FLASH TECHNOLOGY

# PORTABLE AIRFIELD LIGHTING BOX

USER MANUAL


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87830_PALB_UserManual_RevC

# Contents

# Front Matter

**Abstract**

This manual contains information and instructions for operating and maintaining the Portable Airfield Lighting Box (PALB).



**Disclaimer**

While every effort has been made to ensure that the information in this manual is complete, accurate and up-to-date, Flash Technology assumes no liability for damages resulting from any errors or omissions in this manual, or from the use of the information contained herein. Flash Technology reserves the right to revise this manual without obligation to notify any person or organization of the revision.

In no event will Flash Technology be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of or the inability to use this manual.

# 1.0 Safety & Usage

The following symbols indicate important safety warnings and precautions throughout this manual:


WARNING indicates that serious bodily harm or death may result from failure to adhere to the precautions.


CAUTION indicates that damage to equipment may result if the instructions are not followed.


NOTE suggests optimal conditions and provides additional information.

WIRELESS feature or function.

INTERACTION with the controlled product is required for this feature or function.

## 1.1 Battery Precautions


The battery contains lead and other compounds known to the State of California to cause cancer and reproductive harm. Please handle with care and wash your hands thoroughly after handling the battery.


Use extreme caution when handling the battery. This product is capable of generating enormous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, rings) before attempting to handle or remove the battery.


Charge your battery periodically. Permanent damage and reduced capacity will result if the battery is not correctly maintained.

The rate of battery self-discharge is very dependent upon temperature. The warmer the temperature, the faster the batteries will discharge.

## 1.2 Recycling

This product required the extraction and use of natural resources. It may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle the product in an appropriate way that will ensure most of the materials are reused or recycled appropriately. Check your local municipality for electronics recyclers.

The symbol indicates that this product complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

The battery is a rechargeable lithium ion battery. Consult your local laws for information on recycling.

## 1.3 Wireless Precautions


Keep the Handheld Controller at a distance of at least 3 ft. (1 m) from the antennas of controlled products or other Handheld Controllers. It sends out a powerful radio signal that could damage sensitive receiver circuitry if operated at close range.

## 1.4 Warranty Disclaimer


This manual will familiarize you with the features and operating standards of the product. Failure to comply with the use, storage, maintenance or installation instructions detailed in this manual could void the user warranty.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Installation work must be done by a qualified person(s) in accordance with all application local codes and standards.

# 2.0 Specifications

| Physical | |
|---|---|
| Dimensions | 117.84 in (2993.14 mm) total length<br>48 in (1219.2 mm) width<br>59.44 in (1509.78 mm) height |
| Weight | 2,200 lbs. |
| Battery Charger | 1x 20A ProSport Charger |
| Battery | Large 2x AGM battery bank to recharge the airfield lights' batteries during storage. |

## 2.1 PALB Weight Ratings

| Item | Weight (lbs.) |
|---|---|
| Sling Load (shackles) | 22,000 each |
| Vehicle Curb Weight* | 1,154 |
| Payload Maximum | 2,346 |
| Gross Weight Maximum (with lights) | 3,500 |

*Vehicle Curb Weight does not include the onboard batteries. Each battery weighs 69 lbs.

## 2.2 PALB Charging Times (48 lanterns)

The following charge times are for the A704 lights – large with 50Ah batteries *(Assumes onboard batteries are fully charged, with temperature 25°C and 90% charge efficiency)*

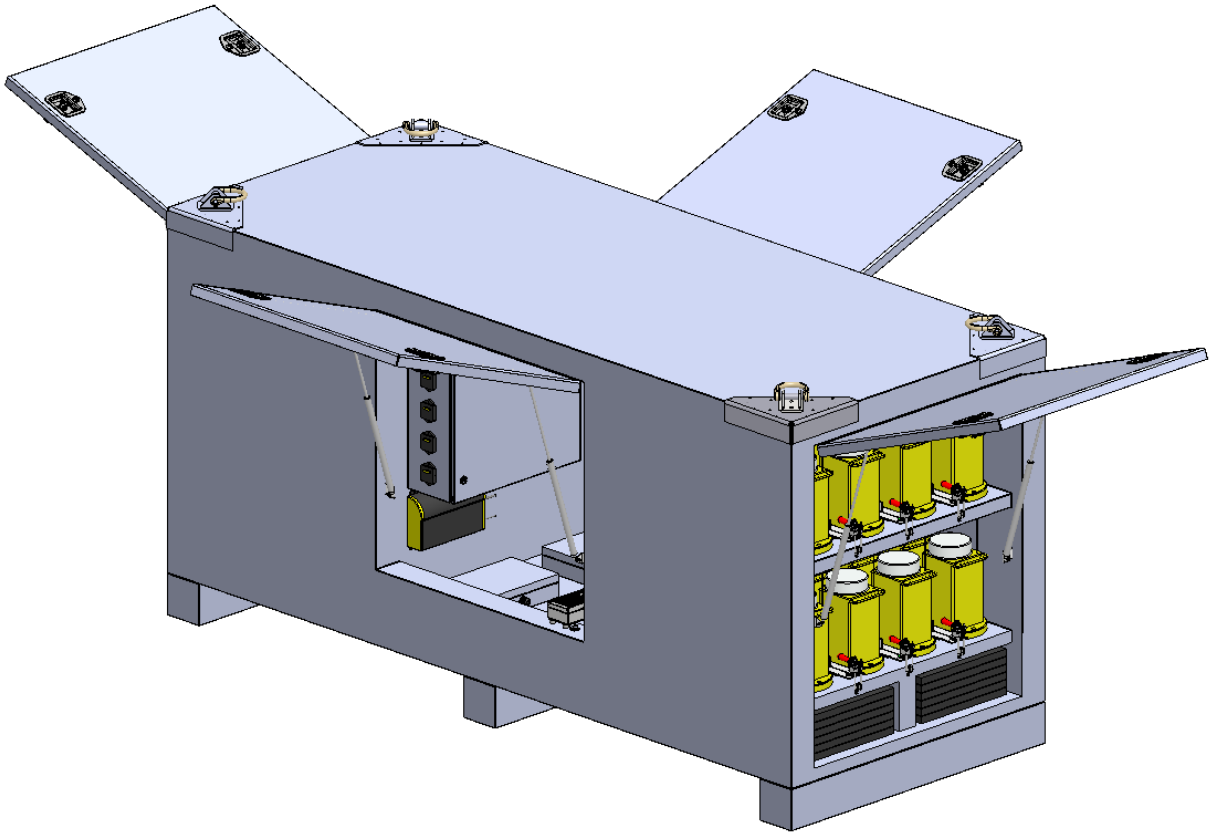
| Battery State | Bank E-G:<br>16 lanterns + 2 HHC*<br>(Hours) | Bank A-D:<br>32 lights<br>(Hours) | Total Hours |
|---|---|---|---|
| 50% depleted | 10 | 16 | 26 |
| Fully depleted | 20 | 32 | 52 |

*HHC = Handheld Controller

# 3.0 PALB Overview

The Portable Airfield Lighting Box (PALB) is a portable airfield lighting system designed for quick and easy deployment of solar portable airfield lights. The PALB can store up to 48 A704 lights. The PALB can be transported via forklift, flat deck or lifted by a crane using the 4 top-mounted slings (shackles).

The PALB system is organized to transport and charge runway edge lights, runway threshold lights, and 2 Handheld Controllers (HHC). It is configurable for up to a 3,800 ft. runway.



# 4.0 PALB Operation & Safety

## 4.1 General Precautions

Always observe the included warning signs and stickers when working in or around the enclosure.

When the side and rear doors are open it is important to pay attention to the door height to avoid injury. Always watch your head when the doors are open or if you are working inside the enclosure.

Never step on any of the electrical distribution boxes as it may expose the technician to live voltages and possible bodily harm.

The light fixtures (A704 – Large) are 23 lbs. Do not lift the fixtures from an extended position. Always lift with your back to avoid injury.

## 4.2 Storage

The PALB, when fully loaded with lights, will experience best results if placed under a canopy or have the doors opened while not in transit to keep peak temperatures down. This will prevent excessive draining of the batteries while not in use due to high temperatures. Batteries inside the PALB and A704 light fixtures should be charged at least every 6 months to prevent permanent damage.

## 4.3 Door Latch Operation

Each door is equipped with a left and right latch. When the T-Handle on the latch is vertical, the door latch is in its locked state. To turn the latch, swing the T-handle out towards the user and turn ¼ of a turn. The T-handle should now be horizontal and the door is now unlocked. You can use the T-handle to pull open the door. Each latch is equipped with a lock. Keys are provided in separate packaging inside the PALB.

# 5.0 A704 Light Fixture and Handheld Controller (HHC)

Refer to the user manual for full A704 and HHC functionality.

**IMPORTANT!** Always connect the HHC to charging cable (external wall plug or PALB charging circuit) when not in use.

# 6.0 Loading and Unloading

Do not connect or disconnect lights while the Light Charging Disconnect breaker is ON, as this could allow shorting the charge cable and blowing a system fuse. Always place the PALB in a well-ventilated location when charging.

## 6.1 Loading Safety Precautions

When loading the A704 light fixtures into the PALB, distribute the lights evenly to stabilize the load during transport.

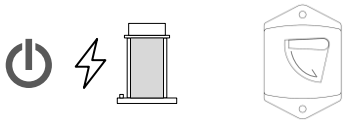
## 6.2 A704 Loading Procedure

Follow this procedure when loading the A704 fixtures into the PALB. Ensure the A704 is put into storage mode before loading in the PALB.

**NOTE!** If the lanterns are placed in “Continuous High” mode they will not automatically go into “Storage Mode” after 24 hours of not receiving ambient light.

1. At the breakers on the Main Power Box, select a charging source:

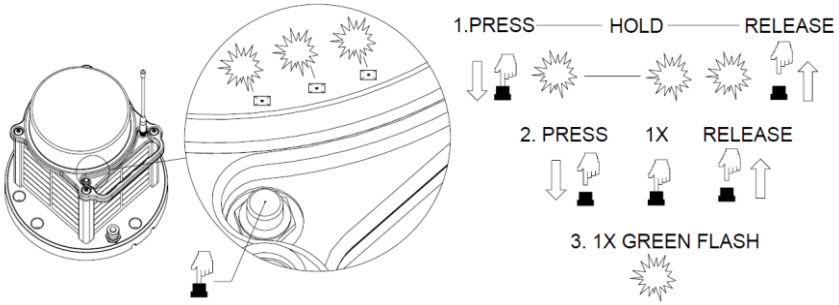
2. Set both “Light Charging Disconnect Banks” breakers to ON. 12-volt power will now be present at the end of each A704 charging cable.



**NOTE**!! If not charging all banks at the same time, it is only necessary to turn on the breakers controlling those specific circuits.

3. Release the lock arms that secure the rails.
    a. Pull back on the “Latch Lock”
    b. Lift UP on the “Grip Handle”
    c. Move the “Draw Arm” UP
        i. **NOTE!** Do not hang the rail/lock arms on the charge cables affixed to the top interior of the PALB.

4. Prior to placing lights into PALB holding bays, set all lights to “Storage Mode” using the following procedure:
    a. Hold down button on light until there are 2 amber flashes
    b. Release button
    c. Press and release button once quickly
    d. Light will produce one green flash to indicate storage mode is operational



5. Once lights are in storage mode, place them into the racks with the handles facing outwards and the military charge connector on the left hand side.

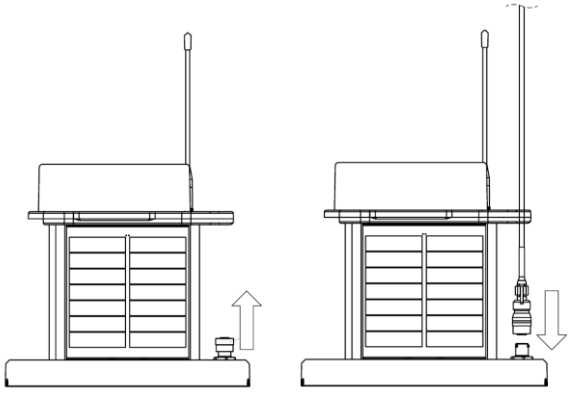
6. Push the light as far back into the channel as possible

7. Detach the charging cable from directly overhead (twist the plug counterclockwise to release)

8. Unscrew the protective cap from the military charge connector on the base of the light.

9. Attach the charging cable to the light. Rotate the main body of the connector until the pins line up and the connector easily drops down into place. Rotate knurled outer ring to lock the connector into place (twist clockwise).

    a. **NOTE!** Use care when connecting the cables. Excessive force can bend the pins inside the connector, causing loss of electrical continuity or short circuits.



10. Verify the light is receiving charging power from the PALB.
    a. The small yellow LED indicator on the circuit board inside the A704 head should be flashing.
    b. Refer to Section 9.0 “Troubleshooting” if a light is not charging.

11. Repeat until all lights are loaded into the PALB.

12. Bring down the locking arms and secure them in place.

13. Ensure all lights are secured in storage racks and connected to charging cables.

## 6.3 A704 Unloading Procedure

The following procedure should be followed when unloading the A704 fixtures from the PALB

1. Set both “Light Charging Disconnect Banks” breakers to OFF.

2. Release the lockdown bars.
    a. **NOTE!** Do not hang the rail/lock arms on the charge cables affixed to the top interior of the PALB.

3. Disconnect the charging cable from the closest light and stow the charging cable in the ceiling by connecting it to a matching bulkhead connector.

4. Secure the protective cap on the light's charge connector

5. Slide the light towards the user and remove from PALB

6. Repeat process until all lights are removed

7. Re-secure the lockdown bars

# 7.0 Charging Operation

The PALB is designed for the transportation, storage, and charging of up to 48 Flash Technology A704 solar aviation lights and 2 HHCs. Except for AC power in, the electrical systems is designed around 12-volts DC. The A704s and HHCs use the PALB's 12-volt supply to charge their internal batteries. Two methods are available for charging:

1. AC power (100-260VAC 50/60Hz)
2. Main Battery Array

Within the Main Power Box, all charging sources and the charging circuits for the A704s and HHCs terminate on shared positive and negative bus bars. The A704s and HHCs are therefore able to obtain their 12-volt charging input power from any of the two sources depending on the breaker settings on the side of the Main Power Box. While performing the charging procedure, it is important to periodically check the status indicator lights on the ProSport20 Battery Charger to determine the status of the charging process (see section 7.1.4).

## 7.1.1 Charging Preparation

When possible, always charge the PALB with the doors open to allow for maximum ventilation.

## 7.1.2 Onboard Battery Bank Charging Procedure

**IMPORTANT!** Always start the light charging process with a fully charged onboard battery bank. It is recommended to leave the trailer connected to shore power to maintain a charge on the internal battery bank while the A704 lights are deployed.

Prior to loading the lights, or turning on the breakers for their respective bank locations, allow the AC charger to fully charge the onboard battery bank (2 batteries in PALB) as detailed in the following procedure. Failure to fully charge the onboard battery bank may result in incomplete light charging.

### Procedure:

1. Check the position of the Disconnect switches on the side of the Main Power Distribution box. Ensure that all are set to OFF (horizontal position).
2. Apply AC power to the Trailer.
3. Verify that the blue AC Power LED is illuminated
4. Close the Battery Charger Disconnect on the side of the Main Power Distribution box. Charging of the onboard battery bank will now begin.

5. Observe the Charge Mode LED's on the charger. As charging progresses, the status will change from Charging to Conditioning, and finally to Auto Maintain. Charging is complete when the charger indicates Auto Maintain.

### 7.1.3 Charging by AC Power

The PALB is equipped with a marine-grade AC connector at the left rear of the PALB. Once inside the PALB, the AC power feeds a ProSport 20 battery charger. The output of the battery charger is connected to the positive and negative main bus bars. A breaker on the outside of the Main Power PALB allows disconnection of the battery charger outputs from the main bus bars.

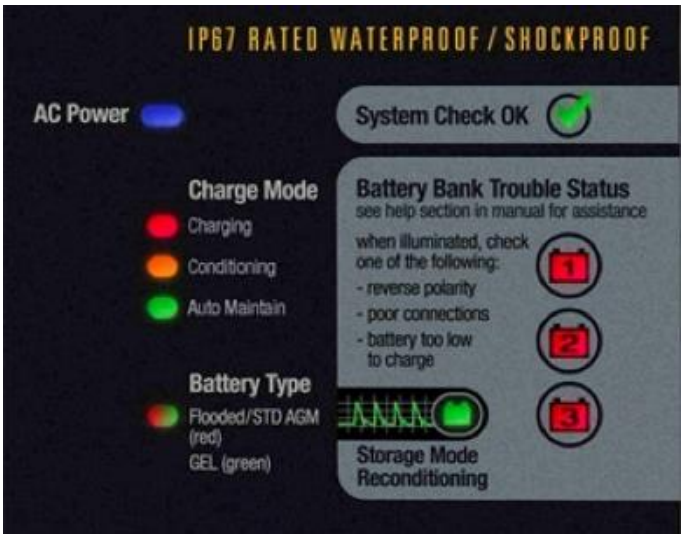
1. Connect the PALB to an appropriately rated AC power source (100-260VAC 50/60Hz) using the provided power cord.

2. Turn on the battery charger.

NOTE: As long as AC power is connected, the battery charger will be powered up

### 7.1.4 ProSport20 Charger

| LED Indicator | Description |
|---|---|
| AC Power | Illuminates blue when AC power is applied. |
| Battery Type | Will illuminate red for standard Flooded (lead-acid)/AGM and green for GEL. **Should be red.** |
| System Check OK | After applying AC power the ProSport20 will self test and analyze all battery connections and batteries. If all checks are OK the green LED will illuminate. This can take up to 2 minutes. |
| Charge Mode | Indicates the progress of the charging cycle:<br>The red Charging LED will flash during the self test and battery test mode (approximately 1-2 minutes) and will be solid red during charging.<br>The amber Conditioning LED illuminates during the conditioning mode.<br>The green Auto Maintain LED illuminates when batteries are fully charged and being automatically maintained. |
| Battery Bank Trouble Status | Red LEDs will illuminate indicating a wiring problem or fault at one of the batteries connected to the ProSport charger. |
| Storage Recondition | Green LED fades in and out when performing a once a month storage recondition mode. |



### 7.1.5 Charging by Main Battery Array

The PALB's Main Battery Array consists of two 100 amp-hour 12-volt deep cycle AGM batteries connected in parallel. The positive and negative connections from the Main Battery Array are terminated on the positive and negative bus bar inside the Main Power Box.

If charging a fully depleted load of lights, it is best to charge one bank at a time by using the Light Charging Disconnect switches on the side of the Main Power Distribution box to control which bank is being charged. Failure to do so could result in the onboard battery bank being drained too fast and causing the onboard LVD (low voltage disconnect) to engage. This will initiate a sequence where the load is removed from the onboard batteries until they are charged back up to begin the charging sequence again. This condition may be observed when the ProSport Battery Bank Trouble Indicator LED's periodically come on.

**Procedure:**

1. Perform the onboard Battery Bank Charging Procedure provided above to ensure that the battery bank is fully charged.
2. Ensure that the Status LED's on the ProSport battery charger indicates Auto Maintain.
3. Close the Light Charging Disconnect K-O. This will charge up to 32 lights plus two handheld controllers.
    a. Observe the ProSport Battery Bank Trouble Indicator LED's and verify they are off.
    b. Observe the ProSport Status LED illuminated (Charging, Conditioning, or Auto Maintain).
    c. Do not proceed to next step until charging is complete, indicated when the charger indicates Auto Maintain.
4. Close the Light Charging Disconnect F-J. This will charge up to 40 additional lights.
    a. Observe the ProSport Battery Bank Trouble Indicator LED's and verify they are off.
    b. Observe the ProSport Status LED illuminated (Charging, Conditioning, or Auto Maintain).
    c. Do not proceed to next step until charging is complete, indicated when the charger indicates Auto Maintain.
5. Close the Light Charging Disconnect A-E. This will charge up to 40 additional lights.
    a. Observe the ProSport Battery Bank Trouble Indicator LED's and verify they are off.
    b. Observe the ProSport Status LED illuminated (Charging, Conditioning, or Auto Maintain).
    c. Charging is complete when the charger indicates Auto Maintain.

### 7.1.6 Charging of the A704s and HHCs

The PALB supports up to 48 A704s and 2 handheld controllers for charging. Charging circuits for the A704s and HHCs are grouped into three main branches with each branch being controlled by an 80-Amp breaker on the outside of the Main Power Box. Each branch circuit divides into 5 secondary feeds that terminate on a distribution box. A704 distribution boxes provides eight individual charge circuits. The single HHC distribution box provides 2 individual charge circuits.

The A704s and HHCs are charged by attaching a 12-volt charge cable with military connector to their corresponding military connector. The connector is located on the top of the baseplate of the A704 and on the left side of the HHC. When 12-volts is present on the power connector of the A704s and HHCs, internal charging circuit electronics automatically charges up the internal batteries

1. When successfully charging, each light will have one amber flash per second.
2. To disconnect lights, perform above steps in reverse.

**NOTE!** It is recommended that the Handheld Controller (HHC) be connected and charging when not in use.

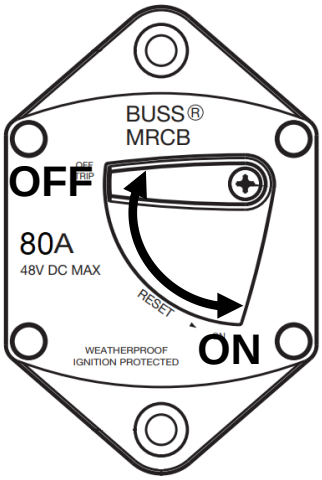
### 7.1.7 Circuit Protection

| | |
|---|---|
| AC Power In | Series 187, Marine-Rated Circuit Breaker, 50A Cooper Bussman |
| Lights Primary Feeder Circuits | Series 187, Marine-Rated Circuit Breaker, 80A Cooper Bussman |
| Lights Secondary Feeder Circuits | 20A Automotive blade fuses |
| Individual Light Circuits | 5A Automotive blade fuses |

### 7.1.8 Use of Main Power Box Breakers

The breakers in the side of the Main Power Box function as both ON/OFF control and protection against overcurrents. To turn a breaker and its associated circuit on, push the yellow lever into the down position as shown in the diagram below. To turn a breaker off, simply switch the yellow lever back into the horizontal position. If at any time a breaker that is set to ON “trips” and turns itself off, that is an indication that excessive current was detected and the breaker turned itself OFF for safety and fire prevention.

**WARNING** Before resetting a breaker to the ON position, conduct an investigation into the cause of the first tripping of the breaker. Excessive currents are usually caused by short circuits to ground such as frayed or damaged wiring or pinched cables making contact with the chassis. Locate and repair the short circuit before attempting to energize the circuit again.



# 8.0 Maintenance

## 8.1 How to Change a Battery in the Main Battery Array

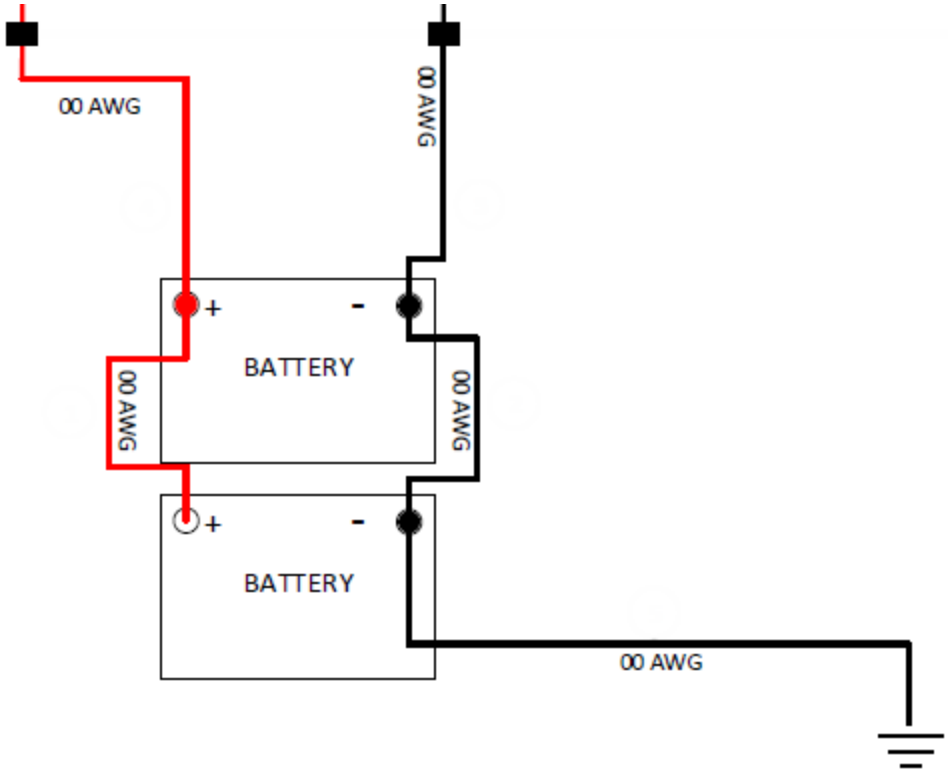
**CAUTION** Removal and/or installation of the PALB batteries should be performed by two people, due to space restrictions, battery weight (69 Lbs.) and the need for extended reach.

**SAFETY** The Main Battery Array is grounded to the metal PALB chassis. Any work on the positive terminals of the battery, particularly with metallic tools, can potentially create accidental short circuits between the battery positive and the chassis ground. Metal tabs also extend into the battery compartment that could make contact with the positive battery terminal when it is removed. This risk can be reduced by observing the following:

- Use socket extensions to put the wrench handle at a safe distance from the chassis
- As soon as possible, disconnect the negative battery connections that are connected to the Main Power Box and the chassis ground
- Use gloves and tools with electrically-insulated handles if available
- Re-attach and cover exposed terminals after cables have been removed
- Use adequate lighting to illuminate the work area
- Work slowly and carefully, keeping the work area clean and free of loose objects

1. Remove the lid and place it away from the PALB interior to free up room and prevent it from creating accidental short circuits. Stow the fasteners to one side.
2. Remove the metal battery hold-down bracket by loosening and removing the fasteners on each end.
3. Remove the negative battery terminal cable that goes under the chassis and is system ground.
4. Remove the negative battery terminal cable that is routed into the Main Power Box.
5. Identify the red positive power cable that connects the Main Battery Array to the Main Power Box. Detach this cable at the positive battery terminal. While the terminal fasteners are loosened, take care to ensure the next battery interconnection cable that is also connected to the terminal continues to be held in place at the terminal until it is ready to be disconnected. Stow the main red power cable off to the side where it will not interfere with battery removal.
6. Returning to the positive terminal of the first battery, detach the second red positive battery cable that connected the first battery to the second battery.

   **CAUTION** Although the chassis ground has been removed, it is safest to consider the cable end that is still connected to the remaining batteries' positive terminals as live and a shock or short circuit hazard. Insulate it and secure it from accidental contact with the chassis, negative connections on the battery, or other wiring.




7. Both terminals of the first battery should now be free of connected cables, and cables that were attached to them are safely secured and set back to allow removal of the battery.
8. One individual will position themselves inside the PALB so they are directly over the battery handle. Pull the battery straight up and swing it over to the flat area adjacent to the battery compartment.
9. The second individual will then be able to lift the battery up and over the ledge of the door opening and place the battery safely on the ground.
10. To install a new battery, follow the above steps in reverse. Ensure that connection of the negative ground and Main Power Box ground are the last steps.

## 8.2 Maintaining Main Battery Array Charge

Readiness of the PALB for charging operation requires the Main Battery Array to always be fully charged. To charge the Main Battery Array only (no A704s or HHCs):

1. Turn the AC Power and Lights breakers OFF
2. Ideally, allow the Main Battery Array to rest for 30 minutes to allow the voltage to decrease to a stable value
3. Measure the Main Battery Array voltage at the positive and negative terminals inside the Main Power Box.
    a. If voltage is below 12.6 volts, recharging is recommended.
4. The time required to arrive at a full charge will vary. Monitor the battery charger or charge controller indicators for charging status.

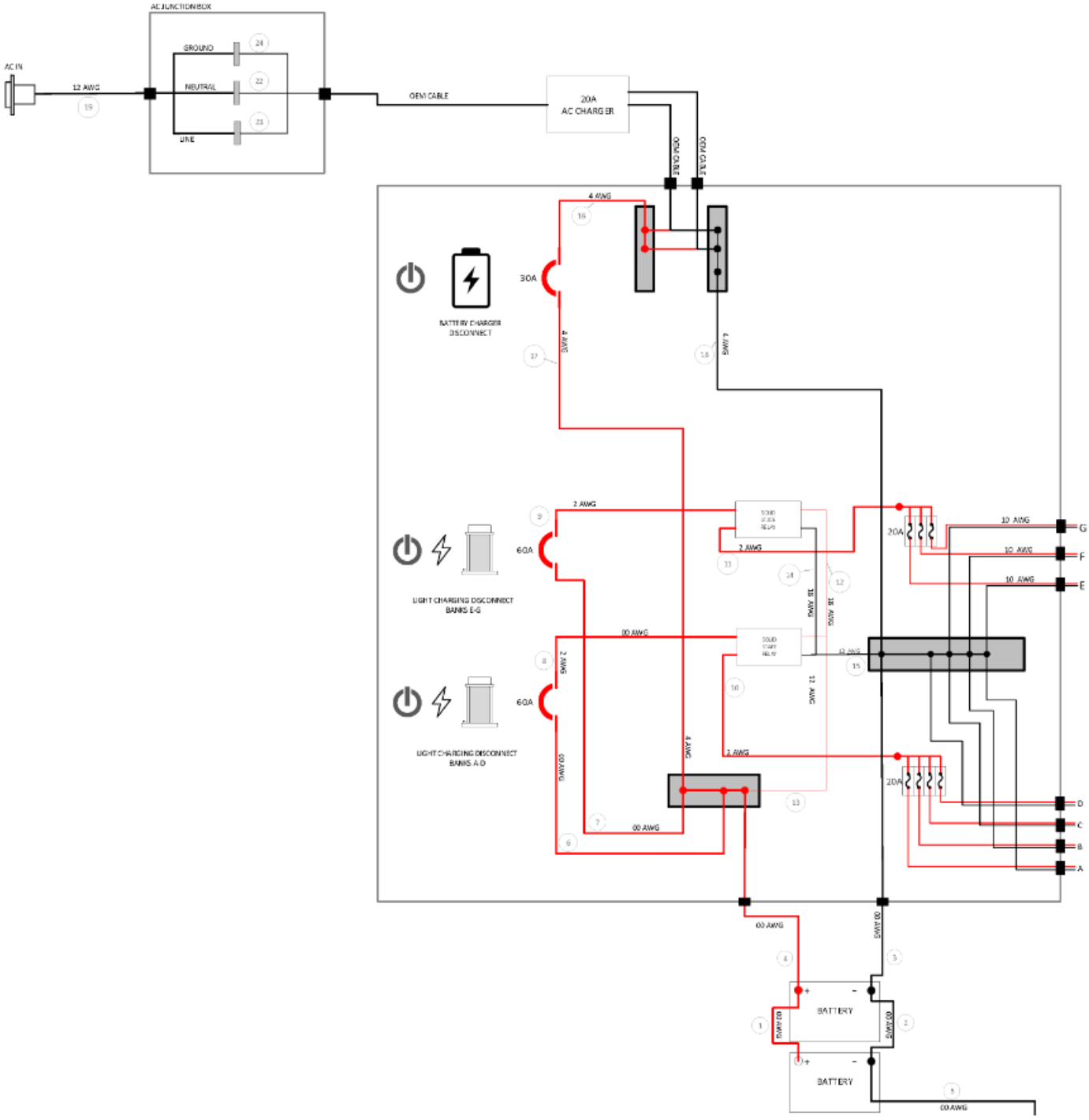
## 8.3 PALB Maintenance

Regular maintenance will be important to ensure reliable operation of all parts of the PALB. Ensure the latches are in good working condition and that the door seals are not damaged.

It is recommended to frequently check for the following:

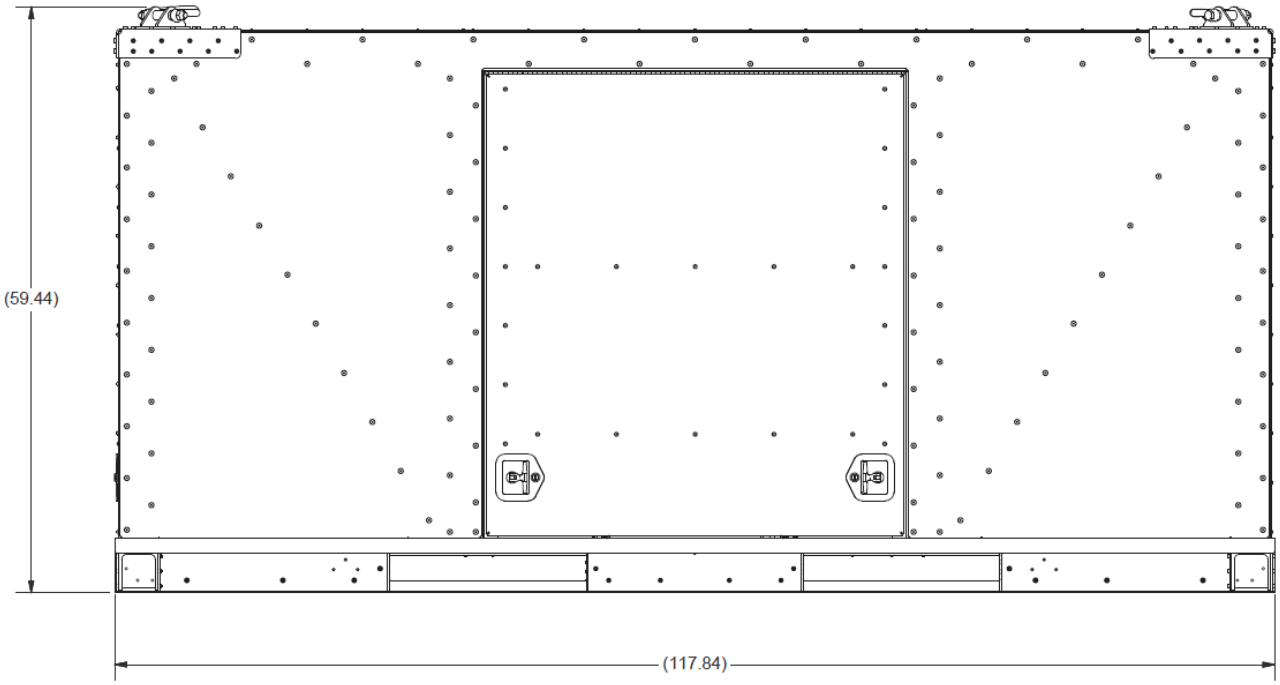
1. Cleanliness
   1.1. Dirt, grease, oil and debris may cover up a serious problem. Clean surface areas regularly.
2. Rust and Corrosion
   2.1. Check the PALB body and frame for rust and/or corrosion.
3. Hardware (bolts, nuts and screws)
   3.1. Ensure that hardware is not loose, missing, bent or broken.
4. Welds
   4.1. Look for loose or chipped paint, rust or cracks where parts are welded together.
5. Wiring Harnesses
   5.1. Inspect for cracked/broken insulation, bare wires, and loose/broken connectors.
6. Leakage
   6.1. Inspect for wetness around seals, gaskets, fittings and other connections.
7. Door lift cylinders
   7.1. Completely open the door & verify dirt or large debris is not present on the rod. Wipe with dry rag if needed.
   7.2. Visual inspection during regular maintenance is acceptable
   7.3. Annual cleaning with a dry rag is recommended

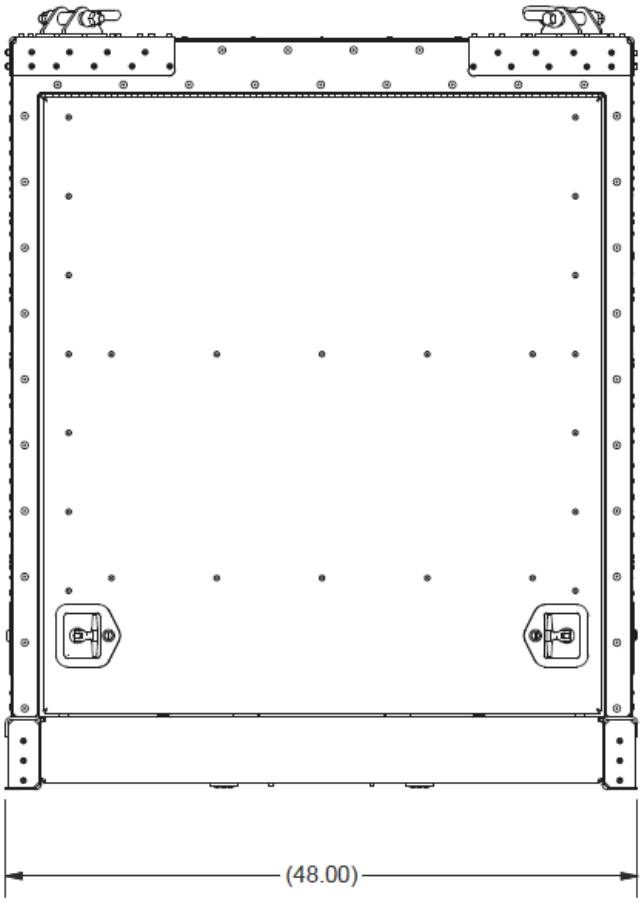
# 9.0 PALB Main Panel Wiring Diagram



## 9.1 PALB Dimensions

The following dimensions are show in inches.



# 10.0 Troubleshooting

**CAUTION!** Any maintenance or troubleshooting should be performed by a qualified electrician. When analyzing the PALB charging system, disconnect all power sources and turn off all switches.

## 10.1 Single Light is not Charging within a Set of Lights

1. Check to see if the 5A fuse for that light is blown by opening the distribution box that is connected to the charging cable for the light in question.
2. If the fuse is blown, check the cable connected to the light for cuts or abrasions that would cause a short to the chassis ground and repair accordingly.
3. Once the short has been repaired, replace the fuse and energize the system to ensure that the system is operational.
4. Also check for bent pins inside the military connector, use the pushbutton to verify the light is working correctly, and try connecting the light to another charge cable that is known to be working correctly.

## 10.2 Entire Set of Eight Lights is not Charging

1. Trace the light charging cables back to the distribution box within the storage compartment and note the letter on the distribution box.
2. Check to see if the 20A fuse with the same letter as the distribution box is blown by opening the main power box.
3. If the fuse in blown, check the cable connected to the distribution box for cuts or abrasions that would cause a short to the chassis ground and repair accordingly.
4. Once the short has been repaired, replace the fuse and energize the system to ensure that the system is operational.

## 10.3 None of the Lights Are Charging

1. If using AC power, make sure the battery charger is operational and have a green check mark.
2. Check the charge controller to see if the system has entered Low Voltage Disconnect (LVD) mode in order to protect the system batteries from excessive discharge. The SOC LED will flash yellow.
3. If the system has entered LVD, connect it to a power source and let the batteries charge sufficiently to power the system again.

# 11.0 Warranty

This product is covered by the Flash Technology warranty. Visit solarairportlights.com for additional information.

Before contacting Flash Technology's customer service department, please have the serial number of your product available, a brief description of the problem, as well as all details of the installation and recharging efforts.

To contact Customer Service or Technical Support:

**Mail:** Flash Technology
332 Nichol Mill Lane
Franklin, TN 37067 USA

**Toll Free:** 1.800.821.5825

**Fax:** 1.615.261.2600

**Email:** customerservice@flashtechnology.com

**Website:** flashtechnology.com

# 12.0 Common Spare Parts List

| Flash Part Number | Description | Manufacturer – Mfg. PN |
|---|---|---|
| 67843 | Battery VRS-100HIT – 100Ah @12V | C&D Technologies |
| 87861 | 20A Fuse | Littelfuse Inc. |
| 87862 | 5A Fuse | Littelfuse Inc. |
| 82189 | A704 Charging Cable | Flash Technology |
| 87875 | Pro Sport 20 PFC, 20A Battery Charger | ProMariner |
| - | Left Door Latch | Silver Eagle – 35103 |
| - | Right Door Latch | Silver Eagle – 35102 |
| - | Door Lift Cylinders | Silver Eagle – 36424 |