carmanah®

R247-E

24 HOUR FLASHING BEACON USER MANUAL

we put solar to work™

Warnings and Precautions

The following symbols indicate important safety warnings and precautions throughout this manual. They are defined as follows:

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 under which the equipment will operate effectively and safely, or provides additional information to the reader.

Warranty Disclaimer

This manual will familiarize you with the features, operation standards, and installation of Carmanah's R247-E 24 Hour Flashing Beacon. Failure to comply with the use, storage, maintenance, installation or placement instructions detailed in this manual could void the warranty.

Standards

Perform all installation, wiring and maintenance in conformance with local building and electrical codes. Adherence to the National Electrical Code (NEC) is mandatory to comply with any certification markings. Non-adherence to code may void the warranty.

Safety and Usage Precautions

Batteries are shipped fully-charged. Use extreme caution when handling the batteries as they are capable of generating hazardous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, etc.) before attempting to handle the batteries.

Solar panels produce DC electricity when exposed to light and can, therefore, produce an electrical shock or burn. To render solar panels inoperative, remove them from sunlight, or fully cover their front surface with an opaque material.

Before lifting any heavy or bulky equipment, ensure that the load is secured so that moving parts do not shift and it can be lifted as far as needed without back strain or loss of grip. Installation may require more than one person.

Ensure the equipment is not powered during installation and wiring of the system.

Re-check all completed wiring for proper polarity prior to energizing the system.

System must not be operated on one battery.

NOTE

Changes or modifications to Carmanah equipment not expressly approved by Carmanah could both void the user's authority to operate the equipment, and void the warranty.

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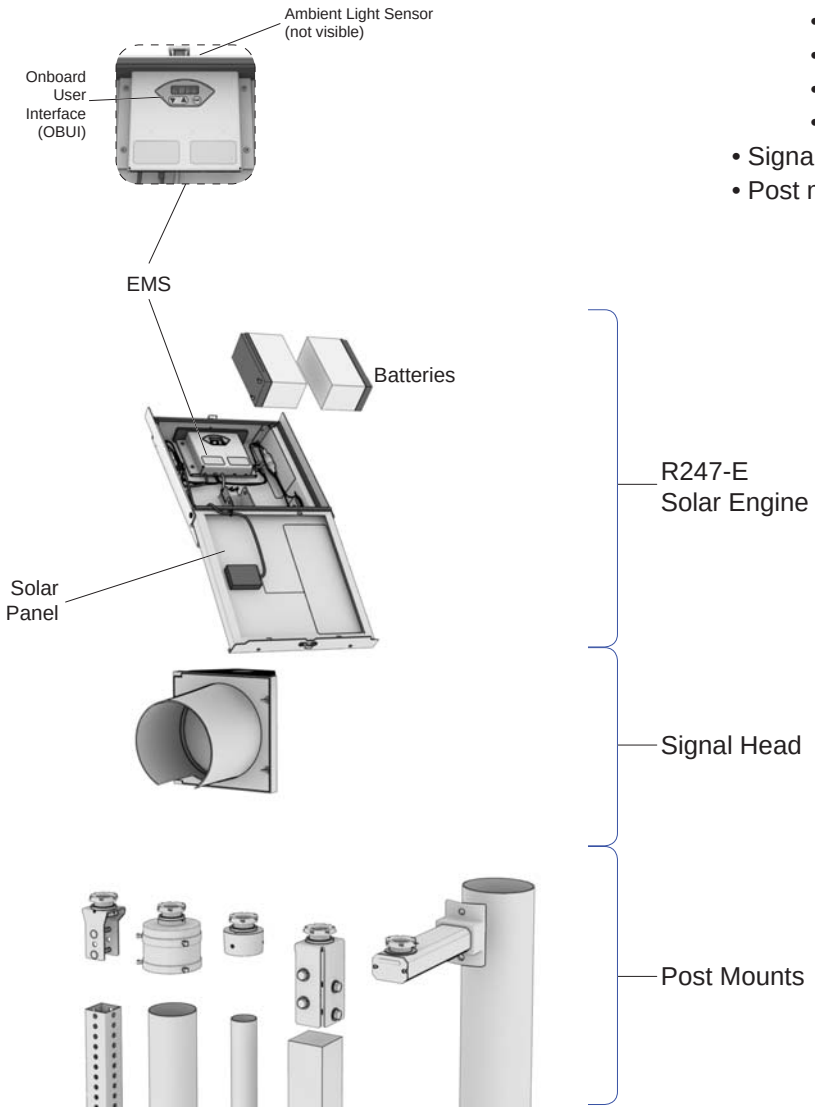
Introduction

The R247-E is the new standard for 24 hour flashing beacons:

The solar panel and EMS work together to charge the batteries during the day. The EMS controls the flow of power from the batteries to the flashing LED module.

System Components

- R247-E solar engine, consisting of:
  - •Energy management system (EMS)
  - •Chassis assembly
  - •Solar panel
  - •Batteries (2)
- Signal head with LED module
- Post mount



WARNING Batteries are shipped fully-charged. Use extreme caution when handling the batteries as they are capable of generating hazardous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, etc.) before attempting to handle the batteries.

CAUTION Consult with Carmanah customer service before making adjustments to the system. Improper system adjustment may reduce operational effectiveness, reduce battery life, or void the warranty.

Installation

Summary

Basic steps to install a R247-E solar engine:

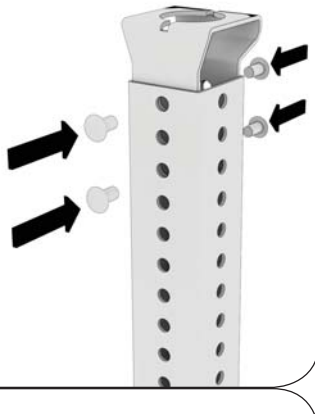
1. Connect the post mount to the post.
2. Mount the solar engine and signal head assembly onto the post and aim the signal head as desired.
3. Tighten the nipple to secure the signal head as required.
4. Rotate the solar engine to ensure the solar panel is facing south and tighten the nut as required.
5. Connect the batteries to the wiring harness and place the batteries into the solar engine with the terminals to the bottom and facing out. Take care not to short the battery terminals to the metal chassis.
6. Secure the batteries with the battery strap. Note the proper routing (reference page 11).
7. The EMS will be pre-configured at the factory. Use the onboard interface to check the system status and configuration, or to make adjustments if necessary.
8. Close the solar engine and secure solar panel with fastener.

Step by Step Instructions

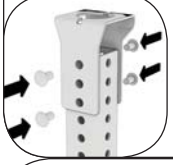
1 Attach the post mount to the post using appropriate fasteners.

Square Post Mount

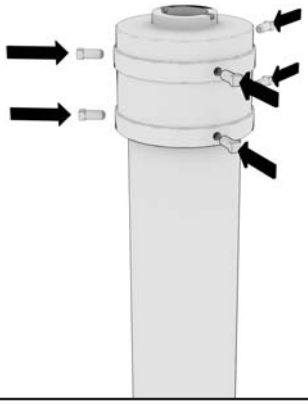
2.5" Square



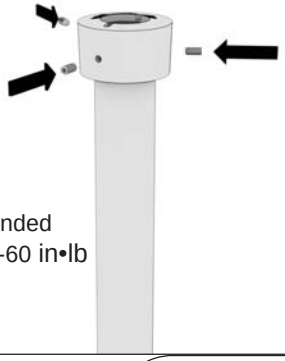
2" Square



4.0-4.5" Round Post Mount

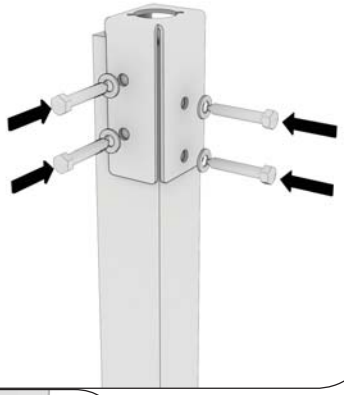


2.38"-2.88" Round Post Mount



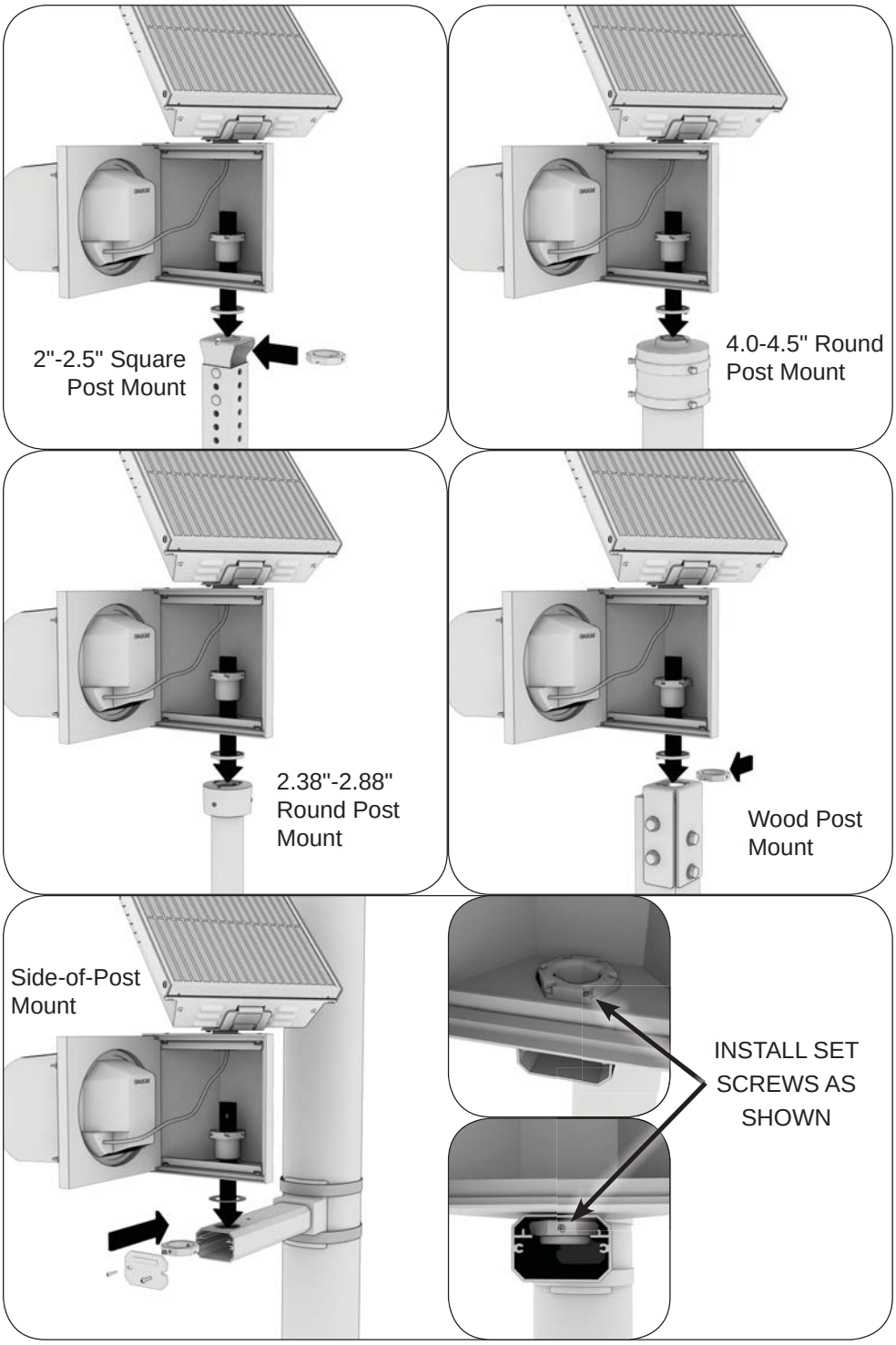
Recommended Torque 50-60 in•lb

Wood Post Mount

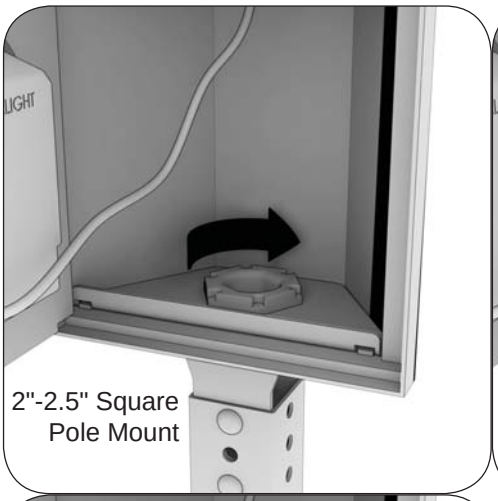


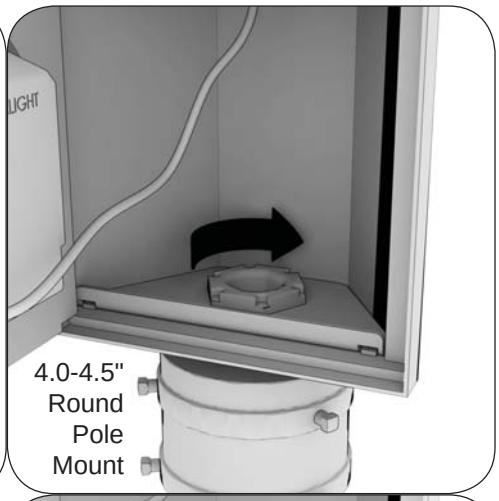
Side-of-Post Mount

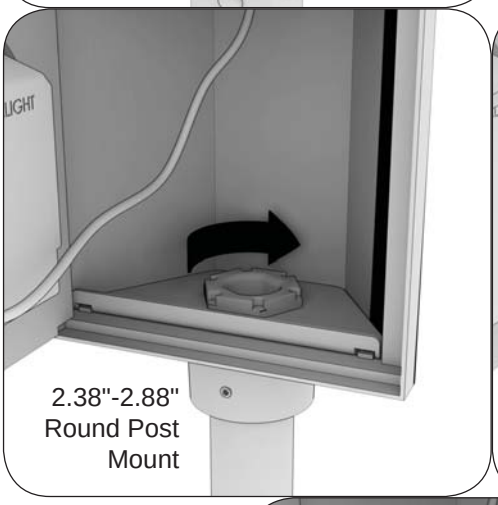
2 Mount the solar engine and signal head assembly to the post mount pointing the signal head in the direction required.

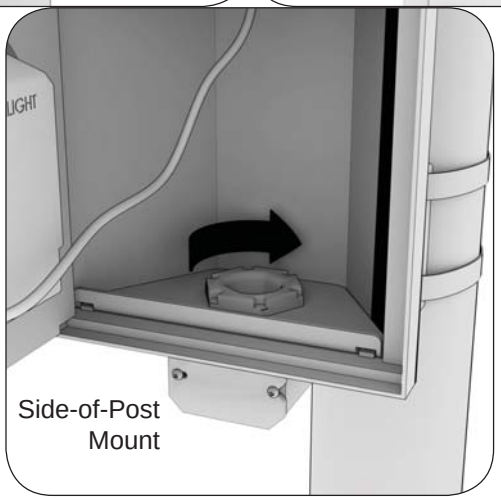


3 Tighten the nipple to secure the system in place.









4 Ensure the solar panel is facing south and then tighten the nut.

5 Note the battery terminal and harness polarity. Open the solar engine. Connect one battery harness and install battery as shown. Note the system will begin operating. Connect second battery harness and install battery as shown.

CAUTION

DO NOT LET BATTERY TERMINALS COME INTO CONTACT WITH ANY EXPOSED METAL

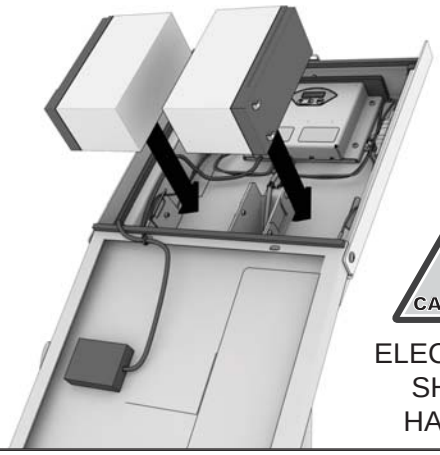
DO NOT LET WIRE TERMINALS COME INTO CONTACT WITH ANY EXPOSED METAL

WARNING

WARNING Batteries are shipped fully-charged. Use extreme caution when handling the batteries as they are capable of generating hazardous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, etc.) before attempting to handle the batteries.

NOTE

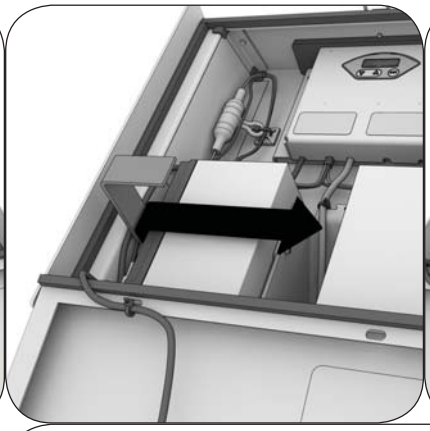
Batteries must be installed with the terminals facing outward.



CAUTION

ELECTRICAL SHOCK HAZARD

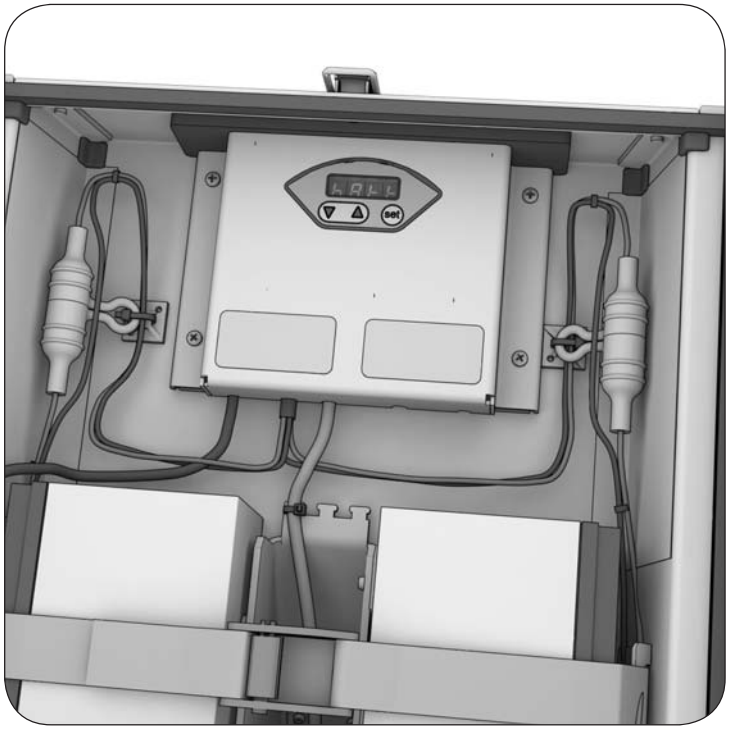
6 Secure batteries with battery strap, note proper routing.



Battery strap is tightened over the two batteries

7 The system will start once the batteries are connected. See 'EMS Programming and Testing' section to check the system status and configuration.

CAUTION Consult with Carmanah customer service before making adjustments to the system. Improper system adjustment may reduce operational effectiveness, reduce battery life, or void the warranty.

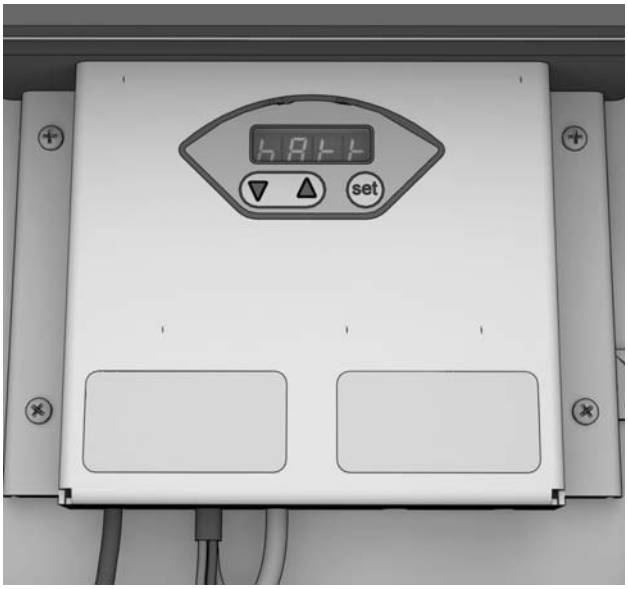


8 Close and latch the solar panel to complete installation.

EMS Programming and Testing

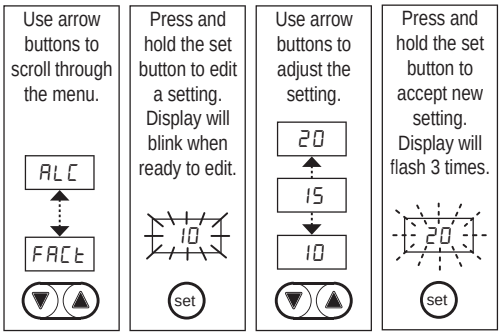
The EMS will be pre-configured at the factory. Use the onboard interface to check the system status and configuration, or to make adjustments if necessary.

The energy management system (EMS) has several programming functions and settings. These are accessed through the onboard user interface (OBUI). This section discusses the various functions, settings and operation.



EMS Onboard User Interface Operation

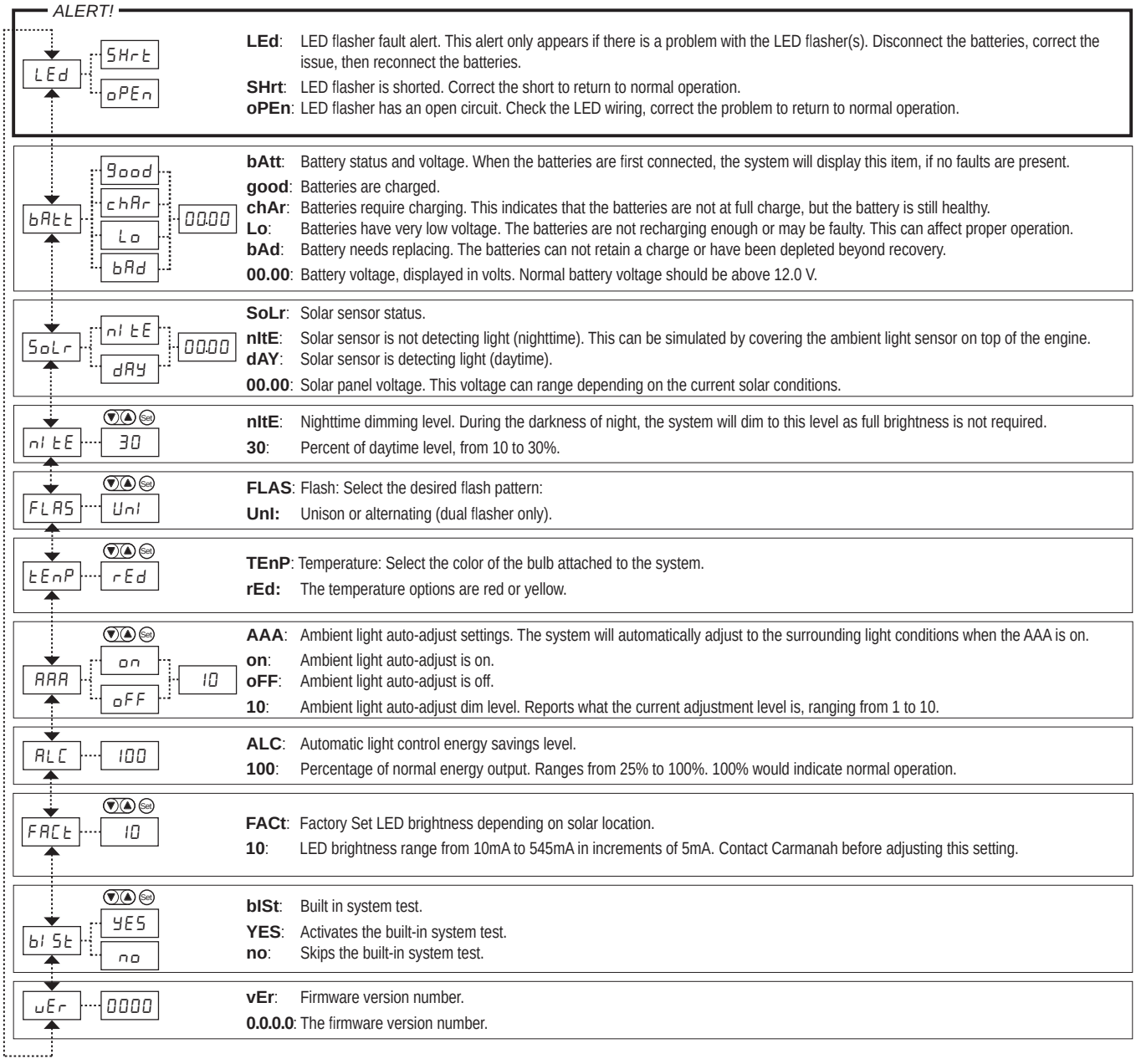
The EMS OBUI has three buttons to navigate and change settings and activate functions as required. The up arrow, down arrow and set button are used to scroll through menus, access and change settings, and accept new settings.



Functions and Settings

The functions and settings are accessed through the OBUI via a menu system. On the next page is the menu hierarchy and a description of the function or setting.

NOTE Only these items in the menu system are adjustable settings: nItE, FLAS, tEnP, AAA, FACt, bISt



LEd: LED flasher fault alert. This alert only appears if there is a problem with the LED flasher(s). Disconnect the batteries, correct the issue, then reconnect the batteries.
SHrt: LED flasher is shorted. Correct the short to return to normal operation.
oPEn: LED flasher has an open circuit. Check the LED wiring, correct the problem to return to normal operation.

bAtt: Battery status and voltage. When the batteries are first connected, the system will display this item, if no faults are present.
good: Batteries are charged.
chAr: Batteries require charging. This indicates that the batteries are not at full charge, but the battery is still healthy.
Lo: Batteries have very low voltage. The batteries are not recharging enough or may be faulty. This can affect proper operation.
bAd: Battery needs replacing. The batteries can not retain a charge or have been depleted beyond recovery.
00.00: Battery voltage, displayed in volts. Normal battery voltage should be above 12.0 V.

SoLr: Solar sensor status.
nItE: Solar sensor is not detecting light (nighttime). This can be simulated by covering the ambient light sensor on top of the engine.
dAY: Solar sensor is detecting light (daytime).
00.00: Solar panel voltage. This voltage can range depending on the current solar conditions.

nItE: Nighttime dimming level. During the darkness of night, the system will dim to this level as full brightness is not required.
30: Percent of daytime level, from 10 to 30%.

FLAS: Flash: Select the desired flash pattern:
UnI: Unison or alternating (dual flasher only).

TEnP: Temperature: Select the color of the bulb attached to the system.
rEd: The temperature options are red or yellow.

AAA: Ambient light auto-adjust settings. The system will automatically adjust to the surrounding light conditions when the AAA is on.
on: Ambient light auto-adjust is on.
oFF: Ambient light auto-adjust is off.
10: Ambient light auto-adjust dim level. Reports what the current adjustment level is, ranging from 1 to 10.

ALC: Automatic light control energy savings level.
100: Percentage of normal energy output. Ranges from 25% to 100%. 100% would indicate normal operation.

FACt: Factory Set LED brightness depending on solar location.
10: LED brightness range from 10mA to 545mA in increments of 5mA. Contact Carmanah before adjusting this setting.

bISt: Built in system test.
YES: Activates the built-in system test.
no: Skips the built-in system test.

vEr: Firmware version number.
0.0.0.0: The firmware version number.

System Testing

Built-in System Test

The OBUI has a built-in system test function (bISt, see previous section). Activating this function through the OBUI performs the system test. After the test completes, it will display any errors or 'PASS' if no error is detected.

NOTE

It may be necessary to start the test and then close the system so the solar panel receives enough light to pass the charging test.

The test is completed after the flashing LED module turns on steadily for several seconds and returns to regular operations.

Possible errors include:

Code	Error
0002	Severe temperature detected
0004	Onboard memory has failed
0008	Battery issue detected
0010	There is a problem with the on board processor supply voltage
0020	Keypad failure detected
0040	Internal communication failure
0080	There is a problem with the ambient brightness sensor
1000	There is a problem with the charging circuit, or the PV is not connected, or not charging
2000	There is a problem with the flashing LED module, LED module wiring, or the LED driver

LED Fault Message

The EMS performs an internal test during start up to check for any shorts or open circuits in the LED flashers and the associated wiring. If any faults are detected this message will be displayed on the OBUI before any other menu item.

Maintenance & Product Care

The R247-E solar engine is designed to operate reliably for years with virtually no need for maintenance. Carmanah recommends routine inspections of the solar panels to ensure that they are unobstructed by anything that may prevent effective solar charging, including:

- dirt and dust
- snow
- leaves
- debris
- shade that may have developed after installation due to adjacent plant or tree growth.

The frequency of the inspections depends on location and local weather patterns. A yearly visual inspection of the R247-E solar engine is typically sufficient. The R247-E is designed to be maintenance free, however maximum system performance will be achieved when the LED module lens and solar panels are clean.

Fuse Replacement

A wiring fault during installation or maintenance can sometimes cause the battery fuses to blow. To replace the fuse:

1. Make sure you're not wearing any metal jewelry, or holding any tools or other conductive objects.
2. Disconnect the batteries.
3. Check all wiring for any faults that may have caused the fuse to blow.
4. Pull the fuse holder apart and check the fuse.
5. Replace a blown fuse with an identical fuse - 1.5A fuse, Littelfuse 0312002.HXP, Carmanah Part # 68372.

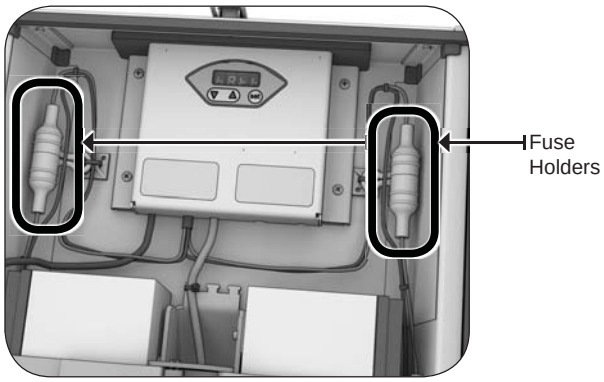
Battery Replacement

When the R247-E system's batteries require replacement, it is recommended that the original R247-E battery be used (Carmanah part # 67620). You should replace both batteries at the same time.

Battery replacement procedure should not be carried out in windy conditions. In all cases, the area at the base of the post must be roped off to prevent death or injury by falling pieces.

EMS Recycling

Production of the EMS required the extraction and use of natural resources. The EMS 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 the release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle the EMS in an appropriate way that will ensure most of the materials are reused or recycled appropriately. Check your local municipality for electronics recyclers.



Troubleshooting

Symptom	Possible Cause - What to Check
The EMS does not activate, does not display any information, or the system does not activate.	This is typically caused by low or no voltage from the batteries. Check both of the fuses. See the maintenance section of this manual for fuse information. Using a volt meter, measure the battery voltage. It should have a reading of 12.0 V or greater. If the voltage is very low, charge or replace the batteries and monitor the system for proper operation. Ensure that the R247-E solar engine is clean, clear of debris, and is not shaded by buildings or vegetation. If the solar panel is covered or shaded, this will prevent proper battery charging. Once the batteries have proper voltage, check the EMS for error codes and run the 'bISt' function. See the 'EMS Programming and Testing' section of this manual.
The LED module will not flash.	This can be caused by either a wiring issue, low battery voltage, or the unlikely event of an EMS failure. Check the wiring to the LED module and make sure the wires are not pinched anywhere along their length. Check the OBUI for errors. See the 'EMS Programming and Testing' section of this manual.
The LED module is dim when flashing.	The battery voltage may be too low for proper operation and the system has activated the Automatic Light Control (ALC). Check the OBUI for ALC status and battery voltage. See the 'EMS Programming and Testing' section of this manual. Ensure that the R247-E solar engine is clean, clear of debris, and is not shaded by buildings or vegetation. If the solar panel is covered or shaded, this will prevent proper battery charging and drive the system into ALC. Check for debris covering the ambient light sensor on top of the solar engine. Check the OBUI Solar (SoLr) setting to ensure it is detecting light ("dAY" not "nItE"). Check the Factory Set LED brightness setting (FACt). Consult Carmanah prior to changing this setting as the LED brightness is set based on the solar location. Check the ambient light auto-adjust (AAA) setting on the OBUI. Turn off the AAA to see if this corrects the dim LED Module. See the 'EMS Programming and Testing' section of this manual.
The LED module appear too bright when flashing.	Settings on the EMS can affect the apparent brightness of the LED module. See the 'EMS Programming and Testing' section of this manual.

Specifications

Mechanical Specifications	
Solar Engine	
Width	13.6" (345 mm)
Depth (not including mount)	3.6" (91 mm)
Tilt angle	45 degrees
Height (above signal head)	12.0 " (302 mm)
Weight (Solar enging only)	19.8 lbs (9kg)
Electrical Specifications	
System	
System voltage	12V (nominal)
System capacity	14 Ah
Overcurrent Protection	
Fuse	2 x 1.5 A
Type	Littelfuse 0312002.HXP
Solar Charge Controller	
Type	Maximum power point tracking 3 stage temperature compensated
Type	Littelfuse 0312002.HXP
Battery	
Quantity	2
Voltage	12 V (nominal)
Capacity	7 Ah
Solar Panel	
Power	10 W
Voc	21.6 V
Vmp	17.5 V
Imp	0.57 A
Isc	0.62 A
LED Driver	
Type	Constant current, buck - boost
Max output voltage	33 Vdc
Max output current	545 mA
Environmental	
Maximum wind zone deployment	110 mph
Operating temperature range	Standard batteries: 5 to 122˚ F (-15 to 50˚ C)
	Extended temperature batteries: -40 to 122˚ F (-40 to 50˚ C)

Warranty

This product is covered by the Carmanah warranty. Visit www.carmanah.com for additional information or contact the customer service department.

Before contacting Carmanah's customer service department, please have the serial number of your system available, a brief description of the problem, as well as all details of the installation.

To contact Carmanah's customer service department:

Mail: Carmanah Technologies Corporation
250 Bay Street
Victoria, BC Canada V9A 3K5

Phone: 1.250.380.0052
877.722.8877 (Toll Free in U.S. and Canada)

Fax: 1.250.380.0062

Email: customerservice@carmanah.com

Website: carmanah.com