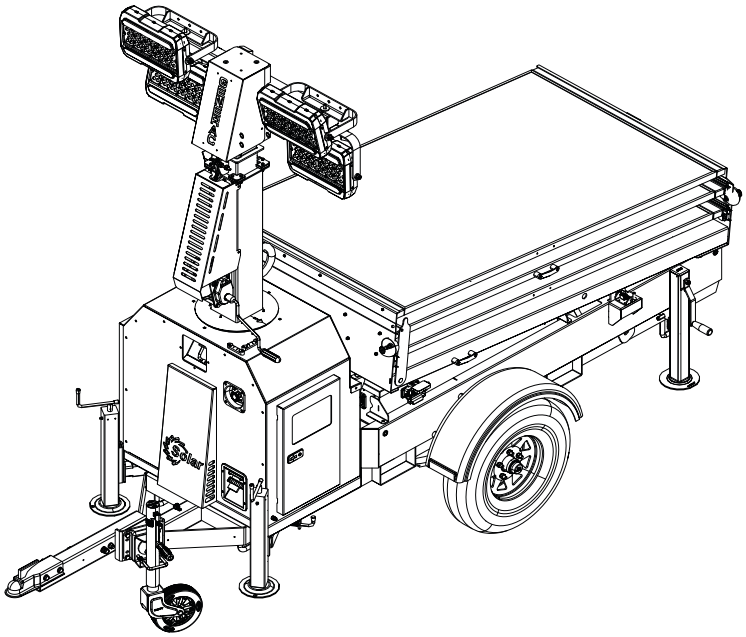
GENERAC® | MOBILE

# *Owner's Manual*

# *VT Solar*

## *Light Tower*



*SAVE THIS MANUAL FOR FUTURE REFERENCE*

**⚠ WARNING**

CANCER AND REPRODUCTIVE HARM
www.p65warnings.ca.gov

(W000393)

# Table of Contents

# Section 1: Introduction and Safety

## Introduction

Thank you for purchasing a Generac Mobile product. This unit has been designed to provide high performance, efficient operation, and years of use when maintained properly.

The information in this manual is accurate based on products produced at the time of publication. The manufacturer reserves the right to make technical updates, corrections, and product revisions at any time without notice.

### Read This Manual Thoroughly

If any section of the manual is not understood, contact your nearest GMASD, or contact Generac Mobile at 1-800-926-9768 or ***www. generacmobileproducts. com*** with any questions or concerns.

The unit has been designed to be used by qualified operator and the content of this manual is intended for such operator.

The operator should receive training on the operation of this unit and be familiar with commonly used tools.

The operator must be aware of the operating modes of the unit, be able to follow the user instructions provided in the manual and pay utmost attention when using the unit Besides hazards deriving from electricity, those related to explosive and flammable substances must be considered (gases and lubricating oils) as well as those related to moving parts, combustion gases, hot parts, and waste products one can come into contact with.

The owner is responsible for proper maintenance and safe use of the equipment. Comply with regulations the Occupational Safety and Health Administration (OSHA) has established, or with equivalent standards. Also, verify that the unit is applied, used, and maintained in accordance with the manufacturer's instructions and recommendations. Do nothing that might alter safe application/ usage and render the unit in noncompliance with the aforementioned codes, standards, laws, and regulations.

SAVE THESE INSTRUCTIONS for future reference. This manual contains important instructions for the unit that should be followed during setup, operation and maintenance of the unit and battery. ALWAYS supply this manual to any individual that will use this unit, and instruct them on how to correctly start, operate, and stop the unit in case of an emergency.

## Safety Messages

The manufacturer cannot anticipate every possible circumstance that might involve a hazard. The alerts in this manual, and on tags and decals affixed to the unit, are not all-inclusive. If using a procedure, work method, or operating technique the manufacturer does not specifically recommend, verify it is safe for others and does not render the equipment unsafe.

Throughout this publication and on tags and decals affixed to the unit, three types of safety messages are used to alert personnel to special instructions about a particular operation which may be hazardous if performed incorrectly or carelessly. Observe them carefully. Their definitions are as follows:

| | |
|---|---|
|  | **HAZARD WARNING**<br>Yellow triangle with black border and black symbol; indicates a hazardous situation which, if not avoided, could result in death or serious injury. |
|  | **MANDATORY ACTION**<br>Blue circle with white symbol; indicates an action required to safeguard personal health and / or avoid causing a hazardous situation which could result in death or serious injury. |
|  | **PROHIBITION**<br>Red ring with diagonal bar and black symbol; indicates a prohibited action. Performing the prohibited action may cause a hazardous situation which could result in death or serious injury. |
| — | **NOTE**<br>Notes provide additional information important to a procedure or component. |

These safety messages cannot eliminate the hazards they indicate. Observing safety precautions and strict compliance with the special instructions while performing the action or service are essential to preventing accidents.

### How to Obtain Service

When the unit requires servicing or repairs, contact a GMASD for assistance. Service technicians are factory-trained and are capable of handling all service needs. For assistance locating a dealer, visit ***www.generacmobile-products. com/parts-service/find-service***. When contacting a GMASD about parts and service, always supply

the complete model number and serial number of the unit as given on its data decal located on the unit. Record the model number and serial numbers in the spaces provided on the inside front cover of this manual.

## Safety Rules

This manual contains main warnings that the operator must know in depth before using the unit.

This manual also provides a summary of the most important information that needs to be consulted for injury prevention: some of this information may be repeated in other documents included in the supply. In case of incomplete data, the references in this manual prevail over any others.

Study these SAFETY RULES carefully before installing, operating, or servicing this equipment. Become familiar with this manual and the unit. The unit can operate safely, efficiently, and reliably only if it is correctly installed, operated, and maintained. Many accidents are caused by failing to follow simple and fundamental rules or precautions.

## General Safety

Hot surface. Keep equipment away from combustible materials during operation. Do not touch hot surfaces when operating equipment. After equipment shutdown, allow sufficient time for surfaces to cool prior to contact.

(ISO000110)

Do not attempt to start or operate a unit in need of repair or scheduled maintenance.

(ISO000291)

Do not obstruct cooling and ventilating airflow around the unit.

(ISO000767)

Do not stand on top of unit or use unit as a step.

(ISO000780)

Do not alter construction of, installation, or block ventilation for unit.

(ISO000783)

Read instruction manual. Read and understand manual completely before using this equipment.

(ISO000100)

Refer to local codes and standards for safety equipment required when working with a live electrical system.

(ISO000257)

Follow all safety precautions in all documents included with this equipment.

(ISO000531)

Verify the unit is installed in accordance with the manufacturer's instructions and recommendations.

(ISO000784)

Following proper installation, do nothing that might alter a safe installation and render the unit in noncompliance with locally applicable codes, standards, laws, and regulations.

(ISO000540)

In the event of an electrical accident, immediately shut power OFF. Use non-conductive implements to free victim from live conductor. Apply first aid and get medical help.

(ISO000145)

Use only fully-charged fire extinguishers rated according to applicable industry standards.

(ISO000252)

Comply with regulations the local agency for workplace health and safety has established.

(ISO000538)

Only qualified service personnel may install, operate, and maintain this equipment.

(ISO000182)

Comply with regulations the local agency for workplace health and safety has established.

(ISO000538)

This product is not intended to be used in a critical life support application.

(ISO000209)

## Explosion and Fire Hazards

Never attempt to fight a fire yourself. Evacuate the building and contact emergency services. Inform dispatcher that lithium-ion batteries are in the building.

(ISO000768)

## Trailer Hazards

Trailer must be securely coupled to the hitch with the chains correctly attached.

(ISO000233)

Do not operate unit during transport.

(ISO000231)

Verify unit is properly secured and on level ground.

(ISO000234)

Tighten wheel lug nuts after first 50 miles to factory specifications.

(ISO000235)

## Electrical Hazards

In the event of an electrical accident, immediately shut power OFF. Use non-conductive implements to free victim from live conductor. Apply first aid and get medical help.

(ISO000145)

Avoid water contact with a power source.

(ISO000104)

Verify electrical system is properly grounded before applying power.

(ISO000152)

Do not wear jewelry while working on this equipment.

(ISO000769)

DO NOT use the unit if electrical cord is cut or worn through.

(ISO000770)

## Operating Safety

### Positioning the Unit

Verify area above unit is clear of overhead wires and obstructions.

(ISO000771)

- The area immediately surrounding the unit should be dry, clean, and free of debris.
- If the unit is equipped with a frame grounding stud, follow any local, state, and National Electrical Code (NEC) guidelines when connecting.
- Do not install the unit in low lying areas prone to flooding.
- For trailered units, once parked, use wheel chocks to prevent the unit from moving.
- Do not operate light tower in standing water.

### Raising and Lowering the Mast

Do not set up or operate this unit if severe weather is expected.

(ISO000773)

Do not set up or operate unit in high winds.

(ISO000774)

Do not raise or lower the mast while the unit is operating.

(ISO000775)

Stop immediately if the mast hangs up or the winch cable develops slack.

(ISO000776)

Extend the outriggers and level the unit before raising the mast. Keep the outriggers extended while the mast is up.

(ISO000777)

- Keep area around the unit clear of people while raising and lowering the mast.
- **ALWAYS** lower the mast when not in use.

## Towing Safety

Towing a trailer requires care. Both the trailer and vehicle must be in good condition and securely fastened to each other to reduce the possibility of an accident. Some states require that large trailers be registered and licensed. Contact your local Department of Transportation office to check on license requirements for your particular unit.

### Hitch and Coupling

- Verify the hitch and coupling on the towing vehicle are rated equal to, or greater than, the trailer's Gross Vehicle Weight Rating (GVWR).
- Verify the trailer hitch and the coupling are compatible. Verify the coupling is securely fastened to the vehicle.
- **DO NOT** tow trailer using defective parts. Inspect the hitch and coupling for wear or damage.
- Connect safety chains in a crossing pattern under the tongue.
- Before towing the unit, verify the weight of the trailer is equal across all tires. On trailers with adjustable height hitches, adjust the angle of the trailer tongue to keep the trailer as level as possible.

### Safe Towing Techniques

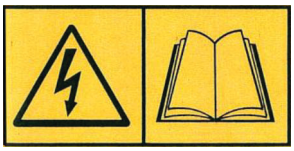
- Practice turning, stopping and backing up in an area away from heavy traffic prior to transporting the unit.
- Maximum recommended speed for highway towing is in accordance with local traffic laws and ordinances. Recommended off-road towing speed is 10 mph (16 km/h) or less, depending on terrain.
- When towing, maintain extra space between vehicles and avoid soft shoulders, curbs and sudden lane changes.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## Safety and Informational Decals (ISO)

There are labels on your equipment that contain important information and safety instructions. These signs warn the user about any dangers which can be harmful to people, property or the machine itself.

Read the explanations and precautions described in the manual.

| Decal | Meaning |
|---|---|
|  | • Risk of electric shocks.<br>• Read the manual. |
|  | • Risk of possible corrosive spills. |
|  | • Risk of crushing hands. |
|  | • Please ensure stabilizers are extended, adjusted and securely tightened before retracting the jockey wheel assembly. |
|  | • Do not approach with free flames. |
|  | • Read the instruction manual before using the machine. |
|  | • Lift points with forklift. |
|  | • Keep feet clear of towing assembly. |

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# Section 2: General Information

## Specifications

| Description | Standard Unit | Unit Of Measure |
|---|---|---|
| ***Machine Specifications*** | | |
| Average Hours Run Time @ 100% Lights | 19.5 | Hours |
| Average Charge Time @ 120V, 20A | 12.2 | Hours |
| Wind Rating | 80 (50) | KPH (MPH) |
| Operating Temperature Range | 0 (-17.8) - 120 (48.9) | F° (C°) |
| Charging Temperature Range - 120V Inlet Plug | 14 (-10) - 104 (40) | F° (C°) |
| ***Inverter/Battery Charger*** | | |
| Make/Brand | Victron MultiPlus-II 120V | — |
| Model | 48/3000/35-50 | — |
| Inverter Input Voltage Range | 38-66 | VDC |
| Inverter Output Voltage | 120 | VAC |
| Inverter Maximum Efficiency | 95 | % |
| Charger Input Voltage Range | 90 - 140 | VAC |
| Charger Maximum Battery Current | 35 | A |
| ***Solar Panels*** | | |
| Make/Brand | Tenka Solar | — |
| Model | TKA400M-120 | — |
| Maximum Power at STC | 400 | Wp |
| Maximum Power Voltage | 34.70 | V |
| Maximum Power Current | 11.53 | A |
| Open-circuit Voltage (Voc) | 42.20 | V |
| Short-circuit Current (Isc) | 12.13 | A |
| Efficiency | 21.96 | % |
| ***Batteries*** | | |
| Make/Brand | Discover | — |
| Model | EV31A-A | — |
| Type | Dry Cell AGM, VRLA | — |
| Battery Voltage | 12 | V |
| Battery Capacity | 120 | Ah |

| Description | Standard Unit | Unit Of Measure |
|---|---|---|
| Pack Configuration | 8X total batteries - 2X groups connected in parallel, 4X batteries connected in series in each group | — |
| Pack Voltage | 48 | V |
| Pack Capacity | 240 | Ah |
| Pack Power Capacity | 11,520 | Wh |
| ***Weight*** | | |
| Total Weight | 2,400 (1,089) | lb (kg) |
| ***Lighting*** | | |
| Lighting Type | LED - Gen4 - 100W | — |
| Number of Luminaires | 4 | — |
| Total Lumens for all four Luminaires | 60,000 | Lumens |
| Luminaire Rating | 65 | IP |
| Mast Rotation | 350 | Degrees |
| Light Coverage @ 0.5 f-c | 21,070 (1,957) | $ft^2$ ($m^2$) |
| ***Trailer*** | | |
| Number of Axles | 1 | — |
| Capacity — Trailer Rating | 3,300 (1,497) | lb (kg) |
| Tire Size | 13 | in |
| *Specifications are subject to change without notice. See spec sheet for complete specifications.* | | |

# Unit Dimensions

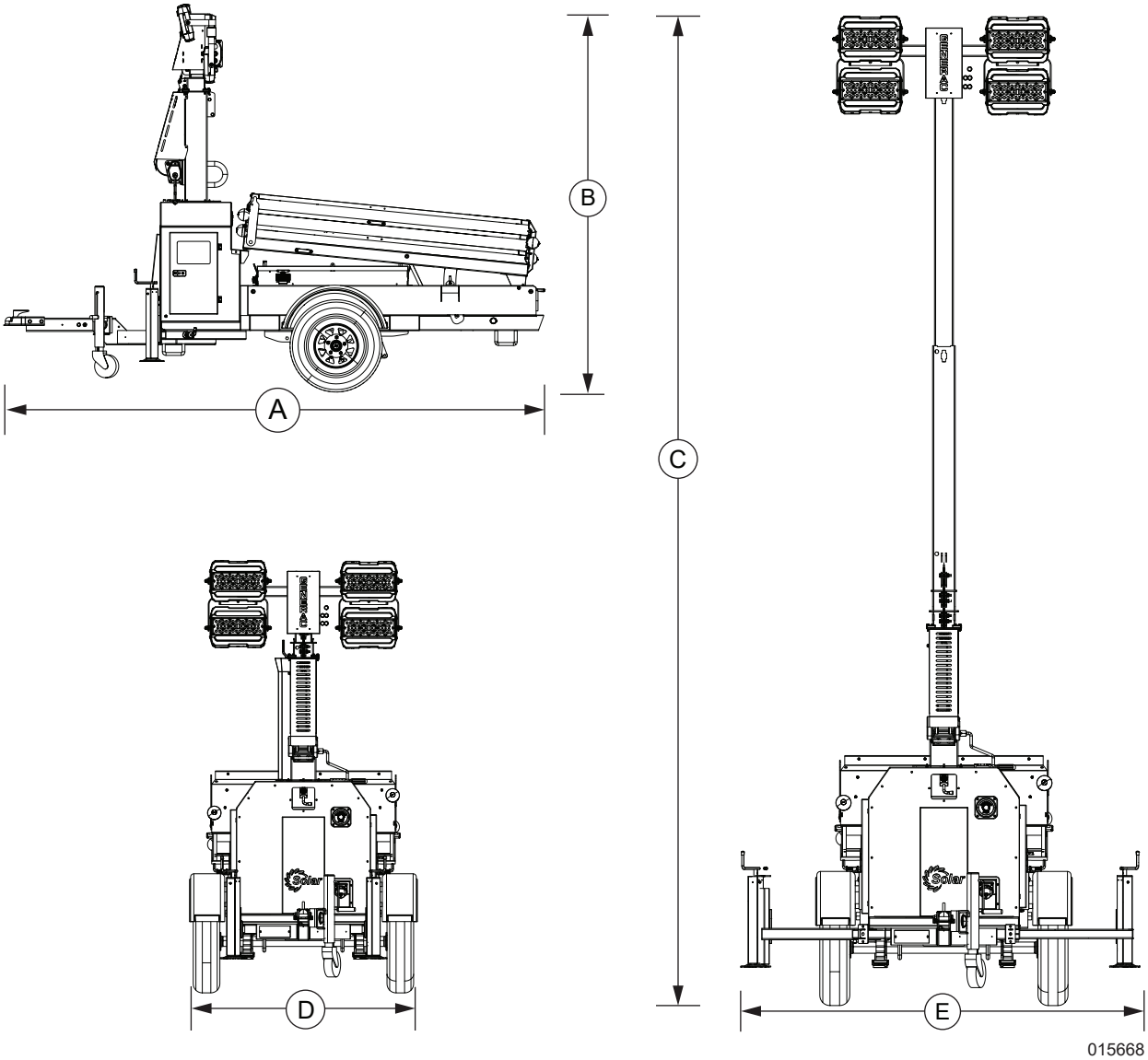


***Figure 2-1. Unit Dimensions***

| A | B | C | D | E |
|---|---|---|---|---|
| 142 in (3.61 m) | 99 in (2.51m) | 21.3 ft (6.49 m) | 54 in (1.37 m) | 57 in (1.45 m) |

# Data Decal

Data Decal on the Solar Light Tower provide information important to that unit.

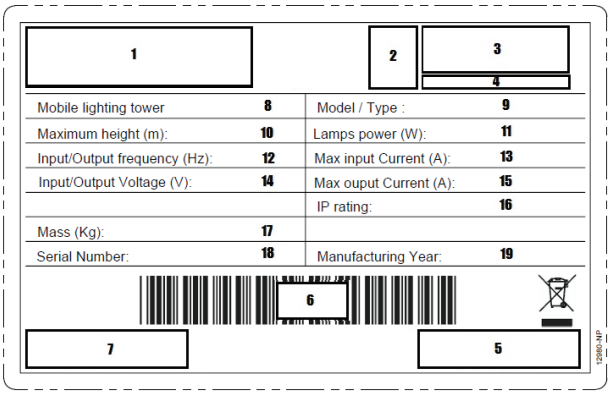


***Figure 2-2. Data Decal***

1. Trademark of the manufacturer
2. QR code with link to the documents download webpage
3. Regulatory marks
4. Country of construction
5. Contacts of the manufacturer
6. Serial number barcode
7. Name and address of the manufacturer
8. Designation of the machinery
9. Designation of series or type
10. Maximum tower height, in meters
11. Total power of lights, in kilowatts
12. Input/output frequency, in hertz
13. Max input current, in Amperes
14. Input/output voltage, in Volts
15. Max output current, in Amperes
16. Ingress protection rating
17. Mass in kilograms
18. Serial number
19. Year of construction

# Unit Serial Number Locations

See ***Figure 2-3*** to locate the unit ID tag and Vehicle Identification Number (VIN) tag on the unit. Important information, such as the unit serial number, model number, VIN, and tire loading information are found on these tags. Record the information from these tags so it is available if the tags are lost or damaged. When ordering parts or requesting assistance, you may be asked to provide this information.

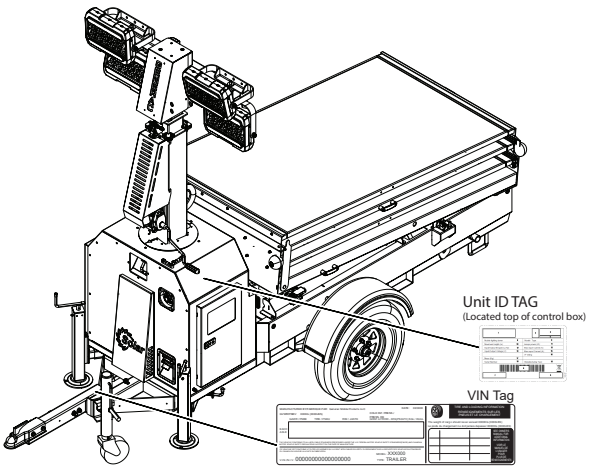


***Figure 2-3. Serial Number Location***

# Component Locations

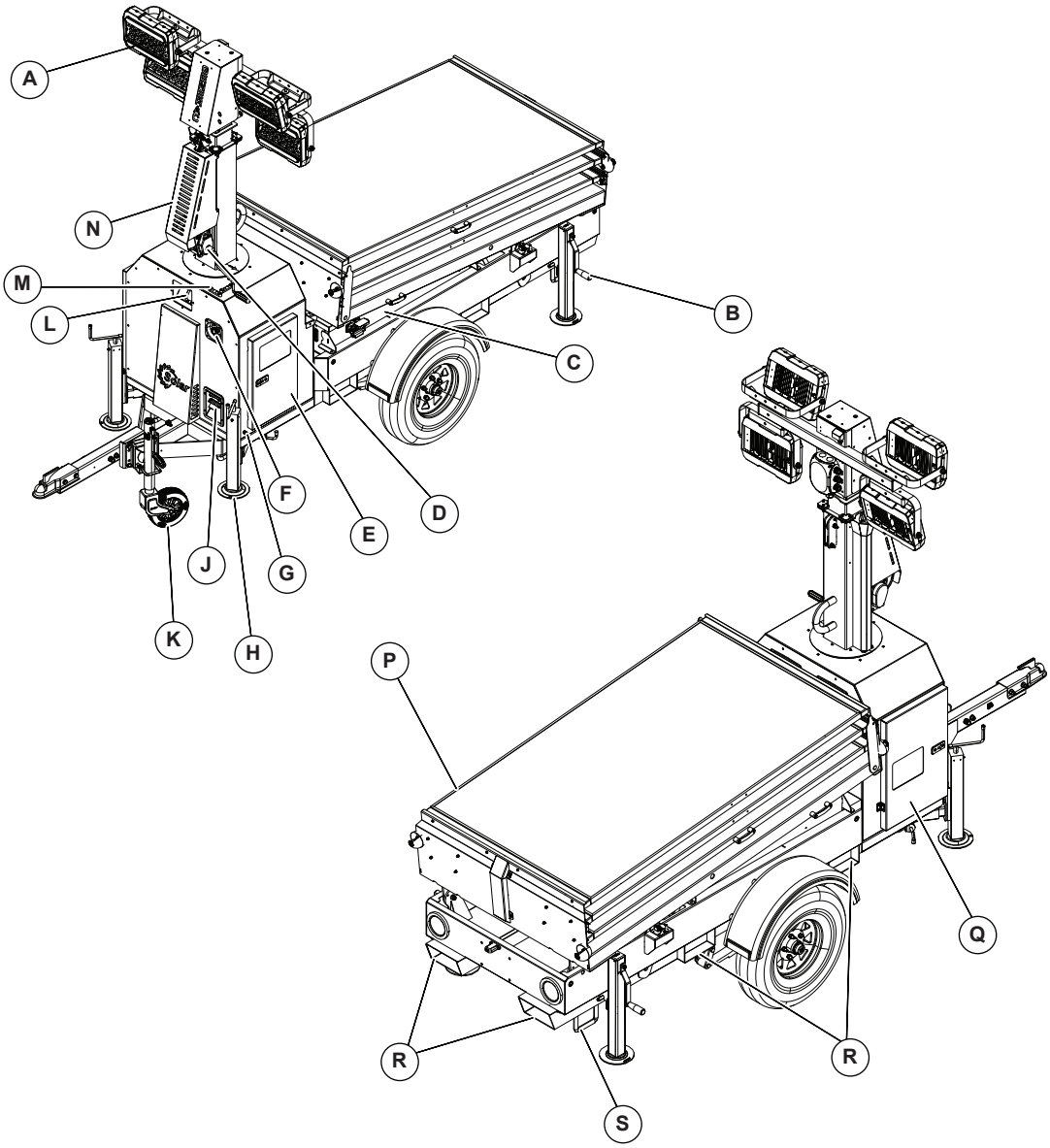


***Figure 2-4. Components—Exterior***

**A.** Light (4 locations)

**B.** Stabilizer jack (Qty 2)

**C.** Battery box

**D.** Winch

**E.** Control panel access door

**F.** E-stop

**G.**Grounding stud

**H.** Outrigger

**J.** Inlet shore power

**K.** Tongue jack

**L.** Mast rotation locking pin

**M.** Bubble levels

**N.** Cable guard

**P.** Solar panels

**Q.**Inverter access door

**R.** Forklift pockets

**S.** Tie down (4 locations)

# Control Panel

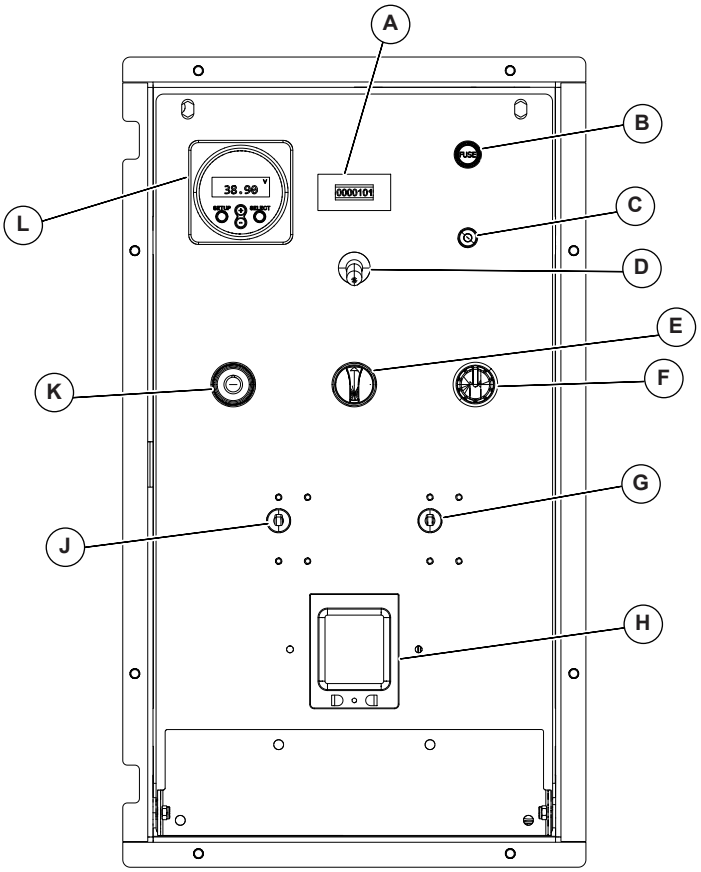


***Figure 2-5. Control Panel***

**A.** Hour meter

**B.** Solar panel fuse

**C.** Solar panels operating light

**D.** Control box main power switch

**E.** Lights operating selector switch

**F.** Dusk to dawn timer selector

**G.** Main circuit breaker

**H.** Dusk to dawn relay

**J.** Inverter/charger circuit breaker

**K.** Light brightness/dimmer selector

**L.** Battery charge level indictor

# Battery Box

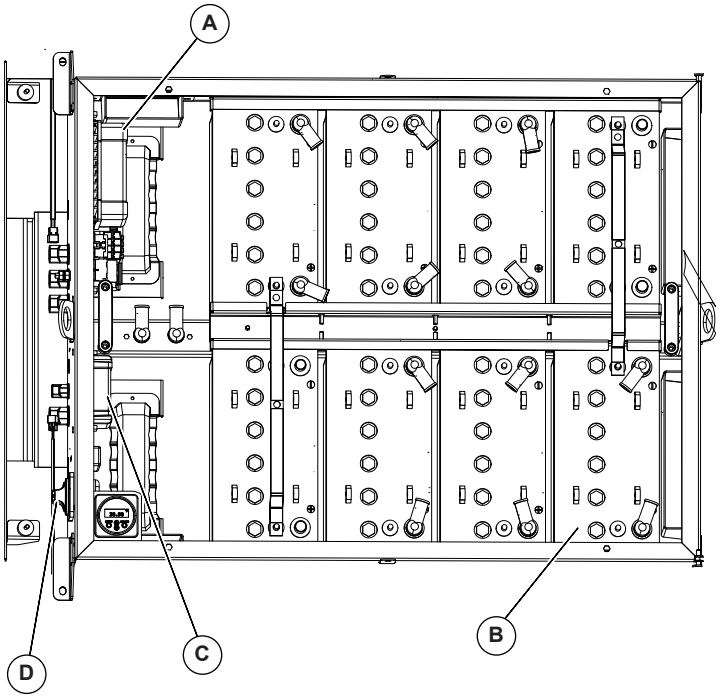


***Figure 2-6. Components—Battery Box***

**A.** Maximum Powerpoint Tracking Charge Controller (MPPT)

**B.** Batteries

**C.** DC to DC converter

**D.** Battery disconnect switch

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# Section 3: Operation

## Light Tower Setup

Verify area above unit is clear of overhead wires and obstructions.

(ISO000771)

Do not set up or operate unit in high winds.

(ISO000774)

Verify ground is stable and can support unit stabilizers.

(ISO000779)

1. For maximum light coverage, position unit at ground level or higher than area being illuminated.

   **NOTE:** See ***Unit Dimensions*** or unit height.

   **NOTE:** Position unit so that solar panels are facing south in the northern hemisphere and north in the southern hemisphere.
2. Place unit on firm, relatively flat ground (less than 5° slope). Block wheels.
3. Extract the front stabilizers (A), releasing the locking pins from their hole locations and manually pulling until the pins block the tube. Verify that the pins enter the dedicated locking holes on the pipe.
4. Lower the stabilizers (B) using the handle.
5. Refer to the bubble levels (C) to ensure the correct stability of the light tower.

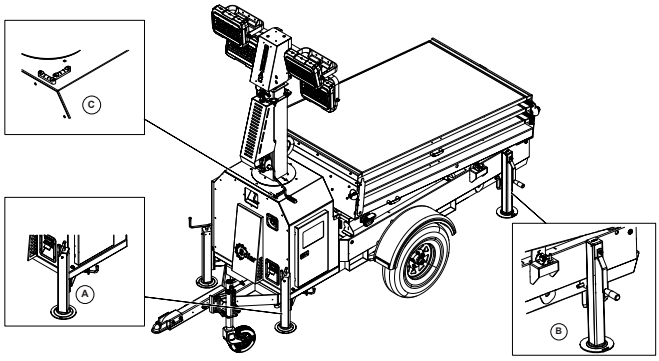


***Figure 3-1. Unit Setup***

6. Pull and rotating both locking pins (D) until they are self-retained.

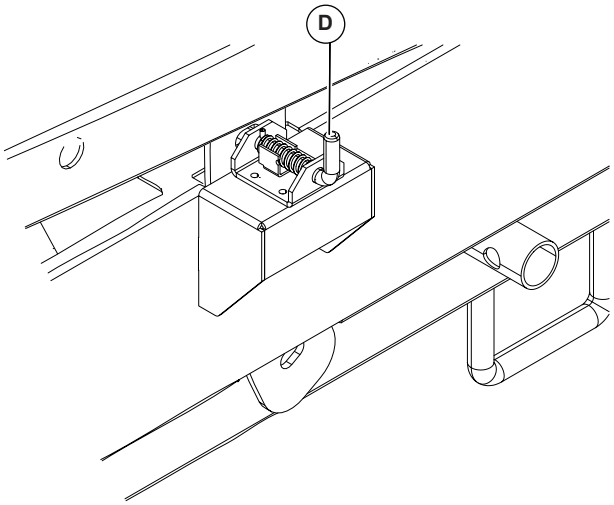


***Figure 3-2. Locking Pins***

7. Tilt the panels using the handles (E).

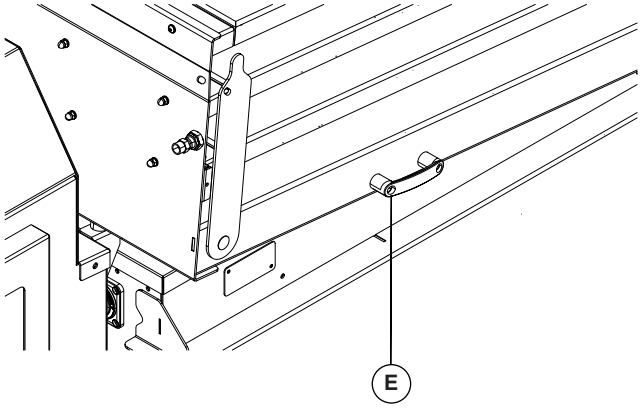


***Figure 3-3. Tilt Panels***

8. Stop to the desired tilt angle. Release the locking pins (F) and verify that it enters in the dedicated locking holes.

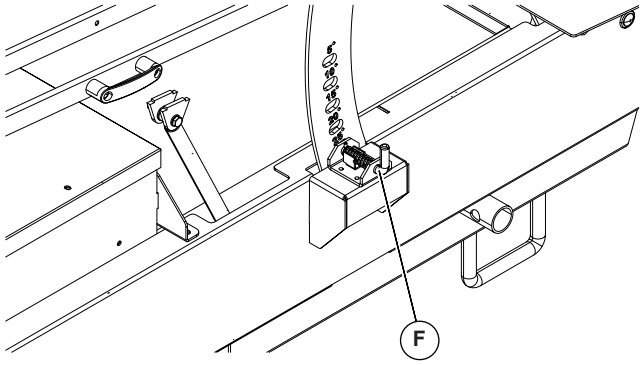


*Figure 3-4. Tilt Angle*

9. Pull both knobs (G) for each panel and block them opened with a little rotation. Extract the panels as far as they will go by pulling the handles. Release the knobs (G) and verify that they block the panels closure.

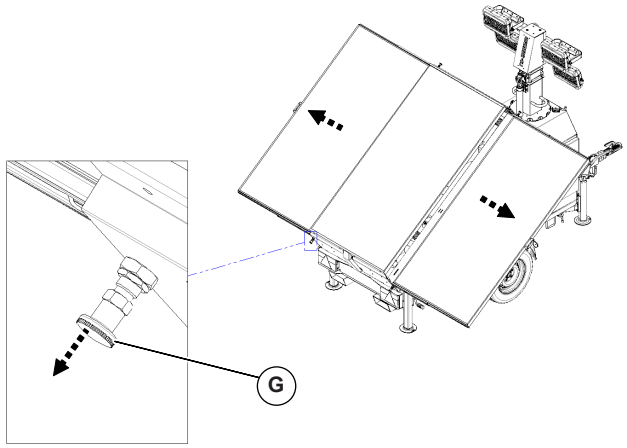


*Figure 3-5. Panels*

## Photovoltaic Panel Alignment

This unit utilizes photovoltaic panels to charge the battery system during the day. Proper alignment of the photovoltaic panels is crucial to the charging performance of the system. The two variables that determine the optimal alignment of the photovoltaic panels are latitude and time of year.

**NOTE:** Ensure photovoltaic panels are cleaned prior to alignment

See ***Figure 3-6*** of the unit location in the table below to determine the correct angle for the time of year.

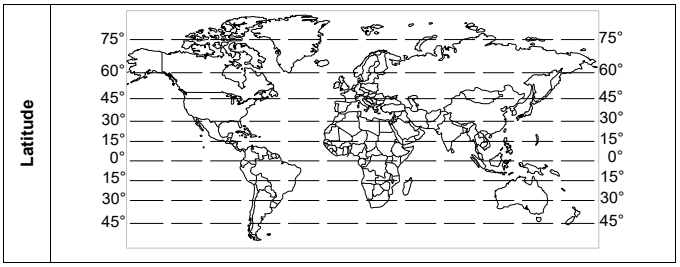


*Figure 3-6. Latitude of the Unit*

| Latitude | Optimal Photovoltaic Panel Angle | | |
|---|---|---|---|
| | Summer | Spring/ Autumn | Winter |
| 25° | 5 | 25 | 35 |
| 30° | 10 | 30 | 35 |
| 35° | 15 | 35 | 35 |
| 40° | 20 | 35 | 35 |
| 45° | 25 | 35 | 35 |
| 50° | 30 | 35 | 35 |
| **NOTE:** Average values for intermediate latitudes and times. | | | |

## Prestart Checklist

Before starting the unit, all items in the prestart checklist must be completed. This checklist applies to both manual and automatic starting of the unit.

- ❑ Verify all maintenance procedures are up to date. For more information, refer to General Maintenance and Basic Maintenance Schedule.
- ❑ Perform a walk-around inspection. Refer to Daily Walk-Around Inspection.
- ❑ The unit must be level.
- ❑ The unit must be dry. Inspect for water inside or near the unit; dry if needed.
- ❑ Always close the enclosure unless inspecting or regular maintenance.
- ❑ For grounding requirements, follow the National Electrical Code (NEC), state, and local regulations.
- ❑ Verify the mode selector switch is OFF.
- ❑ Verify main circuit breaker is OFF.
- ❑ Verify emergency button is pulled out.
- ❑ Inspect all electrical cords; repair or replace any that are cut, worn, or bare.
- ❑ Verify all winch cables are in good condition and centered on each pulley. Do not use if cables are kinked or beginning to unravel.
- ❑ Verify battery connections are secure.
- ❑ Verify all covers are in place and secure.
- ❑ Verify all guards are installed and secured.

## Raising the Mast

DO NOT use the unit if electrical cord is cut or worn through.

(ISO000770)

Extend the outriggers and level the unit before raising the mast. Keep the outriggers extended while the mast is up.

(ISO000777)

Do not raise or lower the mast while the unit is operating.

(ISO000775)

Stop immediately if the mast hangs up or the winch cable develops slack.

(ISO000776)

1. Verify light tower is correctly set up. See ***Light Tower Setup***.
2. See ***Figure 3-7***. Inspect the mast cables for excessive wear or damage. Verify the cables are properly centered in each pulley (A). Inspect the electrical cord for damage.
3. Prior to raising the mast inspect all cables including at the winch cable guard (B) through the viewing holes on side of the cable guard (B).
4. Rotate the winch (D) to slowly extend the mast. Verify the coiled electrical cord is extending at the top sections of the mast. Stop extending the mast when the colored mark on the second mast section is visible as seen in Detail C.

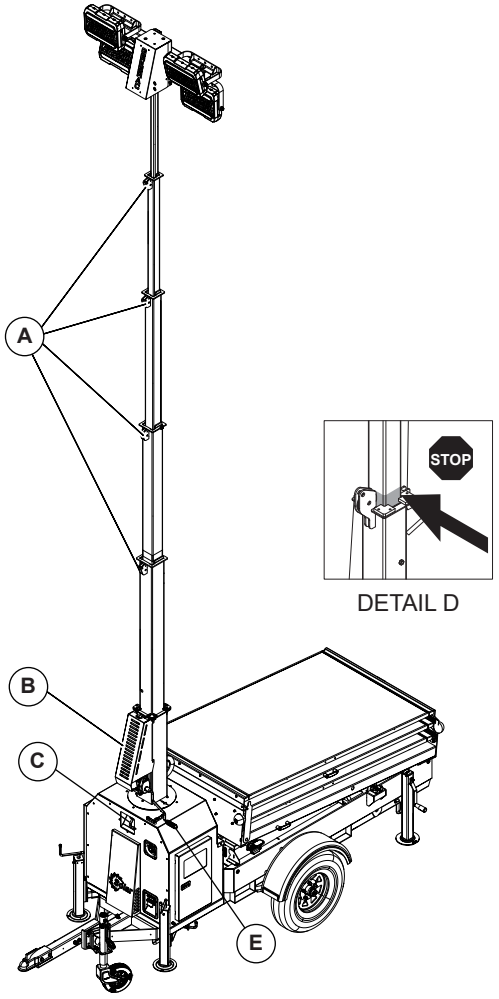


***Figure 3-7. Raising Mast***

5. Rotate the mast by pulling out the mast locking pin (E) at the bottom of the mast. Turn the mast until the lights face in the desired direction. Push in the mast locking pin (C) to secure the mast in position.
6. To rotate the mast:
   - Pull the mast locking pin (E).
   - Rotate the mast until arrows are aligned and the metal stop tabs are touching.

- Push in the mast locking pin (E).

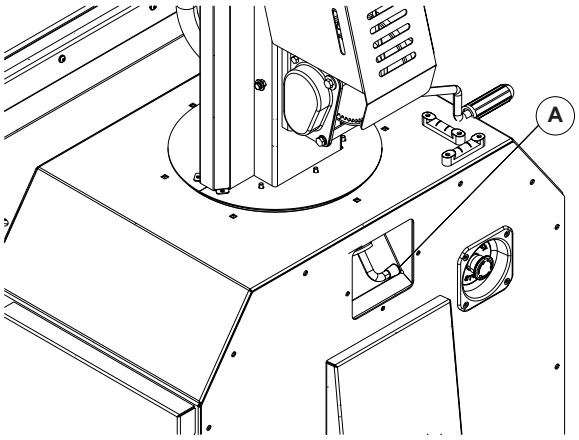


*Figure 3-8. Mast Locking Pin*

## Starting the Unit

1. Turn battery disconnect switch to ON (A).

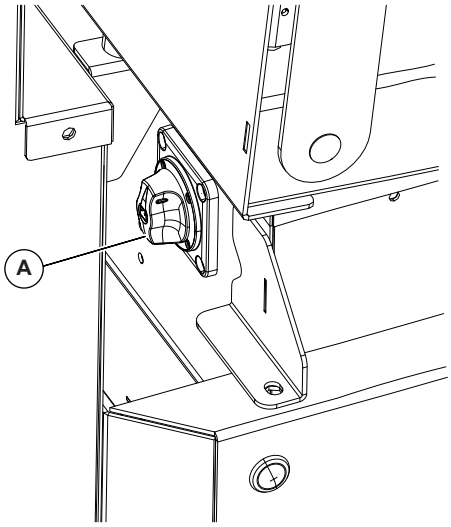


*Figure 3-9. Battery Disconnect*

2. Switch on main circuit breaker (C) and inverter circuit breaker.
3. Switch on control box main power switch (B).

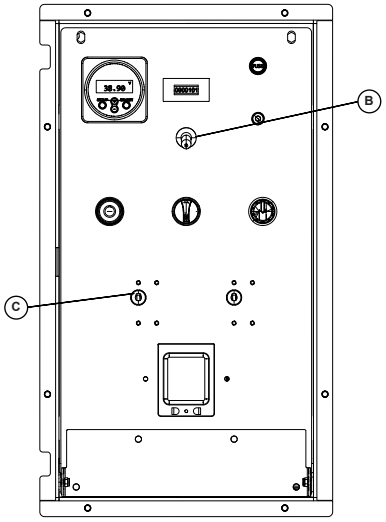


*Figure 3-10. Circuit Breakers*

4. Select operation mode.

## Operating the Lights

Turn selector switch to desired mode. See ***Table 3-1*** for different mode options.

**Table 3-1. Light Modes**

| | |
|---|---|
| Off | Floodlights switched off. The LEDs are always switched off by turning the selector switch to the O position. |
| Manual | The user manually switch ON the floodlights. |
| Light Sensor | Floodlights status controlled as function of the environmental brightness, by using Light Sensor (preset value). The Light Sensor placed on the floodlights support detects the ambient brightness. Check that the sensor is clean. |

Use the light brightness/dimmer selector switch to determine brightness from 0-100%.

## Charging Unit With Solar Panels

**NOTE:** Ambient temperature when charging using solar panels is 0 °F (-18 °C) to 120 °F (49 °C).

1. Extend solar panels. See ***Light Tower Setup***.
2. Turn battery disconnect switch on.
3. Turn control box main switch on.

## Charging Unit With 120V Inlet Plug

**NOTE:** Use only an undamaged, outdoor rated, three prong grounded 120VAC extension cord with a minimum rating of 20A. Connect the cord to a properly grounded 120VAC GFCI outlet.

**NOTE:** See ***Inverter/Charger LED Indicators***. It takes a couple seconds for unit to start charging once extension cord is connected. Inverter/Battery charger will display LED light next to 'Mains On' when battery is charging.

**NOTE:** Ambient temperature when charging using 120VAC, 20A inlet plug is limited to 14 °F (-10 °C) to 104 °F (40 °C). Charging while outside these ambient temperatures can decrease the life of the batteries or cause damage to the batteries.

Connect 120VAC, 20A rated extension cord to charge input plug (A). See ***Figure 3-11***.

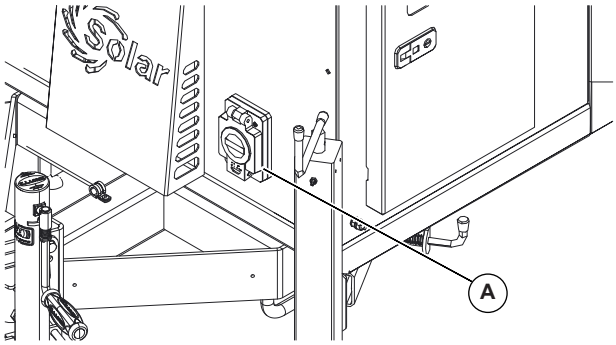


***Figure 3-11. Charge Inlet Plug***

## Shutting Down the Unit

1. Turn selector switch to OFF.
2. Turn control box main power switch to OFF.
3. Turn battery disconnect switch to OFF.

## Lowering the Mast

1. Shut down lights and battery. See ***Shutting Down the Unit***.
2. Lower the mast.
3. Use the winch handle to fully retract the mast. Verify the electrical cord does not get caught in, or pinched by, the mast while it is being lowered.

Stop immediately if the mast hangs up or the winch cable develops slack.

(ISO000776)

**NOTE:** Contact a GMASD immediately if the mast hangs up or the winch cable develops slack.

4. If the unit is going to be moved, rotate the mast so the lights face the left of the unit and the arrows align.

## Storing the Unit

1. If the unit will be stored for an extended time frame, fully charge the unit using the 120VAC, 20A inlet plug.
2. Once fully charged, disconnect inlet plug and ensure that selector switch is in the OFF position.
3. Ensure unit battery disconnect switch is turned to the OFF position.
4. Store unit in a location that is free of water and dust.

**NOTE:** It is important to periodically check battery voltage of unit. If battery voltage is below 44V, charge unit using 120VAC, 20A inlet plug until fully charged.

## Towing the Unit

Once the battery is shut down and the mast and lights are correctly stowed, proceed as follows to prepare the unit for towing.

1. Raise the rear jacks completely and release the locking pins to rotate them up into the travel position. Verify the locking pins snap into place.
2. Raise the outriggers completely then release the outrigger locking pins and slide the outriggers into the trailer frame until the locking pins snap into place.
3. Use the tongue jack to raise or lower the trailer onto the hitch of the towing vehicle. Lock the hitch coupling and attach the safety chains or cables to the vehicle. Remove the tongue jack locking pin and rotate the jack into the travel position. Replace the locking pin.
4. For maintenance interval information, see Basic Maintenance Schedule.
5. Connect trailer wiring to the tow vehicle. Inspect for correct operation of the directional and brake lights.
6. Verify that doors are closed and properly latched.
7. Verify solar panels are stowed and locking pins are in place.
8. Check for correct inflation of the trailer tires. For maximum tire pressures, see Specifications.
9. See ***Figure 3-12*** Inspect the wheel lugs. Tighten or replace any lugs that are loose or missing. If a tire has been removed for axle service or replaced, tighten the lugs, in the order shown, to the following specifications:
   - Start all lug nuts by hand.
   - First pass: Tighten to 20– 25 ft-lb (27– 33 Nm).
   - Second pass: Tighten to 50–60 ft-lb (67–81 Nm).
   - Third pass: Tighten to 90–120 ft-lb (122–162 Nm).

   **NOTE:** After first road use, torque lug nuts in sequence.
10. Maximum recommended speed for highway towing is 65 mph (105 km/h). Recommended off-road towing speed is not to exceed 10 mph (16 km/h) or less, depending on the terrain.

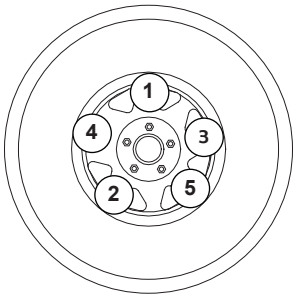


***Figure 3-12. Lug Sequence***

## Lifting the Unit

Comply with regulations the local agency for workplace health and safety has established.

(ISO000538)

Do not stand on top of unit or use unit as a step.

(ISO000780)

Only qualified service personnel may install, operate, and maintain this equipment.

(ISO000182)

Proceed as follows to prepare the unit for lifting:

1. Verify the equipment being used to lift the unit is in good condition and has sufficient capacity. For approximate weights, see ***Specifications***.
2. Close and lock all hoods and doors.

   **NOTE:** Always remain aware of people and objects around the work site when moving or lifting the unit.
3. See ***Component Locations***for lifting points. Lift unit in accordance with guidelines below.
   - When lifting the unit using the fork pockets (A):
     - When lifting the unit using the fork pockets (A): Verify the forklift capacity is above the total weight to be lifted.
     - Verify the length of the forks is equal to or greater than the width of the unit (measured on the fork insertion side).

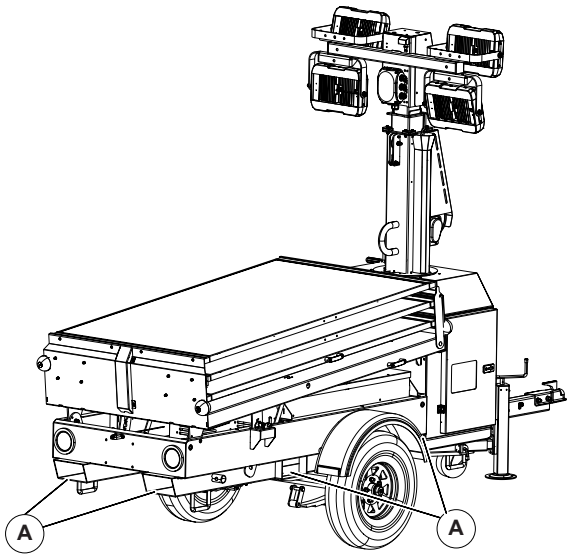


***Figure 3-13. Lifting the Unit***

## Tying Down the Unit

When securing the unit for transportation, verify the equipment being used to fasten the unit is in good condition and has sufficient strength to hold the unit in place during transport. See ***Figure 3-14***. Use the tie-down points (A) as shown.

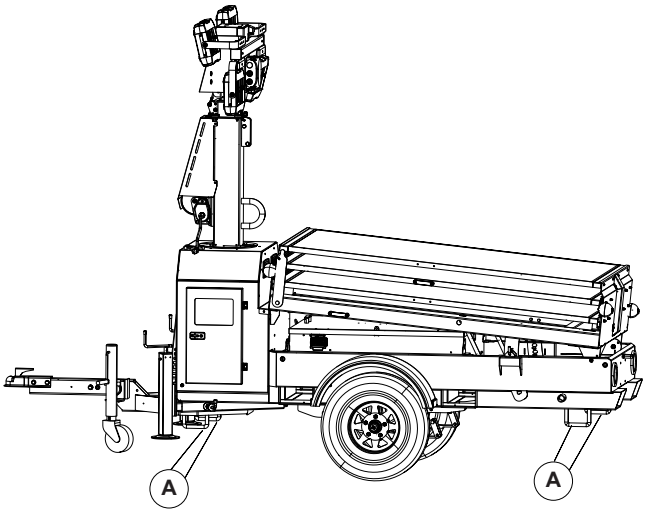


***Figure 3-14. Tying Down the Unit***

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# Section 4: Maintenance

## Daily Walk-Around Inspection

A daily inspection must be performed to prevent damage to the unit.

(ISO000306)

Perform a walk-around inspection of the unit every day before starting the unit. Look for conditions that could hinder performance or safety, such as (but not limited to):

- Blocked vents
- Loose or missing hardware
- Loose or broken electrical connections
- Cracks or chips that would hinder enclosure structural integrity
- Water collecting inside enclosure

## General Maintenance

Poorly maintained equipment can become a safety hazard. In order for the equipment to operate safely and correctly over a long period of time, periodic maintenance and occasional repairs are necessary. DO NOT perform routine service unless all electrical components are shut off.

Regular maintenance will improve performance and extend equipment life. Generac Mobile recommends that all maintenance work be performed by a GMASD. Regular maintenance may be performed by any repair shop or person of the owner's choosing.

### Preparing for Service

Before servicing the unit, always follow the instructions listed below.

1. Verify main circuit breaker and inverter breaker are switched to OFF.
2. Ensure battery disconnect switch is OFF.
3. Attach a "Do Not Start" sign to the control panel to signify that the unit is being serviced and reduce the chance of unauthorized use.

### Cleaning the Unit

Avoid water contact with a power source.

(ISO000104)

**Important Note: Do not wash the unit with a high pressure hose or power washer.**

**Important Note: Do not wash inverter with water.**

- **Clean unit after each use, removing substances such as dust, grease, and mud.**
- **Use soft, clean rags to wipe cabinet exterior and control panel.**
- **Low-pressure compressed air (less than 40 psi [276 kPa]) can be used to remove dust and debris from the cabinet interior.**

**NOTE:** This unit contains sensitive electronic components that can be damaged by high pressure and heat.

### Inspecting the Unit

- If the unit is stored outside, inspect for water inside the cabinet before each use. If wet, dry the unit thoroughly before starting.
- Inspect condition of electrical cords. **DO NOT** use the unit if insulation is cut or worn through.
- Verify winch cables are in good condition and centered on each pulley. **DO NOT** use a cable that is kinked or starting to unravel.
- Verify the wheel lugs are present and correctly tightened. Refer to ***Towing Safety***.

## Basic Maintenance Schedule

Refer to the original equipment manufacturer's operating manual for a complete list of maintenance requirements. Maintenance records may be required to complete a warranty request.

Use the schedule in the following table as a guide for regular maintenance intervals.

| Maintenance Activity | Daily | Monthly |
|---|---|---|
| Clean unit | | ● |
| Clean photovoltaic panels | * | |
| Grease stabilizers | | ● |
| Inspect mast cable | ● | |
| Inspect lug nuts | ● | |
| Check tire pressure | ● | |
| Inspect unit hardware | ● | |

* In order to not compromise the efficiency is recommended to clean the glass surface of the photovoltaic panels as necessary. Always use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove stubborn dirt.

## Trailer Wheel Bearings

The trailer axles are equipped with a grease fitting to allow lubrication of the wheel bearings without needing to disassemble the axle hub. To lubricate the axle bearings, remove the small rubber plug on the grease cap, attach a standard grease gun fitting to the grease fitting, and pump grease into the fitting until new grease is visible around the nozzle of the grease gun. Use only a high quality grease made specifically for lubrication of wheel bearings. Wipe any excess grease from the hub with a clean cloth and replace the rubber plug when finished. The minimum recommended lubrication is every 12 months or 12,000 miles (19,312 km). More frequent lubrication may be required under extremely dusty or damp operating conditions.

## Jack Maintenance

Before each use, inspect each jack foot for damage and remove any mud or debris. The jacks must be clean and in good operating condition to correctly support the unit.

# Section 5: Troubleshooting

## General Troubleshooting

Only qualified service personnel may install, operate, and maintain this equipment.

(ISO000182)

This information is intended to be a check or verification for simple causes that can be located and fixed. It does not cover all types of problems. See the engine operator's manual for additional troubleshooting information. Procedures that require in-depth knowledge or skills should be performed by a GMASD.

| Problem | Possible Cause | Solution |
|---|---|---|
| The unit does not start | Emergency stop button is pressed | To re-arm it, turn the "STOP" button clockwise . |
| | Battery is out of charge | Charge battery. |
| | Battery disconnect switch is switched to OFF | Switch battery disconnect switch to ON. |
| | One or more fuses are burned out | Replace burned fuses (refer to wiring diagram), if necessary contact the manufacturer . |
| One or more lamps fail to light | Defective or faulty lamps | Replace the lamps presumed faulty and if necessary contact directly the manufacturer. |
| | Lamps have been accidentally switched off | Switch on the lamps through selector. |
| The light sensor does not work properly | The light sensor is dirty or it is covered by some kind of obstruction. | Clean the sensor and make sure that it is free from obstructions. |
| Solar panels cannot be lifted to proper angle | Locking pin are not properly extracted | Pull and rotate both locking pins until they are self-retained. |
| Solar panels cannot be slid out | The knobs are not properly opened | Pull both knobs for each panel and block them open with a little rotation. |
| The power generated by photovoltaic panels is not as expected | The unit is not properly positioned | Position the machine as described in the chapter "POSITIONING". |
| | The photovoltaic panels are not properly aligned | Align the panels as described in the chapter "PHOTOVOLTAIC PANELS ALIGNMENT". |
| | The photovoltaic panels are dirty | Clean the photovoltaic panels as described in the chapter "MAINTENANCE". |
| The winch does not hold the load | The steel cable is not wound up correctly – the direction of rotation when lifting the mast is incorrect | Lay the steel cable in place correctly. |
| | Brake worn or faulty | Check the brake parts and renew worn parts. |
| | Greasy brake clutch | Clean or replace the clutch. |
| Friction disk brake does not close (does not hold the load). Friction disk brake does not open. Lowering is difficult | Handle not mounted properly – incorrectly tightened with the hexagonal screw | Reassemble the handle in the correct way. |

| Problem | Possible Cause | Solution |
|---|---|---|
| | Brake disk mechanism or brake disks distorted – or the crank is stuck | Unlock the brake lightly hitting the handle using the palm of the hand in counter clockwise direction (if necessary block the gearwheels until the handle becomes loose, grease the handle thread). |

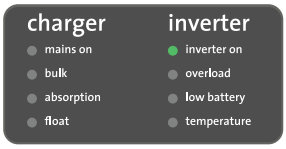
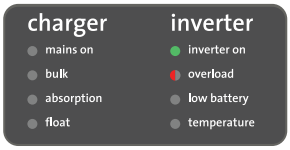
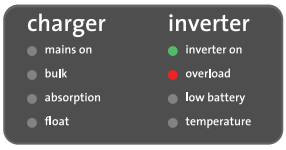
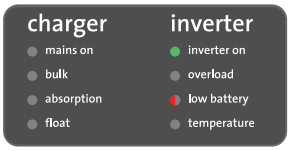
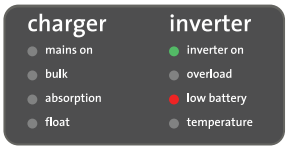
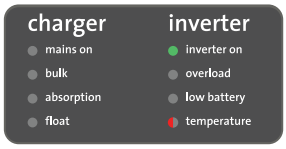
# Inverter/Charger LED Indicators

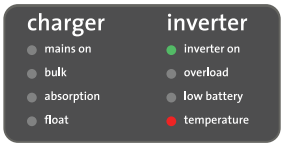
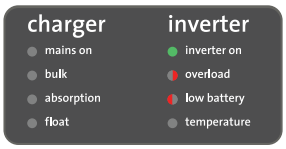
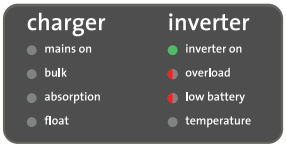
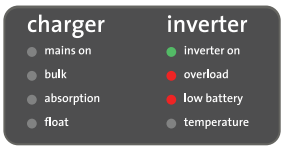
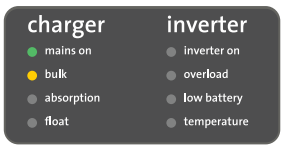
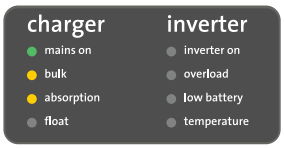
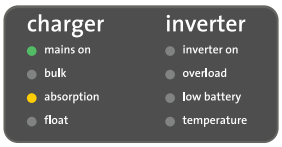
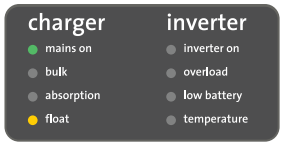
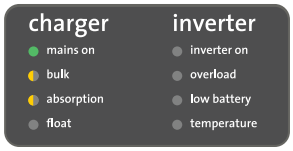
**Table 5-1. LED Indicators**

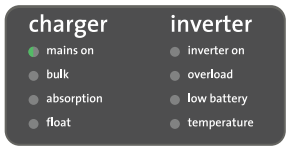
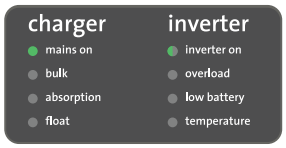
| | |
|---|---|
|  | LEDs off |
|  | LEDs blinking |
|  | LEDs illuminated |

See ***Table 5-2*** for charger/Inverter status.

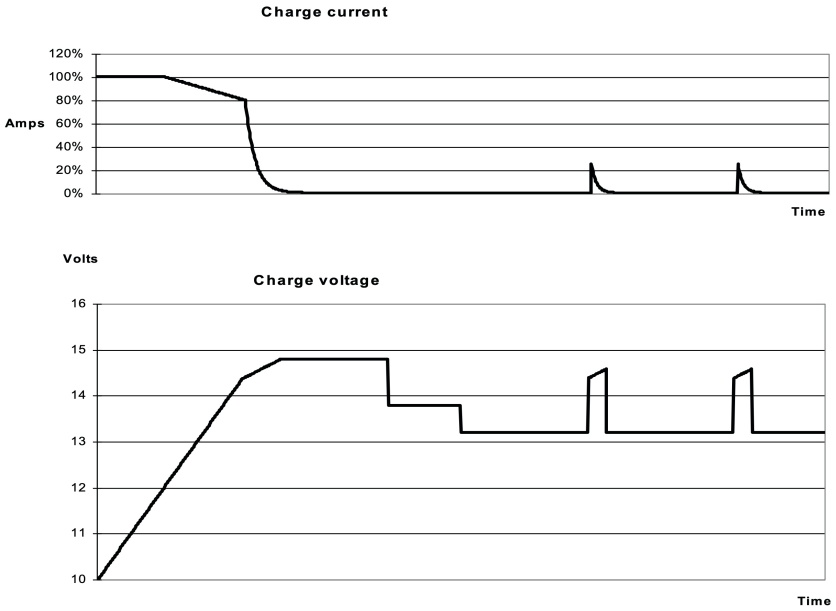
**Table 5-2. Charger/Inverter Status**

| | |
|---|---|
|  | **Inverting**<br>The inverter is on. Inverter power is supplied to the load. The "inverter" LED is on. |
|  | **Overload pre-alarm**<br>The nominal output of the inverter is exceeded. The "overload" LED is blinking |
|  | **Overload alarm**<br>The inverter is switched off due to overload or short circuit. The "overload" LED is on. |
|  | **Low battery pre-alarm**<br>The battery voltage is getting low. The battery is almost fully exhausted. The "low battery" LED is blinking. |
|  | **Low battery alarm**<br>The inverter has switched off due to low battery voltage. The "low battery" LED is blinking. |
|  | **Temperature pre-alarm**<br>The internal temperature is reaching a critical level. The "temperature" LED is blinking. |

| | |
|---|---|
|  | **Temperature alarm**<br>The inverter has switched off due it's internal temperature being too high. The "temperature" LED is on. |
|  | **Overload pre-alarm and low battery pre-alarm**<br>The battery is nearly exhausted and the nominal output of the inverter is exceeded. The "overload" and "low battery" LEDs are both blinking alternately. |
|  | **Ripple pre-alarm**<br>The ripple voltage on the battery terminals is too high. The "overload" and "low battery" LEDs are both blinking simultaneously. |
|  | **Ripple alarm**<br>The inverter has switched off due to excess ripple voltage on the battery terminals. The "overload" and "low battery" LEDs are both on. |
|  | **Bulk charging**<br>The AC input voltage is switched through and the charger operates in bulk mode. The "bulk" LED is on. |
|  | **Battery Safe**<br>The mains voltage is switched through and the charger is on. However, the set absorption voltage has not yet been reached. The "bulk" and "absorption" LEDs are both on. |
|  | **Absorption charging**<br>The mains voltage is switched through and the charger operates in absorption mode. The "absorption" LED is on. |
|  | **Float charging**<br>The mains voltage is switched through and the charger operates in float mode. The "float" LED is on. |
|  | **Equalize charging**<br>The mains voltage is switched through and the charger operates in equalize mode. The "bulk" and "absorption" LED are both blinking. |

| | |
|---|---|
|  | **Power Control**<br>The AC input is switched through. The AC output current is equal to the preset maximum input current. The charge current is reduced to 0A. The "mains on" LED is blinking. |
|  | **Power Assist**<br>The AC input is switched through, but the load requires more current than the preset maximum input current. The inverter is switched on to supply the required additional current. The "mains on" LED is on and the "inverter" LED is blinking. |

# 4-stage Charging




## Bulk

Entered when charger is started. Constant current is applied until nominal battery voltage is reached, depending on temperature and input voltage, after which constant power is applied up to the point where excessive gassing is starting (14.4 V resp. 28.8 V, temperature compensated).

## Battery Safe

The applied voltage to the battery is raised gradually until the set Absorption voltage is reached. The Battery Safe Mode is part of the calculated absorption time.

## Absorption

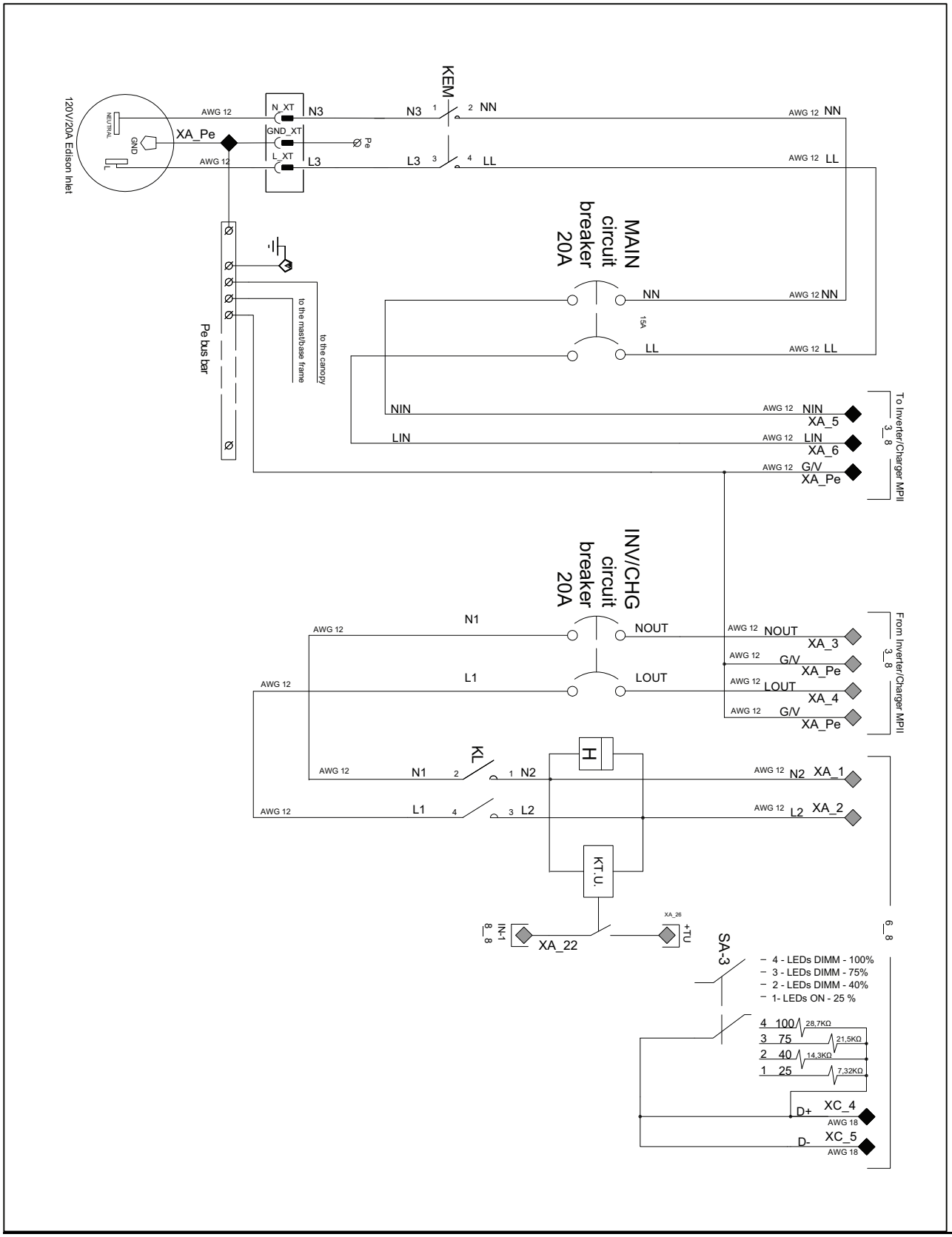
The absorption period is dependent on the bulk period. The maximum absorption time is the set Maximum Absorption time.

## Float

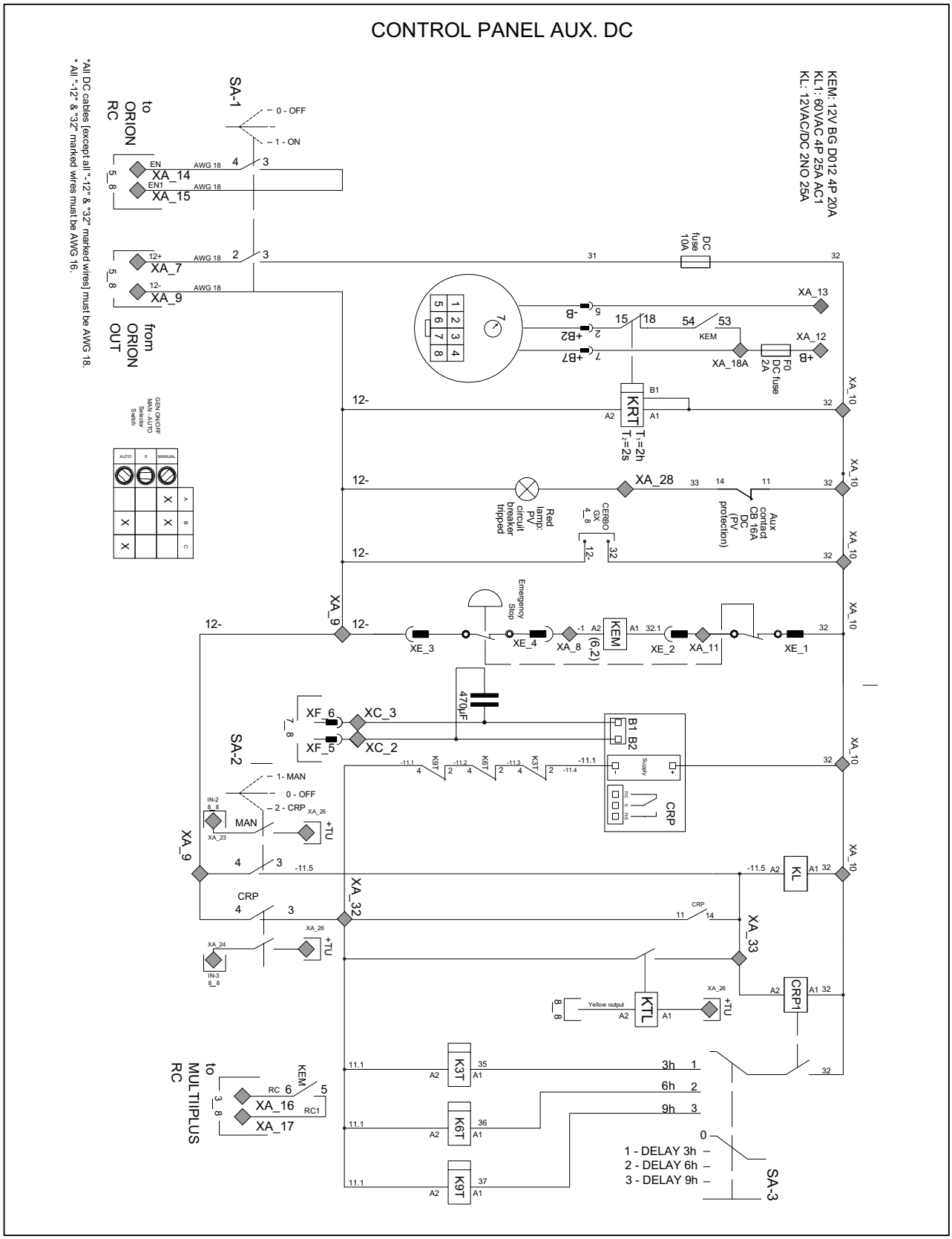
Float voltage is applied to keep the battery fully charged.

# Section 6: Wiring Diagrams

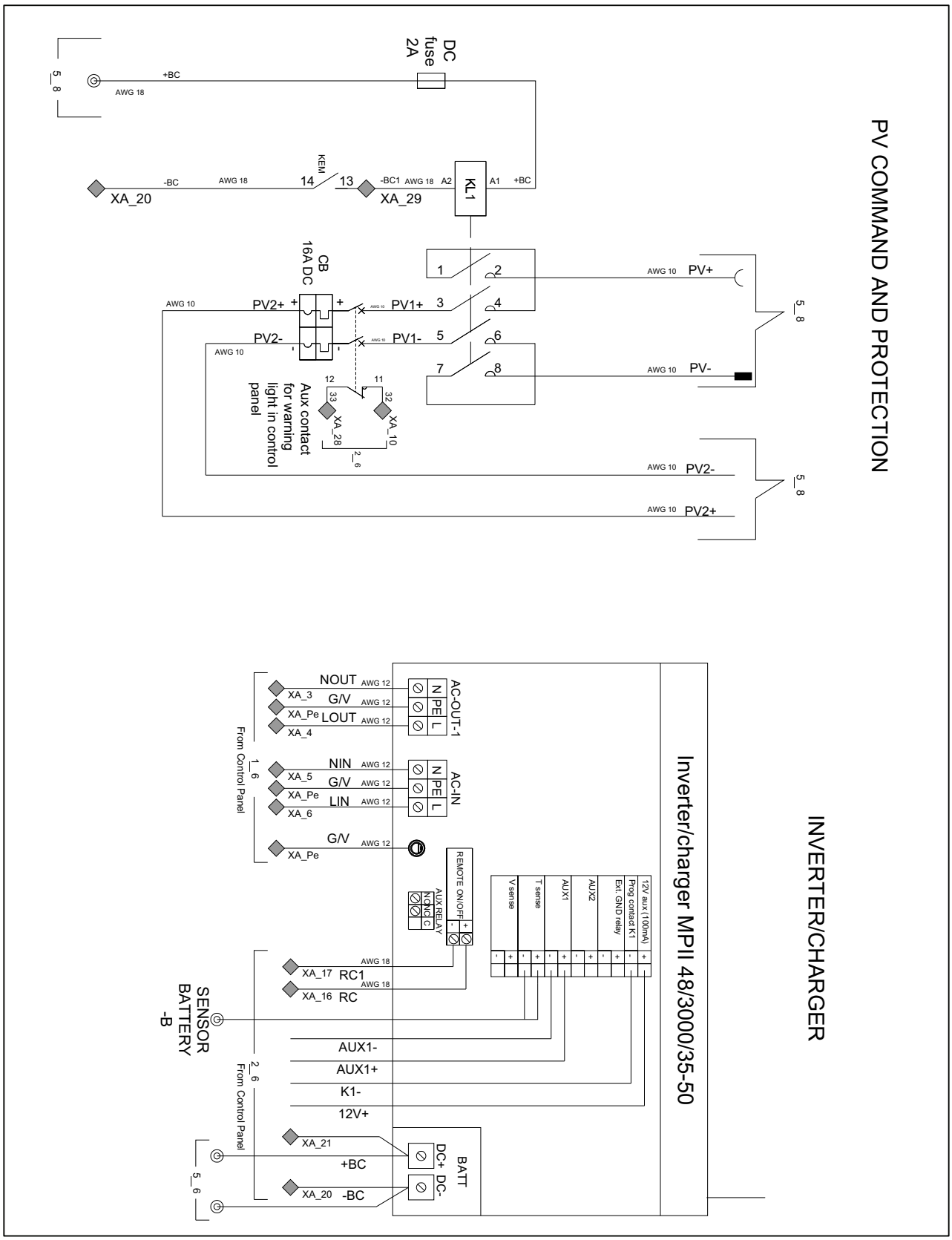
## AC Input and Main Circuit Breakers



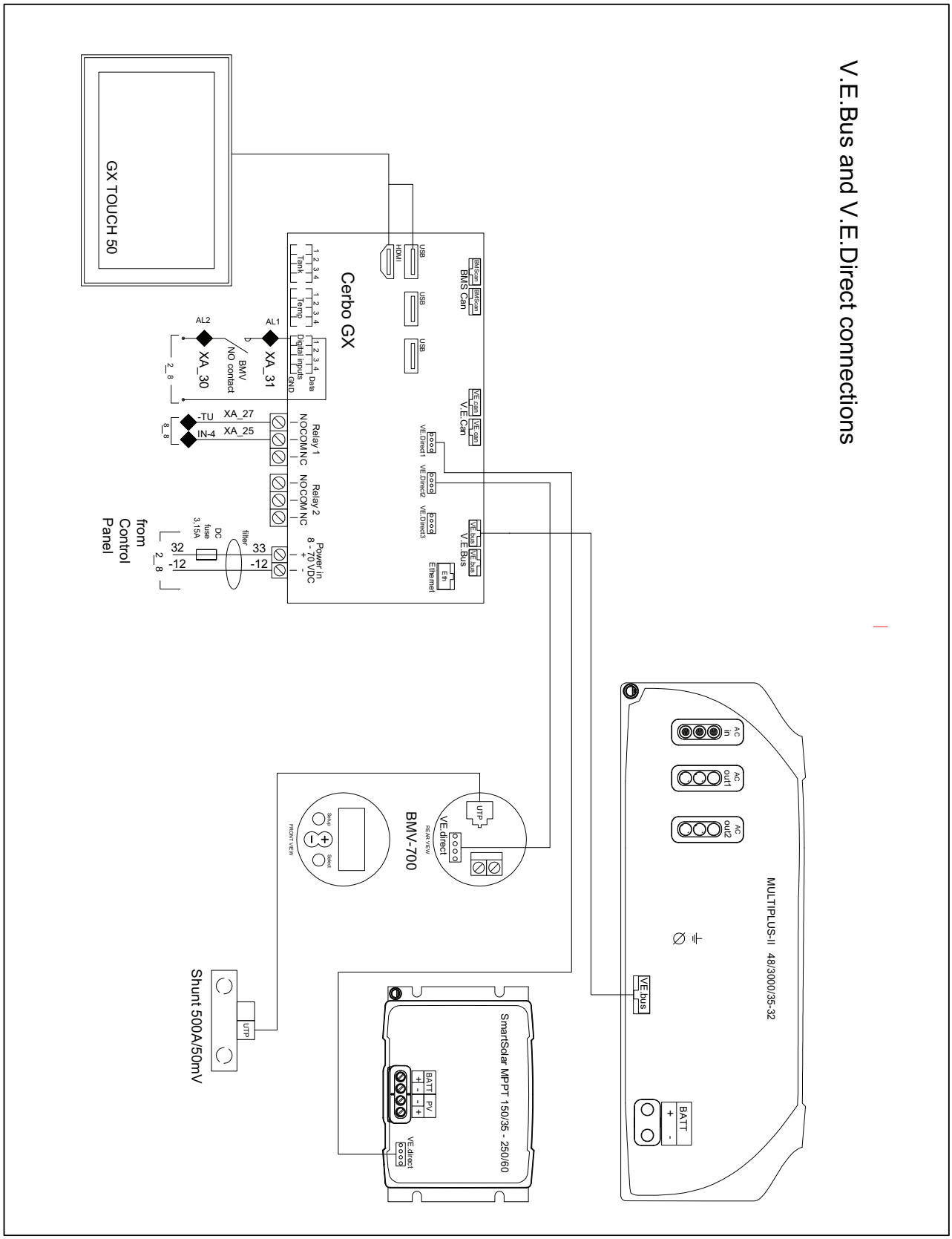
# Control Panel



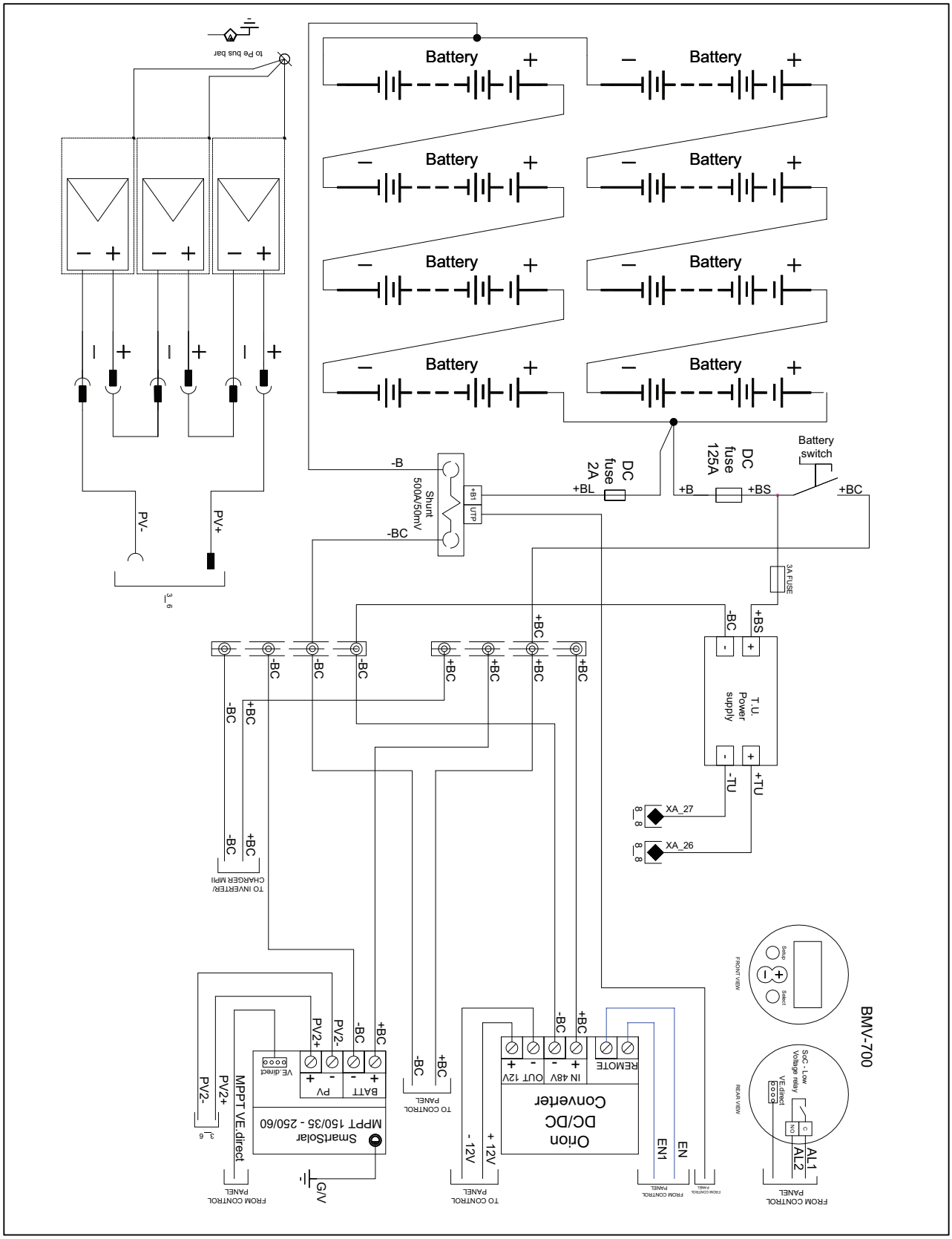
# PV Command/Protection and Inverter/Charger



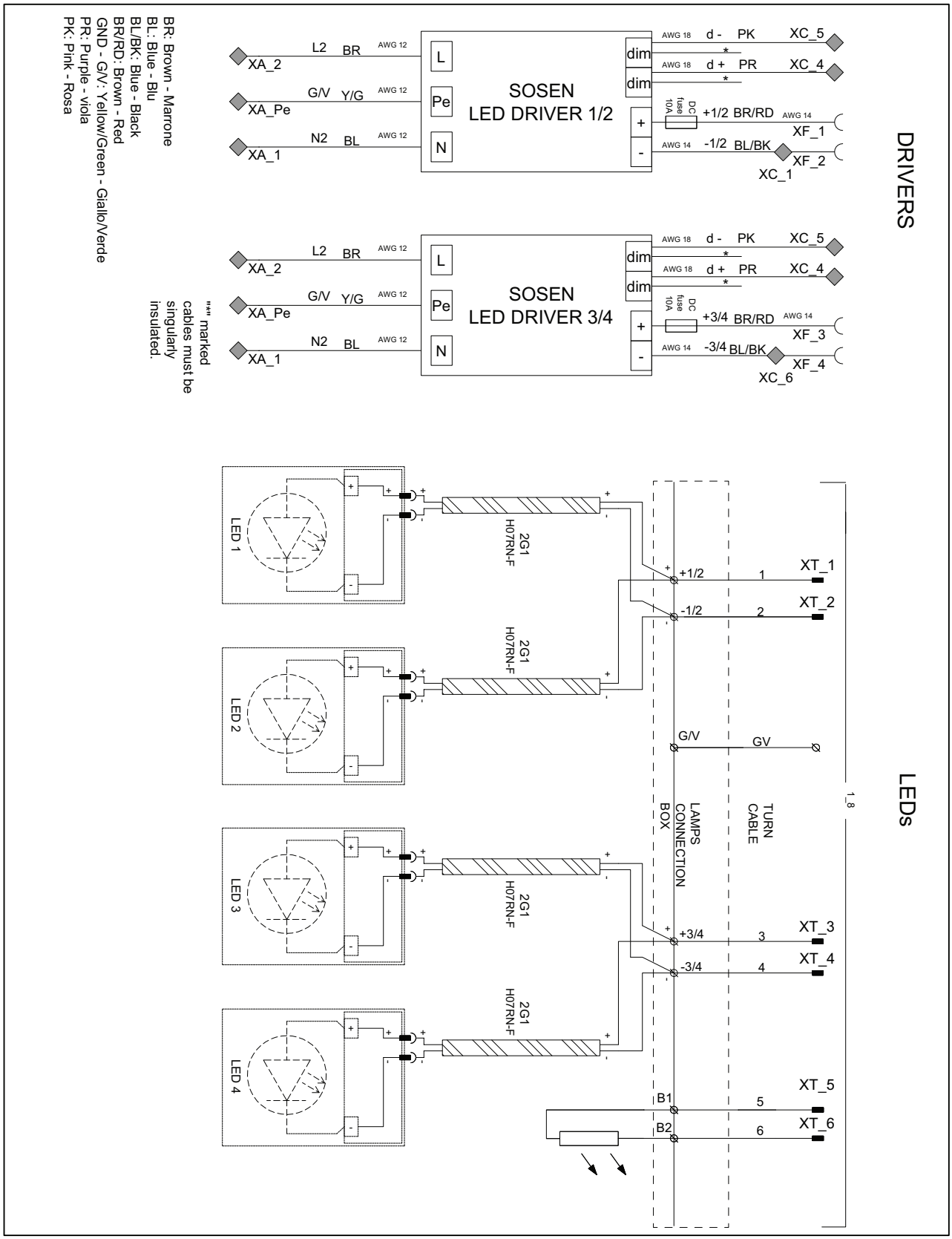
# V.E. Bus and V.E. Direct Connections



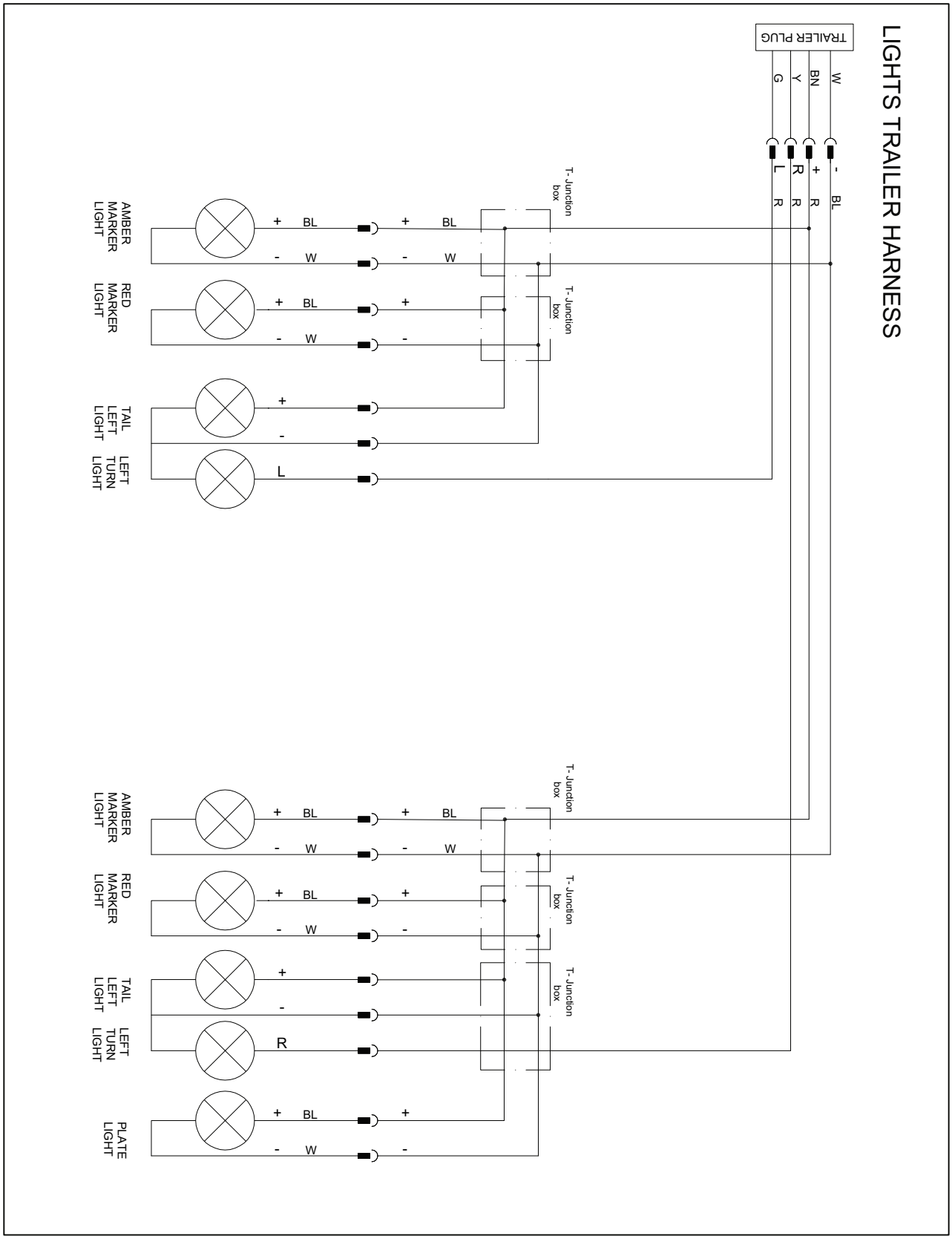
# Solar Panels and Battery Box



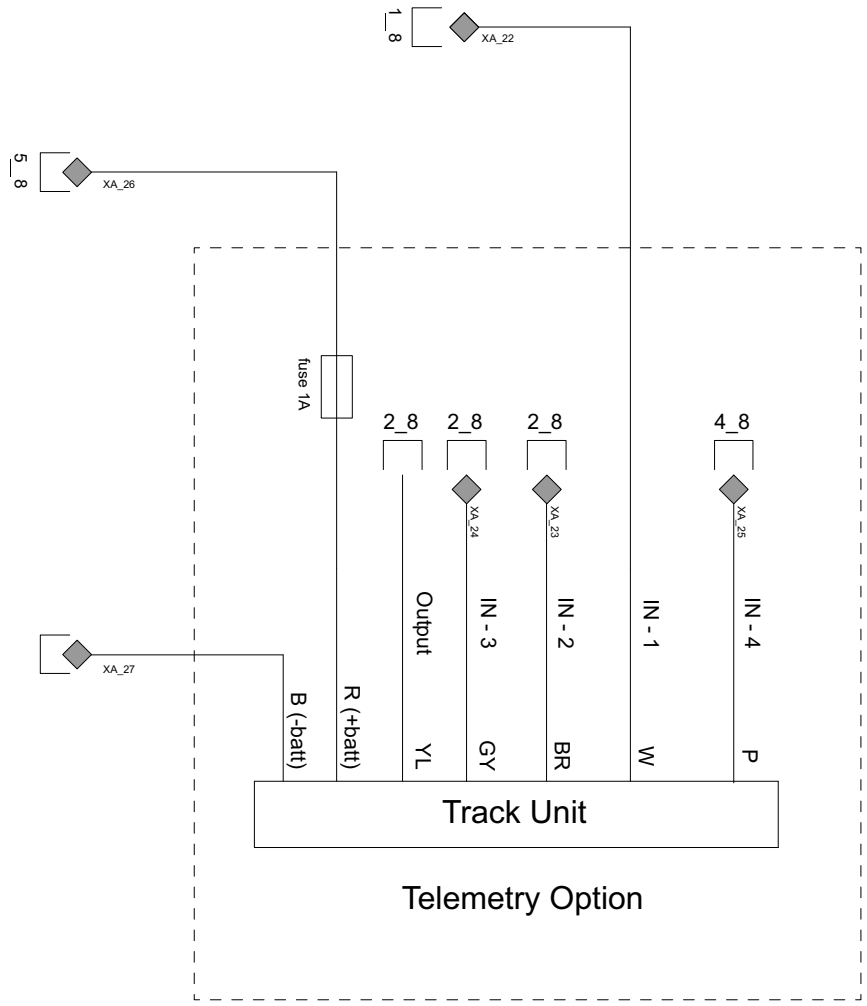
# LEDs and Drivers



# Lights Trailer Harness



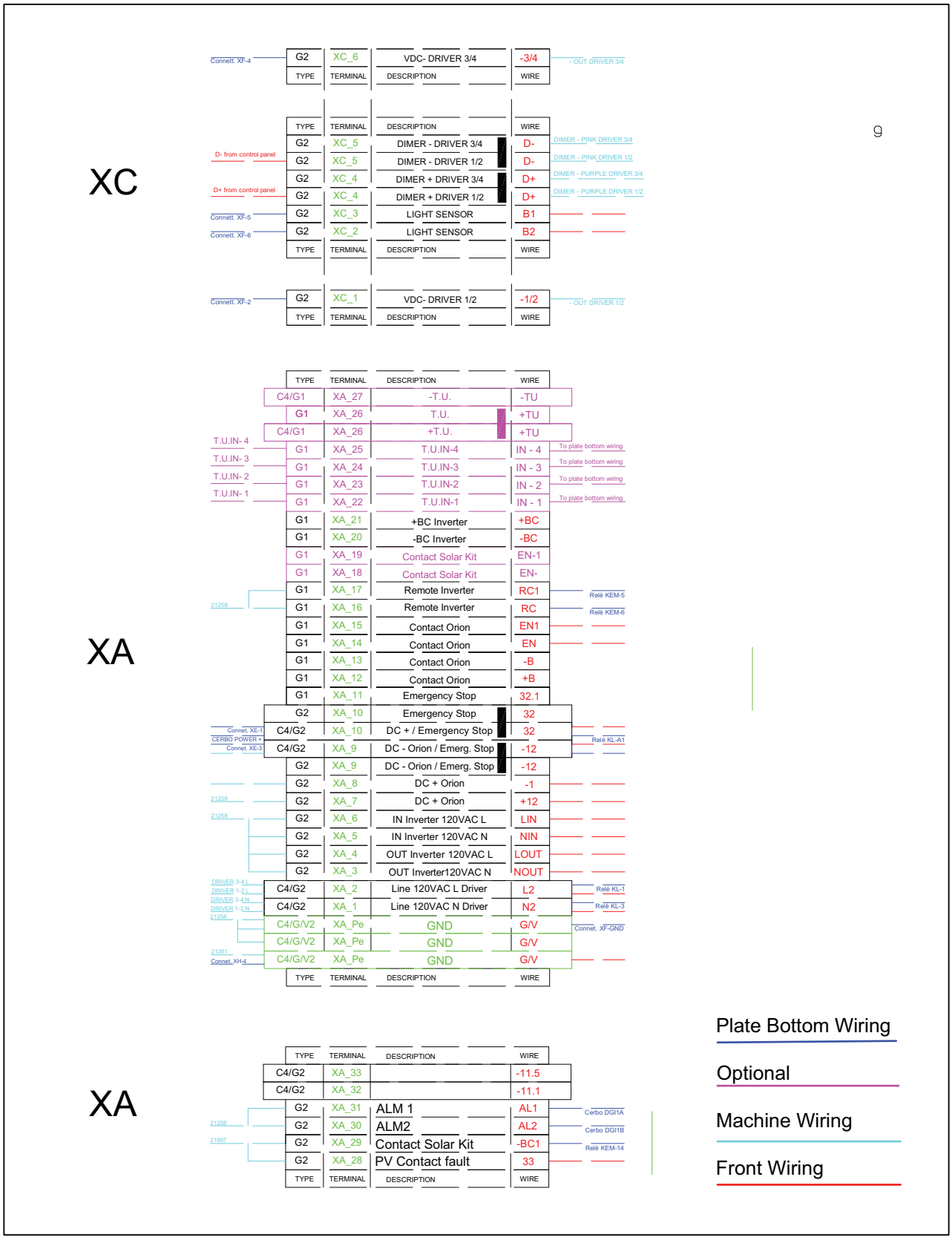
# LEDs and Drivers




R: red
B: blue
P: pink
W: white
GY:grey
BR: brown
LB: light blue
O: orange
YL: yellow

For Track Unit:
16577 - 1CO 16A/12VDC AgNi mini relay & 15927- 1C Relay socket - KTL Relay
15929 - 1CO 16A/230VAC AgNi mini relay & 15927- 1C Relay socket - KT.U. Relay
18075 - Automotive blade fuse 1A-32V & 21021 - Automotive blade fuse holder 40A 50V - T.U.
22340 - Automotive blade fuse 3A-32V & 21021 - Automotive blade fuse holder 40A 50V - T.U. Power supply
22343 - DC/DC Converter - Vin18 → 75 V c.c., Vout 12V cc - T.U. Power supply

# Terminal Boards/Connections Pin Out



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# Section 7: NHTSA Trailer Equipment Requirements

## Reporting Safety Defects to the United States Government

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 Generac Mobile.

If NHTSA receives similar 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 GMASD, or Generac Mobile.

To contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-888-327-4236 (TTY:1-800-424-9153), go to http://www.safercar.gov; or write to:

Administrator

NHTSA

400 Seventh Street, SW.

Washington, DC 20590

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

## Tire Safety Information

The following section contains tire safety information as required by 49 CFR 575.6. It will cover the following:

- Tire labeling, including a description and explanation of each marking on tires provided with the vehicle, and information about the location of the Tire Identification Number (TIN);
- Recommended tire inflation pressure, including a description and explanation of:
  - Recommended cold tire inflation pressure,
  - The vehicle placard and tire inflation pressure label and their location in the vehicle
  - Adverse safety consequences of underinflations (including tire failure), and
  - Measuring and adjusting air pressure to achieve proper inflation;
- Glossary of tire terminology, including “cold tire pressure”, “maximum inflation pressure,” and “recommended inflation pressure,” and other nontechnical terms;
- Tire care, including maintenance and safety practices;
- Vehicle load limits, including a description and explanation of:
  - Locating and understanding load limit information, total load capacity, seating capacity, towing capacity, and cargo capacity,
  - Calculating total and cargo load capacities with varying seating configurations including quantitative examples showing/illustrating how the vehicle’s cargo and luggage capacity decreases as the combined number and size of occupants increases,
  - Determining compatibility of tire and vehicle load capabilities,
  - Adverse safety consequences of overloading on handling and stopping and on tires.

### Steps for Determining Correct Load Limit – Trailer

Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a Federal certification / VIN label that is located on the forward half of the left (road) side of the unit. This certification / VIN label will indicate the trailer’s Gross Vehicle Weight Rating (GVWR). This is the most weight the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity. Cargo can be added to the trailer, up to the maximum weight specified on the placard. The combined weight of the cargo is provided as a single number. In any case, remember: the total weight of a fully loaded trailer cannot exceed the stated GVWR.

For trailers with living quarters installed, the weight of water and propane also need to be considered. The weight of fully filled propane containers is considered part of the weight of the trailer before it is loaded with cargo, and is not considered part of the disposable cargo load. Water, however, is a disposable cargo weight and is treated as such. If there is a fresh water storage tank of 100 gallons, this tank when filled would weigh about 800 pounds. If more cargo is being transported, water can be off-loaded to keep the total amount of cargo added to the vehicle within the limits of the GVWR so as not to

overload the vehicle. Understanding this flexibility will allow you, the owner, to make choices that fit your travel needs.

When loading your cargo, be sure it is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as reasonable. Too many items on one side may overload a tire. The best way to know the actual weight of the vehicle is to weigh it at a public scale. Talk to your dealer to discuss the weighing methods needed to capture the various weights related to the trailer. This would include the weight empty or unloaded, weights per axle, wheel, hitch or king-pin, and total weight.

Excessive loads and/or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the certification / VIN label and/or on the Tire Placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

**Trailers 10,000 lbs (4,536 kg) GVWR or Less**

1. Locate the statement "The weight of cargo should never exceed XXX kg or XXX lbs." on your vehicle's placard.
2. This figure equals the available amount of cargo and luggage load capacity.
3. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.

**Trailers over 10,000 lbs (4,536 kg) GVWR**

**NOTE:** These trailers are not required to have a tire information placard on the vehicle.

1. Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.
2. Locate the GVWR of the trailer on your trailer's VIN (Certification) label.
3. Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and may not be safely exceeded.

## Steps for Determining Correct Load Limit – Tow Vehicle

1. Locate the statement "The combined weight of occupants and cargo should never exceed XXX kg or XXX lbs." on your vehicle's placard.
2. Determine the combined weight of the driver and passengers that will be riding in your vehicle.
3. Subtract the combined weight of the driver and passengers from XXX kg or XXX lbs.
4. The resulting figure equals the available amount of cargo and luggage load capacity. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb passengers in your vehicle, the amount of available cargo and luggage load capacity is 650 lbs. (1400-750 (5x150) = 650 lbs.)
5. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity calculated in Step 4.
6. If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle's manual to determine how this reduces the available cargo and luggage load capacity of your vehicle.

## Glossary of Tire Terminology

Accessory weight means the combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio, and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

Bead means the part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

Bead separation means a breakdown of the bond between components in the bead.

Bias ply tire means a pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

Carcass means the tire structure, except tread and sidewall rubber which, when inflated, bears the load.

Chunking means the breaking away of pieces of the tread or sidewall.

Cord means the strands forming the plies in the tire.

Cord separation means the parting of cords from adjacent rubber compounds.

Cracking means any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

Curb weight means the weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

Cold inflation pressure means the tire pressure when the vehicle hasn't been driven for at least three hours.

Extra load tire means a tire designed to operate at higher loads and higher inflation pressure than the corresponding standard tire.

Groove means the space between two adjacent tread ribs.

Gross Axle Weight Rating or GAWR means the value specified by the vehicle manufacturer as the loadcarrying capacity of a single axle system, as measure at the tire-ground interfaces.

Gross Vehicle Weight Rating or GVWR means the value specified by the manufacturer as the loaded weight of a single vehicle.

Hitch weight means the downward force exerted on the hitch ball by the trailer coupler.

Innerliner means the layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Innerliner separation means the parting of the innerliner cord material in the carcass.

Light truck (LT) tire means a tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

Load rating means the maximum load that a tire is rated to carry for a given inflation pressure.

Maximum load rating means the load rating for a tire at the maximum permissible inflation pressure for that tire.

Maximum permissible inflation pressure means the maximum cold inflation pressure to which a tire may be inflated.

Maximum loaded vehicle weight means the sum of (a) Curb weight; (b) Accessory weight; (c) Vehicle capacity weight; and (d) Production options weight.

Measuring rim means the rim on which a tire is fitted for physical dimension requirements.

Non-pneumatic rim means a mechanical device which, when a non-pneumatic tire assembly incorporates a wheel, supports the tire, and attaches, either integrally or separably, to the wheel center member and upon which the tire is attached.

Non-pneumatic spare tire assembly means a nonpneumatic tire assembly intended for temporary use in place of one of the pneumatic tires and rims that are fitted to a passenger car in compliance with the requirements of this standard.

Non-pneumatic tire means a mechanical device which transmits, either directly or through a wheel or wheel center member, the vertical load and tractive forces from the roadway to the vehicle, generates the tractive forces that provide the directional control of the vehicle and does not rely on the containment of any gas or fluid for providing those functions.

Non-pneumatic tire assembly means a non-pneumatic tire, alone or in combination with a wheel or wheel center member, which can be mounted on a vehicle.

Normal occupant weight means 68 kilograms (150 lbs.) times the number of occupants specified in the second column of Table I of 49 CFR 571.110.

Occupant distribution means distribution of occupants in a vehicle as specified in the third column of Table I of 49 CFR 571.110.

Open splice means any parting at any junction of tread, sidewall, or innerliner that extends to cord material.

Outer diameter means the overall diameter of an inflated new tire.

Overall width means the linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

Passenger car tire means a tire intended for use on passenger cars, multipurpose passenger vehicles, and trucks, that have a gross vehicle weight rating (GVWR) of 10,000 pounds or less.

Pin weight means the downward force applied to the 5th wheel or gooseneck ball, by the trailer kingpin or gooseneck coupler.

Ply means a layer of rubber-coated parallel cords.

Ply separation means a parting of rubber compound between adjacent plies.

Pneumatic tire means a mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

Production options weight means the combined weight of those installed regular production options weighing over 2.3 kilograms in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

Radial ply tire means a pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

Recommended inflation pressure means the proper Cold Inflation Pressure as shown on the Tire Information label.

Reinforced tire means a tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard fire.

Rim means a metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

Rim diameter means nominal diameter of the bead seat.

Rim size designation means rim diameter and width.

Rim type designation means the industry of manufacturer's designation for a rim by style or code.

Rim width means nominal distance between rim flanges.

Section width means the linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

Sidewall means that portion of a tire between the tread and bead.

Sidewall separation means the parting of the rubber compound from the cord material in the sidewall.

ST tire means a tire designed for use only on trailers drawn on a road.

Test rim means the rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire.

Tread means that portion of a tire that comes into contact with the road.

Tread rib means a tread section running circumferentially around a tire.

Tread separation means pulling away of the tread from the tire carcass.

Treadwear indicators (TWI) means the projections within the principal grooves designed to give a visual indication of the degrees of wear on the tread.

Vehicle capacity weight means the rated cargo and luggage load plus 68 kilograms times the vehicle's designated seating capacity.

Vehicle maximum load on the tire means that load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

Vehicle normal load on the tire means that load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table I of 49 CFR 571.110) and dividing by two.

Wheel center member means, in the case of a nonpneumatic tire assembly incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the nonpneumatic rim and provides the connection between the nonpneumatic rim and the vehicle; or in the case of a nonpneumatic tire assembly not incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the nonpneumatic tire and provides the connection between the tire and the vehicle.

Wheel-holding fixture means the fixture used to hold the wheel and tire assembly securely during testing.

## Tire Safety

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by 49 CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following website:

http://www. nhtsa. dot. gov/cars/rules/TireSafety/ridesonit/tires_index.html

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and others from avoidable breakdowns and accidents
- Improve fuel economy
- Increase the life of your tires

This booklet presents a comprehensive overview of tire safety, including information on the following topics:

- Basic tire maintenance
- Uniform Tire Quality Grading System
- Fundamental characteristics of tires
- Tire safety tips

Use this information to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

### Basic Tire Maintenance

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.

### Finding Your Vehicle's Recommended Tire Pressure And Load Limits

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire inflation pressure
- Vehicle capacity weight (VCW – the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR – the maximum weight the axle systems are designed to carry)

Both placards and certification labels are permanently attached to the trailer near the left front.

### Understanding Tire Pressure And Load Limits

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure – measured in pounds per square inch (psi) – a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kpa), which is the metric measure used internationally.)

Manufacturers of passenger vehicles and light trucks determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.)

Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

### Checking Tire Pressure

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- With radial tires, it is usually not possible to determine underinflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.

The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours.

When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

### Steps For Maintaining Proper Tire Pressure

1. Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.
2. Record the tire pressure of all tires.
3. If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
4. If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.
5. At a service station, add the missing pounds of air pressure to each tire that is underinflated.
6. Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

### Tire Size

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

### Tire Tread

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

### Tire Balance And Wheel Alignment

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that

they are positioned correctly relative to the vehicle's frame. These adjustments require special equipment and should be performed by a qualified technician.

### Tire Repair

The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

### Tire Fundamentals

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

### Information on Passenger Vehicle Tires

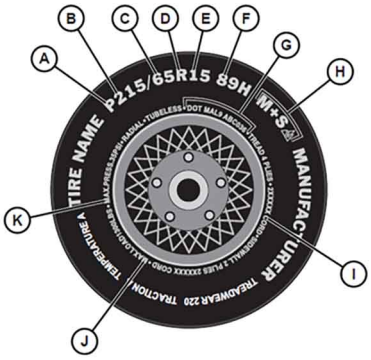


***Figure 7-1. Passenger Vehicle Tires***

| | |
|---|---|
| A | "P" indicates the tire is for passenger vehicles. |
| B | This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire. |
| C | This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement. |
| D | "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years. |
| E | This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter. |
| F | (Number) This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer.<br>**NOTE:** You may not find this information on all tires because it is not required by law.<br><br>(Letter) The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed below.<br>**NOTE:** You may not find this information on all tires because it is not required by law.<br>**NOTE:** See ***Figure 7-1*** for complete list of letter and speed ratings. |
| G | U.S. DOT Tire Identification Number. This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall. |
| H | The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability. |
| I | Tire Ply Composition and Materials Used. The number |

| | |
|---|---|
| | of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others. |
| J | Maximum Load Rating. This number indicates the maximum load in kilograms and pounds that can be carried by the tire. |
| K | Maximum Permissible Inflation Pressure. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions. |

**Table 7-1. Tire Letter and Speed Rating**

| Letter Rating | Speed Rating |
|---|---|
| Q | 99 MPH |
| R | 106 MPH |
| S | 112 MPH |
| T | 118 MPH |
| U | 124 MPH |
| H | 130 MPH |
| V | 168 MPH |
| Y | 186 MPH |

**NOTE:** For tires with a maximum speed capability over 149 mph, tire manufacturers sometimes use the letters ZR. For those with a maximum speed capability over 186 mph, tire manufacturers always use the letters ZR.

### Uniform Tire Quality Grading (UTQGS)

Quality grades can be found where applicable on the tire sidewall between tread shoulder and maximum section width. For example: TREADWEAR 200 TRACTION AA.

### Temperature A

All passenger car tires must conform to federal safety requirements in addition to these grades.

### Treadwear

The treadwear grade is a comparative rating based on the war rate of the tire when tested under controlled conditions on a specified government test course. For example, a tire graded 150 would wear one and one-half (1.5) times as well on the government course as a tire graded 100. The relative performance of tires depends upon the actual conditions of their use, however, and may depart significantly from the norm due to variations in driving habits, service practices and differences in road characteristics and climate.

### Traction

The traction grades, from highest to lowest, are AA, A, B, and C. Those grades represent the tire's ability to stop on wet pavement as measured under controlled conditions on specified government test surfaces of asphalt and concrete. A tire marked C may have poor traction performance.

**NOTE:** The traction grade assigned to this tire is based on straight-ahead braking traction tests, and does not include acceleration, cornering, hydroplaning, or peak traction characteristics.

### Temperature

The temperature grades are A (the highest), B, and C, representing the tire's resistance to the generation of heat and its ability to dissipate heat when tested under controlled conditions on a specified indoor laboratory test wheel. Sustained high temperature can cause the material of the tire to degenerate and reduce tire life, and excessive temperature can lead to sudden tire failure. The grade C corresponds to a level of performance which all passenger car tires must meet under the Federal Motor Safety Standard No. 109. Grades B and A represent higher levels of performance on the laboratory test wheel than the minimum required by law.

**NOTE:** The temperature grade for this tire is established for a tire that is properly inflated and not overloaded. Excessive speed, under-inflation, or excessive loading, either separately or in combination, can cause heat buildup and possible tire failure.

### Additional Information on Light Truck Tires

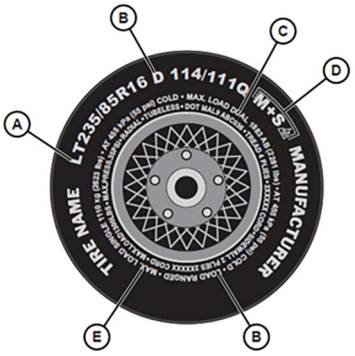


***Figure 7-2. Light Truck Tires***

| | |
|---|---|
| A | The “LT” indicates the tire is for light trucks. An “ST” is an indication the tire is for trailer use only. |
| B | Load Range. This information identifies the tire’s load-carrying capabilities and its inflation limits. |
| C | Maximum Load Dual. This information indicates the maximum load and tire pressure when the tire is used as a dual, that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).* |
| D | The “M+S” or “M/S” indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability. |
| E | This information indicates the maximum load and tire pressure when the tire is used as a single.* |

* Maximum load is presented in kilograms and pounds (kg/lbs). Maximum tire pressure is presented in kilopascals and pounds per square inch (kPa/psi) for when the tire is cold.

**Preventing Tire Damage**

- Slow down if you have to go over a pothole or other object in the road.
- Do not run over curbs of foreign objects in the roadway, and try not to strike the curb when parking.

**Tire Safety Checklist**

- Check tire pressure regularly (at least once a month), including the spare.
- Inspect tires for cracks, foreign objects, uneven wear patterns on the tread, or other signs of wear or trauma.
- Remove bits of glass and foreign objects wedged in the tread.
- Verify your tire valves have valve caps.
- Check tire pressure before going on a long trip.
- Do not overload your vehicle. Check the tire information placard or owner’s manual for the maximum recommended load for the vehicle.

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