dino 135TB / 150TB / 180TB Circuit diagram Akkukone		Object ID AF / 23.8.2012	Electrical position UCB	Job no. 4CB6635
		Sheet 9/12		
		Drawing no.		
		Check		

DINO 150TB



	boom down zoom out rotation boom up zoom in platform levelling forward zoom in Horn	
A Rev	B Rev	C Rev
Plan. AF / 23.8.2012 Draw. AF Check		
DINO 135TB / 150TB / 180TB Circuit diagram Akkukone		Object ID LCB Drawing no. 4CB6635 Sheet 10/12 Job no.

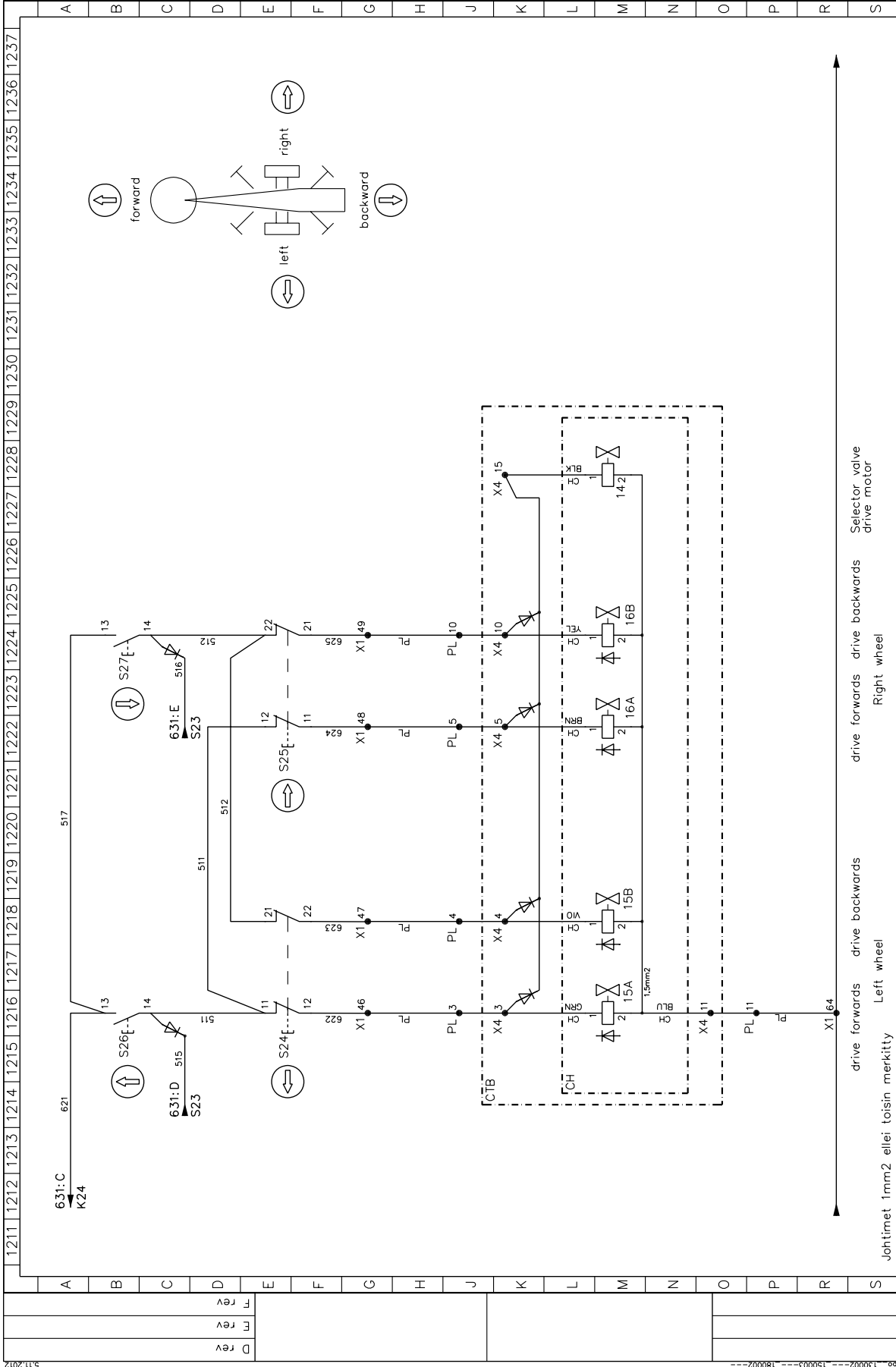
DINO 150TB



A rev		platform leveling forward	platform rotation left	platform spindel motor	
B Rev.					
C Rev.					
		Dino 135TB / 150TB / 180TB Circuit diagram Akkukone		Object ID AF / 23.8.2012	Job no. UCB
				Sheet 11/12	Drawing no. 4CB6635
				Check	

456635 3kW 0999 130002 150003 180002

DINO 150TB



	drive forwards Left wheel	drive forwards Right wheel	
Johltimet 1mm2 ellei toisin merkitty	drive backwards Left wheel	drive backwards Right wheel	Selector valve drive motor
A Rev	Dino 135TB / 150TB / 180TB Circuit diagram Akkukone		Object ID LCB
B Rev			Drawing no. 4CB6635
C Rev			Electrical position

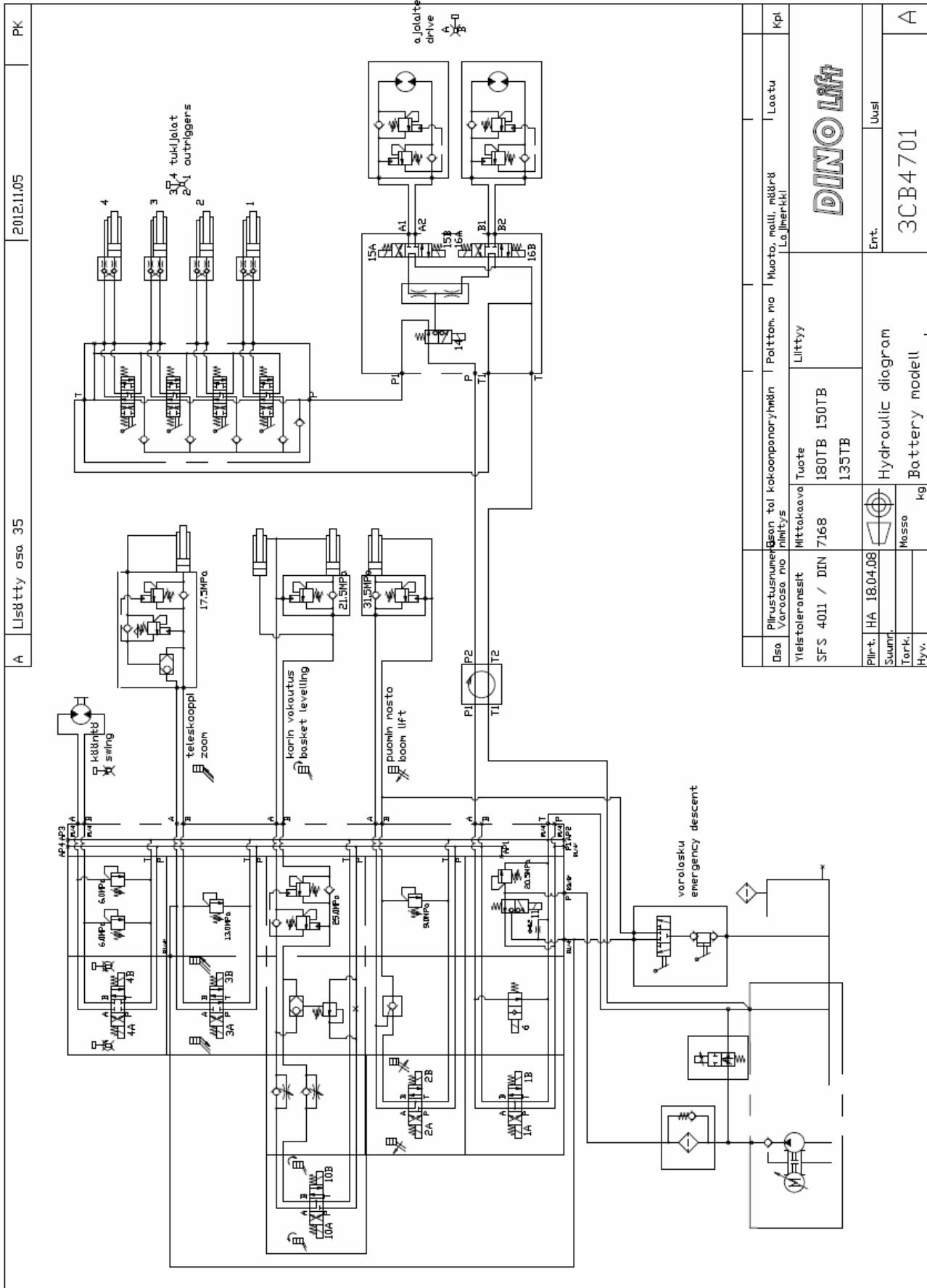
4466535 *K*W r2990 1300022 150003 1800027 5.11.2012

Notes

26 HYDRAULIC COMPONENTS**150005->**

REFERENCE	SPARE PART NO.	DESCRIPTION	PC
1		2 kW, DC power unit	1
2	47.171	pressure filter	1
3	47.2990	hydraulic pump, manual operation	1
3,1		pump	1
3,2		valve	1
		block	1
4	47.190	breather	1
5		tank	1
6	47.2667A	base plate	1
7	4CB1944	rotary adaptor, hydraulic part	1
8	47.3014	block, pressure relief valve	1
8,1	47.2917	pressure relief valve	1
8,2	47.2827	solenoid valve	1
		nozzle	
9	47.3004	solenoid valve, cetop	1
10	47.3007	solenoid valve, cetop	1
11	47.2750	pressure relief valve, cetop	1
12	47.2755	solenoid valve, cetop	1
13	47.2769	double load regulation valve	1
13,1	47.2768	load regulation valve	2
14	47.2930	check valve, pressure activated, cetop	1
15	47.2755	solenoid valve, cetop	1
16	47.2808	pressure relief valve	1
17	47.3009	solenoid valve, cetop	1
18	47.2749	double pressure relief valve, cetop	1
19	47.2757	solenoid valve, cetop	1
20	47.2273	turning motor	1
21	47.2970	valve block for telescope	1
21,1	47.2969	load regulation valve Breathing	1
21,2	47.2722	load regulation valve	1
21,3	47.2972	check valve	1
22	2CA8239	telescope cylinder	1
23	DL10.007	master cylinder	1
24	47.2722	load regulation valve	1
25	DL10.005	slave cylinder	1
26	DL6.018	lifting cylinder	1
27	47.2722	load regulation valve	1
28	47.2953	valve block for driving device	1
28,1	47.2905	flow control valve	1
28,2	47.2824	solenoid valve	2
28,3	47.2910	solenoid valve	1
29	47.2319	drive motor	2
30	47.2720B	manually operated directional valve	1
31	DL7.006	outrigger cylinder	4
32	47.377	lock valve	4
34	47.3018	lock valve	1
	47.2796	lock valve cartridge	
35	47.3119	solenoid valve	1

27 HYDRAULIC DIAGRAM 150005->



Notes