Models

Toucan 1010

Toucan 1010 I
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<th>Section</th>
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<td>Foreword</td>
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<td></td>
</tr>
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</table>
FOREWORD

This manual has been compiled to assist you in properly operating and maintaining your Grove Manlift Aerial Work Platform.

The Work Platform has been designed for maximum performance with minimum maintenance. With proper care, years of trouble-free service can be expected.

Constant improvement and engineering progress make it necessary that we reserve the right to make specification and equipment changes without notice.

The definitions of DANGER, CAUTION and NOTE as used in this manual apply as follows:

<table>
<thead>
<tr>
<th><strong>DANGER</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A DANGER is used to emphasize that if an operation, procedure or practice is not followed exactly, death or serious injury to personnel may result.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ATTENTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A CAUTION is used to emphasize that if an operation, procedure, or practice is not followed exactly, equipment damage may result.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>NOTE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A NOTE is used to emphasize an important procedure or condition.</td>
</tr>
</tbody>
</table>

GENERAL WARNING
It is mandatory that all hydraulic hoses and fittings are correctly tagged and identified before they are disconnected to effect repairs or service. Failure to correctly tag and identify hoses and fittings can cause wrong reconnection, which can result in death or serious injury to personnel.
WARRANTY

THERE ARE NO WARRANTY, EXPRESS OR IMPLIED, MADE BY EITHER THE DISTRIBUTOR OR THE MANUFACTURER ON NEW GROVE WORLDWILDE EQUIPMENT, EXCEPT THE MANUFACTURER'S WARRANTY AGAINST DEFECTS, IN MATERIAL AND WORKMANSHIP SET OUT BELOW:

NEW EQUIPMENT WARRANTY

"The Manufacturer warrants each new Grove Worldwide product made by the Manufacturer to be free from defects in material and workmanship, its obligation and liability under this warranty being limited to repairing or replacing free of charge at its factory, any part proving defective under normal use and service, and the reasonable cost of repair and/or replacement of said part or parts, within twelve (12) months from the date of initial sale, lease or rental, providing the equipment is on record with the Manufacturer as being installed by the distributor. Grove Worldwide further warrants for an additional six (6) years the structural components described and identified as the mast weldment, turnable, and frame (chassis) weldment to be free from defects in material and workmanship, its obligation and liability under the structural warranty being limited to repairing or replacing free of charge at its factory any part proving defective under normal use and service and does not cover any labor or installation costs incurred for the repair or replacement of the structural component. If the machine is not on record as being installed by the Distributor, the Manufacturer will consider the date of shipment from the factory as the date of initial sale, lease or rental. This warranty is in lieu of all other warranties, express or implied and the obligation and liability of the Manufacturer under this warranty shall not include any transportation or other charges or any liability for direct, indirect or consequential damages or delay resulting from the defect. Any operation beyond rated capacity or the improper use or application of the product or substitution upon it of parts not approved by the Manufacturer shall void this warranty. This warranty covers only the products of Grove Worldwide. The product of other Manufacturers are covered only by such warranties as are made by their Manufacturers."

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATIONS OR LIABILITY ON THE PART OF THE MANUFACTURER, AND GROVE WORLDWIDE NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH SUCH EQUIPMENT.

NOTICE TO OWNER/USER

Should this work platform become involved in a accident, please contact your local Grove Worldwide distributor immediately and relate details of the incident so he can notify Grove Worldwide.

If the distributor is unknown and/or cannot be reached, please contact:

Delta Manlift
Z.I. de Fauillet, BP 20, 47400 Tonneins FRANCE
(33) 553 84 85 11
CORRECTIVE ACTION REQUEST

The following form is for the use of the Distributor, Customer, Mechanic, and all other person who use this manual and recognize beneficial ways to improve its purpose as a worthy reference. SMCAR's are to be made in regards to, but not limited to: Safety, Operation Correctness, and Technical Content. All SMCAR's will be reviewed by the responsible Department at Grove. Approved SMCAR's will be distributed in a Service Bulletin immediately and then incorporated in the next scheduled change to the manual. An answer to the SMCAR, approved or disapproved, will be sent directly to the one submitting the SMCAR.

Date ________________________________
Customer name _______________________
Name/first name _______________________
Address __________________________________
Telephone ____________________________

Service Manual
Affected _________________________________________________________________________

Page(s) Affected ___________________________________________________________________

Reason for submitting SMCAR (Use additional paper or back if necessary)
_________________________________________________________________________________
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Signature (optional)

Adress SMCAR's to :
Supervisor, Publications
Delta Manlift
Z.I. de Faulllet,
B.P. 20
47400 Tonneins, France
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## WORK PLATFORM CHARACTERISTICS

2.1. Description  
2.2. Characteristics - Dimensions - Performances
2.1 Description

The work platform consists of a self-propelled all welded steel frame, a telescopic mast mounted on a turntable and a pendular jib. The platform is mounted at the end of the jib.

The drive function is accomplished by two hydraulic motors which propel the rear axle. The steering function (front axle) is accomplished by a hydraulic cylinder supplied with a hydraulic pump unit located on the chassis between the steering wheels. The parking brakes integrated to the hydraulic motors work through lack of pressure.

The main hydraulic power unit supplying the functions of the work platform (except steering) is located at the top of the main hydraulic tank, at the rear of the chassis.

The turntable rotation movement is accomplished through a moto-reducer group located at the base of the turntable.

The movement of the pendular jib is accomplished by means of hydraulic cylinder.

The work platform movements are controlled from the control boxes through hydraulic control valves controlled electrically located at the front of the chassis.

The progressivity of movements is obtained by an electronic controller which controls the rotation speed of the main hydraulic group motor. The electronic controller is located near the emergency control box (ground controls), on the left hand side of the telescopic mast.

The energy for the control and power circuits of the work platform is supplied by a 24 VDC battery.
## 2.2. Characteristics - Dimensions - Performances

### Dimensions (Lowered)

<table>
<thead>
<tr>
<th></th>
<th>Standard platform</th>
<th>Large platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>2,89 m</td>
<td>3,20 m</td>
</tr>
<tr>
<td>Width</td>
<td>0,99 m</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>1,99 m</td>
<td></td>
</tr>
<tr>
<td>Weight T 1010</td>
<td>3300 kg</td>
<td></td>
</tr>
<tr>
<td>Weight T 1010 l</td>
<td>2650 kg</td>
<td></td>
</tr>
<tr>
<td>Ground Clearance</td>
<td>0,08 m</td>
<td></td>
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</table>

### Capacity - Manoeuvrability

<table>
<thead>
<tr>
<th></th>
<th>Standard platform</th>
<th>Large platform</th>
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</thead>
<tbody>
<tr>
<td>Platform floor min. height</td>
<td>0,54 m</td>
<td></td>
</tr>
<tr>
<td>Platform floor max. height</td>
<td>8,10 m</td>
<td></td>
</tr>
<tr>
<td>M. x. working height</td>
<td>10,10 m</td>
<td></td>
</tr>
<tr>
<td>Max. outreach (from centerline)</td>
<td>2,62 m</td>
<td>2,93 m</td>
</tr>
<tr>
<td>Max. working outreach (from centerline)</td>
<td>3,12 m</td>
<td>3,43 m</td>
</tr>
<tr>
<td>Floor height at max. outreach</td>
<td>6,72 m</td>
<td></td>
</tr>
<tr>
<td>Working height at max. outreach</td>
<td>8,72 m</td>
<td></td>
</tr>
<tr>
<td>Swing</td>
<td>360° non continous</td>
<td></td>
</tr>
<tr>
<td>Inner turning radius</td>
<td>Machine raised : 1,78 m</td>
<td>Machine half raised : 0 m</td>
</tr>
<tr>
<td>Outer turning radius</td>
<td>Machine raised : 3,37 m</td>
<td>Machine half raised : 1,75 m</td>
</tr>
</tbody>
</table>

### Platform

<table>
<thead>
<tr>
<th></th>
<th>Standard platform</th>
<th>Large platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>0,70 m</td>
<td>1,01 m</td>
</tr>
<tr>
<td>Width</td>
<td>0,90 m</td>
<td></td>
</tr>
<tr>
<td>Rated load</td>
<td>200 kg</td>
<td></td>
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</tbody>
</table>

### Hydraulic Circuit

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Main hydraulic tank capacity</td>
<td>25.5 l</td>
</tr>
<tr>
<td>Steering group tank capacity</td>
<td>1 l</td>
</tr>
<tr>
<td>Main hydraulic pump displacement</td>
<td>8 cm³/t</td>
</tr>
<tr>
<td>Steering hydraulic pump displacement</td>
<td>0.5 cm³/t</td>
</tr>
</tbody>
</table>

### Filtration

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Pressure</td>
<td>20 µm absolute</td>
</tr>
<tr>
<td>Return</td>
<td>20 µm absolute</td>
</tr>
</tbody>
</table>

### Pressures

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Main hydraulic circuit max. pressure</td>
<td>23 MPa</td>
</tr>
<tr>
<td>Steering hydraulic circuit max. pressure</td>
<td>12 MPa</td>
</tr>
</tbody>
</table>

### Electrical Components

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Main hydraulic unit motor</td>
<td>3 kw</td>
</tr>
<tr>
<td>Steering hydraulic unit motor</td>
<td>0.8 kw</td>
</tr>
</tbody>
</table>
DRIVE SPEEDS (*)

| 1st gear (slow speed)         | 0.65 to 0.7 km/h |
| 2nd gear                     | 1.8 km/h         |
| 3rd gear                     | 4 km/h           |

MOVEMENT SPEED (**) 

| Mast elevation time           | 24 to 27 s       |
| Mast lowering time            | 21 to 24 s       |
| Jib elevation time            | 16 to 19 s       |
| Jib lowering time             | 17 to 20 s       |
| Slewing time (from stop to stop) | 50 to 55 s     |

(*) speeds measured on horizontal ground with one person in the platform (approximately 80 kg).
(**) times measured with the maximum rated load in the platform (200 kg), the movements were performed from platform controls.

Speeds are indicated for a machine with a fully charged battery and working in an ambient temperature of 20°C.

Constant product improvement make it necessary that GROVE reserve the right to make specification and equipment changes without notice.
3.1. Relief valve setting
3.2. Brake release circuit pressure check
3.3. Circuit relief valve adjustment
  3.3.1. Main pressure (PR1)
  3.3.2. Right swing (PR2)
  3.3.3. Left swing (PR3)
  3.3.4. Mast elevation (PR4)
  3.3.5. Jib elevation (PR5)
  3.3.6. Jib lowering (PR6)
  3.3.7. Brake release maximum pressure (PR7)
  3.3.8. Drive at low speed (PR8)
3.4. Counterbalance valve setting
Relief valves used in the work platform's hydraulic system protect the system from excessive pressure (within the circuit in which they are used) by returning hydraulic oil to the hydraulic reservoir when the pressure setting is exceeded.

You can determine the point at which a relief valve opens by placing a pressure gauge in the pressure test port of the appropriate valve manifold. The needle on the pressure gauge will climb until it reaches the relief valve setting. At that point, the needle will stop climbing and fluctuate - indicating that the relief valve is open and returning hydraulic oil to the hydraulic reservoir.

Correct relief valve adjustment is mandatory if any hydraulic circuit is to function properly. Relief pressure settings must always be within established tolerances.

**NOTE**
Adjustment of relief valve pressure settings should only be performed - after the need for adjustment has been established - by qualified mechanics using the correct equipment.

**NOTE**
Check pressure settings prior to delivery of work platform.

The table titled *Relief Valve Pressure Settings* lists main and circuit relief valve pressure settings. If the pressure setting of any relief valve is not ± 5 bar of the setting listed in the table, adjust valve as necessary (unless otherwise specified).

<table>
<thead>
<tr>
<th>CAUTION</th>
<th>Do not overtighten the adjustment screw or locknut.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTION</td>
<td>Do not hold the relief valve open for more than one minute.</td>
</tr>
<tr>
<td>CAUTION</td>
<td>For a correct relief valve pressure check, the locknut of the relief valve adjustment screw must be tightened.</td>
</tr>
</tbody>
</table>

**NOTE**
To adjust a relief valve turn the adjustment screw (in to increase or out to decrease) until the proper setting is reached.

### 3.1 Relief valve setting

**NOTE**
Check the relief valve adjustments with a pressure gauge connected to the pressure test port (M) of the FUNCTION MANIFOLD except for the brake release relief valve [PR7]. Check brake release relief valve [PR7] adjustment with a pressure gauge connected to the pressure test port (M) of the BRAKE MANIFOLD.

**Preparation**

**NOTE**
Before setting pressures, warm the hydraulic oil to between 25°C to 50°C.

**NOTE**
Use a 0 to 40,0 MPa/400 bar pressure gauge when adjusting the relief valves. For pressures lower than 3 MPa/30 bar, use a 6 MPa/60 bar pressure gauge.

**NOTE**
When adjusting the relief valves, operate the machine from the platform controls AT MAXIMUM SPEED.
3.2 Brake release circuit pressure check

1- Chock both front wheels as indicated below:

2- Connect the pressure gauge to the pressure test plug at port "M" on BRAKE MANIFOLD.
3- Position the DRIVE SPEED selector switch to HIGH ( ).
4- Activate a DRIVE FORWARD function by pushing the controller forward (away from the operator). If the maximum reading on the pressure gauge is not between 15 and 21 bar, refer to BRAKE RELEASE MAXIMUM PRESSURE in § 3.3.7. If the maximum reading is over 21 bar, consult your local Grove Manlift distributor for servicing.
5- Remove the pressure gauge.

3.3 Circuit relief valve adjustment

3.3.1. Main pressure (PR1)

1- Chock both rear wheels as indicated below:

2- Connect the pressure gauge to the pressure test plug at port "M" on FUNCTION MANIFOLD.
3- Position the DRIVE SPEED SELECTOR switch to HIGH ( ).
4- Activate a DRIVE REVERSE function by FULLY pulling the controller to the rear (towards the operator). Note the maximum reading on the pressure gauge. If the reading is not within ± 5 bar of the relief pressure shown in the table titled Relief Valve Pressure Settings, adjust the pressure setting as necessary.
5- Remove the pressure gauge.

3.3.2. Right swing (PR2)

1- Connect the pressure gauge to the pressure test plug at port "M" on FUNCTION MANIFOLD.
2- SWING the superstructure fully to the RIGHT (jib over the front). Note the maximum reading of the pressure gauge. If the reading is not within ± 5 bar of the relief pressure shown in the table titled Relief Valve Pressure Settings, adjust the pressure setting as necessary.
3- Remove the pressure gauge.

3.3.3. Left swing (PR3)

1- Connect the pressure gauge to the pressure test plug at port «M» on FUNCTION MANIFOLD.
2- SWING the superstructure fully to the LEFT (jib over the front). Note the maximum reading of the pressure gauge. If the reading is not within ± 5 bar of the relief pressure shown in the table titled Relief Valve Pressure Settings, adjust the pressure setting as necessary.
3- Remove the pressure gauge.

3.3.4. Mast elevation (PR4)

1- Connect the pressure gauge to the pressure test plug at port «M» on FUNCTION MANIFOLD.
2- Perform a MAST RAISING function until the mast cylinder reaches the end of its course. Note the maximum reading of the pressure gauge. If the reading is not within ± 5 bar of the relief pressure shown in the table titled Relief Valve Pressure Settings, adjust the pressure setting as necessary.
3- Remove the pressure gauge.

3.3.5. Jib elevation (PR5)

1- Connect the pressure gauge to the pressure test plug at port «M» on FUNCTION MANIFOLD.
2- Perform a JIB RAISING function until the jib cylinder reaches the end of its course. Note the maximum reading of the pressure gauge. If the reading is not within ± 5 bar of the relief pressure shown in the table titled Relief Valve Pressure Settings, adjust the pressure setting as necessary.
3- Remove the pressure gauge.
3.3.6. Jib lowering (PR6)

1- Connect the pressure gauge to the pressure test plug at port "M" on FUNCTION MANIFOLD.
2- Perform a JIB LOWERING function until the jib cylinder reaches the end of its course. Note the maximum reading of the pressure gauge. If the reading is not within ± 5 bar of the relief pressure shown in the table titled Relief Valve Pressure Settings, adjust the pressure setting as necessary.
3- Remove the pressure gauge.

3.3.7. Brake release maximum pressure (PR7)

1- Chock both front wheels as indicated below:

2- Disconnect and cap the hydraulic lines to the brakes.
3- Connect the pressure gauge to the pressure test plug at port «M» on BRAKE MANIFOLD.
4- TURN FULLY IN the PR7 relief valve adjustment screw.
5- Position the DRIVE SPEED SELECTOR switch to HIGH ( ) speed.
6- Activate a DRIVE FORWARD function by pushing the controller forward (away from the operator). The maximum reading on the pressure gauge must be between 15 and 21 bar corresponding to the pressure reducer setting. Note the exact reading on the pressure gauge.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the pressure reading is lower than 15 bar or higher than 21 bar, consult your local Grove Manlift distributor for servicing.</td>
</tr>
</tbody>
</table>

9- Insert the handle in the hand pump and activate the handle energetically. Note the peak pressure on the pressure gauge. If the peak pressure exceeds 35 bars, turn out the PR7 relief valve adjustment screw 1/8 turn and check the peak pressure again.
10- Remove the pressure gauge.
11- Connect the hydraulic lines to the brakes.

3.3.8 Drive at low speed (PR8)

1- Chock both wheels as indicated below:

2- Connect the pressure gauge to the pressure test plug at port "M" on FUNCTION MANIFOLD.
3- Position the DRIVE SPEED SELECTOR switch to LOW ( ) speed.
4- Activate a DRIVE FORWARD function by FULLY pushing the controller forward (away from the operator). Note the maximum reading on the pressure gauge. If the reading is not within 0/-5 bar of the relief pressure shown in the table titled Relief Valve Pressure Settings, adjust the pressure setting as necessary.
5- Remove the pressure gauge.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brakes maximum working pressure = 30 bar. Maximum admissible peak-pressure when using the hand pump to release the brakes = 35 bar.</td>
</tr>
</tbody>
</table>

7- TURN OUT the PR7 relief valve adjustment screw until the pressure drops just under the previously recorded value, then turn the adjustment screw 1/4 turn IN.
8- Unhook the pump handle and push the brake release lever towards the chassis to BRAKE UNLOCKED position ( ). Refer to the Towing procedure in the Operator's and Safety handbook.
### 3.4 Counterbalance valves setting

- Mast/jib cylinder counterbalance valve. The valve opening pressure is factory pre-set at 210 bars at 4 l/min. This setting must not be modified.

- Drive manifold counterbalance valve.

The counterbalance valves on the drive manifold ensure dynamic braking for the work platform. The more the setting screw is tightened, the sharper the braking is.

Setting must be performed with the rated load (200 kg) evenly distributed in the platform.

The counterbalance valves must be set so that:

- When the work platform is driven at its maximum speed (3rd gear), it must stop over a 0.8m to 1m distance on flat ground (in both forward and reverse) when the joystick is returned to neutral.
- When the work platform is driven directly up or down a 15% slope in 2nd gear, it must stop over a distance inferior to 1m when the joystick is returned to neutral.

### RELIEF VALVE PRESSURE SETTINGS

<table>
<thead>
<tr>
<th>Function</th>
<th>Relief Pressure</th>
<th>Relief Valve</th>
<th>Check Port &quot;M&quot; on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main pressure</td>
<td>230 bar</td>
<td>PR1</td>
<td>Function manifold</td>
</tr>
<tr>
<td>Right swing</td>
<td>60 bar</td>
<td>PR2</td>
<td>Function manifold</td>
</tr>
<tr>
<td>Left swing</td>
<td>60 bar</td>
<td>PR3</td>
<td>Function manifold</td>
</tr>
<tr>
<td>Mast elevation</td>
<td>170 bar</td>
<td>PR4</td>
<td>Function manifold</td>
</tr>
<tr>
<td>Jib elevation</td>
<td>120 bar</td>
<td>PR5</td>
<td>Function manifold</td>
</tr>
<tr>
<td>Jib lowering</td>
<td>50 bar</td>
<td>PR6</td>
<td>Function manifold</td>
</tr>
<tr>
<td>Manual brake release</td>
<td>35 bar</td>
<td>PR7</td>
<td>Brake manifold</td>
</tr>
<tr>
<td>Max. pressure</td>
<td>max. peak pressure</td>
<td>PR8</td>
<td>Function manifold</td>
</tr>
<tr>
<td>Drive at low speed</td>
<td>80 bar</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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4.2 Charger
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4.1. Battery

The electrical energy of the work platform is provided by a 24 VDC battery. The battery is composed of 12 cells (1 cell is 2 volts).

⚠️ **DANGER**

The batteries are integral part of the machine counterweight. Substitution of the batteries for a lighter or a heavier one will affect work platform stability and will cause the machine to tip over.

⚠️ **CAUTION**

New electrical vehicles batteries do not have their full capacity until they have been cycled several times (somewhere between five and 40 cycles). For at least the first five cycles, it is recommended not to discharge the battery above 70% of its capacity. To obtain the maximum battery life, do not discharge the battery above 80% of its capacity.

### Batteries location

- **T1010** (3 packs):
  - 1 pack at the front,
  - 1 pack on both sides of the mast

- **T1010** (2 packs):
  - 1 pack on both sides of the mast,
  - 1 additional counterweight at the front

- **T1010I**:
  - 1 pack at the front,
  - 1 pack on the left hand side of the mast

### Batteries wiring

- **T1010** (3 battery packs)
- **T1010** (2 battery packs)
- **T1010I** (2 battery packs)
4.2 Charger

The work platform on-board electronic charger is designed to automatically charge 24 VDC (wet) lead-acid rechargeable batteries.

⚠️ DANGER

Lead-acid batteries may emit highly explosive gases. The emission is greatly increased during charging. Never introduce flames, sparks, or other sources of ignition to battery area. Failure to comply with this warning could result in death or injury to personnel. Always charge batteries in a well-ventilated area.

⚠️ DANGER

Do not disconnect battery plug when the charger is ON. The resulting arcing and burning could cause battery to explode.

NOTE

It is not necessary to charge the battery if the electrolyte specific gravity has not dropped under 1.240 kg/l. Regular charge of a battery when its specific gravity is higher than 1.240 kg/l can greatly reduce the battery life time.

NOTE

The charger has an interlock feature which causes the work platform power circuit to open anytime the charger is plugged into a live AC outlet.

NOTE

It is important to perform an equalisation charge regularly to equalise electrolyte specific gravity in all battery cells. The equalisation charge takes place at the end of the charge cycle (Fulmen and SGTE chargers only).

NOTE

If a power cut occurs during the charge cycle, the charger switches to a waiting mode and restarts automatically as soon as the power returns.
4.2.1 "Fulmen" charger.

Charger panel

- a. Circuit breaker.
- b. Display.
- c. Equalisation function button.
- d. 100% charged LED indicator.
- e. Charger ON LED indicator.
- f. 80% charged LED indicator.
- g. ON/OFF button.

Power supply: 110VAC - 60Hz / 220VAC - 50Hz

- Adaptation to network voltage:

DANGER

Prior to any operation requiring charger cover removal, the battery must be disconnected and the charger must be unplugged from the AC outlet. Failure to do so could result in death or serious injury to personnel.

Connections on transformer inlet terminals block:

- Protections:
  - Single pole circuit breaker:
    - 15 Amps on 24 MO 40A models
    - 20 Amps on 24 MO 65A models
  - Output fuse:
    - 40 Amps on 24 MO 40A models
    - 80 Amps on 24 MO 65A models

NOTE

A spare output fuse is strapped inside the charger cover.

Troubleshooting chart:

<table>
<thead>
<tr>
<th>Display</th>
<th>Probable cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0</td>
<td>Charger in test mode</td>
<td>Move the jumper from &quot;test&quot; position to &quot;propor.&quot; position on the electronic card.</td>
</tr>
<tr>
<td>E1</td>
<td>Output fuse faulty Low intensity</td>
<td>Replace the fuse. Check voltage at output and input of the transformer.</td>
</tr>
<tr>
<td>E2</td>
<td>Fault on electronic card</td>
<td>Contact Grove Manlift Product Support.</td>
</tr>
<tr>
<td>E3</td>
<td>Electronic card programme erased (configuration lost)</td>
<td>Contact Grove Manlift Product Support.</td>
</tr>
<tr>
<td>E4</td>
<td>Batteries too discharged</td>
<td>Leave the batteries to rest before resuming charge.</td>
</tr>
<tr>
<td>E5</td>
<td>Electronic safety. Safety time switch faulty</td>
<td>Disconnect and reconnect the batteries. Contact Grove Manlift Product Support if the fault persists.</td>
</tr>
<tr>
<td>E6</td>
<td>Battery incorrect nominal voltage</td>
<td>Connect the battery from the work platform to the charger.</td>
</tr>
</tbody>
</table>
4.2.2 "Oldham-Hawker" charger

Power supply: 110VAC - 60Hz / 230VAC - 50Hz
- Adaptation to network voltage:

⚠️ DANGER

Prior to any operation requiring charger cover removal, the battery must be disconnected and the charger must be unplugged from the AC outlet. Failure to do so could result in death or serious injury to personnel.

Connections on transformer inlet terminals block:
- 230 VAC - 50 Hz
- 110 VAC - 60 Hz

- Protections:
  - Single pole circuit breaker: 32 Amps.
  - Output fuse: 100 Amps.

### FAULT SIGNALLING CHART (CPIV models)

<table>
<thead>
<tr>
<th>DEFAULT LED</th>
<th>CURRENT LEDS INDICATOR</th>
<th>CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default LED lights up</td>
<td>The first LED flashes</td>
<td>Voltage still below 1.7 V per cell after 1 minute of charge</td>
</tr>
<tr>
<td></td>
<td>The 2nd LED flashes</td>
<td>Voltage still below 2.05 V per cell after 1 hour of charge</td>
</tr>
<tr>
<td></td>
<td>The 3rd LED flashes</td>
<td>Voltage per cell still below the required gazing voltage after 10 hours of charge</td>
</tr>
<tr>
<td></td>
<td>The 4th LED flashes</td>
<td>Charging safety time exceeded</td>
</tr>
<tr>
<td>Default LED flashes</td>
<td>The 4 LEDs flash</td>
<td>Charge interruption due to a power cut. Charge will be resumed as soon as the power returns</td>
</tr>
<tr>
<td></td>
<td>Voltage per cell 140% above the nominal values</td>
<td></td>
</tr>
</tbody>
</table>

- CP IV models

NOTE

A spare output fuse is strapped inside the charger cover.

- CP IV models panel

- Protections:
  - Single pole circuit breaker: 32 Amps.
  - Output fuse: 100 Amps.

- Connections:
  - 230 VAC - 50 Hz
  - 110 VAC - 60 Hz

- Protections:
  - Single pole circuit breaker: 32 Amps.
  - Output fuse: 100 Amps.

### NOTE

A spare output fuse is strapped inside the charger cover.
- HP III model

HP III models panel

a- Charger ON LED indicator (green)
b- Second charging rate LED indicator (yellow)
c- Compensation charge LED indicator (green)
d- End of charge LED indicator (yellow flashing)
e- Fault LED indicator (red)
f- ON/OFF switch
g- Circuit breaker

- Fault signalling :
If a problem occurs, the charger stops. The led "⚠️" lights up and the screen displays an error code.

- Screen display :

Axxx
Charging supply
Ux.xx
Voltage per element
cxxx or Cxxx
Ah reinjected into the battery
(cxxx = <999 Ah - Cxxx>999Ah)
Hxx.x Charging time from the begining of the charge
(hour and tenth)
L000
O.K
UL0
Voltage below 1.65V/cell
L205
Voltage below 2.05V/cell after 30 mm charging
L09H
Voltage below 2.4V/cell after 9 H charging
LIL0
Supply = 0
LUAC
No supply voltage (charging horameter has stopped)
LHHS
Safety time (9 -12 - 14 or 16 hours depending on the charger type)
ForC
Forced cut by the push button
OFFS
Periodic mail of control
4.2.3 "Westinghouse-SGTE" charger.

- Connections on auto-transformer and transformer inlet terminals block:

220 VAC - 50 Hz:
- Auto-transformer
- Transformer terminal block
- Pre-insulated terminal

110 VAC - 60 Hz:
- Auto-transformer
- Transformer terminal block
- Pre-insulated terminal

- Protections:
  - Single pole thermal circuit breaker 20 Amps.
  - Output fuse: 100 Amps
  - AC auxiliaries: 2 Amps

Default LED indicator

Troubleshooting

The default LED indicator lights up:

<table>
<thead>
<tr>
<th>PROBABLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage above 3V per cell (corroded plates)</td>
<td>Depress the equalising function button to resume charge. (The default LED indicator flashes).</td>
</tr>
<tr>
<td>Voltage below 1.8V per cell after 5 minutes charge.</td>
<td>Depress the equalising function button to resume charge. (The default LED indicator flashes).</td>
</tr>
<tr>
<td>Note: If the voltage is below 1.5V per cell, the charger will not detect the battery.</td>
<td></td>
</tr>
<tr>
<td>Voltage does not reach 2.4V per cell after 11 hours charge (Soft timer #1).</td>
<td>Check condition of battery - connections and charger. Disconnect the charger from the battery and connect it again. If the problem persists, contact Grove Manlift® Product Support.</td>
</tr>
<tr>
<td>Charging time exceeds 15 hours (Voltage above 2.4V per cell) (Soft timer #2).</td>
<td></td>
</tr>
<tr>
<td>Charging time exceeds 16 hours (Hard timer).</td>
<td></td>
</tr>
</tbody>
</table>

Prior to any operation requiring charger cover removal, the battery must be disconnected and the charger must be unplugged from the AC outlet. Failure to do so could result in death or serious injury to personnel.

Connections on auto-transformer and transformer inlet terminals block:

Power supply: 110VAC - 60Hz / 220VAC - 50Hz

- Adaptation to network voltage:
4.3. Battery filling

Verify the electrolyte level using the floats in the center of each filling cap.

- Float doesn't emerge  → Insufficient level
- Float emerges  → Correct level

**NOTE**
Tilt the charger to gain access to the front battery pack.

If necessary, fill the battery cells after the charge using the centralised water filling system.

**CAUTION**
Use only distilled or demineralised water to fill the battery cells.

**CAUTION**
Battery cells filling must be performed only after charge (during charge, electrolyte level increases and can overflow).

1. Ensure that the water can of the filling unit is filled sufficiently with distilled water.
2. Position and hold the ELECTRICAL BATTERY FILLING switch either to the left or to the right to activate the filling unit.
3. Release the ELECTRICAL BATTERY FILLING switch when the flow indicator stops turning.
4. Verify the proper electrolyte level in each battery cell.

4.4. Electrolyte specific gravity and battery voltage

Specific gravity and voltage measure is the most important check to be performed on a battery. A hydrometer is supplied with the work platform.
Specific gravity and voltage readings must be performed at least once a month and recorded in a battery service log.
The state of charge of the battery can be checked by measuring the specific gravity of the electrolyte. This value decreases as the battery discharges.
When the battery is fully charged, the specific gravity is 1.280 kg/l.
When the battery is 80% discharged, the specific gravity is 1.150 kg/l.
The following graphic shows the correspondence between specific gravity and battery discharge.
Checking electrolyte specific gravity:

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery electrolyte must not be allowed to contact the skin or eyes. If it does occur, flush the contacted area with water and consult a doctor immediately. Appropriate equipment must be worn (GLOVES, GOGGLES, RUBBER APRON) to prevent the electrolyte from contacting the skin or any other part of the body during any servicing operation on the battery.</td>
</tr>
</tbody>
</table>

**NOTE**

Specific gravity measure must not be performed after battery cell filling.

1- Open the battery cell filling cap.
2- Using the hydrometer, take a sufficient quantity of electrolyte so that the float emerges. Ensure the float top does not touch the rubber bulb or that the float does not stick by capillarity to the glass walls.
3- Read the value as indicated on the example below:

![Hydrometer Image]

<table>
<thead>
<tr>
<th>Value</th>
<th>Specific Gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.12</td>
<td>1.14</td>
</tr>
<tr>
<td>1.16</td>
<td>1.18</td>
</tr>
<tr>
<td>1.20</td>
<td>1.22</td>
</tr>
<tr>
<td>1.24</td>
<td>1.26</td>
</tr>
<tr>
<td>1.28</td>
<td>1.30</td>
</tr>
<tr>
<td>1.23 kg/l</td>
<td></td>
</tr>
</tbody>
</table>

4- Return the electrolyte in the cell and record cell electrolyte specific gravity on the battery service log.
5- Repeat operation for each battery cell.

### 4.5. Centralised filling system maintenance

It is necessary to service the centralised filling system at least once a year. Cleaning frequency must be increased in case of premature clogging of the filter or a reduction of water flow.

- Disconnect and clean the filter by reversing the water flow from the normal direction.
- Check the hoses for flexibility. In case of hardening in the connection areas, replace the hose.
- Check every fitting for tightness and leakage.
- Check the cell caps individually. Ensure the perfect mobility of the floats. In case of excessive clogging, replace the cap.

- During maintenance or any servicing operation on the battery, rings, watches or any other jewellery must be removed.

- Specific gravity measure must not be performed after battery cell filling.
4.6. Cleaning - Battery maintenance

It is necessary to clean the battery regularly to prevent salt formation and current arcing which could damage the machine.
- Clean battery top with a damp cloth.
- Allow to dry and wipe the battery top with a dry non-fluffy cloth.
- Ensure the connections are clean and correctly tighten.

NOTE
Coat terminals and connections with an anti-corrosion compound or grease.
- Keep the metallic containers clean. In case of corrosion, clean, neutralize corrosion and apply anti-acid paint on the affected area.
- Drain the water which can accumulate at the bottom of the container (electrolyte overflow, leak in the centrals and filling circuit, battery cleaning...).

DANGER
Drained water may have been in contact with acid and may have become corrosive. Do not allow drain water to contact the skin or eyes. If it does occur, flush the contacted area with water and consult a doctor immediatly. Appropriate equipement must be worn (gloves, goggles, rubber apron) to prevent the drained water from contacting the skin or any part of the body.

To drain the water:
1- Fill the draining bulb with water (a draining bulb is supplied with the work platform).
2- Connect the hose to the pipe located in the battery container.
3- Connect the other end of the hose to the bulb and press the bulb to fill the hose and the pipe with water.
4- Once the hose and the pipe are filled, remove the bulb and place the hose in a container on the ground to recuperate the drainage water. The battery container drains itself automatically by siphoning.

NOTE
To drain the water, it is necessary that the end of the hose is kept below the bottom of the container.
5- Repeat operation for each container.
4.7. Storage of a battery at temperatures below 0°C (32°F)

Prior to battery storage at temperatures below 0°C (32°F), electrolyte specific gravity must be verified in each cell. Refer to ELECTROLYTE SPECIFIC GRAVITY AND BATTERY VOLTAGE in this section for electrolyte specific gravity measurement operating mode.

Electrolyte specific gravity measures enable to determine the electrolyte freezing point using the chart below:

**NOTE**

When the battery is fully charged (1.280 kg/l), the electrolyte freezing point is –85°C (-121°F). The freezing point of a battery 80% discharged (1.150 kg/l) is –12°C (10°F).

4.8. Use of a battery in a cold chamber or in a cold climate

**CAUTION**

The battery must be fully charged when the work platform is operated in a cold chamber or in cold weather conditions.

Temperature has an effect on battery autonomy: the battery looses 1% of its capacity per Celcius degree below +25°C (77°F) (temperature of the electrolyte).

Example: a battery operating with its electrolyte at a temperature of –30°C (-22°F) will loose 55% of its autonomy.

4.9. Battery not working continuously or inactive battery

A battery which is not used or used by intermittence must be stored charged in a dry area away from freezing temperatures. An equalization charge must be performed once a month. (In these conditions battery storage is possible at temperature of 30°C (86°F) for a 12 months period.)

**CAUTION**

Storing a discharged battery will result in irreversible damage to the battery.

- Unplug the battery to insulate it electrically.
- Keep the top of the battery clean and dry to prevent self discharge: during inactivity periods, batteries loose their charge progressively (self-discharge). Self-discharge causes battery plates corrosion, which increases with time, resulting in battery malfunction.

**CAUTION**

If the battery is not used continuously, it must be recharged at least once a month, even if the electrolyte specific gravity measures are high.

**CAUTION**

Before placing in service a battery which remained inactive for a long period of time you must recharge the battery and check the electrolyte level in the cells.
### 4.10. Battery troubleshooting

Serious accidents resulting in complete destruction of a traction battery are relatively rare. If small problems encountered on a battery in use are rapidly and correctly determined, battery life and operation can be improved.

**PREVENTION = AUTONOMY AND LONG LIFE**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Probable causes</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrolyte overflow.</td>
<td>Filling done before the charge.</td>
<td>Fill battery cells after the charge.</td>
</tr>
<tr>
<td></td>
<td>Cells overfilled.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overcharge.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loss of electrolyte due to overflow.</td>
<td>Perform an equalization charge.</td>
</tr>
<tr>
<td></td>
<td>Stratification of the electrolyte.</td>
<td>Contact your Grove Manlift Distributor/Product Support.</td>
</tr>
<tr>
<td>Inequal electrolyte specific gravity or electrolyte specific gravity too low.</td>
<td>Filling done before the charge.</td>
<td>Fill battery cells after the charge.</td>
</tr>
<tr>
<td></td>
<td>Electrolyte specific gravity too low.</td>
<td>Refer to &quot;electrolyte specific gravity too low&quot;.</td>
</tr>
<tr>
<td></td>
<td>Short-circuit.</td>
<td></td>
</tr>
<tr>
<td>Low voltage in the cells in open circuit.</td>
<td>Electrolyte specific gravity too low.</td>
<td>Refer to &quot;electrolyte specific gravity too low&quot;.</td>
</tr>
<tr>
<td>Battery cells temperature too high.</td>
<td>Problem with the charger.</td>
<td>Get the charger checked by a technician.</td>
</tr>
<tr>
<td></td>
<td>Bad air circulation during charge.</td>
<td>Open access doors to batteries during charge. Leave the battery to cool down when disconnected before charge. Reduce temperature of the area where the battery is charged (artificial ventilation).</td>
</tr>
<tr>
<td></td>
<td>Cell weak or faulty Cells shorted.</td>
<td>Change battery cell</td>
</tr>
<tr>
<td>Battery not able of supporting regular operation.</td>
<td>Battery under charged.</td>
<td>Perform an equalization charge.</td>
</tr>
<tr>
<td></td>
<td>Cell faulty.</td>
<td>Replace faulty cell.</td>
</tr>
<tr>
<td></td>
<td>Faulty cable or connection.</td>
<td>Check wires condition and connections.</td>
</tr>
<tr>
<td></td>
<td>Battery at the end of its service life.</td>
<td>Replace the battery.</td>
</tr>
</tbody>
</table>
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5.1. System malfunctions

When analysing a system malfunction, use a systematic procedure to locate and correct problems:

- Determine problem.
- List possible causes.
- Plan checks.
- Conduct checks in a logical order to determine the cause.
- Consider remaining service life of components against cost of parts and labour necessary to replace them.
- Make necessary repairs.
- Recheck to ensure that nothing has been overlooked.
- Functionally test failed part in its system.

NOTE
Your safety and that of others is always the number one consideration when working around machines. Safety is a matter of thoroughly understanding the job to be done and the application of good common sense. It is not just a matter of do's and don'ts. Stay clear of all moving parts.

5.2. Cleanliness

Keep dirt out of working parts to preserve the long life of the machine. Enclosed compartments, seals and filters keep the supply of air, hydraulic oil and lubricants clean. Maintain these enclosures properly. Whenever hydraulic lines are disconnected, clean the adjacent area as well as the point of disconnection. As soon as the disconnection is made, cap, plug or tape each line or opening to prevent entry of foreign material. The same recommendations for cleaning and covering apply when access covers or inspection plates are removed.

Clean and inspect all parts. Make sure:

- All passages and holes are open.
- Parts are covered to keep them clean.
- Parts are clean when they are installed.
- New parts are left in their containers until ready for assembly.
- Rust preventive compound has been removed from all machined surfaces of new parts before they are installed (except leaf chains).

5.3. Removal and installation

When performing maintenance, do not attempt to manually lift heavy parts when hoisting equipment should be used. Never locate or leave heavy parts in an unstable position. When raising a portion of a work platform - or a complete work platform - securely block the work platform and support the weight of the machine on blocks (rather than by lifting equipment).

When using hoisting equipment:

- Follow hoist manufacturer's recommendations.
- Use lifting devices that will allow you to achieve the proper balance of the assemblies being lifted and ensure safe handling.

Unless otherwise specified, all removals requiring hoisting equipment should be accomplished using an adjustable lifting attachment. All supporting members (chains and cables) should be parallel to each other and as near perpendicular as possible to the top of the object being lifted.

Some removals require the use of lifting fixtures to obtain proper balance.

If a part resists removal, make sure:

- All nuts and bolts have been removed.
- Adjacent parts are not interfering.

5.4. Disassembly and assembly

When assembling or disassembling a component or system, complete each step in turn:

- Do not partially assemble one part and then start assembling another part.
- Make all adjustments as recommended.
- Always check the job after it is completed to ensure that nothing has been overlooked.
- Recheck various adjustments by operating the machine before returning it to the job.
5.5. Parts replacement

Parts found damaged or out of tolerance during maintenance should be replaced. Refer to the corresponding Spare Parts Manual for proper replacement parts.

5.6. Wires and cables

Always disconnect batteries prior to working on the electrical system.

When removing or disconnecting a group of wires or cables, tag each one to ensure proper identification during assembly.

5.7. Gaskets

Ensure the holes in the gaskets correspond with the lubricant passages in the mating parts. If it is necessary to make gaskets, select material of the proper type and thickness. Ensure holes are cut in the right places. Blank gaskets can cause serious damage.

When removed, always install new cylinder head and manifold gaskets using recommended gasket compound on head gaskets to allow uniform sealing.

5.8. Care and installation of teflon-coated bushings

The following instructions must be followed when working with teflon-coated bushing:

5.8.1. Bushings

- No jiffy wheels or reaming of any kind can be used on coated bushings.
- Once the coating on the bushing is damaged it cannot be used and must be replaced.
- Coat bushing, pin and interior of housings with grease before assembling.

5.8.2. Pin

- Any rough or damaged surface on pin will damage the teflon coating on the bushing; the bushing therefore must be replaced.
- All rust or masking residue must be cleaned from pin prior to installation. Use emery cloth as appropriate.

5.8.3. Bushings and pin

- When installing pin, proper care must be taken to ensure bushing and pin are properly aligned so that bushing coating is not damaged.
- I.D. of bushing MUST be coated with clean grease before pins are installed at any assembly level.
- Pins have a chamfered or rounded end to prevent the teflon coating on the bushing from being damaged during pin installation.

5.8.4. Bushing installation

Bushings must be inserted in their housing with an appropriate driver with a smooth flat end (preferably in soft steel).

The O.D. of the bushing must be slightly oiled to facilitate assembly. Bushing, driver and housing must be correctly aligned during assembly.

Bushing driver
Blocking must be used on parts that will receive two bushings to prevent damage to the flange of the lower bushing.

### 5.9 Mast roller removal

**NOTE**
The mast rollers (Qty 16) can be removed one by one without removing the telescopic mast.

**5.9.1. Upper rollers.**

1. Lower the mast.
2. Unscrew the locknut from the roller to be removed using a polygonal spanner.
3. Unscrew the roller pin to release the bronze spacer and free the roller as indicated below.

**CAUTION**
Hold the bronze spacer, roller and washer to prevent any of them from falling to the bottom of the mast.

**CAUTION**
Install the roller before removing another one (refer to § 5.9.3).
5.9.2. Lower rollers.

NOTE
Before removing the lower rollers, ensure the upper rollers are installed.

Using ground controls:

1. Raise the telescopic mast to gain access to the roller to be removed.
2. Unscrew the locknut from the roller to be removed using a polygonal spanner.
3. Unscrew the roller pin to release the bronze spacer and free the roller as indicated previously.

![CAUTION]
Install the roller before removing another one (§ 5.9.3.).

5.9.3. Rollers

![CAUTION]
The bronze spacer must be replaced if its thickness is below 3,5 mm. Check the condition of roller pin, bushings and roller prior to installation. Replace damaged parts with original parts. Grease bushings before installation.

- Partly tighten the pin on the mast section and insert the washer on the pin.
- Apply grease to the spacer so that it "sticks" to the mast and does not fall to the bottom of the mast.
- Press the spacer onto the mast and slide it. The roller and spacer must be in line with the pin.

![CAUTION]
Clean and grease the faces of the bronze spacers on the mast. Refer to § 7.1 Lubrication points.

![CAUTION]
After maintenance operation on the roller, the mast alignment must be adjusted. Refer to § 5.17.
5.10 Hydraulic system

**DANGER**

Exercise extreme care around pressurized hydraulic systems. Do not work on a hydraulic system while it is in operation or until all pressure is released.

Cleanliness

Contaminants in a hydraulic system affect operation and will result in serious damage to the system components. Dirty hydraulic systems are a major cause of component failures.

**Keep the system clean**

When removing components of a hydraulic system, cover all openings on both the component and the work platform.

If evidence of foreign particles is found in the hydraulic system, flush the system.

Disassemble and assemble hydraulic components on a clean surface.

Clean all metal parts in a non-flammable cleaning fluid. Then lubricate all components to aid in assembly.

**Hydraulic filters location**

*Pressure filter*

Pressure filter is located on the front left hand side of the chassis.

*Return filter*

The top in-tank return filter is located at the rear of the chassis.

Sealing elements

Inspect all sealing elements (O-rings, gaskets, etc,...) when disassembling and assembling hydraulic system components. Installation of new elements is always recommended.

Hydraulic lines

When installing metal tubes, tighten all bolts finger-tight. Then, in order, tighten the bolts at the rigid end, the adjustable end and the mounting brackets. After tubes are mounted, install the hoses. Connect both ends of the hose with all bolts finger-tight. Position the hose so that it does not rub on the machine and can bend and twist. Tighten bolts in both couplings.

Due to manufacturing methods there is a natural curvature to a hydraulic hose. The hose should be installed so any bend is with this curvature.

**Removing air from the hydraulic system**

Air entering the hydraulic oil will normally be removed automatically with the hydraulic oil passing in the reservoir. However, if a component has been replaced or the reservoir level is too low, air can enter the system. If air becomes entrapped in the hydraulic oil, it may be detected by noisy operation of the pump/motor-operated components. Should this occur, check the level of the hydraulic reservoir and replenish as necessary.

Minute leaks may be difficult to locate. Should you encounter a leak that is not readily detectable, use the following method when checking for leaks:

- Seal all normal openings in the hydraulic system and the hydraulic reservoir.
- Using a positive means to control the pressure (i.e. a regulator), pressurize the hydraulic system to 13.8 kPa/0.14 bar - 27.5 kPa/0.28 bar.
- Inspect all joints and fittings for evidence of leaks. A soap solution may also prove helpful in detecting minute leaks when the system is pressurized.
- Remove the pressure, repair any leaks found and reopen any openings (vents, etc...) closed for inspection.
- Refill the hydraulic reservoir after completing any repairs or service.
- Operate all hydraulics circuits several times in both directions. This action should return any entrapped air to the hydraulic reservoir where it can be removed from the hydraulic oil by the hydraulic reservoir vent.

**DANGER**

Use extreme care when removing any plugs or restrictions from a hydraulic system suspected to have entrapped air that may be pressurized. Failure to comply could result in death or injury to personnel.
Entrapped air may be removed from cylinders (having wet rods) by cycling. On certain cylinders, a plugged port is provided on the barrel end to bleed off entrapped air.

**DANGER**

Do not attempt to loosen fittings in pressurized lines or while the hydraulic pump is in operation. Failure to comply could result in death or injury to personnel.

If air entrapment should persist, it may become necessary to bleed air by loosening various clamp-and screw-type fittings. If the above procedures fails to eliminate air entrapment, contact your Grove Worldwide distributor.

**NOTE**

When servicing the hydraulic system, use a container to collect the oil from the hydraulic lines or components and prevent it from spilling on the work platform or on the ground.

### 5.11. Fatigue of welded structures

Experience has shown that highly stressed welded structures - when repeatedly subjected to varying stresses caused by twisting, shock, bending and intentional and/or unintentional overloads - often become subject to weld cracking which may be attributed to fatigue of the welded joint. This condition is not uncommon in construction equipment.

Equipment should be periodically inspected for evidence of weld fatigue. The frequency of these inspections should be commensurate with the:

- Age of equipment.
- Severity of application.
- Experience of operators and maintenance personnel.

A visual inspection of the following high-stress areas should be made part of the owner's planned preventive maintenance program:

- Welded joint of the plates making up the chassis base plate.
- Hydraulic wheel motors attachment plates (rear axle).
- Front axle beam connection on chassis plate.
- Steering brackets.
- Mast section #1 connection on turntable plate.
- Hydraulic cylinder end connections.
- Roller pins, tie rods, hydraulic cylinders attachment points.

The items listed above are provided as a guide. Do not limit your inspection plan to the areas listed. A thorough visual inspection of all weldments is good practice.

If you require more detailed inspection instructions and/or repair procedures, contact your local Grove Worldwide distributor for assistance.

**Welding from/on work platform**

When welding from/on work platforms, follow these precautions:

- When welding from the platform, always run the welder ground wire directly to the structure that is being welded. Do not allow any part of the work platform to contact welding rods, holders, ground terminals or the structure being welded. Do not ground the welder through the machine as this can cause arcing inside the turntable bearing or inside hydraulic cylinders.
- When welding on the work platform, disconnect all electronic components. When welding on the frame on all work platforms, connect the welder ground wire to the machine frame - as close to the area being welded as possible. When welding on the superstructure, connect the welder ground wire to the machine superstructure - as close to the area being welded as possible. This is to prevent arcing inside the turntable bearing.

**5.12. LOCTITE®**

Loctite®-type adhesives contain chemicals that may be harmful if misused. Read and follow the instructions on the container.

Always follow the directions on the Loctite® container. Not all Loctite® types are suitable for all applications.
5.13. Fasteners and torque values

Use bolts of the correct length. A bolt that is too long may bottom before the head is tight against the part it is to hold. If a bolt is too short, there may not be enough threads engaged to hold the part securely. Threads can be damaged. Inspect them and replace fasteners as necessary.

Torque values should correspond to the type of bolts, studs and nuts being used unless otherwise noted.

Torque tables are provided by Grove Worldwide for reference when preforming maintenance.

Use of proper torque values is extremely important. Improper torquing can seriously affect performance and reliability.

NOTE
Some special applications require variation from standard torque values. Reference should always be made to component overhaul procedures for recommendations.

Special attention should be given to the existence of lubricant, plating or other factors that might require variation from standard torque values.

When maximum recommended torque values have been exceeded, the fastener should be replaced. If installation is in a tapped hole, check the thread with a gauge and then replace the bolt.

If reusing previously installed grade 10.9 bolts that have not been over torqued, the bolts shall be visually inspected for cracks and thread damage and replaced if discontinuities are found. Bolts are not to be rethreaded or reworked.

It is mandatory to replace systematically ALL washers, bolts and nuts of turntable bearing if they were removed (even if bolts have not been over torqued).

All lower grade fasteners must also be properly tightened to assure a good assembly. This tightening can be achieved by using a procedure (such as the turn-of-the-nut) or by applying the measured torque.

When unfinished self-locking nuts (such as the plastic patch or dimpled types) are coated with a light oil, the run down torque that would normally be added to the wrench setting need not be added. Run down torque is the force necessary to turn the nut on a free thread.

When referring to applicable torque charts, use values as close as possible to the torque values shown to allow for wrench calibration tolerance. An erratic or jerking motion of the wrench can easily result in excessive torque. ALWAYS use a slow wrench movement and STOP when the predetermined value has been reached.

Torque wrenches are precision instruments and are to be handled with care to ensure calibrated accuracy. Calibration checks should be made on a scheduled basis. Whenever the wrench might be either overstressed or damaged, it should immediately be removed from service until recalibrated.
Nut identification:

Grade 8.8  Grade 10.9  Grade 12.9

Bolt identification:

Grade 8.8  Grade 10.9  Grade 12.9

TORQUE VALUES FOR PLATED NUTS AND BOLTS
FOR TORQUING WITH TORQUE WRENCH
(COARSE THREAD)

<table>
<thead>
<tr>
<th>QUALITY</th>
<th>TENSILE STRENGTH N/mm²</th>
<th>UNIT</th>
<th>M4</th>
<th>M5</th>
<th>M6</th>
<th>M7</th>
<th>M8</th>
<th>M10</th>
<th>M12</th>
<th>M14</th>
<th>M16</th>
<th>M18</th>
<th>M20</th>
<th>M22</th>
<th>M24</th>
<th>M27</th>
<th>M30</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.8</td>
<td>785</td>
<td>N.m</td>
<td>Maxi</td>
<td>2.5</td>
<td>5.2</td>
<td>8.8</td>
<td>15.2</td>
<td>21.6</td>
<td>42.4</td>
<td>75</td>
<td>119</td>
<td>184</td>
<td>255</td>
<td>358</td>
<td>487</td>
<td>620</td>
<td>908</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N.m</td>
<td>mini</td>
<td>2.28</td>
<td>4.7</td>
<td>8</td>
<td>13.6</td>
<td>20</td>
<td>39.2</td>
<td>68</td>
<td>109</td>
<td>170</td>
<td>235</td>
<td>330</td>
<td>450</td>
<td>572</td>
<td>837</td>
</tr>
<tr>
<td>10.9</td>
<td>981</td>
<td>N.m</td>
<td>Maxi</td>
<td>3.6</td>
<td>7.4</td>
<td>12.8</td>
<td>20.8</td>
<td>30.4</td>
<td>60</td>
<td>104</td>
<td>170</td>
<td>258</td>
<td>364</td>
<td>503</td>
<td>685</td>
<td>872</td>
<td>1273</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N.m</td>
<td>mini</td>
<td>3.3</td>
<td>6.8</td>
<td>11.2</td>
<td>19.2</td>
<td>28</td>
<td>55.2</td>
<td>96</td>
<td>156</td>
<td>238</td>
<td>334</td>
<td>465</td>
<td>632</td>
<td>804</td>
<td>1175</td>
</tr>
<tr>
<td>12.9</td>
<td>1177</td>
<td>N.m</td>
<td>Maxi</td>
<td>4.3</td>
<td>8.8</td>
<td>15.2</td>
<td>24.8</td>
<td>36</td>
<td>71.2</td>
<td>125</td>
<td>199</td>
<td>310</td>
<td>426</td>
<td>605</td>
<td>823</td>
<td>1045</td>
<td>1528</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N.m</td>
<td>mini</td>
<td>3.9</td>
<td>8</td>
<td>13.5</td>
<td>22.4</td>
<td>33.6</td>
<td>66.4</td>
<td>115</td>
<td>182</td>
<td>286</td>
<td>392</td>
<td>559</td>
<td>760</td>
<td>965</td>
<td>1410</td>
</tr>
</tbody>
</table>

TORQUE VALUES FOR JIC FITTINGS
FOR TORQUING WITH TORQUE WRENCH

<table>
<thead>
<tr>
<th>UNIT</th>
<th>MIN.</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.m.</td>
<td>N.m.</td>
<td>N.m.</td>
</tr>
<tr>
<td>JIC 7/16</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>JIC 9/16</td>
<td>23</td>
<td>35</td>
</tr>
<tr>
<td>JIC 3/4</td>
<td>32</td>
<td>48</td>
</tr>
</tbody>
</table>

TORQUE VALUES FOR BSPP FITTINGS
FOR TORQUING WITH TORQUE WRENCH

<table>
<thead>
<tr>
<th>UNIT</th>
<th>N.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSPP 1/4</td>
<td>50</td>
</tr>
<tr>
<td>BSPP 3/8</td>
<td>80</td>
</tr>
<tr>
<td>BSPP 1/2</td>
<td>105</td>
</tr>
<tr>
<td>BSPP 3/4</td>
<td>220</td>
</tr>
</tbody>
</table>
KNOW YOUR TORQUE WRENCH! Flexible beam type-wrenches - even though they might have a preset feature - must be pulled at right angles and the force must be applied at the exact center of the handle. Force value readings must be made while the tool is in motion.

Rigid handle-type torque wrenches are available with torque limiting devices that can be preset to required values and which eliminate dial readings.

**NOTE**
When multipliers and/or special tools are used to reach hard-to-get-at spots, ensure torque readings are precisely calculated. Identification of fastener grade is always necessary. When marked as a high-strength bolt (grade 10.9, 12.9 etc.), the mechanic must be aware that he is working with a highly stressed component and the fastener should be torqued accordingly.

### 5.14 Steering switches

**Upper switches:**
The upper switches cut off the drive function when the mast has been raised at more than half its course (when the limit switch located on the right hand side of the telescopic mast is activated) with the steering wheels initially steered at an angle above 45°. The wheels need to be straightened to restore the drive function.

When the mast is fully lowered and the machine is driven at HIGH speed (\( \leq 12 \)) the machine switches automatically to TORQUE speed when one of the lower switches is activated (drive speed limitation when the wheels are steered at an angle above 45°).

**NOTE**
When steering the wheels, the lower switches must be activated before the upper switches so as the steering limitation occurs before the drive function cut-off.

**Lower switches:**
The lower switches limit the steering angle of the wheels when the mast is raised at more than half its course (when the limit switch located on the right hand side of the telescopic mast is activated). The right hand side lower switch limits the steering to the right when the steering angle of the right steering wheel reaches 45°. The left hand side lower switch limits the steering to the left when the steering angle of the left steering wheel reaches 45°.
5.15 Main hydraulic power unit

Main hydraulic power unit motor brushes (Qty = 4) have to be regularly checked. Motor ventilation holes have to be regularly cleaned by blowing compressed air through the holes as indicated below:

Brushes removal:

1- Disconnect the battery plug.
2- Remove the covers from the motor.
3- Remove brushes connection screws.
4- Lift the spiral springs and remove the brushes from their housing.

If the length of one of the brushes is below 10 mm, all 4 brushes must be replaced. During removal/installation, do not interchange the brushes.

Brushes installation:

1- Lift the spiral spring and install the brushes.
2- Install the brushes connection screws.
3- Install the protection covers.

5.16 Steering bracket thrust washers

Check thickness of thrust washers on both steering brackets. Replace the washers if their thickness is below 2.5 mm.

5.17 Mast section alignment

Mast sections alignment and adjustment of the transversal play between the mast sections must be performed by trained and qualified personnel.

1- Clean the inside walls of the mast sections to remove old grease.
2- Loosen the locknuts of the roller pins.
3- Reduce the transversal play by tightening the roller pins in succession.

Do not suppress the play completely: for the mechanism to work, a minimum play is necessary.
4- Use a plumb line to ensure the vertical alignment of the mast sections is kept:

5- Tighten the roller pin locknuts.
Torque value: 1000 N.m approximately.

**CAUTION**
If during adjustment one of the mast sections jams, stop the lowering movement and raise the mast to retension the chains. Loosen slightly the roller pins of the jammed mast.

**Controls after adjustment**
- Fully raise and lower the telescopic mast two or three times with the rated load (200 kg) evenly distributed in the platform.
- If no jamming occurs, fully raise and lower the telescopic mast with one person in the platform.
- If jamming occurs during lowering, loosen slightly the roller pins of the jammed mast section.
- Check the torque value of all roller pin locknuts.

Do not hesitate to contact your approved Grove Manlift distributor for more information.

**5.18 Lifting chains adjustment**

The lifting chains of a same stage must have an identical tension.
The chains must always be tensioned so that the mast sections are slightly offset towards the top:

**Control of tension:**
1- Fully raise the telescopic mast.
2- Lower the mast by approximately 50 cm.
3- Press on each chain between the pulley and chain yoke. Each chain of a same stage must have the same deflection.
4- Fully lower the mast.
5- Raise the mast by approximately 50 cm. Ensure the deflection is the same for each chain of a same stage:

Tighten the nut on the anchor of the chain which is too slack or loosen the nut on the anchor of the chain which is too tight, ensuring the final offset of the mast sections is kept.

6- Check the presence and correct tightening of the locknut on each chain anchor.

**NOTE**
Refer to Section 7. LUBRICATION for chain lubrication procedure and lubricant specification.
5.19 Chain control and lubrication

The service life of a lifting chain depends on the work platform operating conditions and on the environment in which the machine is used or stored. Service life is reduced if the chains are exposed to significant temperature fluctuations, acid or corrosive products or vapours, or abrasive dust.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to the high resistance level of their components, chains can be weakened by hydrogen.</td>
</tr>
</tbody>
</table>

5.19.1 Control of chain wear.

Inspect thoroughly each chain in turn over its entire length:
- Chains, chain yokes, clevis pins and split pins must not be corroded.
- Plate must not be cracked.

![cracked plate]

- The plate clevis pins must not present excessive play. The pins must not be turned in their housing (1):

![image]

- Plates must not present a wear above 5% of the total height (refer to chart below).

A plate with wear above 5% of A max.

<table>
<thead>
<tr>
<th>Pitch</th>
<th>5/8&quot; (15,875 mm)</th>
<th>3/4&quot; (19,05 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A min.</td>
<td>11,5 mm</td>
<td>13,6 mm</td>
</tr>
</tbody>
</table>

Chain stretching cannot be superior to the values indicated in the chart below:

<table>
<thead>
<tr>
<th>Pitch</th>
<th>5/8&quot; (15,875 mm)</th>
<th>3/4&quot; (19,05 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L max.</td>
<td>163,5 mm</td>
<td>196 mm</td>
</tr>
</tbody>
</table>

If a chain appears to be faulty or worn, it must be replaced; the condition of the pulleys and the telescopic mast alignment must be checked.

5.19.2 Chains lubrication.

- **CAUTION**
  - Do not use grease to lubricate the lifting chains.

- **CAUTION**
  - Do not remove lubricant applied at the factory from the chains. Do not use acid or detergent to clean the lifting chains.

Lubrication of the lifting chains can be performed manually with a brush, or by spraying. Chain lubrication intervals must be established with care, depending on the environment in which the work platform is operated or stored (dusty or aggressive environment).

The lubricant must be adapted to the machine’s operating conditions. In general, a non-detergent mineral oil is sufficient. Its viscosity must be adapted to temperatures according to the chart below:

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Recommended viscosity grades ISO - VG</th>
</tr>
</thead>
<tbody>
<tr>
<td>-15 &lt; T &lt;= 0</td>
<td>15 to 32</td>
</tr>
<tr>
<td>0 &lt; T &lt;= 50</td>
<td>46 to 150</td>
</tr>
<tr>
<td>50 &lt; T &lt; 80</td>
<td>220 to 320</td>
</tr>
</tbody>
</table>

**CAUTION**

A viscosity too low facilitates draining of the lubricant by gravity. A viscosity too high prevents the lubricant from reaching the friction surfaces.

Lubricant must be applied:
- Longitudinally: in areas where joints are under small load to facilitate penetration of the lubricant.
- Transversely: between the plates to enable the lubricant to reach the joint and between the internal plates and the rollers (lubricant type refer to § 7.1).
5.20 Overload detection setting

Check:

1- Place a 200 kg load evenly distributed on the platform floor.
2- Position the Ground controls/Platform controls selector switch to "Platform controls". Ensure the lower emergency stop is not activated.
3- Apply a slight pressure $F_1$ on the platform.
   - An acoustic alarm sounds.
   - The corresponding LED alarm lights up.
   - Every function is disabled from the platform controls.
4- Position the "Ground controls"/"Platform controls" selector switch to "Ground controls".
   - An acoustic alarm sounds.
   - Every function is disabled from the ground controls.
5- Apply a slight traction force $F_2$ on the platform.
   - The acoustic alarm stops.

Setting:

1- Place a 200 kg load evenly distributed on the platform floor.
2- Loosen the locknut of the setting screw.
3- Loosen the setting screw until the sensor is activated and the acoustic alarm sounds.
4- Apply a slight traction force $F_2$ on the platform.
   - The acoustic alarm should stop. If the acoustic alarm does not stop, tighten slightly the setting screw.
5- When the correct setting has been found, tighten the locknut.
6- Follow steps 3 and 4 of the checking procedure to verify the setting is correct.
5.21 Tilt alarm

General

This machine is fitted with a tilt sensor. The device is located on the front of the frame.

Check:

1- Position the selector switch to "Ground controls" or "Platform controls"
2- Chock the rear wheels.
3- Place a spirit level (digital display) on the chassis positioned lengthways from \( \vec{i} \rightarrow \vec{j} \).
4- With a jack of appropriate capacity, lift the front of the chassis in \( \vec{i} \):
   - An acoustic alarm sounds when the chassis is tilted at 2°.
   - The corresponding LED alarm lights up on platform controls.

5- Chock the front wheels.
6- With a jack of appropriate capacity, lift the rear of the chassis in \( \vec{j} \):
   - An acoustic alarm sounds when the chassis is tilted at 2°.
   - The corresponding LED alarm lights up on platform controls.

7- Place a spirit level (digital display) across the chassis from \( \vec{\perp} \rightarrow \vec{\perp} \).
8- With a jack of appropriate capacity, lift the right hand side of the chassis in \( \vec{\perp} \):
   - An acoustic alarm sounds when the chassis is tilted at 2°.
   - The corresponding LED alarm lights up on platform controls.

9- With a jack of appropriate capacity, lift the left hand side of the chassis in \( \vec{\perp} \):
   - An acoustic alarm sounds when the chassis is tilted at 2°.
   - The corresponding LED alarm lights up on platform controls.

Setting:

If the tilt sensor does not work symmetrically in the direction \( \vec{i} \rightarrow \vec{j} \):
   - Correct the symmetry fault by tightening or loosening the nut \( C \).

If the tilt sensor does not work symmetrically in the direction \( \vec{\perp} \rightarrow \vec{\perp} \):
   - Correct the symmetry fault by tightening or loosening nuts \( A \) or \( B \).
A battery discharge indicator and hourmeter is fitted on the upper control box.

A series of 10 coloured LEDs provide information on battery discharge.

As the battery discharges, the green LEDs (5) followed by the yellow LEDs (3) light up in succession from the right to the left.

When a red LED flashes, the battery has reached a 70% discharge depth: the machine must be driven to a charging station to recharge the battery.

When both red LEDs flash in alternance, the battery is discharged at 80% of its capacity and power supply to the work platform is automatically cut off: the battery must imperatively be recharged (a push button resets the power supply to enable the machine to reach the charging station).

The state of discharge of the battery is determined by comparison of the battery voltage when the work platform is operating at a pre-determined reference voltage, then by integration of the period of time during which the battery voltage is below the reference voltage.

The most significant function of the discharge indicator is to cut off the electrical circuit when the battery is 80% discharged, thus protecting the battery.

The power cut threshold depends on the battery capacity and from the discharge conditions to which the battery is submitted. This threshold can be adjusted using the potentiometer at the back of the indicator, where a scale from 1 to 9 allows precise setting.

The potentiometer is set depending on the capacity of the battery for "normal" discharge conditions.

In certain operating cases, these discharge conditions are not respected, therefore making it necessary to adjust the potentiometer.

For example, in quick discharge conditions, the power cut will occur when the battery is still charged. To adjust power cut threshold, proceed as follows:

- Measure battery electrolyte specific gravity when the power cut occurs (both red LEDs flash in alternance).
- Set the power cut threshold using the potentiometer knowing that each number corrects the battery specific gravity by 0.020 points.

For example, if the potentiometer is set on number 2 and electrolyte specific gravity is 1.170 kg/l when the power was cut off:
- Specific gravity will be 1.150 kg/l on the next discharge cycle if the setting is modified to number 1.
- Specific gravity will be 1.190 kg/l on the next discharge cycle if the setting is modified to number 3.
5.23 Motor speed controller

The motor speed controller fitted to the work platform enables fluctuation of the rotation speed of the main hydraulic unit motor, therefore modifying the speed of the work platform movements. The controller presents eight programmable speeds:
- Six variable speeds (four are used).
- Two fixed speeds.

The controller variables can only be set with an appropriate SEVCON calibrator (P/N: 920021).

**DANGER**
No variable or parameter can be modified without prior written approval from the manufacturer.

**Controller variable setting:**

1- Position the control panel selector either to "platform controls" or "ground controls". Ensure the lower emergency stop switch is not activated.

2- Connect the calibrator to the controller.

When the calibrator is connected to the controller, the operating time is displayed on the screen.

- Press on the arrow [↓] to display the operating hours.
- Press on the arrow [↑] to display 1000's of operating hours.

Example:
For an operating time of 1436 hours 27 minutes and 20 seconds, the screen will display:
- Display on connection to the calibrator: 27.2 (meaning 27 minutes and 20 seconds).
- Button [↓] depressed, display: 436 (meaning 436 hours).
- Button [↑] depressed, display: 1 (meaning 1000 hours).

**NOTE**
The meter rolls over to 0 after 65500 hours of operation.

3- Press on the "select" button. A red LED lights up opposite the first parameter: "speed1". The parameter value is displayed on the screen.

Press on the arrow [↓] to increase the value of this parameter.

Press on the arrow [↑] to decrease the value of this parameter.

Each time the "select" button is depressed, a red LED lights up opposite the next parameter, the value of this parameter is displayed on the screen and can be modified with the [↑] and [↓] buttons.
Description and parameters values for **Toucan 1010** models.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Unit</th>
<th>Step</th>
<th>Values</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Speed 1   | Speed n°1 (variable) | %  | 1%  | 45     | **First gear drive speed.**  
Mast and jib lowering function speed  
Swing movement speed from platform controls. |
| Speed 2   | Speed n°2 (variable) | %  | 1%  | 50     | **Jib raising function speed from platform controls.**  
Mast raising function speed from ground controls. |
| Speed 3   | Speed n°3 (variable) | %  | 1%  | 80     | **Mast raising function speed from platform controls.** |
| Speed 4   | Speed n°4 (variable) | %  | 1%  | 100    | Drive speed in 2\textsuperscript{nd} and 3\textsuperscript{rd} gear. |
| Speed 5   | Speed n°5 (variable) | %  | 1%  | 0      | Not used. |
| Speed 6   | Speed n°6 (variable) | %  | 1%  | 0      | Not used. |
| Speed 7   | Speed n°7 (fixed)   | %  | 1%  | 45     | **Speed of movements from the emergency control panel (Ground controls).** |
| Speed 8   | Speed n°8 (fixed)   | %  | 1%  | 30     | Pump speed for make-up flow to hydraulic wheel motors. |
| Creep%VB  | Starting threshold  | %  | 1%  | 10     | |
| Ramp sec  | Ramp shape         | sec.| 0,1 | 1      | 1 second max. |
| Extra %   | Additional speed   | %  | 1%  | 0      | Not used. |
| Imax Amp. | Current limit      | Amp.| 10  | 400    | |
| Batt V    | Battery voltage    | Volt|     |        | Refer to "Calibrator use as measuring instrument" |
| Motor V   | Motor voltage      | Volt|     |        | |
| Motor Amp.| Motor current      | Amp.|     |        | |
| Temp °C   | Temperature of mosfet radiator | °C |     |        | |
| Test      | Test Mode          | -   |     |        | Refer to "Calibrator use as operating control instrument" |

**Calibrator use as measuring instrument:**

**BATT V:** The measure of battery voltage can be done at any time, even when the work platform is in operation, thus enabling analysis, if necessary, of the battery voltage fluctuations.

**MOTOR V:** The measure of the motor voltage in operation enables the determination, for a chosen speed, of the voltage to be applied at the motor terminals. The value of this voltage calculated in percentage of the battery voltage determines the speed setting.

**MOTOR AMP.:** The measure of the current at the motor enables the determination of the current limit value to which the controller must be set when the machine is driven on a ramp.

**TEMP °C:** The measure of the temperature enables the analysis of the controller temperature increases, therefore the operating conditions of the work platform.
Calibrator use as operating control instrument (test mode):
- Position the control panel selector either to "platform controls" or "ground controls".
- Ensure the lower emergency stop switch is not activated.
- Connect the calibrator to the controller and depress the "select" button until "TEST" is displayed.

**NOTE**
When "TEST" is selected, the work platform can operate normally.

The value displayed on the screen corresponds to the value of the acceleration input received by the motor speed controller.

- When the joystick controller is activated at platform controls, the acceleration input varies from 0 to 100%.
- When controlling a superstructure function and using the rotary potentiometer, the acceleration input varies from 40/45% to 100%.

<table>
<thead>
<tr>
<th>Test sequence</th>
<th>Function</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Accelerator</td>
<td>0 to 100%</td>
</tr>
<tr>
<td>1</td>
<td>Speed n°1</td>
<td>CL or OP</td>
</tr>
<tr>
<td>2</td>
<td>Speed n°2</td>
<td>CL or OP</td>
</tr>
<tr>
<td>3</td>
<td>Speed n°3</td>
<td>CL or OP</td>
</tr>
<tr>
<td>4</td>
<td>Speed n°4</td>
<td>CL or OP</td>
</tr>
<tr>
<td>5</td>
<td>Speed n°5</td>
<td>CL or OP</td>
</tr>
<tr>
<td>6</td>
<td>Speed n°6</td>
<td>CL or OP</td>
</tr>
<tr>
<td>7</td>
<td>Speed n°7</td>
<td>CL or OP</td>
</tr>
<tr>
<td>8</td>
<td>Speed n°8</td>
<td>CL or OP</td>
</tr>
<tr>
<td>9</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Not used</td>
<td></td>
</tr>
</tbody>
</table>

- The ▲ or ▼ buttons step through the other tests.
- CL: (closed) means that the selected speed is active.
- OP: (open) means that the speed is not selected or is not active.

**Diagnostic Led:**
The controller is equipped with a diagnostic system using a green LED located near the calibrator socket. At connection the LED must light up and stay lit. If the green LED is off:
- The controller is out of order.
- The controller circuit is faulty.
- Controller supply fault (fuses faulty in the control circuit).

The green led may also flash a certain number of times at connection:
- 2 flashes: "Pump inhibit" function active. (Pump inhibit function is active when the telescopic mast is raised above its middle course with the wheels steered over 45°).
- 3 flashes: Short circuit across mosfets or motor open circuit.
- 7 flashes: Battery discharged. (Voltage less than 13V).
- 8 flashes: Activation of thermal cutback (overheat).

**Connections on 17 pin connector "SEVCON-MOS" 90 - "PUMP" controller:**
5.24 Fuses

Fuses used in the work platform electrical system protect the electrical circuit and electronic boards from excessive intensity (within the electrical circuit in which they are used).

5.24.1. Power circuit main fuse

The POWER CIRCUIT MAIN FUSE (F1) located on the right hand side of the lower control box, protects the power supply circuit (DIN 43560 - 325 Amps).

5.24.2. Steering power circuit fuse

The STEERING POWER CIRCUIT FUSE (F2) located on the front axle beam of the chassis protects the power supply circuit of the electrical steering unit motor (DIN 43560 - 63 Amps).

5.24.3. Control circuit main fuse

The CONTROL CIRCUIT MAIN FUSE (F3) panel mounted on the Lower Control Box protects the whole control circuit. Cartridge fuse link: 5 x 20 mm quick acting fuse - 5 Amps.

5.24.4. Battery voltage indicator fuse

The BATTERY VOLTAGE INDICATOR FUSE (F4) panel mounted on the Lower Control Box protects the circuit between the battery (+) and the battery voltage input on the battery discharge indicator. Cartridge fuse link: 5 x 20 mm quick acting fuse - 0.5 Amp.

5.24.5. Battery filling unit fuse

The BATTERY FILLING UNIT FUSE (F5) located inside the Lower Control Box protects the power supply circuit of the battery filling unit motor. Cartridge fuse link: 5 x 20 mm quick acting fuse - 3 Amps.
5.24.6. Electronically piloted circuits fuses

The ELECTRONIC PILOTED CIRCUIT FUSES (Qty: 7) mounted on the electronic board inside the Lower Control Box protect the coil supply circuit of:

- The DRIVE FWD valve (F1) [MAV]
- The DRIVE REV valve (F2) [MAR]
- The DUMP valve (F3) [DV]
- The DRIVEHI/LO valve (F4) [HI/LO]
- The DRIVE BRAKE valve (F5) [EVF]
- The MAST valve (F7) [DM]
- The JIB LOWERING valve (F6) [DB]

F1, F2, F3, F5, F6 & F7 : ATO quick acting fuses 1 A.
F4 : ATO quick acting fuse 2 A.

5.25 Drive function sequences.

Electronic board potentiometers setting.

**CAUTION**

The potentiometers used on the electronic board are single turn trimmers. Do not attempt to turn the wiper setting screw more than the allowed mechanical rotation. Use a screwdriver of proper dimension.

*Description*

The potentiometers (P1) (P2) (P3) enable the adjustments of the correct sequencing delays for a proper operation of the drive function.

*Start sequence* : When the controller is activated to perform a drive function (DRIVE SPEED selector positioned on HIGH speed (\(\text{\textsuperscript{\textcircled{H}}\text{\textsuperscript{\textcircled{S}}}}\)), the work platform starts driving in TORQUE speed and switches automatically to HIGH speed. The time delay for the work platform to switch to HI speed can be adjusted by means of the potentiometer (P1).

*Soft start / Stop Sequence* : When the controller is slowly activated to perform a drive function (DRIVE SPEED selector positioned on HIGH speed (\(\text{\textsuperscript{\textcircled{H}}\text{\textsuperscript{\textcircled{S}}}}\)), the work platform starts in TORQUE speed and should only switch to HI speed when the acceleration input value (from the controller potentiometer) has reached about 70% of its maximum course. With the platform driving in HI speed, the platform should switch to TORQUE speed when the acceleration input value (from the controller potentiometer) falls just under 40% when slowly returning the controller to neutral. The speed change threshold can be adjusted by means of the potentiometer (P2).

**NOTE**

The differential acceleration input value for speed changing (from HI to TORQUE speed) is a fixed value (about 30%).
Stopping sequence - Brusque drive direction inversion sequence:

In case of brusque drive direction inversion, the work platform first slows down and then stops before restarting in the opposite direction (as described in the Start Sequence). The time delay for the work platform to re-start in the opposite direction can be adjusted by means of the potentiometer (P3). During this time delay, the pump motor is running at low speed, providing make-up flow to the hydraulic wheel motors.

**Setting**

**NOTE**

The potentiometers arrow head indicator positions shown on the figures below correspond to an approximate setting.

Potentiometers with arrow head indicators:

![Potentiometers with arrow head indicators](image)

Potentiometers without arrow head indicators:

![Potentiometers without arrow head indicators](image)

**NOTE**

A smooth jerk occurs when the machine switches from TORQUE speed to HI speed or from HI speed to TORQUE speed.

**Potentiometer (P1) setting:**

1. Position the DRIVE SPEED selector switch to HI speed.
2. Perform a DRIVE REVERSE movement by fully pulling the controller towards the operator as quickly as possible.
3. The work platform should start in TORQUE speed then should switch to HI speed within an approximate 2 seconds time delay.
   - If the time delay for the work platform to switch to HI speed is longer than 2 seconds, reduce the delay by turning slightly (by 1/32 turn) the potentiometer P1 wiper screw anticlockwise.
   - If the work platform switches too quickly to HI speed, the work platform may not be able to go forward or backwards, increase the delay by slightly turning (by 1/32 turn) the potentiometer P1 wiper screw clockwise.
Potentiometer (P2) setting:

1. Connect the calibrator to the SEVCON controller. Using the "SELECT" button select the ACCELERATOR INPUT TEST SEQUENCE. Refer to MOTOR SPEED CONTROLLER in this section for further information.
2. Position the DRIVE SPEED selector switch to HI speed (\( \frac{5}{6} \)).
3. Perform a drive function by acting slowly on the controller. The work platform should switch to HI speed when the accelerator input value (displayed by the calibrator) reaches about 70%.
4. Reduce the work platform speed by letting the controller slowly return to neutral. The work platform should return to TORQUE speed when the accelerator input value falls under 40% and before the movement stops.
   - If the drive movement stops before the work platform switches to TORQUE speed turn slightly (by 1/32 turn) the potentiometer P2 wiper screw anticlockwise.
   - If the work platform switches to HI speed with an accelerator input value too high, slightly turn (by 1/32 turn) the potentiometer (P2) wiper screw clockwise.

Potentiometer (P3) setting:

1. Position the DRIVE SPEED selector switch to HI speed (\( \frac{5}{6} \)).
2. Drive the work platform forward at full speed (controller fully pushed away from the operator).
3. Release the pedal. The work platform should stop smoothly. The work platform should stop before the pump motor stops running (the pump motor runs at low speed to provide make-up flow to the wheel motors).
4. Drive the work platform forward at full speed then quickly reverse the movement. The work platform should stop smoothly BEFORE starting in the reverse direction:
   - If the work platform re-starts in reverse direction before stopping completely and/or the wheels motors clatter, increase the delay by turning slightly (by 1/32 turn) the potentiometer (P3) wiper screw clockwise.
   - If the time during which the pump motor runs at low speed (make-up flow) exceeds 1 second, reduce the delay by turning slightly (by 1/32 turn) the potentiometer (P3) wiper screw anticlockwise.
6.1 General
6.2 Preventive maintenance and inspection required
   6.2.1 Daily preventive maintenance and inspection
   6.2.2 Weekly preventive maintenance and inspection
   6.2.3 Monthly preventive maintenance and inspection
   6.2.4 Every 125 hours of operation preventive maintenance and inspection
   6.2.5 Every 250 hours of operation preventive maintenance and inspection
   6.2.6 Every 500 hours of operation preventive maintenance and inspection
6.1. General

The information in this section point out the items to be checked when performing daily, weekly and time based maintenance and inspections required on Grove Manlift aerial work platforms.

NOTE
This material does not replace any pre-operational checks required by the owner or a local or state safety board.

NOTE
State regulations require that written, dated and signed inspection records are maintained.

NOTE
Perform lubrication as outlined in section 7.

The control and maintenance procedures described in this chapter require specific competences. We recommend that these operations are performed only by authorised and qualified personnel.

If you have any queries concerning control and maintenance procedures, please contact your Grove Manlift distributor.

Certain operations require removal of covers or protection housings. All covers or protection housings must be installed before returning the work platform to service.

Work platform cleaning:

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>During cleaning, the battery must be disconnected from the work platform circuit, the charger must be disconnected from the power supply, the 220 V power socket on the platform (option) must be disconnected.</td>
</tr>
</tbody>
</table>

External cleaning:

Clean the work platform with an appropriate cleaning chemical mixed with water (water spray, sponge, cloths)

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>High pressure cleaning can only be used with a maximum pressure of 50 bar and a maximum temperature of 70°C.</td>
</tr>
</tbody>
</table>

Dry thoroughly the work platform (compressed air, cloths...) and lubricate as indicated (§ 7) before the work platform is returned to service.
6.2. Preventive maintenance and inspection required

**CAUTION**

Control and maintenance intervals must be respected to ensure safe operation of the work platform. The work platform must not be used if it is not operating PERFECTLY; it must be repaired and checked by a qualified and trained personnel before the machine is returned to service.

**NOTE**

If the work platform has been left idle for a long period of time, all the control, cleaning and lubrication procedures described below must be performed before the work platform is used again.

6.2.1. Daily preventive maintenance and inspection

Daily preventive maintenance/inspections should include verification of the following items:

- Operator's and Safety Handbook
- Decals - warning and instruction
- Work platform
- Controls / indicators
- Tilt alarm
- Motion alarm
- Mast limit switches
- Steering limitation switches
- Overload detection
- Chain slack/breaking detection
- Battery state of charge
- Electrolyte level in battery cells
- Tyres condition
- Hydraulic oil level in reservoir
- Jib and attachments
- Screw and cotter pins for clevis pins
- Power track
- Lubrication

6.2.2. Weekly preventive maintenance and inspection

Weekly preventive maintenance/inspections should include verification of the following items:

- Wheels nuts
- Hydraulic hoses and fittings
- Battery (electrolyte level)
- Mast/jib cylinders
- Lubrication

6.2.3. Monthly preventive maintenance and inspection

Monthly preventive maintenance/inspections should include verification of the following items:

- Mast lifting chains (lubrication)
- Batteries (electrolyte specific gravity - cells voltage)
- Lubrication

6.2.4. Every 125 hours of operation preventive maintenance and inspection

Preventive maintenance/inspections should include the previous preventive and maintenance inspections and verification of the following items:

- Cylinders
- Mast lifting chains/pulleys
- Batteries
- Wheel nuts (torque value)
- Tilt indicator (setting)
- Overload detection (setting)
- Motor brushes of main hydraulic unit
- Motor ventilation holes (cleaning)
- Steering brackets thrust washers
- Brake release pressure
- Bushes (jib/steering system)
- Lubrication

6.2.5. Every 250 hours of operation preventive maintenance and inspection

Preventive maintenance/inspections should include the previous preventive and maintenance inspections and verification of the following items:

- Hydraulic filters (replacement)
- Turntable bearing (greasing)
- Lubrication
6.2.6. Every 500 hours of operation preventive maintenance and inspection

Preventive maintenance/inspections should include the previous preventive and maintenance inspections and verification of the following items:

- Swing bearing bolts (torque)
- Lifting chains (wear)
- Telescopic mast alignment/bronze spacers on roller pins
- Relief valve settings
- Lubrication

**NOTE**
The work platform must be controlled by a notified body according to the regulation in force.

**NOTE**
Fire extinguisher (optional equipment) must be checked according to regulations in force.

**NOTE**
Turntable attachment caps screws have to be retorqued after the first 100 hours operation.

**NOTE**
Hydraulic filters have to be replaced after the first 50 hours operation.
7.1 Lubrication points
Follow designated lubrication procedures to ensure maximum work platform lifetime and use. The procedures and lubrication chart in this section provide information on the types of lubricants used, the location of lubrication points, the lubrication intervals and other important material.

### 7.1. Lubrication Points

Regular lubrication must be performed on all lubrication points. Normally, the frequency for lubrication is based on component operating time. The most efficient method for keeping track of lubrication intervals is to maintain a job log indicating machine usage. The log should include hourmeter readings which can be used to determine which lubrication points will require attention.

Lubricants or grease types as well as lubrication intervals must be adapted to the conditions, operating and storage environments of the work platform (temperature, dusty atmosphere, corrosive atmosphere, humidity...)

Check oil levels and perform lubrication only when the work platform is parked on a level surface in the transport position - and while the oil is cold (unless otherwise specified).

Excessive lubrication on non-sealed fittings will not harm the fittings or components, but too little lubrication can lead to shorter component life.

Unless otherwise indicated, items not equipped with grease fittings (such as linkages, pins, levers, etc...) should be lubricated with oil once a week. Motor oil applied sparingly will provide the necessary lubrication and help prevent the formation of rust. An anti-seize compound may be used if rust has not formed.

If rust or corrosion is present, the component must be thoroughly cleaned before applying lubricant.

Grease fittings that are worn and will not hold the grease gun (or those that have a stuck check ball) must be replaced.

Where wear pads are used, cycle the component and relubricate to ensure complete lubrication of the entire wearing surface.

The following chart titled *Lubrication Chart* describes lubrication points and gives the lubricant type, lubrication interval, lubricant amount and application of each.

**NOTE**

Check all fluid levels at ambient temperature.

---

**LUBRICATION CHART**

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>LUBE TYPE</th>
<th>LUBE INTERNAL</th>
<th>LUBE AMOUNT</th>
<th>APPLICATION</th>
</tr>
</thead>
</table>
| 1. Mast profiles | MOBILUX EP2 (Lithium base grease) or MOBILITH SHC 220 (Low temperature) | Every 125 hours of operation or after each cleaning or more often if the work platform is used or stored in a very dusty or corrosive environment. | N/A         | 1. Clean the inside wall of mast to remove the old grease  
2. Lubricate the mast inside wall using a brush  
3. Cycle the mast and relubricate. |
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>LUBE TYPE</th>
<th>LUBE INTERNAL</th>
<th>LUBE AMOUNT</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Lifting chains</td>
<td>MOBIL DTE 16M</td>
<td>Every 125 hours or once every 30 days of operation or more often if the platform is used or stored in a very dusty or corrosive environment.</td>
<td>N/A</td>
<td>Lubricant can be applied manually with a brush or by spraying. Apply lubricant: - Longitudinally = in areas where joints are under small load to facilitate penetration of the lubricant. - Transversally = between the plates to enable the lubricant to reac</td>
</tr>
<tr>
<td>3. Wheel bearings (non-drive hubs)</td>
<td>MOBILUX EP2 (Lithium base grease)</td>
<td>Every 250 hours of operation.</td>
<td>N/A</td>
<td>1 Grease nipple on each hub</td>
</tr>
<tr>
<td>4. Swing bearing race</td>
<td>MOBILUX EP2 (Lithium base grease)</td>
<td>Every 250 hours of operation.</td>
<td>N/A</td>
<td>1 Grease nipple on turntable base plate</td>
</tr>
<tr>
<td>5. Main hydraulic reservoir</td>
<td>MOBIL DTE 13M</td>
<td>- Check daily. - Drain after 1000 hours of operation or at least every 2 years.</td>
<td>21.5 l</td>
<td>Fill through top in-tank return filter.Check level through the sight gauge on the reservoir.</td>
</tr>
<tr>
<td>6. Return filter</td>
<td></td>
<td></td>
<td></td>
<td>Element replacement interval : After first 50 hours of operation and every 250 hours thereafter.</td>
</tr>
<tr>
<td>7. Pressure filter</td>
<td></td>
<td></td>
<td></td>
<td>Element replacement interval : After first 50 hours of operation and every 250 hours thereafter.</td>
</tr>
<tr>
<td>8. Steering unit reservoir</td>
<td>MOBIL DTE 13M</td>
<td>- Check every 125 hours of operation. - Drain after 1000 hours of operation or at least every 2 years.</td>
<td>1l</td>
<td>Check level/fill through reservoir breather cap.</td>
</tr>
<tr>
<td>9. Swing bearing internal gear</td>
<td>MOBILTAC 81 or MOBILITH SHC 1500</td>
<td>Every 1000 hours of operation.</td>
<td>Coat all teeth.</td>
<td>1- Remove swing gear box 2- Apply a thick coat of grease with a brush through the gear box centering hole. Manually rotate the turntable to reach the whole teeth.</td>
</tr>
</tbody>
</table>