metrolite


# SLT-490

# Operation & Service Manual



PART NO. 28034

# FOREWORD

This manual contains important information about the light towers and specific instructions for its operation and maintenance. It is important to keep a copy of this manual in the machine “Operator manual” holder to ensure that all machine operators have quick access to this manual .

It is the responsibility of the owner/operator to perform the required maintenance, service and replacement of required parts / filters to ensure proper care of the machine and a safe work environment. It is also important to have an authorised service dealer inspect the machine on a periodic basis.

# CALIFORNIA PROPOSITION 65 WARNING

**Engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.**

This product contains or emits chemicals known to the state of California to cause cancer, birth defects, and other reproductive harm.

Always recycle batteries, battery posts, or any items containing lead or lead compounds at an official recycling center in accordance with all local laws and regulations. Failure to do so could result in environmental damage, or injury

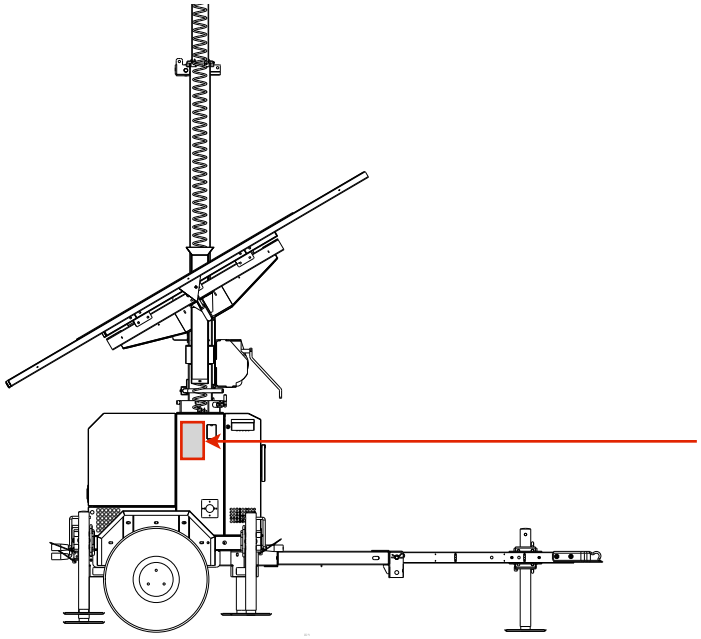
**To read more on Cancer and Reproductive harm please visit:**
**www.P65Warnings.ca.gov**

# IMPORTANT INFORMATION ABOUT THIS MACHINE

Use this page to record information about your machine. Please see below for location of the serial plate:

| | |
|---|---|
| **LIGHT TOWER MODEL** | |
| **LIGHT TOWER SERIAL NUMBER** | |
| **LIGHT TOWER MANUFACTURE CODE** | |
| **LED CONFIGURATION** | |
| **SOLAR PANEL CONFIGURATION** | |
| **INVERTER SERIAL NUMBER** | |
| **MPPT CHARGER SERIAL NUMBER** | |
| **BATTERY SERIAL NUMBERS** | |

# LOCATION OF THE SERIAL PLATE



# INDEX

# 1. GENERAL INFORMATION

The owner / operator is responsible for proper maintenance and safe operation of the equipment. It is important to comply with all the required and appropriate regulations of the Occupational Safety and Health Administration (OSHA) or equivalent local health and safety rules and standards. Ensure that the machine is commissioned, used and maintained according to the manufacturer's instructions and recommendations.

⚠ **DO NOT ALTER OR MODIFY THE MACHINE IN A WAY THAT MAY MAKE THE LIGHT TOWER IN NON-COMPLIANCE WITH THE FEDERAL AND LOCAL SAFETY CODES, STANDARDS, LAWS OR REGULATIONS.**

The manufacturer cannot anticipate all possible situations that might involve unsafe conditions, or potential hazards to people and equipment. As a result all the warnings, labels, cautions that are listed in the manual and on decals on the machine represent only a portion of all risks involved in running or using the equipment. Accordingly it is very important that if something looks unsafe, or looks dangerous for the operator or for others around, turn off the machine and/ or move everyone to a safe location.

Decals on the machine with the following instructions will mean the following:

| | |
|---|---|
| **DANGER** | *This is a hazardous and dangerous situation which if not handled properly or avoided will result in death/serious injury or serious damage to property* |
| **WARNING** | *This is a hazardous and dangerous situation which if not handled properly or avoided could result in death/serious injury or serious damage to property* |
| **CAUTION** | *This is a hazardous and dangerous situation which if not handled properly or avoided could result in minor or moderate injury or minor/moderate damage to property* |

The portable light tower is built for illumination of outdoor areas or surveillance of areas. It should be operated on and maintained by persons who are trained on the use and maintenance of this particular model(s) of light towers and are older than 18 years of age. No one who is impaired by alcohol, drugs or prescription medication should operate or be next to the machine when it is setup or operational. No one should smoke or start a fire anywhere near the machine.

# 2. SAFETY INFORMATION

- ☑ DO NOT charge the batteries from an electric source in a non ventilated or closed area.
- ☑ Always wear appropriate PPE when working on the light tower. There are a number of surfaces that are very HOT during operation and could cause burns when touched without gloves.
- ☑ Always ensure that there is sufficient ventilation and air flow around the machine to reduce fire or explosion risks.
- ☑ DO NOT loosen any hydraulic fittings (if present) without de-pressurising the hydraulic system first. Failure to do so might cause serious injuries.
- ☑ DO NOT operate on any electrical items or wiring in/on the light tower without first shutting all power sources off. This unit generates high voltage and current that can cause serious injury or even death. Always lockout the battery isolator before servicing the machine.
- ☑ Always disconnect the batteries / remove batteries from the machine before doing any welding on the frame.
- ☑ Always make sure that the machine is properly grounded.
- ☑ DO NOT plug any cords or cables that are worn out or have their insulation cut with the bare copper exposed.
- ☑ DO NOT operate or perform electrical repairs on the machine when standing in water.
- ☑ Always take precaution when working on batteries. They emit explosive gases when charging.
- ☑ DO NOT throw old batteries into trash cans. They can leak poisonous liquids that may come from the damaged batteries.
- ☑ DO not operate or raise the light tower under high voltage lines or trees or obstructions. Contact with the obstructions could cause injury to the operator or damage to the tower.
- ☑ DO NOT start or operate a machine that is damaged or in need for maintenance.
- ☑ DO NOT run the machine is severe weather or in thunder/lightning storms. Lightning strikes can cause severe injury or death to people around the tower.
- ☑ Always bring the mast down and close the solar panels in high winds (> 80 mph). High winds can cause the machine to topple over. ALWAYS make sure the outriggers are extended and jacks firmly resting on the ground when high winds are present.

# 2. SAFETY INFORMATION

- ☑ DO not raise the mast or lower it if any of the tubes get stuck or the wire rope becomes slack. Immediately call service support.
- ☑ DO NOT keep the solar panels open or tilted if there is an issue with the gas springs.
- ☑ Always extend the outriggers and level the light tower before operating or raising the mast.
- ☑ Always make sure that all the stabilizer jacks are resting on firm hard ground. If that is not possible make sure that large firm plates are placed under the jack to ensure proper ground support.
- ☑ Always connect the trailer chains to the tow vehicle by crossing over underneath the towbar.
- ☑ Make sure that the hitch and coupling on the towing vehicle are rated equal to or greater than the Gross Vehicle Weight Rating (GVWR).
- ☑ Make sure the brake lights and indicators are working properly after connecting the tow connector
- ☑ Make sure that the pneumatic tires are properly filled with air to the correct pressure.
- ☑ Make sure that the wheel lugs are present and tightened to the specified torque.
- ☑ ALWAYS make sure that the voltage and current rating of the charging source is appropriate for charging the batteries.
- ☑ **Reporting Trailer safety defects:**

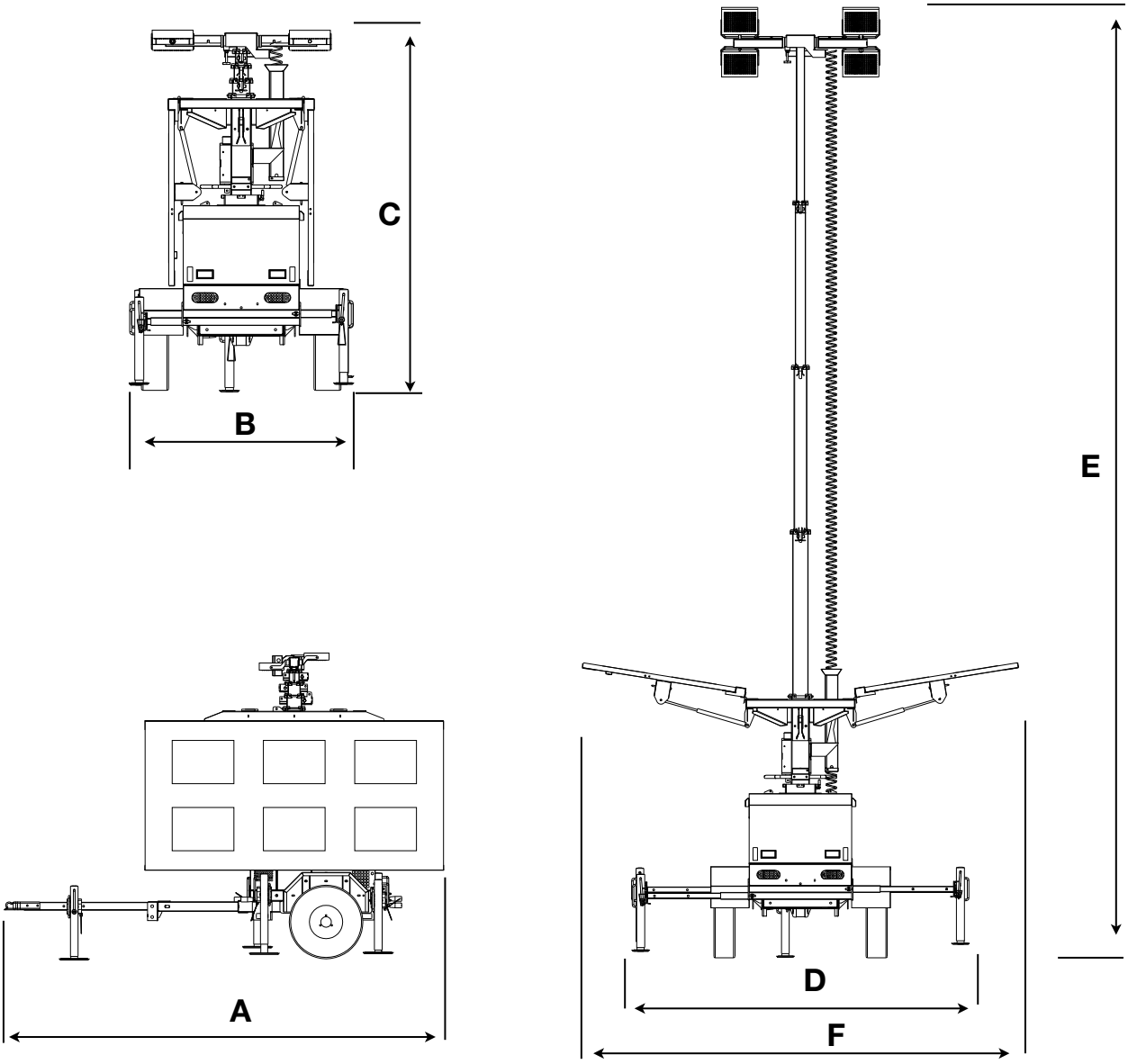
  a. If you believe your trailer has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying the manufacturer or Dealer.

  b. If NHTSA receives similarly complaints, it may open an investigation; and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in an individual problem between you, your dealer or the manufacturer or Dealer.

  c. To contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153), or go to http://www.safercar.gov ; or write to: Administrator, NHTSA, 1200 New Jersey Avenue S.E., Washington, DC 20590

  d. You can also obtain other information about motor vehicle safety from http://www.safercar.gov

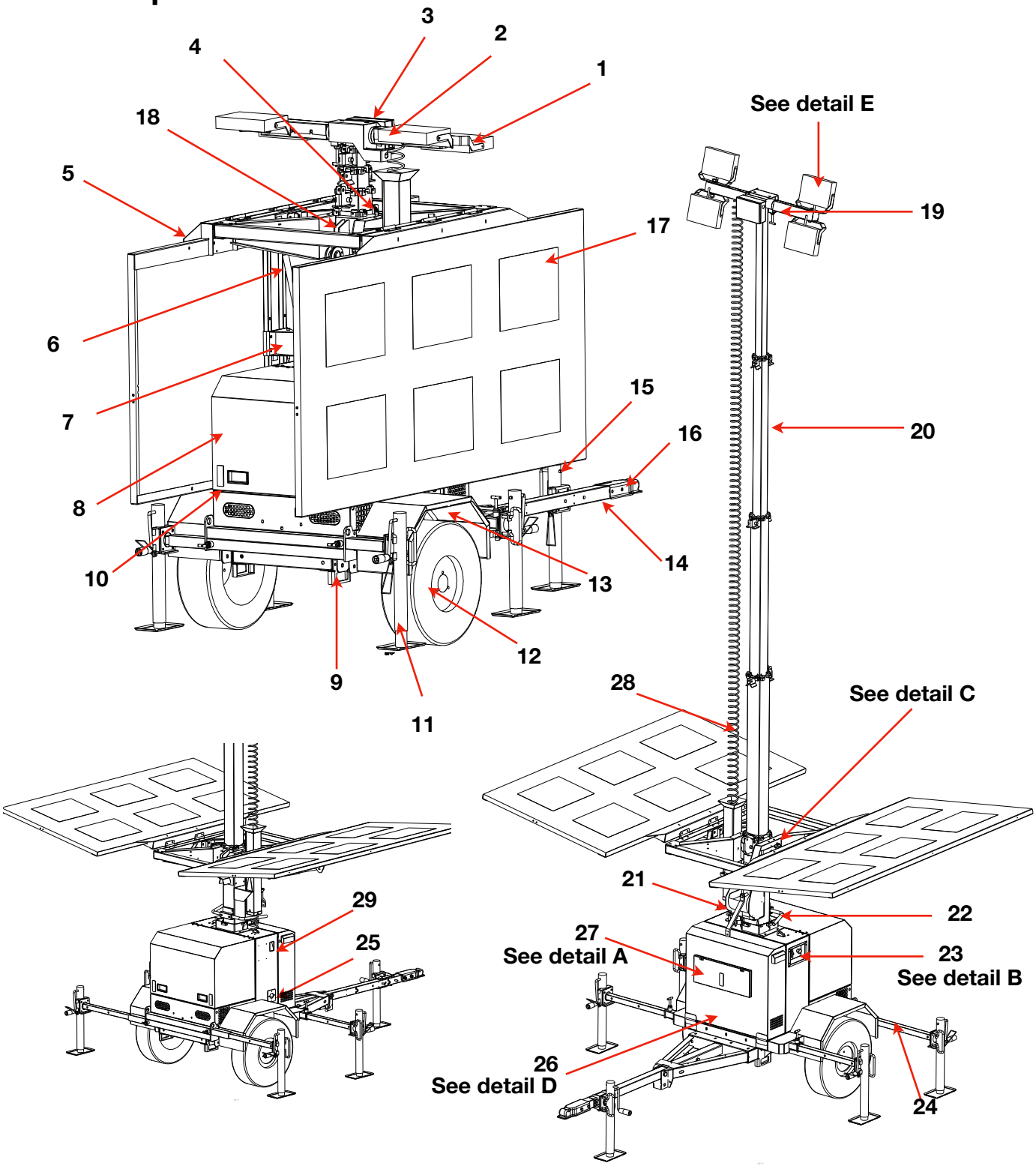
# 3. MACHINE DIMENSIONS




| MODEL | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| SLT-490 | 3.34 m (11 ft) | 1.4 m (4.6 ft) | 2.33 m (7.6 ft) | 2.43 m (7.9 ft) | 7 m (23 ft) | 3.2 m (10.2 ft) |

# 4. MACHINE PARTS

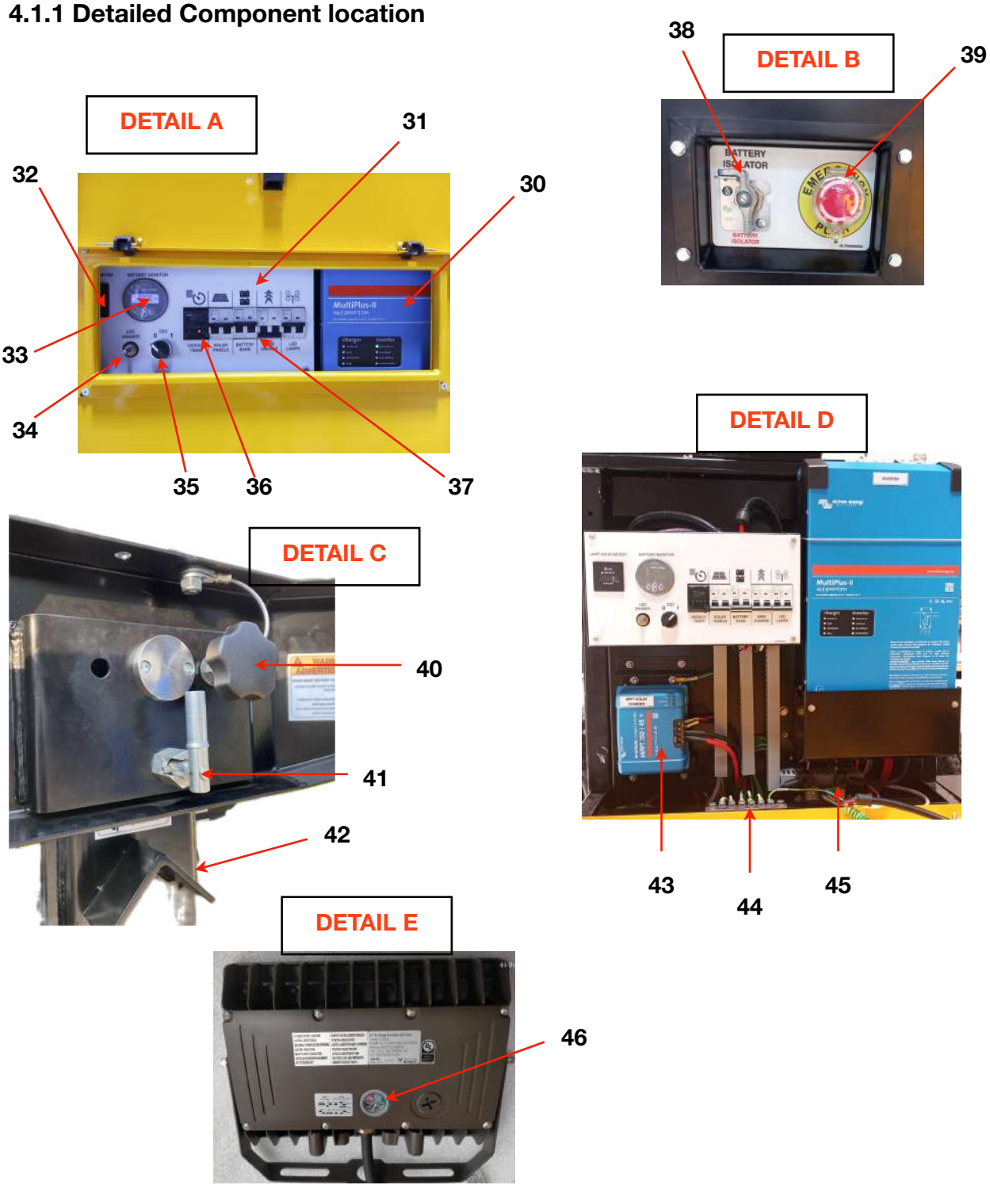
## 4.1 Component location




**LABELS AND DESCRIPTIONS ON NEXT PAGE**

# 4. MACHINE PARTS

### 4.1.1 Detailed Component location




**LABELS AND DESCRIPTIONS ON NEXT PAGE**

# 4. MACHINE PARTS

## 4.2 Component labels

| | | | |
|---|---|---|---|
| **1** | LED lamp (4 nos or 8 nos) | **24** | Outrigger tube |
| **2** | Light cross arm | **25** | Charging port / socket NEMA 5-15P, 15A, 120V |
| **3** | Junction box (Mast top) | **26** | Solar equipment box |
| **4** | Spiral wire collection tube | **27** | Control panel access cover |
| **5** | Solar panel hinge frame | **28** | Spiral wire |
| **6** | Solar panel opening gas spring | **29** | D2D sensor (Dusk to Dawn) |
| **7** | Solar panel locking wire rope with locking pin | **30** | AC-DC-AC inverter |
| **8** | Canopy hood | **31** | Operator control panel |
| **9** | Air vents | **32** | Load (LED) hour meter |
| **10** | Canopy hood lock | **33** | Battery monitor BMV |
| **11** | Stabilizer jack | **34** | LED dimmer knob |
| **12** | Pneumatic tire | **35** | D2D bypass switch |
| **13** | Fender | **36** | LED operator timer |
| **14** | Drawbar | **37** | Breakers |
| **15** | Stabilizer jack (Drawbar) | **38** | Battery Isolator |
| **16** | Ball hitch | **39** | Emergency Stop button |
| **17** | Monocrystal Solar panel | **40** | Solar panel tilt locking bolt |
| **18** | Single point lifting hook | **41** | Solar panel tilt locking spring pin |
| **19** | Light cross arm tilting pin | **42** | Solar panel tilt dead stop |
| **20** | Telescopic galvanized mast | **43** | Solar MPPT charger |
| **21** | Manual winch | **44** | Earth bar |
| **22** | Mast rotation handle | **45** | Shunt for battery monitor |
| **23** | E-Stop + Battery isolator | **46** | LED light sensor window |

# 4. MACHINE PARTS

## 4.3 AC-DC inverter

The inverter (Ref item 30 on pg. 6) converts the battery DC power into AC voltage and powers the load like the LEDs. It also acts as a charger when the batteries are to be powered by an outside source like the grid. Here it converts the AC input voltage and power to DC voltage and charges the batteries.

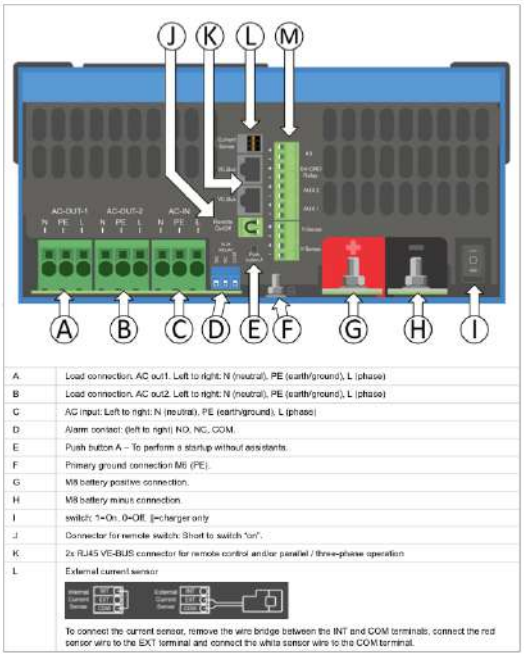
### 4.3.1 Inverter component details

The inverter used is a Victron 3kVA-120V inverter.
This section gives the basic details for the inverter.
For detailed information, please refer to the Victron manual


1. Inverter LED indicator ***(See section 4.3.3)***
2. Charger LED indicator ***(See section 4.3.4)***
3. Hot air exhaust
4. Cool air entry
5. All wiring entry ***(See section 4.3.2)***
6. Power on/off switch

### 4.3.2 Wiring entry section

Remove the cover at the bottom of the inverter to access the wiring section. The bottom of the inverter will look like that shown below:

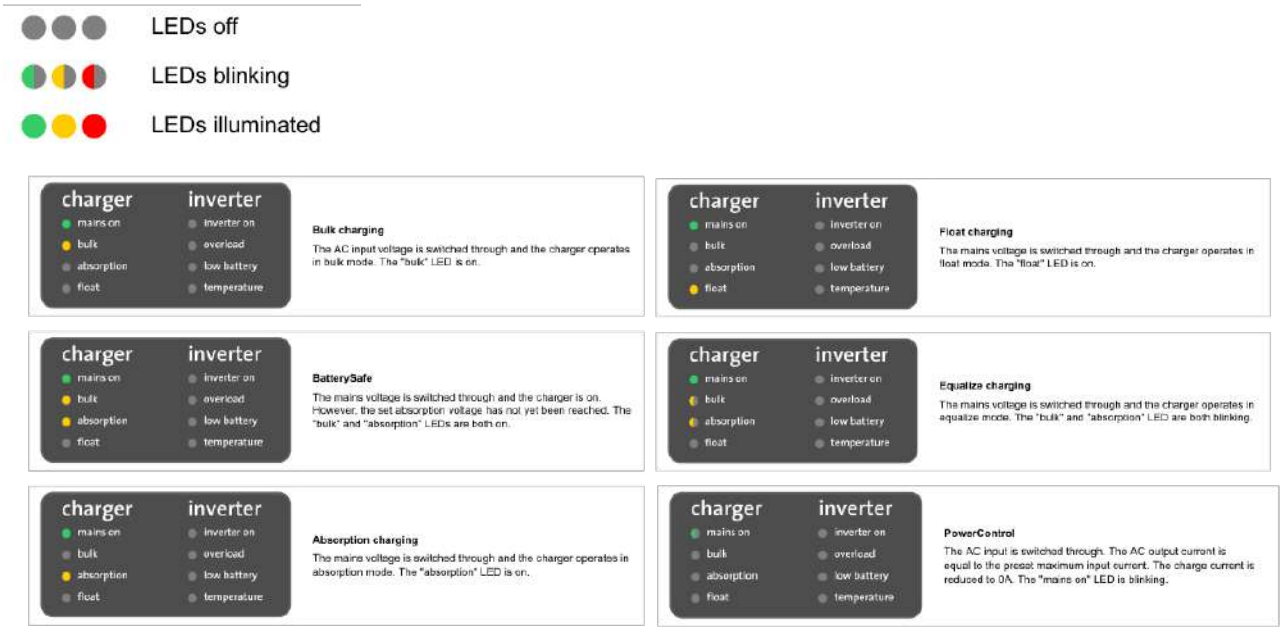


### 4.3.3 Inverter LED indicator details

The LEDs display Color and will either blink or stay steady. Below is an explanation of the inverter led details.
The LED Color code key is as follows:

### 4.3.4 Charger LED indicator details

The LEDs display Color and will either blink or stay steady. Below is an explanation of the charger led details.
The LED Color code key is as follows:



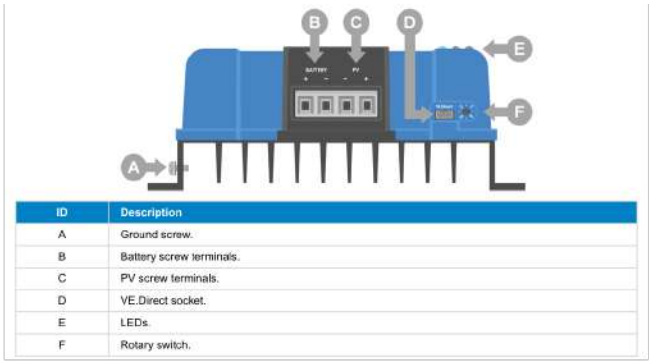
# 4. MACHINE PARTS

## 4.4 Solar MPPT charger

The Solar MPPT charger (Ref item 43 on pg. 6) converts the solar energy received by the solar panels into electrical DC energy and charges the batteries. This solar charger works on 24V and produces a max current of 45A DC.

### 4.4.1 Solar MPPT component details

The solar charger used is a MPPT solar charger Victron SmartSolar MPPT 150-45.
This section gives the basic details for the solar charger.
For detailed information, please refer to the Victron manual.




| ID | Description |
|---|---|
| A | Ground screw. |
| B | Battery screw terminals. |
| C | PV screw terminals. |
| D | VE.Direct socket. |
| E | LEDs. |
| F | Rotary switch. |

### 4.4.2 Solar Charger LED indicator details

The LEDs display Color and will either blink or stay steady. Below is an explanation of the solar charger led details.

| Operation mode | Bulk LED | Absorption LED | Float LED |
|---|---|---|---|
| Not charging [1] | Blinking | Off | Off |
| Bulk[1] | On | Off | Off |
| Absorption[2] | Off | On | Off |
| Manual equalisation (alternating blinking)[2] | Blinking | Blinking | Off |
| Automatic equalisation[2] | Off | On | On |
| Float[2] | Off | Off | On |

| Symbol | Meaning |
|---|---|
| ● | Permanent on |
| ◎ | Blinking |
| ○ | Off |

1. The bulk LED will blink briefly every 3 seconds when the system is powered but there is insufficient power to start charging.
2. The LED(s) might blink every 4 seconds indicating that the charger is receiving data from another device, this can be a GX device (ESS) or a VE.Smart Network link via Bluetooth

| Fault mode | Bulk LED | Absorption LED | Float LED |
|---|---|---|---|
| Charger temperature too high | Off | Off | Blinking |
| Charger over-current | Blinking | Off | Blinking |
| Charger or panel over-voltage | Off | Blinking | Blinking |
| VE.Smart networking or BMS issue | Off | Blinking | Off |
| Internal error, calibration issue, settings data lost or current sensor issue. | Blinking | Blinking | Off |

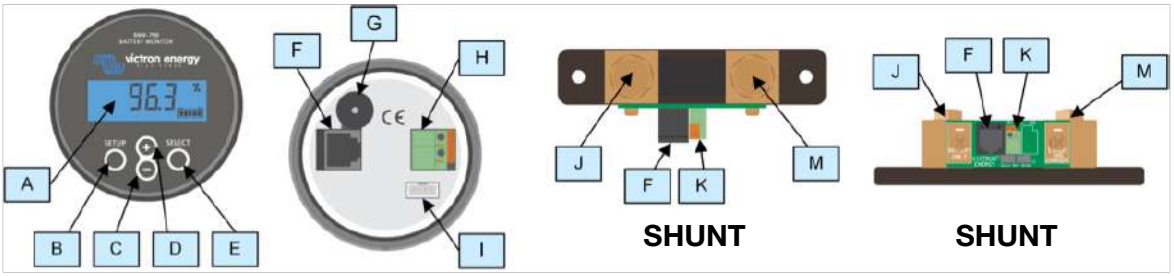
# 4. MACHINE PARTS

## 4.5 Battery Monitor

The Battery monitor is located on the operator panel (Ref item 33 on pg. 6). This display shows all the details of the battery pack, like voltage, discharging current, charging current, remaining charge in hrs, etc. It is connected to a shunt (Ref item 44 on pg. 6) which is in series with the battery -ve cable.

### 4.5.1 Battery monitor details

The solar charger used is a MPPT solar charger Victron SmartSolar MPPT 150-45.
This section gives the basic details for the solar charger.
For detailed information, please refer to the Victron manual.




| # | Name | Terminal type |
|---|---|---|
| A | Display | - |
| B | Setup button | - |
| C | Down button | - |
| D | Up button | - |
| E | Select button | - |
| F | RJ12 connector | RJ2 terminal |
| G | Buzzer | - |
| H | Programmable relay connector | Push connector |
| I | VE.Direct connector | VE.Direct terminal |
| J | Negative battery connection | M10 bolt |
| K | Positive battery connection | Push connector |
| M | Negative load connection | M10 bolt |

### 4.5.2 Battery monitor button details

Here are the details for the four buttons on the front to the unit:

| Button | Function when in normal mode | Function when in setup mode |
|---|---|---|
| SETUP | Press and hold for two seconds to switch to setup mode. The display will scroll the number and description of the selected parameter. | Press SETUP any time to return to the scrolling text, and press again to return to normal mode. When pressing SETUP while a parameter is out of range, the display blinks five times, and the nearest valid value is displayed. |
| SELECT | Press to switch to the history menu. Press to stop scrolling and show the value. Press again to switch back to normal mode. | • Press to stop scrolling after entering the setup mode with the SETUP button.<br>• After editing the last digit, press to end editing. The value is stored automatically. A short beep indicates confirmation.<br>• If required, press again to restart editing. |
| SETUP and SELECT simultaneously | Press and hold both SETUP and SELECT buttons simultaneously for three seconds to restore factory settings | n/a |
| + | Move upwards. | When not editing, press to move up to the previous parameter.<br>When editing, this button will increment the value of the selected digit. |
| - | Move downwards. | When not editing, press to move down to the next parameter.<br>When editing, this button will decrement the value of the selected digit. |
| + and - simultaneously | Press and hold both buttons simultaneously for three seconds to manually synchronise the BMV. | n/a |

### 4.5.3 Battery displays

Here are the various displays that are shown when the +/- buttons are pressed on the monitor:


(1) Battery Amp-hours used by the system


(2) Current used by the system (-ve number indicates discharge current and +ve number indicates charging current)


(3) Power consumed by the load (-ve number indicates discharge power and +ve number indicates charging power)


(4) Current state of charge of the battery


(5) Time to go is the hours left based on the current state of charge of the battery and load on the battery. This will change as the load is increased or decreased.

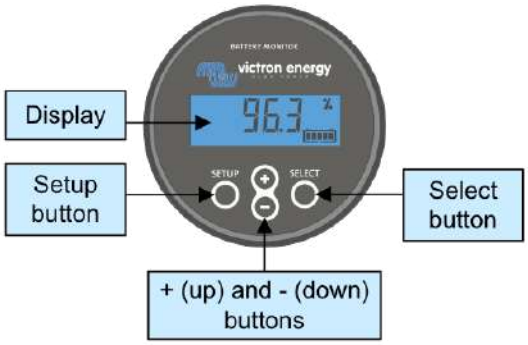

(6) Total kWh charged from start.


(7) Total kWh discharged from start


(8) Battery pack voltage.

### 4.5.4 Adjusting parameters using the front display

Use the display buttons to enter and navigate through the settings menu. Each setting has a number and a name. For example: "01 - Battery capacity". The full list of all battery settings and their corresponding number can be found in the "All features and settings [23] chapter" in the main Victron manual. This section will give the procedure to set the key settings required to operate the machine.




*BMV head unit display and buttons.*

To access the settings menu and change settings:

| | | |
|---|---|---|
| 1 | Start in the main menu. |   |
| 2 | Press SETUP for two seconds to enter the settings menu. |   |
| 3 | The first setting item 01-Battery capacity will be shown. |   |
| 4 | Use the + and – buttons to go to the desired setting item. |  |
| 5 | Press SELECT to access the setting item. |   |
| 6 | Use SELECT and the + and – buttons to customize the setting. |   |
| 7 | Press SETUP to return to the setting menu. |   |
| 8 | Go to the next setting using the + or - buttons. |  |
| 9 | After all settings have been made, press SETUP to return from the settings menu to normal mode. |   |

### 4.5.5 Battery monitor (BMV) essential parameters (Access and adjusting)

Most settings / parameters on the BMV are ok for most applications. However if there are changes to the batteries type or qty and / or the batteries are replaced, it becomes necessary to make the following adjustments to these 3 key parameters :

1. Battery Capacity

To set the battery capacity (Total battery C20 Ah value) use process explained in section 4.5.3. to access the battery capacity setting **Setup menu > Setting 01 - Battery capacity**. Update the setting value and save.

Please note following for calculating the total Ah value for the battery pack:

A. For batteries in parallel: Add the Battery C20 Ah values (Eg. 2 batteries of 150Ah connected in parallel will have a total Ah value of 300Ah)
B. For batteries in series: Use a single Battery C20 Ah value (Eg. 2 batteries of 150Ah connected in series will have a total Ah value of 150Ah)

2. Charged voltage

To set the charged voltage use process explained in section 4.5.3. to access the charged voltage setting **Setup menu > Setting 02 - Charged voltage**. Update the setting value and save.

Use the following table to determine the charged voltage for the battery pack voltage (please note the current battery pack nominal voltage is set to 24V. **DO NOT CHANGE OR USE A DIFFERENT VOLTAGE. IT WILL CAUSE DAMAGE TO THE MACHINE**. Please consult your dealer if a different voltage is required):

These are the recommended "Charged voltage" values for lead acid batteries:

| Nominal battery voltage | Recommended charged voltage setting |
|---|---|
| 12V | 13.2V |
| 24V | 26.4V |
| 36V | 39.6V |
| 48V | 52.8V |

Please note following for calculating the total nominal Ah value for the battery pack:

A. For batteries in parallel: Use a single battery voltage value (Eg. 2 batteries of 12V connected in parallel will have a total nominal voltage value of 12V)
B. For batteries in series: Add the battery voltages (Eg. 2 batteries of 12V connected in series will have a total nominal voltage value of 24V)

3. State of charge (or start Synchronisation)

For a reliable readout, the state of charge, as displayed by the battery monitor, must self-synchronise regularly with the true state of charge of the battery. This is to prevent drift of the "State of charge" value over time. A synchronisation will reset the state of charge of the battery to 100%. If the battery monitor does not perform a regular synchronisation, the state of charge

value will start to drift over time. This is due to the small inaccuracies of the battery monitor. Once a battery has been fully charged, and the charger has gone to the float stage, the battery is full and the battery monitor will automatically synchronise by setting the state of charge value to 100%. Sometimes it is required to manually synchronise the battery pack voltage whenever the battery supply to the BMV is interrupted or the battery wires are disconnected from the battery pack. A manual synchronisation can also be needed when the battery has not been fully charged, or if the battery monitor has not detected that the battery has been fully charged because the charged voltage, current or time has been set incorrectly. In this case, review the settings and make sure the battery regularly receives a full charge.
There are 2 ways to perform the synchronisation:

A. Use process explained in section 4.5.3. to access the Start synchronised setting **Setup menu > Setting 70 - Start synchronised**. Select ON and save.
B. The battery monitor can be synchronised when in normal operating mode by simultaneously pressing and holding the + and – buttons for 3 seconds.

***Please review the Victron BMV manual for more details on this process. If the manual is missing, contact your dealer or download the latest version from the Victron website: https://www.victronenergy.com/support-and-downloads/manuals***
***Select the BMV model used on your machine using the dropdown menu.***

### 4.5.6 Accessing historical data on BMV unit

To view the battery monitor history menu press SELECT when in normal mode:

- Press + or – to browse the various parameters.
- Press + or – to browse the various values.
- Press Select again to stop scrolling and show the value.
- Press SELECT again to leave the historical menu and to go back to the normal operation mode.

Use the table shown below to see all the different historical parameters:

| # | Display | Discription |
|---|---|---|
| A | A dEEPESt dI SCHAr9E | Deepest discharge |
| B | b LASt dI SCHAr9E | Last discharge |
| C | C AvErA9E dI SCHAr9E | Average discharge |
| D | d CYCLES | Cycles |
| E | E dI SCHAr9ES | Discharges |
| F | F CUMULAtIvE AH | Cumulative Ah |
| G | 9 LOWESt vOLtA9E | Lowest voltage |
| H | H HIGHESt vOLtA9E | Highest voltage |
| I | I dAYS SInCE LASt CHAr9E | Days since last full charge |
| J | J SYnCHrOnISAtIOnS | Synchronisations |
| L | L LO! VOLtA9E ALArMS | Low voltage alarms |
| M | M HI 9H VOLtA9E ALArMS | High voltage alarms |
| R | r dI SCHAr9Ed EnEr9Y | Discharged energy |
| S | S CHAr9Ed EnEr9Y | Charged energy |

# 4. MACHINE PARTS

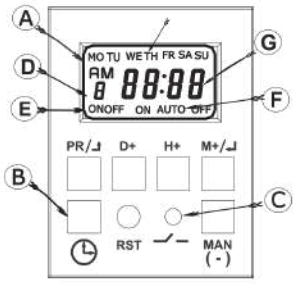
## 4.6 Weekly Timer

The Weekly timer module is located on the operator panel (Ref item 36 on pg. 6). This timer can be used to set the start and stop times for the LEDs on the mast of the machine or any other load that is connected to the machine. This can be used in conjunction with the light sensor (D2D sensor). Please note, when using both the timer and the light sensor (D2D sensor) for operating the lights, the unit (timer or D2D) that activates later for the start operation in the evening will take precedence. Similarly the unit that activates earlier for the stop operation in the morning will take precedence. So if an accurate start and stop time is required for the machine operation, please deactivate the D2D sensor (by turning the D2D switch on the panel to '0') and cover/deactivate the light sensors located on each LED unit.

If the timer is not required for the operation and is to be bypassed, then press the 'MAN' key on the timer front to put the timer into manual override mode. Press the 'MAN' key 4 times until the following 'ON ON' is displayed on the screen as shown in the figure to the right.


### 4.6.1 Weekly time details

The timer used is a GIC DC timer.
This section gives the basic details for the timer used and its basic setup and operation.
For detailed information, please refer to the GIC manual.




A - LCD
B - Keypad
C - Relay 'ON / OFF' LED Indication.
D - ProgramNumber
E - RelayStatus
F - Mode
G - HR : MIN
H - Day

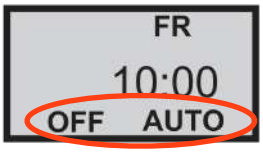
| KEY FUNCTIONS: | |
|---|---|
| PR /↵ | Program key to view & edit programs & As ESC Key |
| D+ | Day selection & Also as an Date/DST Increment key |
| H+ | HourIncrement & Also as an Date/DST Decrement key |
| M+/↵ | For Crono: To increment Minute<br>For Pulse : To set Pulse duration<br>Also as an ENTER key |
| (H+)+(M+) | To enter in DATE / DST mode |
| RST | Reset programs & settings in the device. |
| MAN (-) | Manualkeyforoverriding.<br>Also to decrement D/H/M in program mode |
| ⏲ | Clock Key, to set the clock |
| CLK + MAN | To set 12/ 24h clock mode |
| CLK + PR | To Lock / Un-lock keypad |

### 4.6.2 Setting the Timer clock and date

Follow procedure below to set the time and date

| | |
|---|---|
| ⏲ + MAN | Press clock key⏲ & MAN key simultaneously to toggle between 12/24 hour clock mode.<br>**AM/PM** |
| ⏲ + D+ | Keep the Clock key⏲ pressed & then press the D+ key to set day.<br>**MO/ TU/ WE/ TH/ FR/ SA/ SU** |
| ⏲ + H+ | Keep the Clock key⏲ pressed, then press the H+ key to set hour.<br>**00-23** - in 24 Hour Mode<br>**01-12** - in12 Hour Mode |
| ⏲ + M+ | Keep the clock key⏲ pressed, then press M+ key to set min.<br>**00- 59** |

### 4.6.3 Programming the timer




To use the timer as a means to start and stop the light tower, it is necessary to first put the timer into the AUTO mode. This is done by pressing the 'MAN' button until it displays 'OFF AUTO' on the screen as shown on the right.
Then use the following steps to create a program to start and stop the machine:

Screen 1


After power ON, screen 1 will be displayed

Screen 2


Set the current time(e.g.10:00), Day(e.g. Friday) & Relay mode(e.g. AUTO) as per CLOCK setting & mode function
**PR ->** Press PR to enter in ON time program.

Screen 3

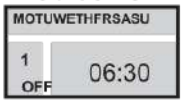

Press D+ stepwise for day selection as given below.
Mon to Sun is default setting so no need to press any key

1) **MO TU WE TH FR SA SU** (All week days)
2) **MO TU WE TH FR SA** (Exclude Sunday)
3) **MO TU WE TH FR** (ExcludeWeek-ends)
4) **MO TU WE TH SU** (Exclude Friday & Saturday)
5) **SA SU**
6) **FR SA** (OnlyWeekends)
7) **TU WE TH FR SA SU** (Excludeanysingleday)
8) **MO/TU/WE/TH/FR/SA/SU** (IncludeSingleday)
9) **MO WE FR**
10) **TU TH SA** (ExcludeAlternateday)

Screen 4


Press H+ to edit & increment the hour as & if needed, use MAN (-) key to decrement hours. Set the time to 18:00.
**PR ->** Press PR to switch in OFF time program.

Screen 5




Press H+ continuous to set the hour as 18:00. Use MAN (-) key to decrement hours

To save and exit the program, press the key.

# 5. SETUP OF MACHINE

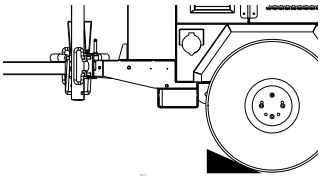
## 5.1 Setup of machine for operation

**1**

**WARNINGS**

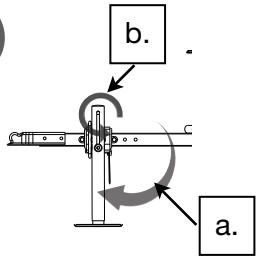
- ⚠ Machine parked on level surface
- ⚠ No overhead obstructions or trees or anything that creates shadows on the panels
- ⚠ Machine is parked on firm surface and not loose mud
- ⚠ Machine is not parked in standing water
- ⚠ There is clear space of 10 feet around the machine

**2**



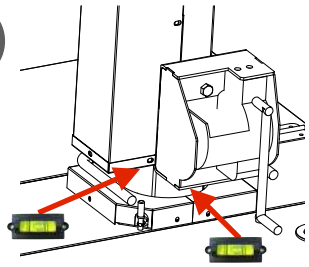
a. Chock the wheels / pull handbrake if present.
b. Disconnect the chains and tow plug.
c. Release the ball hitch coupler lock / remove the tow pin.

**3**



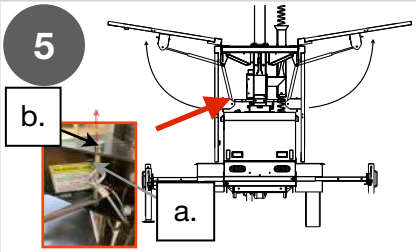

a. Rotate the drawbar/tongue jack down.
b. Extend jack by turning the handle CCW.
c. Once the tow hitch coupler is clear of the tow vehicle tow, move the vehicle away from the tower.

**4**



a. Pull out all the remaining jacks on the outriggers to the operational position.
b. Use the bubble levels on the mast to ensure that the mast is level.
c. It is also important to visually check the mast to ensure that it is not inclined.

**5**




a. Pull out the locking pin below.
b. Pull out in an upward direction the solar panel holding pin.
c. Open each solar panel gently.

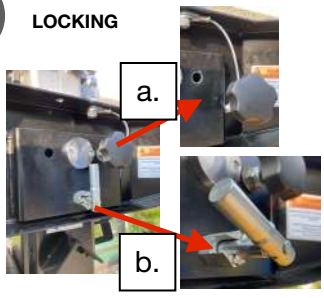
⚠ *Make sure to clean the solar panels properly with a soft duster. Dirt or water streaks can affect the panel performance*

**6**

a. Open hood and check all battery connections.
b. Make sure there are no leaking batteries or frayed / burnt wires.

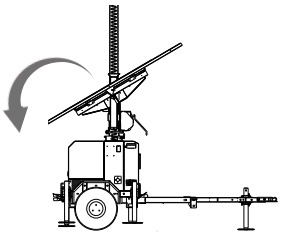
**7**

**SOLAR PANEL UNLOCKING / LOCKING**



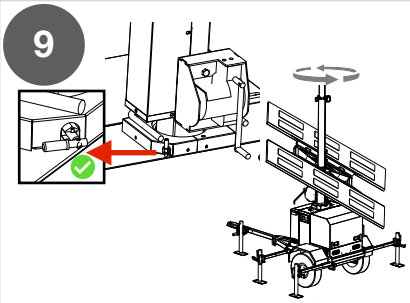

a. Loosen the locking bolt and remove.
b. Pull the lever out and rotate LH or RH such that the pin stays retracted.
c. To lock follow process in reverse

**8**



a. Unlock the solar panels as shown in Sec. 5.1, block #7.
b. Tilt panels carefully using tilt handles to have panels tilt towards hood side.
c. Lock the panels at the 2nd tilt position. Make sure the locking bolt is properly fastened.

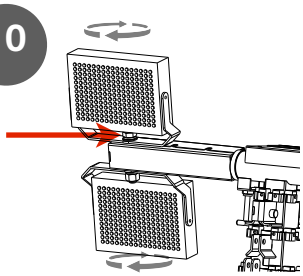
**9**



a. Unlock the rotation locking pin and rotate the mast to face the solar panels towards the south (if located in the northern hemisphere).
b. Engage the mast rotation lock.

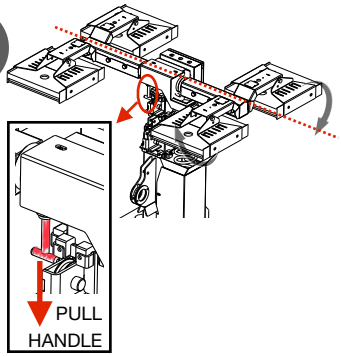
# 5.1 Setup of machine for operation

**10**



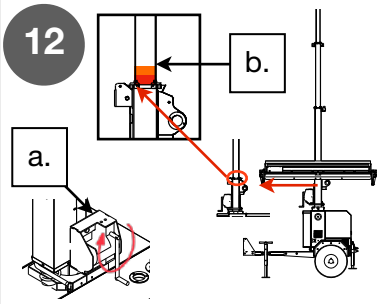
a. Loosen the center bolt.
b. This will allow both the top and bottom LED lamp to be rotated in either direction as shown by the arrows.
c. Tighten the bolt after adjustment.

**11**




a. There are 3 positions for the cross light arm; (1) Face Down, (2) 45 deg, (3) 70 deg
b. To set, pull tilt handle and tilt arm to desired position

**12**




a. To raise the tower to the desired height, turn the winch handle clockwise.
b. The max height is reached when the orange/red sticker is visible on the mast.

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# 5. SETUP OF MACHINE

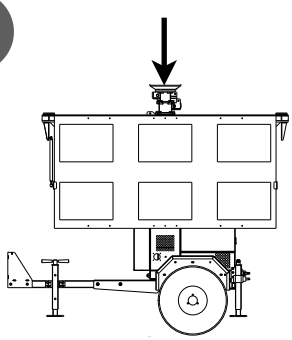
## 5.2 Towing the machine (Hitching)

**1**

**WARNINGS**

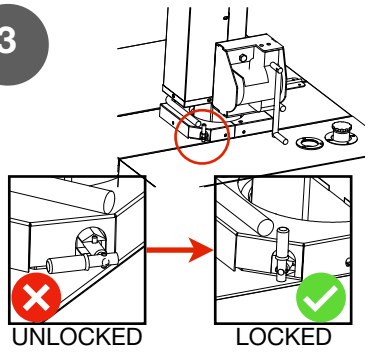
- ⚠ Machine parked on level surface
- ⚠ Wheels are chocked
- ⚠ Machine is parked on firm surface and not loose mud
- ⚠ Machine is not parked in standing water
- ⚠ There is clear space for the tow vehicle to approach and couple with the machine

**2**



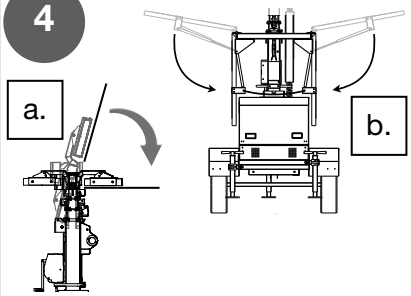
a. Using the winch, make sure the mast is completely retracted

**3**



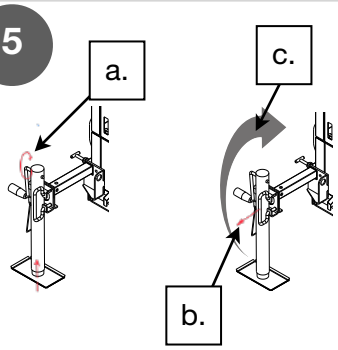

a. Make sure the mast rotation lock is in the locked position and the mast is secure.

**4**



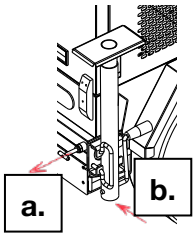

a. Tilt light arm to travel position by pulling the arm tilt pin
b. Carefully close the solar panels and put the solar panel locking pin on both sides of the panel.

**5**



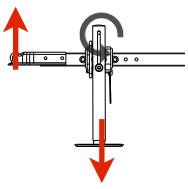

a. Rotate handle retract the jacks
b. Pull handle
c. Rotate jacks into travel position

**6**



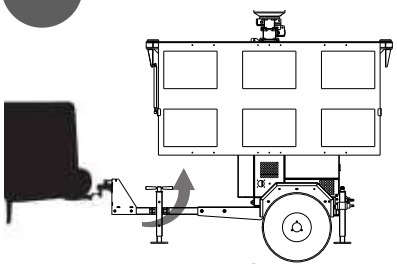

a. Pull spring handle
b. Push jack & outrigger into machine
c. Do same for all jacks/outriggers

**7**



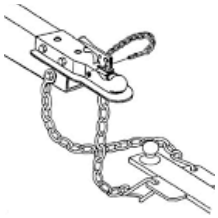
a. Raise coupler to allow tow vehicle to be positioned underneath.
b. Apply thin film of grease on coupler.
c. Lower jack to couple.

**8**



a. After coupling, retract and rotate the drawbar jack by 90 deg.

**9**



a. Unchock the wheels.
b. Plug the trailer plug (if available).
c. Connect the safety chains (if available). Ensure that it is crossed over when connecting to the tow vehicle.

# 5. SETUP OF MACHINE

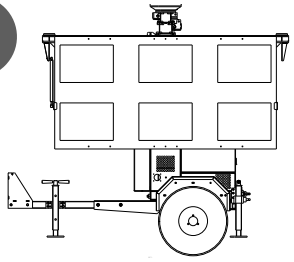
## 5.3 Lifting the machine using central lifting eye

**1**

**WARNINGS**

- ⚠ Lifting crane should be on a firm surface
- ⚠ Atleast 1 stabiliser jack should be oriented with the plate facing the ground.
- ⚠ Lifting eye should face the rear direction of the machine (hood side)
- ⚠ Always check the tackles and hooks for load rating

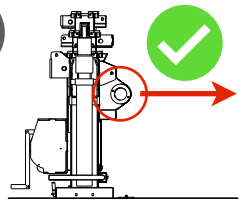
**2**



a. Get machine into position shown above.
b. Follow blocks #2 - #6 in section 5.2 to setup the machine.

⚠ **MAKE SURE THE SOLAR PANELS ARE LOCKED IN THE TRAVEL POSITION.**

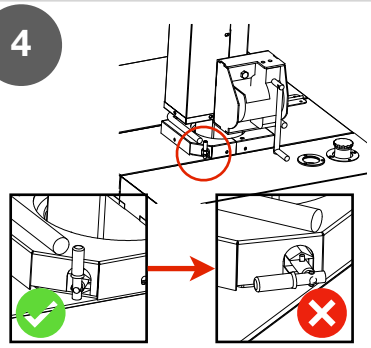
**3**



a. Make sure that the central lifting eye is facing the rear direction (hood side).

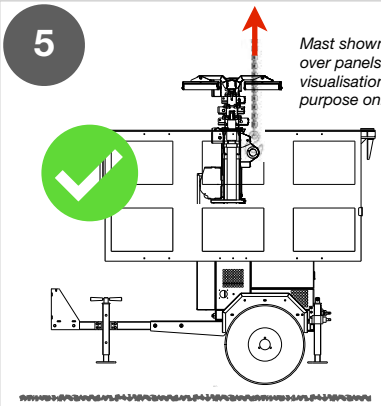
⚠ **DO NOT LIFT THE MACHINE WITH THE EYE FACING IN ANY OTHER DIRECTION**

**4**



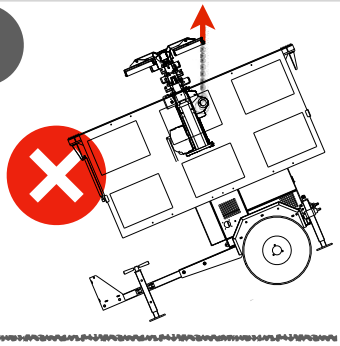

a. Ensure the mast rotation locking pin is locked before lifting. Keep in locked position.

**5**




a. Connect the lifting equipment to the lifting eye using shackles, chain etc.

**6**



a. Lift the machine a little bit off the ground and check for stability.
b. DO NOT lift if the machine is tilting excessively in one direction.

**7**

a. Continue to lift the machine and position in location desired.
b. Make sure that the final resting position is level and can take the weight of the machine.

**8**

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# 5. SETUP OF MACHINE

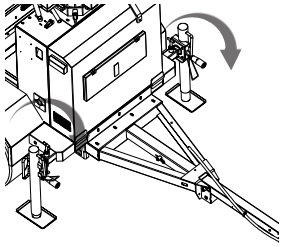
## 5.4 Folding the towbar (where available)

**1**

**CAUTION**

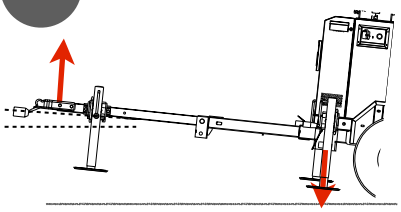
- ⚠ DO NOT operate the machine with the drawbar folded UP.
- ⚠ DO NOT store the machine with the mast extended and the drawbar folded
- ⚠ DO NOT attempt folding drawbar with the mast extended
- ⚠ Always ensure that the side jacks are supporting the machine when folding the drawbar

**2**



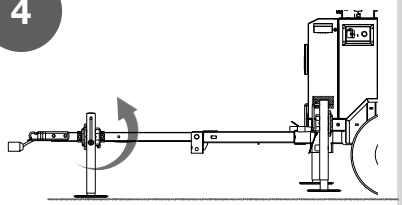
a. Rotate the 2 jacks at the front to the operation position

**3**



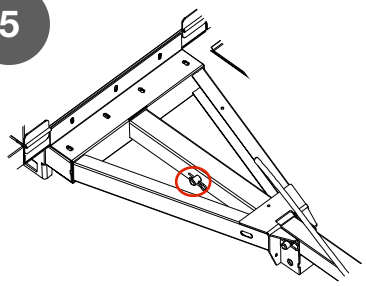
a. Extend the front jacks to lift the draw bar above the horizontal in effect tilting the machine and raising the draw bar up.

**4**



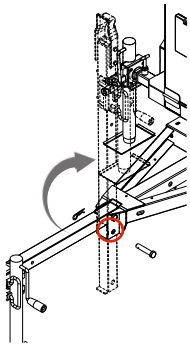
a. Rotate the jack on the drawbar to the stow position

**5**



a. Pull out the R pin and pull out locking pin circled

**6**



a. Carefully tilt the towbar to a vertical position.
b. Insert the locking pin removed into the hole shown circled. Insert R pin to constrain pin in place.

**7**

a. Retract the two jacks until the machine is resting on the tow bar bottom.
b. Rotate and position the jacks in the stow position.

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# 5. SETUP OF MACHINE

## 5.5 Hydraulic mast setup for use (where available)

**1**

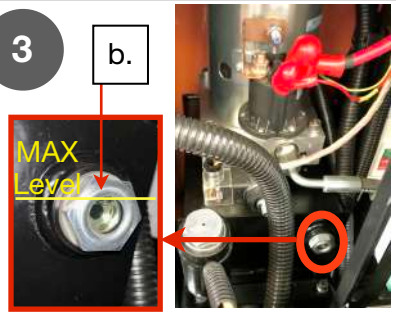
**CAUTION**

- ⚠ Wheels are to be Chocked
- ⚠ Machine stable on level ground
- ⚠ DO NOT check oil level unless mast is fully retracted.
- ⚠ DO NOT fill oil level unless mast is fully retracted. Oil filled when the mast is not retracted will leak out from the unit

**2**

a. Open the hood and locate the hydraulic mast motor MCB / breaker / fuse.
b. Turn ON the breaker / MCB. No action required if fuse is present.

**3**



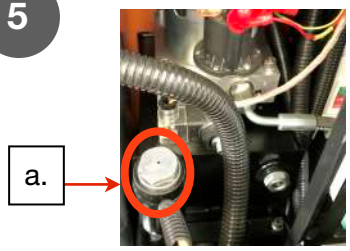

a. Check the oil level in the hydraulic tank by using the view port located on the tank.
b. With the mast fully retracted, the oil level should just fully cover the view port.

**4**

a. Once filled the hydraulic oil rarely needs to be topped up unless there is a leak.
b. However, if the oil level drops follow the next steps to top up.

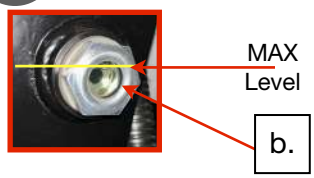
- ⚠ DO NOT fill oil level unless mast is fully retracted.
- ⚠ DO NOT WORK on the unit when it is pressurised

**5**




a. To fill oil, open the oil filler plug using a wrench.
b. Insert a funnel into the tube
c. Pour mineral hydraulic oil into the funnel. Refer to section **9.2.2** for correct grade of oil.

**6**




a. Check the view port for oil level.
b. When the port is just filled with oil, stop filling and fit the oil filler plug back.
c. Wipe down the tank and any oil that may have fallen around.

**7**

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# 5. SETUP OF MACHINE

## 5.6 Raising and lowering hydraulic mast (where available)

**1**

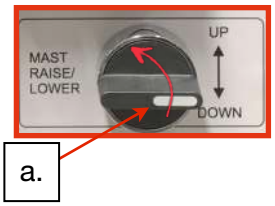
**PROCESS TO RAISE THE HYDRAULIC MAST**

**2**

a. Startup the machine using process 6.1.
b. Follow process 5.5, steps 1 to 3 to setup the hydraulic mast for operation.

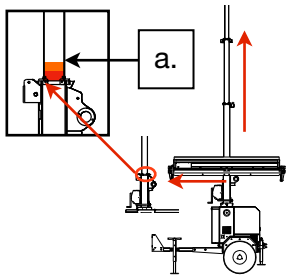
⚠ The machine needs to be ON to be able to raise the hydraulic mast.

**3**




a. To raise the mast turn the switch to the 'UP' direction.
b. The mast will start to telescope up.

**4**

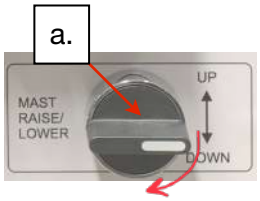



a. Max tower height is reached when the orange and red sticker comes into view on the tube.
b. Depending on the ambient temperature and oil used, it will take around 20 sec to reach full height.

**5**

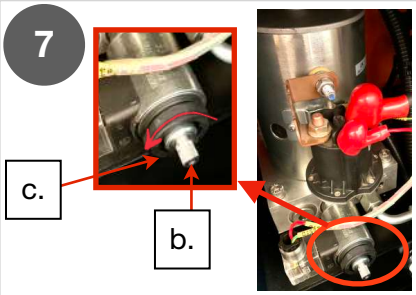
**PROCESS TO LOWER THE HYDRAULIC MAST**

**6**




a. To lower the mast, turn the switch on the panel to the 'DOWN' direction.
b. The mast will lower until it retracts fully.

**7**




a. To manually lower the mast, use the safety override valve.
b. Loosen the knob using an Allen key.
c. Turn the knob CCW until the mast starts to lower. Tighten after the mast is fully retracted.

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# 6. OPERATION OF MACHINE

## 6.1 Turning on the machine and the lights

**1**

**WARNINGS**

- ⚠ Machine parked on level surface
- ⚠ No overhead obstructions or trees or anything that creates shadows on the panels
- ⚠ Machine is parked on firm surface and not loose mud
- ⚠ Machine is not parked in standing water
- ⚠ There is clear space of 10 feet around the machine

**2**


a. Release the E-Stop and turn ON the battery isolator (if provided).
b. The battery isolator can either be located next to the E stop or inside the canopy.

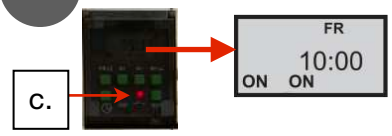
**3**


a. Open the operator panel cover.
b. Turn ON the breakers in the order of battery, solar and grid.
c. This should power up the battery monitor and the inverter.
d. Check the battery voltage to ensure that it is above 22V.
e. Also check for any alarms/errors.

**4**

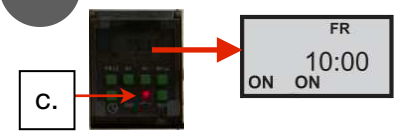
a. There are 4 ways to operate the LEDs on the solar tower:
   A. Without timer + D2D sensor
   B. With only D2D sensor
   C. With only timer
   D. With both timer + D2D sensor

**5** **A. Without timer + D2D**



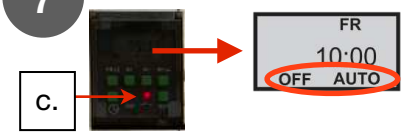

a. Switch the D2D selector to '0'.
b. Cover the light sensors on each LED with an opaque tape.
c. Press the 'MAN' button on the timer until the display shows the above screen. The red light will be on.
d. Turn on the LED breaker.
e. Turn the 'Dimmer' switch to set the desired brightness.

**6** **B. With only D2D sensor**




a. Switch the D2D selector to '1'.
b. Make sure LED light sensors are open.
c. Set the timer in override mode. (See block#5, (c) for details)
d. Turn on the LED breaker.
e. Turn the 'Dimmer' switch to set the desired brightness.
f. Note the lights will come on only when the ambient light grows dim.

**7** **C. With only timer**




a. Switch the D2D selector to '0'.
b. Make sure LED light sensors are closed with opaque tape.
c. Set the timer per section 4.6.3. Screen should show 'OFF AUTO'.
d. Turn on the LED breaker.
e. Turn the 'Dimmer' switch to set the desired brightness.
f. Note the lights will come on and switch off only when the start and stop times on the timer are active.

**8** **D. With both timer + D2D**

a. Switch the D2D selector to '1'.
b. Make sure LED light sensors are open.
c. Set the timer per section 4.6.3. Screen should show 'OFF AUTO'.
d. Turn on the LED breaker.
e. Turn the 'Dimmer' switch to set the desired brightness.
f. Note the lights will come on only when the start time on the timer is active and it is dusk time.
g. The LEDs will switch off only when the stop time and it is dawn time.

**9** **USING GRID POWER**

⚠ ***USE SINGLE PHASE 120VAC SUPPLY ONLY***


a. Locate the charge port (socket) located on the side of the machine.
b. Turn OFF supply side and then plug a female NEMA 5-15R plug into socket.
c. Turn ON power to the machine.
d. The charger status light on the inverter will turn on.

# 6. OPERATION OF MACHINE

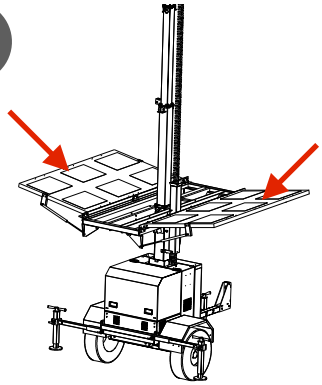
## 6.2 Key checkpoints for operation

**1**

**WARNINGS**

⚠ Batteries are dangerous. Use care when working with batteries. Always work in open spaces.
⚠ DO NOT dispose the batteries on the ground.
⚠ Always turn off the battery isolator when working on the batteries.

**2**



a. Solar panels are open and clean

**3**


a. Battery isolator is turned on and E-stop released

**4**

a. Battery voltage is > 22V during charging. If less than 24V then it would be necessary to charge the batteries using grid power.

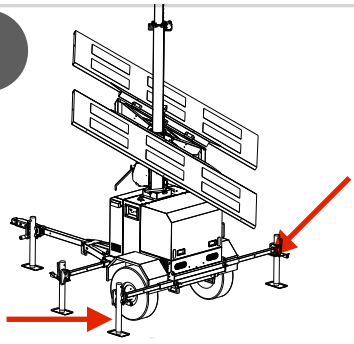
**5**


a. Inverter is working properly and is producing output.

**6**

a. Batteries terminals are not corroded or showing any excessive build up of white corrosion.

**7**



a. Jacks are properly deployed and extended out

**8**

a. The canopy hood and the operator window are properly closed and locked during operation.

**9**

**INTENTIONALLY LEFT BLANK**

# 7. DERATING INFORMATION

## 7.1 Derating information for solar panels

The solar panels are rated at the following conditions:

1. Irradiance (sunlight) = 1000 W/m2 of full solar noon sunshine
2. Sea level
3. Air temperature = 298K or 25 deg C or 77 deg F
4. Air mass = 1.5

There will be a change to the output power when the solar panels are operated in a condition that is different from the standard conditions. Please use the below approximations to calculate the effective power from the panels

**EFFECT OF HEAT ON SOLAR PANEL OUTPUT POWER**

The temperature of the cells of the panel give the best power when maintained between 15 deg C and 25 deg C. However for temperatures beyond 25 Deg C, one can expect a loss of 0.4% per Deg C

**EFFECT OF DUST ON SOLAR PANEL OUTPUT POWER**

Dust accumulation plays a big role in reduction of the output of the solar panel. It is necessary to keep the panels clean for the best power output. A fully dirty panel can see a drop off of almost 30%.

Cleaning of the solar panel can be done using fresh cool water and a soft brush that is used while pouring the water. It is essential NOT to brush the dust off using a hard brush or a cloth as that might cause multiple scratches on the surfaces causing a drop off in cell efficiency.

# 8. GENERAL MAINTENANCE

## 8.1 Overall machine maintenance

### 8.1.1 Checklist to prep for machine maintenance

- ☑ Machine is on level ground and has its wheels chocked
- ☑ All external power supply wires have been disconnected from the machine
- ☑ Any wires from the power outlets are disconnected
- ☑ Emergency Stop button is activated and locked/tagged.
- ☑ Battery Isolator switch or MCB is in the OFF position
- ☑ All MCBs are in the OFF position
- ☑ If there is any welding work or major electrical work being done on the machine, disconnect the battery negative wire from the battery.

## WARNINGS

⚠ Do not perform any maintenance on the machine when the machine is operational.

⚠ Do not work on electrical components when standing in water or in rainy conditions.

### 8.1.2 Maintenance schedule for proper machine use

| ACTION | DAILY / BEFORE USE | MONTHLY | EVERY 6 MONTHS |
|---|---|---|---|
| Check mast for damage | X | | |
| Check wire ropes for fraying | X | | |
| Check winch drum to make sure wire is properly wound | X | | |
| Check lamp connections for damage or disconnection | X | | |
| Check electrical connections inside the machine | X | | |
| Clean solar panels | X | | |
| Check battery condition. Replace if not charging | | | X |
| Clean battery terminals | | X | |
| Clean inside of canopy | | X | |
| Clean outside of machine | | X | |

# 8. GENERAL MAINTENANCE

### 8.2.2 Hydraulic mast oil details (where available)

| | |
|---|---|
| **OIL TANK CAPACITY** | 1.2 gal (4.8 liters) |
| **OIL GRADE (> -10 deg C)** | Mineral oil grade 46 |
| **OIL GRADE (< -10 deg C)** | Mineral oil grade 32 |

* DO NOT mix different grades of oil. Always completely drain all oil before replacing oil with a different grade.

⚠ DO NOT spill used oil on the ground when draining oil from the oil sump. Always collect the used oil in a container and dispose according to local laws and regulations.

# 9. TROUBLESHOOTING

This section addresses the common problems that arise when using this light tower. The troubleshooting guide is meant to be a first level analysis and guide to resolving basic issues that prevent a trouble free operation of the machine. For any detailed or major issues that are not listed in this guide, it is recommended that the nearest service center or dealer is contacted.

⚠ Risk of burns when working on LEDs or light fixtures when they are operational.
⚠ Risk of electrocution when the machine is operational and electrical covers are open. Always ensure that the machine is properly grounded when diagnosing the electric issues.
⚠ Numerous pinch points in the mast and winch can cause severe injury to fingers. Always use gloves.

## 9.1 Overall machine troubleshooting

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| LED (or load) will not turn ON when MCB turned on | MCB is faulty | Replace MCB |
| | Voltage is not correct | Using a multimeter check voltage of battery pack and output voltage of inverter. |
| | LED driver is faulty | Contact service center to replace faulty LED driver |
| | LED module is faulty | Replace faulty LED module |
| | LED connector / connection in junction box at top of mast is loose | Re-connect the LED connector or replace connector if faulty |
| | LED wiring is faulty | Contact service center for help to trace fault in LED wiring |
| | Spiral cable is damaged internally | Replace Spiral cable |
| | Inverter is not powered ON | Check power input to the inverter from the battery pack. Also make sure that the output AC voltage is available.<br>Check to ensure that either the ambient light is below the threshold of the D2D sensor (if the D2D switch is on '1').<br>Or check the wiring of the D2D switch (if switched to '0') to ensure that the switch is working |
| | LED light sensor is active | 1. Wait for ambient light to reduce<br>2. Put a opaque tape on top of the sensor<br>3. Switch the DIP switches on LED to bypass the light sensor |
| | D2D sensor is active | 1. Wait for ambient light to reduce<br>2. Check the wiring of the sensor<br>3. Switch the D2D sensor to '0' |

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| | Timer not in manual/override mode | Press the 'MAN' button until the display shows 'ON ON' and the red light comes on. |
| | LED dimmer knob is turned down fully | Turn UP the dimmer knob to increase brightness |
| LED does not switch ON / OFF with Dusk to dawn sensor at dusk / dawn (Where available) | Dawn to Dusk (D2D) sensor not active | Follow process in section 7.4 to set the D2D sensor cover |
| | D2D sensor not working | Contact Service center or dealer for front shield |
| | LED light sensors not working / covered. | Move the machine to a new location or block stray light from activating the sensor |
| | Timer not active | Press the AUTO button. |
| | Timer faulty | Contact service center for help in tracing the fault in the D2D sensor wiring |
| | LED Breakers are OFF | Replace the D2D sensor |
| Inverter does not turn on when the battery pack MCB is switched on or when the grid power is connected | MCB is faulty | Replace MCB |
| | Battery wiring to inverter loose or faulty | Check wiring |
| | Inverter faulty | Replace inverter / send inverter to service center for repair |
| | D2D sensor switch (where available) activated and there is a lot of ambient light | Switch off the D2D sensor or wait until it is dark to operate the tower. |
| Solar wattage recorded by inverter is low on a sunny day | Solar panels are dirty | Clean panels by first dusting off any dust and then using fresh water to wash the panels |
| | Solar panels are tilted or angled away from the sun | Tilt the panels to face south |
| | There is a shadow falling on the panels | Turn the mast so that there is no or little shadow on the panels.<br>Else move the machine to a location where there is no shadows on the panels |
| | Temperature of panels are high | Pour fresh cool water on the panels to cool the panels down. |
| | Solar panel breaker is switched OFF | |
| Battery monitor not coming on | Connection to battery monitor has come loose | Check connections to BMV and at the shunt |
| | Fuse on B+ cable is blown | Open fuse casing and replace fuse |
| | Battery pack is completely dead | Either charge the batteries from an outside deep charger or replace batteries |

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| Battery monitor current readings sign is inverted | Battery -ve cable connection to shunt are inverted | Follow the instructions on the shunt to connect the wire to load and from battery correctly. |
| Battery monitor shows current reading with no actual current flow | Drifting or incorrect zero current setting | Do a zero current calibration. Follow the official Victron manual to do above calibration. |
| | Noise or other stray offsets | Set the current threshold value to a small value above the noise value.<br>Follow the official Victron manual. |
| Incorrect state of charge displayed or is not available on the display | Battery capacity setting is not correct | Use manual to set the battery capacity setting to the actual battery capacity installed |
| | Peukert exponent is not correct | Use the formula to set the Peukert exponent (for the factory set machines, it should be 1.13) |
| | Charge efficiency factor if not correct | Adjust charge efficiency factor on the BMV. |
| | Automatic synchronisation is not happening | First perform a manual sync after getting the batteries fully charged from the grid source.<br>Then check to make sure that the settings shown below are set to the current values.<br>1. Charged voltage<br>2. Tail current<br>3. Charged detection time |
| State of charge does not reach 100% | Battery has not been charged fully or the charging / discharging setup does not allow the battery to reach full charge | Switch off all LEDs (or loads) on the machine. Plug into outside grid source and charge the battery fully.<br>Manually sync the charge to 100% |
| | Settings of the charged voltage, tail current and charged detection time is not correct | If the battery is fully charged, then check and adjust the 3 settings to the values recorded at fully charge. |
| State of charge always shows 100% | Battery cable connection is wrong | Check and rewire the cable connection as per the shunt labels |
| State of charge increases very slowly or very fast when charging | Battery capacity value is not correct | Follow procedure in manual to change the battery capacity value. |
| | | |

## 9.2 Inverter/Charger troubleshooting

| Problem | Cause | Solution |
|---|---|---|
| No output voltage on AC-out-2. | Operating in inverter mode | Connect the inverter/charger to an AC source, and after a 2-minute delay, the AC-out-2 should become live. |
| Unable to switch over to generator or mains operation. | Circuit breaker or fuse in the AC-in input is open as a result of overload. | Remove overload or short circuit on AC-out-1 or AC-out-2, and reset the fuse or circuit breaker. |
| Inverter operation not initiated when switched on | The battery voltage is excessively high or too low. No voltage on DC connection. | Ensure that the battery voltage is within the correct range. |
| 'Low battery' LED flashes | The battery voltage is low. | Charge the battery or check the battery connections. |
| Low battery' LED lights. | The converter switches off because the battery voltage is too low. | Charge the battery or check the battery connections. |
| 'Overload' LED flashes. | The converter load is higher than the nominal load. | Reduce the load. |
| 'Overload' LED lights | The converter is switched off due to excessively high load. | Reduce the load. |
| 'Temperature' LED flashes or lights. | The environmental temperature is high, or the load is too high. | Install the converter in cool and well-ventilated environment, or reduce the load. |
| 'Low battery' and 'overload' LEDs flash intermittently. | Low battery voltage and excessively high load. | Charge the batteries, disconnect or reduce the load, or install higher capacity batteries. Fit shorter and/or thicker battery cables. |
| 'Low battery' and 'overload' LEDs flash simultaneously. | Ripple voltage on the DC connection exceeds 1.5 Vrms. | Check the battery cables and battery connections. Check whether battery capacity is sufficiently high, and increase this if necessary. |
| 'Low battery' and 'overload' LEDs light. | The inverter is switched off due to an excessively high ripple voltage on the input. | Install batteries with a larger capacity. Fit shorter and/or thicker battery cables, and reset the inverter (switch off, and then on again). |
| One alarm LED lights and the second flashes. | The inverter is switched off due to alarm activation by the lighted LED. The flashing LED indicates that the inverter was about to switch off due to the related alarm. | Check this table for appropriate measures in regard to this alarm state. |
| The charger does not operate. | The AC input voltage or frequency is not within the range set. | Ensure that the AC input is between 97 VAC and 140 VAC, and that the frequency is within the range set (default setting 45-65 Hz). |
| | Circuit breaker or fuse in the AC-in input is open as a result of overload. | Remove overload or short circuit on AC-out-1 or AC-out-2, and reset fuse/breaker. |
| | The battery fuse has blown. | Replace the battery fuse. |
| | The distortion or the AC input voltage is too large (generally generator supply). | Turn the "Weak AC" and "Dynamic current limiter" settings on. |

# 9.2 Inverter/Charger troubleshooting

| Problem | Cause | Solution |
|---|---|---|
| The charger does not operate.<br>'Bulk' LED flashes and 'Mains on' LED illuminates | Charger is in 'Bulk protection' mode thus, the maximum bulk charging time of 10 hours is exceeded.<br>Such a long charging time could indicate a system error (e.g. a battery cell short-circuit). | Check your batteries.<br>You can reset the error mode by switching the unit off and back on again.<br>In the standard factory settings the 'Bulk protection' mode is enabled. The 'Bulk protection' mode can be switched off with the help of VEConfigure only. |
| The battery is not completely charged. | Charging current excessively high, causing premature absorption phase. | Set the charging current to a level between 0.1 and 0.2 times the battery capacity. |
| | Poor battery connection. | Check the battery connections. |
| | The absorption voltage has been set to an incorrect level (too low). | Set the absorption voltage to the correct level. |
| | The float voltage has been set to an incorrect level (too low). | Set the float voltage to the correct level. |
| | The available charging time is too short to fully charge the battery. | Select a longer charging time or higher charging current. |
| | The absorption time is too short. For adaptive charging this can be caused by an extremely high charging current with respect to battery capacity, so that bulk time is insufficient. | Reduce the charging current or select the 'fixed' charging characteristics. |
| The battery is overcharged. | The absorption voltage is set to an incorrect level (too high). | Set the absorption voltage to the correct level. |
| | The float voltage is set to an incorrect level (too high). | Set the float voltage to the correct level. |
| | Poor battery condition. | Replace the battery. |
| | The battery temperature is too high (due to poor ventilation, excessively high environmental temperature, or excessively high charging current). | Improve ventilation, install batteries in a cooler environment, reduce the charging current, **and connect the temperature sensor.** |
| The charging current drops to 0 as soon as the absorption phase initiates. | The battery is over-heated (>50°C) | • Install the battery in a cooler environment<br>• Reduce the charging current<br>• Check whether one of the battery cells has an internal short circuit |
| | Defective battery temperature sensor | Disconnect the temperature sensor. If charging functions correctly after approximately 1 minute, the temperature sensor should be replaced. |

# 9.2 Inverter/Charger troubleshooting

| Bulk, Absorption, Float LEDs | Code | Description | Cause/solution |
|---|---|---|---|
| ○ ○ ☼ | 1 | Device is switched off because one of the other phases in the system has switched off. | Check the failing phase. |
| ○ ☼ ○ | 3 | Not all, or more than, the expected devices were found in the system. | The system is not properly configured. Reconfigure the system.<br>Communication cable error. Check the cables and switch all equipment off, and then on again. |
| ○ ☼ ☼ | 4 | No other device whatsoever detected | Check the communication cables. |
| ○ ☼ ✸ | 5 | Overvoltage on AC-out. | Check the AC cables. |
| ☼ ○ ☼ | 10 | System time synchronisation problem occurred. | Should not occur in correctly installed equipment. Check the communication cables. |
| ☼ ☼ ✸ | 14 | Device cannot transmit data. | Check the communication cables (there may be a short circuit) |
| ○ ✸ ✸ | 17 | One of the devices has assumed 'master' status because the original master failed. | Check the failing unit. Check the communication cables. |
| ✸ ○ ○ | 18 | Overvoltage has occurred | Check AC cables. |
| ✸ ○ ○ | 22 | This device cannot function as 'slave'. | This device is an obsolete and unsuitable model. It should be replaced |
| ✸ ✸ ○ | 24 | Switch-over system protection initiated. | Should not occur in correctly installed equipment. Switch all equipment off, and then on again. If the problem recurs, check the installation.<br>**Possible solution: increase lower limit of AC input voltage to 110 VAC (factory setting is 90 VAC)** |
| ✸ ✸ ○ | 25 | Firmware incompatibility. The firmware of one the connected devices is not sufficiently up to date to operate in conjunction with this device. | 1. Switch all equipment off.<br>2. Switch the device returning this error message on.<br>3. Switch on all other devices one by one until the error message reoccurs.<br>4. Update the firmware in the last device that was switched on. |
| ✸ ✸ ✸ | 26 | Internal error. | Should not occur. Switch all equipment off, and then on again. Contact Victron Energy if the problem persists. |

# 9.2 Inverter/Charger troubleshooting

| Bulk, Absorption, Float LEDs | Code | Description | Cause/solution |
|---|---|---|---|
| ○ ○ ☼ | 1 | Device is switched off because one of the other phases in the system has switched off. | Check the failing phase. |
| ○ ☼ ○ | 3 | Not all, or more than, the expected devices were found in the system. | The system is not properly configured. Reconfigure the system.<br>Communication cable error. Check the cables and switch all equipment off, and then on again. |
| ○ ☼ ☼ | 4 | No other device whatsoever detected | Check the communication cables. |
| ○ ☼ ✸ | 5 | Overvoltage on AC-out. | Check the AC cables. |
| ☼ ○ ☼ | 10 | System time synchronisation problem occurred. | Should not occur in correctly installed equipment. Check the communication cables. |
| ☼ ☼ ✸ | 14 | Device cannot transmit data. | Check the communication cables (there may be a short circuit) |
| ○ ✸ ✸ | 17 | One of the devices has assumed 'master' status because the original master failed. | Check the failing unit. Check the communication cables. |
| ✸ ○ ○ | 18 | Overvoltage has occurred | Check AC cables. |
| ✸ ○ ○ | 22 | This device cannot function as 'slave'. | This device is an obsolete and unsuitable model. It should be replaced |
| ✸ ✸ ○ | 24 | Switch-over system protection initiated. | Should not occur in correctly installed equipment. Switch all equipment off, and then on again. If the problem recurs, check the installation.<br>**Possible solution: increase lower limit of AC input voltage to 110 VAC (factory setting is 90 VAC)** |
| ✸ ✸ ○ | 25 | Firmware incompatibility. The firmware of one the connected devices is not sufficiently up to date to operate in conjunction with this device. | 1. Switch all equipment off.<br>2. Switch the device returning this error message on.<br>3. Switch on all other devices one by one until the error message reoccurs.<br>4. Update the firmware in the last device that was switched on. |
| ✸ ✸ ✸ | 26 | Internal error. | Should not occur. Switch all equipment off, and then on again. Contact Victron Energy if the problem persists. |

# 10. NOTES

# END OF MANUAL