



carmanah®

Model L-806 and L-807 Windsock

Installation and Assembly Manual

Carmanah Solar LED Internally-Illuminated Windsock

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Warranty Disclaimer

This manual will familiarize you with the features and operation standards of Carmanah's Solar LED Internally Illuminated Windssock. Failure to comply with the use, storage, maintenance, installation or placement instructions detailed in this manual could void the applicable user warranty.


Warnings and Precautions

Safety Precautions

	Do not look directly into any light beam. Serious and permanent eye damage may result.
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	The battery pack in this device contains a chemical known to the State of California as a carcinogen. Please handle with care and wash your hands thoroughly after handling the battery pack.
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Usage Precautions


	For best performance, mount the windsock in a location where the solar panels are not shaded at any time during the day.
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Safety Warnings

The following symbols indicate important safety warnings and precautions throughout this guide.

They are defined as follows:

	<p>WARNING indicates that serious bodily harm or death may result from failure to adhere to the precautions.</p>
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	<p>CAUTION indicates that damage to equipment may result if the instructions are not followed.</p>
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	<p>NOTE suggests optimal conditions under which the equipment will operate effectively and safely.</p>
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CONTENTS

1.0 Introduction	6
1.1 L-806 Windsock	6
1.2 L-807 Windsock	6
1.3 ESD Precautions and Proper Handling Procedures.....	7
1.4 How It Works	7
1.5 Solar Engine System	7
2.0 Components	9
2.1 Tools and Materials Required for Installation	9
2.2 Installing the L-806 Windsock and LED fixture.....	10
2.2.1 Attaching the Swivel (L-806 and L-807)	10
2.2.2 Securing the Windsock Pole to the Ground (L-806 Only)	12
2.2.3 Securing the Solar Engine Pole to the Ground (L-806 and L-807)	14
2.2.4 Assembling the Solar Engine (L-806 and L-807)	15
2.2.5 Connecting the Pole Top Adapter (L-806 and L-807)	17
2.2.6 Connecting the Windsock to the Solar Engine (L-806 and L-807).....	19
2.2.7 Attaching the LED fixture to the Windsock Basket (L-806 and L-807).....	21
2.2.8 Wiring the LED fixture (L-806 and L-807)	23
2.2.9 Connecting the LED to the EMS (L-806 and L-807)	25
2.2.10 Connecting the Solar Panels to the EMS (L-806 and L-807).....	27
2.2.11 Connecting the Batteries to the EMS (L-806 and L-807)	27
2.2.12 Installing the Windcone Fabric (L-806 and L-807)	28
2.2.13 Drilling Holes on the Poles (L-806 and L-807)	30
3.0 Product Care.....	31
3.1 Batteries.....	31
4.0 Troubleshooting.....	32
5.0 Warranty and Customer Service	33

1.0 Introduction

The Carmanah internally-illuminated solar-powered aviation windsock uses Carmanah's EverGEN-30 solar engine (which features an advanced Energy Management System (EMS)). The windsock system is designed to operate reliably with no scheduled maintenance for up to five years (except routine cleaning).

Carmanah offers two models of solar-powered windsocks; the L-806 and the L-807.

The L-806 and L-807 Windsocks provide a visual indication of wind direction and velocity at small airfields and heliports, and as a supplemental wind indicator near runway touchdown areas on large airfields.

1.1 *L-806 Windsock*

Features:


- A water-repellant fabric windcone which is 18" diameter x 8' long
- Mounted on a 1.9" diameter steel pole, with frangible coupling at base
- One-piece welded aluminum basket with pre-installed bearings
- Raincaps protect the bearings from weather
- May be mounted directly to an L-867 light base, 2" NPT baseplate (sold separately)
- Powder-coated international orange
- Virtually no maintenance

1.2 *L-807 Windsock*

Features:

- A water-repellant fabric windcone which is 18" diameter x 8' long
- Center-hinged pole, with 4" diameter steel on the bottom, and 3" diameter steel on the top
- Center-mounted braked winch allows one-person maintenance
- Four anchor bolts as a one-piece welded assembly, ready to drop in the ground
- One-piece welded aluminum basket has pre-installed bearings
- Raincaps protect the bearings from weather
- Powder-coated international orange
- Virtually no maintenance

1.3 ESD Precautions and Proper Handling Procedures

	Exercise caution when handling the batteries. They are capable of generating enormous short-circuit currents. Remove all jewellery (bracelets, metal-strap watches, rings, etc) before attempting to handle the batteries.
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- Dissipate static electricity before handling any system components (EMS, LED light) by touching a grounded metal object, such as the unpainted metal housing on the system unit.
- If possible, use anti-static devices such as wrist straps
- Avoid touching the contacts and components on the EMS
- Take care when connecting or disconnecting cables. A damaged cable can cause a short in the electrical circuit.
- Prevent damage to the connectors by aligning connector pins before you connect the cable.

1.4 How It Works

The Carmanah EverGEN-30 solar engine (mounted alongside the L-806 or L-807 Windssock) provides power to an energy-efficient LED-4SE fixture. Mounted inside the mouth of the windssock, the LED fixture's light is projected down the length of the windssock to provide internal illumination resulting in high visibility at night.

The solar engine contains the solar panel, batteries, and EMS. The EMS features Carmanah's MICROSOURCE technology with Automatic Light Control (ALC). ALC adapts to the prevailing solar conditions ensuring continuous light output regardless of environmental conditions.

This is a completely self-contained system. No grid power connection or external power supply is required. The solar panel converts sunlight to electricity, the electricity charges the batteries and powers the LED fixture. The EMS determines the most efficient use of the solar panel's electricity.

The unit is completely automatic, illuminating from dusk until dawn.

1.5 Solar Engine System

The main functional subsystems of the solar power system are:

Solar Panel

The Carmanah windssock system ships with a 30-watt solar panel in its solar engine. The solar panel is connected to the charging circuitry of the EMS to collect enough solar energy to operate the system every night.

Rechargeable Batteries

The battery bank is composed of three 12-volt batteries. The batteries are sealed, lead acid rechargeable with excellent temperature performance and very long life.

LED Fixture

The LED-4SE fixture contains four high-power white LEDs with special lenses to direct the light beam down the length of the windsack.

Energy Management System (EMS)

The EMS is the lighting system's control center; it controls the battery charging and also regulates the current to the LED fixture. It has sophisticated power management algorithms that have been refined over years of field-testing.

The EMS employs three main power management related strategies:

- Automatic Light Control (ALC) maintains battery operation during the winter months or during long periods of less than normal light.
- Low battery shutdown prevents damage caused by over-discharging the battery (to less than 10% capacity). When low battery shutdown is engaged, lighting is suspended. The system remains in this status until the battery charges to 50% capacity.
- 24-hour shutdown prevents over-discharge of the battery by shutting down the system if it detects 24 hours of darkness. Shutdown may occur due debris on the solar panels.

Windcone

The fabric windcone is constructed from 4.5 oz/sq.yd polyurethane coated nylon, reinforced at the mouth with double-thick PVC-coated nylon, and triple stitched for maximum strength. The windsack cone is mounted on a basket 18" (46cm) in diameter which swivels 360 degrees, achieving electrical conductivity through two concentric conductive rings.

The Carmanah windsack system ships as a collection of structural components: an EverGEN-30 solar engine, LED-4SE light fixture, wiring, and other associated parts. The full list of shipped parts is as follows:

L-806

- EverGEN-30 solar engine with mounting brackets and pole top adapter
- LED-4SE light fixture with 20 ft (6m) extension cable
- Windsack assembly composed of vertical pole, swivel-mounted 18" (metric value) Basket, LED fixture mounting bar and associated wiring
- Fabric windsack
- 2' (metric equivalent) tall 3" (metric equivalent) diameter post
- Three (3) Frangible couplings
- Two (2) Floor Flanges
- Bolts, nuts and washers and zip ties.

L-807

- EverGEN-30 solar engine with mounting brackets and pole top adapter
- LED-4SE light fixture with 20 ft (6m) extension cable
- Windsack assembly composed of vertical pole, swivel-mounted 18" (metric value) Basket, LED fixture mounting bar and associated wiring
- Fabric windsack
- 2' (metric equivalent) tall 3" (metric equivalent) diameter post
- Three (3) Frangible couplings
- Two (2) Floor Flanges
- Bolts, nuts and washers and zip ties.

2.0 Components

This section describes the following:

- Tools and materials required for installing the windsock
- Installing the windsock and LED fixture
- Installing the solar engine
- Powering up the system

2.1 *Tools and Materials Required for Installation*

You will require the following tools and materials to successfully install a Carmanah windsock system:


Tools:

- Cordless drill
- Center punch
- Hammer
- Tape measure
- 17/64", 5/32", and 3/4" drills
- Ratchet
- Sockets
- Wrench set
- Security bit drivers (provided)

Materials

- Cement (for the L-807)
- Two-part epoxy
- Silicone

2.2 Installing the L-806 Windssock and LED fixture

	<p>While it is possible for one person to install a Carmanah L-806 Windssock, Carmanah highly recommends using two people to avoid personal injury or damage to the system.</p>
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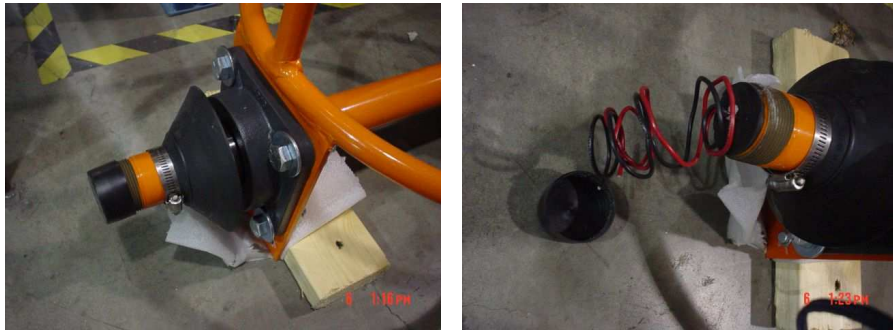
The L-806 is secured to the ground using two floor flanges – one for the windssock and one for the solar engine.

NOTE: The following instructions refer to the L-806. Many of the procedures for the L-806 and L-807 are identical and will be identified in these instructions.

2.2.1 Attaching the Swivel (L-806 and L-807)

When assembling an L-806 or L-807, the first step is to thread the wiring through the basket and then attach the basket to the top pole.

1. Pull off the plastic cap (on the top of the windssock) to reveal the two wires (red and black) inside.



The following is a picture of the swivel assembly. The swivel assembly allows stationary wires to enter from the windssock's top pole while also allowing 360-degree rotation of the LED fixture around the vertical axis.



2. Remove the connection box cover from the swivel. Feed the black and red wires from the top of the basket into the brass bottom of the swivel and pull them out through the connection box.
3. Cut the wires to fit and connect them using wire nuts. Connect black to black and red to red.
4. Screw the cover back onto the connection box.
5. Thread the swivel onto the top of the windssock.



NOTE

The swivel assembly includes a cable that leads to a connection box attached to a mounting bar for the LED fixture.

You have now completed assembling the swivel. The next step is to secure the windssock pole to the ground.

2.2.2 Securing the Windssock Pole to the Ground (L-806 Only)

1. The bottom of the windssock pole has a threaded interior. Screw a frangible coupling into the bottom of the windssock as shown.



2. Using the floor flange as a reference template, install four wedge anchor bolts (or equivalent) into the ground.
3. Secure the floor flange to the ground.
4. Carefully lift the windssock into the vertical position, and then carefully thread it into the floor flange. Take care not to cross-thread the unit.
The basket can turn freely 360 degrees, so it is not necessary to orient it to the equator.

NOTE

When installing the solar engine mount, pointing the face of the solar engine toward the equator *is* an important requirement.



The upright L-806 Windssock will resemble the following (L-807 not shown):

NOTE	This photo shows the LED fixture mounting bar already in place.
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2.2.3 Securing the Solar Engine Pole to the Ground (L-806 and L-807)

A two-foot long solar engine mounting pole is provided.



1. Determine a location for the solar engine floor flange that is at least 10 feet from the windssock pole. This separation ensures that the solar panel is not obscured by the windssock fabric or its shadow.
2. Thread a frangible coupling into the floor flange and tighten



3. Thread the 2-foot solar engine mounting pole onto the frangible coupling and tighten.



2.2.4 Assembling the Solar Engine (L-806 and L-807)

These are the mounting brackets that attach to the back of the solar engine.

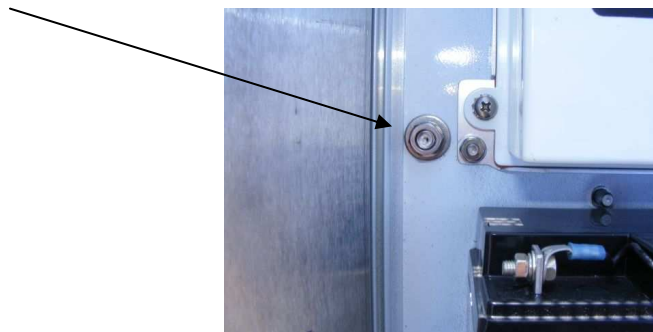


1. Install the mounting brackets *exactly* as shown in relation to the large opening into which the water tight conduit from the windsock enters.
2. Tighten the nuts from inside the solar engine.



The following pictures are INTERIOR VIEWS of the four bracket fastener locations:

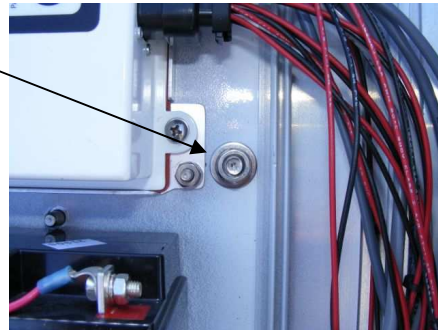
Top Left nut



Bottom left nut



Top right nut



Bottom Right nut



2.2.5 Connecting the Pole Top Adapter (L-806 and L-807)

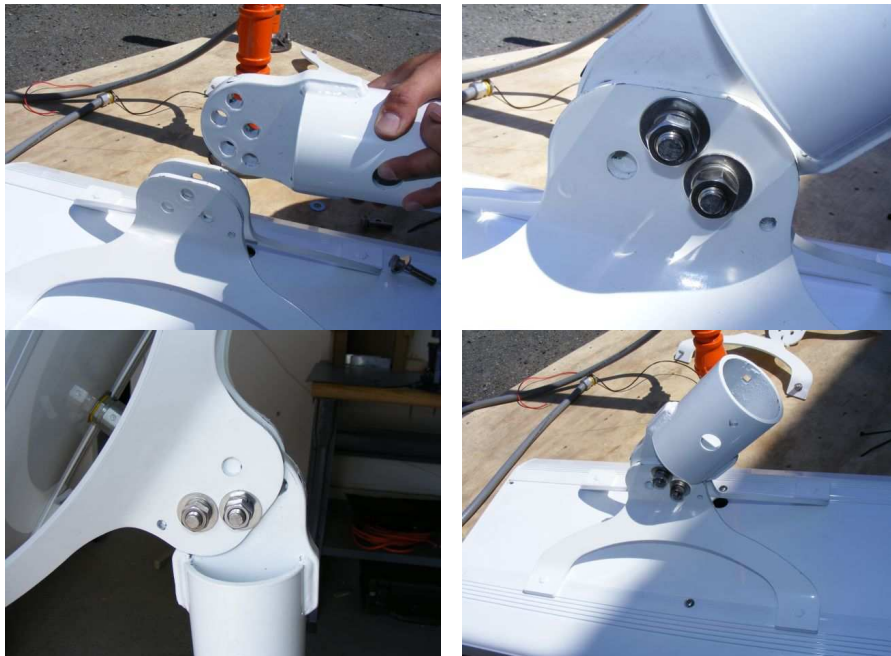
NOTE

When the mounting brackets and pole top adapter are correctly installed, the Carmanah sticker on the back of the solar engine is at the bottom of the solar engine.



(The red oval circling the label visible at the back and bottom of the engine)

1. Connect the pole top adapter to the mounting brackets as shown. Refer to your Carmanah EverGEN manual for information on how to set the engine for the correct inclination for your latitude.



2. Remove the black grommet from the hole in the back of the solar engine. This is where the water tight conduit from the windsock enters.

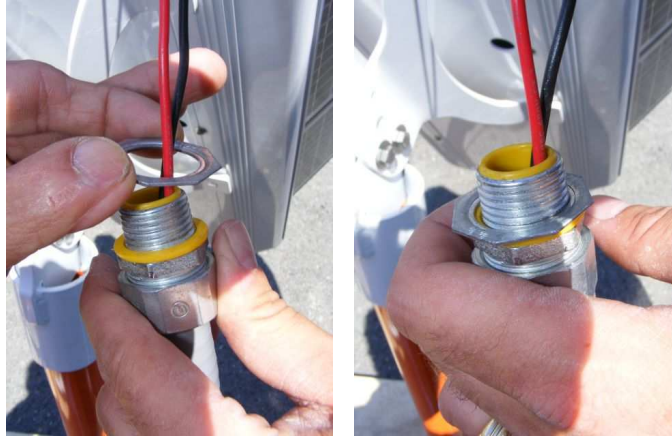


3. Lift up the solar engine and carefully place it on the top of the 2-foot post.



2.2.6 Connecting the Windsock to the Solar Engine (L-806 and L-807)

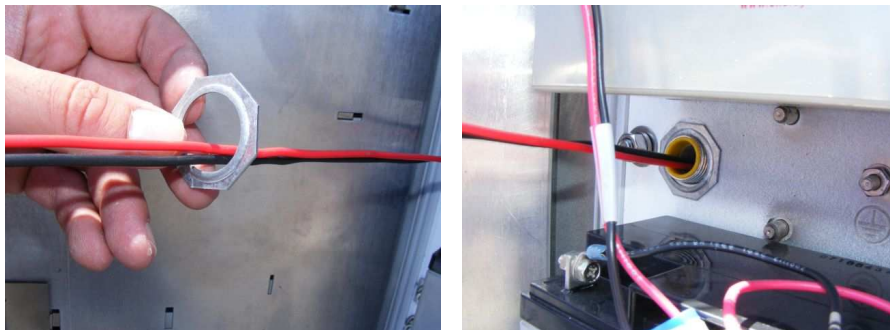
1. Bring the liquid tight cabling from the windsock over to the solar engine.
2. Place one of the washers over the fitting.



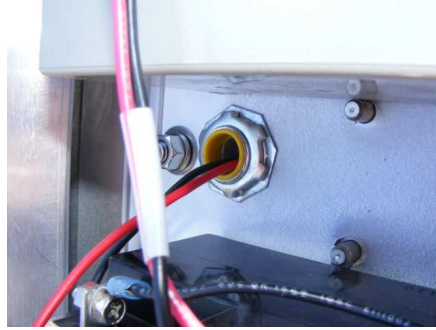
3. Insert the liquid tight cable into the back of the solar engine.



4. Inside the solar engine, place a second washer over the wires and seat the washer on the connector.

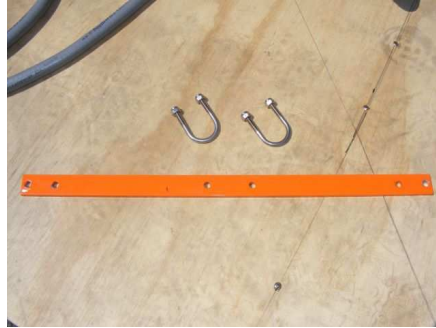


5. Thread the nut down and tighten with needle nose pliers or suitable tool.



2.2.7 Attaching the LED fixture to the Windssock Basket (L-806 and L-807)

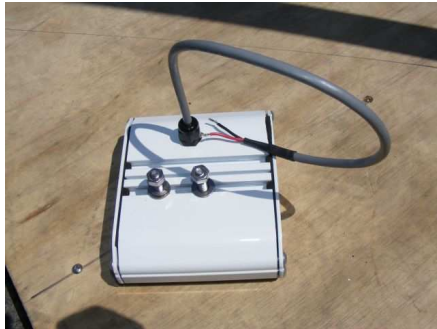
You will need the mounting bar and a pair of U-Bolts to mount the LED fixture in the mouth of the windssock:



1. Attach the mounting bar as shown below, ensuring that it is installed on top of the horizontal tubing.



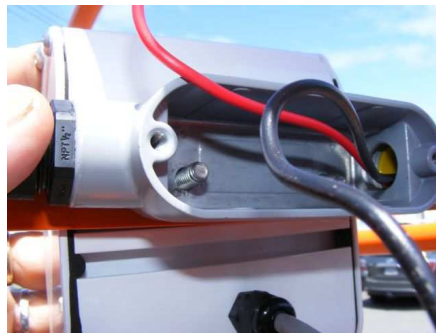
2. Remove the nuts and washers from the back of the LED fixture



3. Insert the LED fixture fasteners through the holes in the mounting bar as shown below.



4. Place the connection box (that is connected by wiring up to the swivel) over the fasteners.



5. Add the washers and nuts that were removed from the LED fixture and tighten using a socket wrench.



2.2.8 Wiring the LED fixture (L-806 and L-807)

1. Feed the LED fixture wire into the connection box until the grey sheathing is visible inside the connection box.



2. Tighten the black fitting to make LED fixture wire watertight.
3. Using the supplied wire nuts, connect the LED wiring to the wire from the swivel above (which is already in the connection box). Ensure you connect black to black and red to red.



4. Using a flat blade screwdriver, install the connection box's backing plate.



Once you are finished, the LED fixture, mounting bar and windsack basket should appear as follows:

NOTE

The following two pictures show the fabric windsack already installed. Installing the fabric windsack takes place in section 2.2.12



2.2.9 Connecting the LED to the EMS (L-806 and L-807)

The EMS is located inside the solar engine:



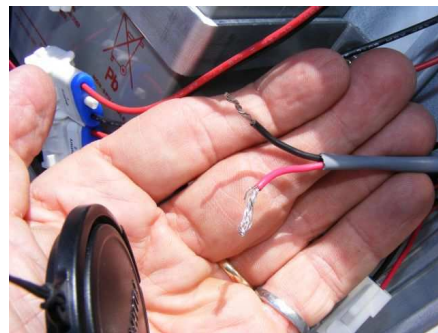
Below the EMS are the three system batteries. On the right side, the wiring harness from the EMS descends with connectors for LEDs, solar panels and batteries.



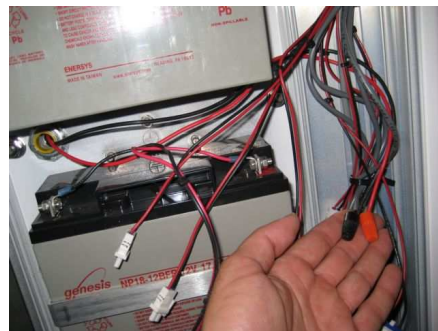
1. Locate the connector labeled “LED 1”



2. Cut the connector and strip the wires as shown

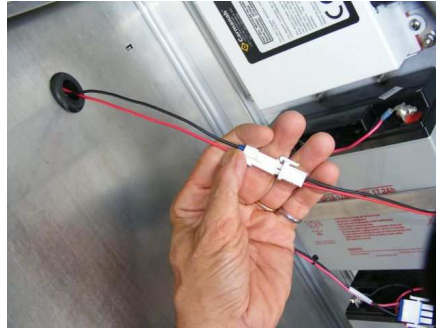


3. Using wire nuts, connect the “LED 1” wiring from the EMS to the wiring from the windssock. Connect black to black and red to red.



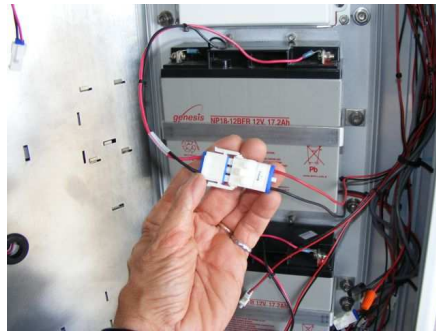
2.2.10 Connecting the Solar Panels to the EMS (L-806 and L-807)

Connect the three solar panels to the three numbered solar panel (PV Photovoltaic) connectors by clipping together the appropriate connectors.



2.2.11 Connecting the Batteries to the EMS (L-806 and L-807)

1. Connect the three batteries to the three numbered battery connectors.



2. Close the solar engine and fasten the solar panel lid shut.

If the system is working correctly, the moment you connect the first battery the LED fixture illuminates for approximately one minute as the EMS system initializes.

The operation of the system can also be confirmed by either:

- a) Covering the solar panels with an opaque material to simulate night
- b) Opening the solar engine and disconnecting the three solar panels to simulate night

2.2.12 Installing the Windcone Fabric (L-806 and L-807)

The L-807 Windsack must be tilted over using the hinge assembly to gain access to the basket.

1. Slide the fabric windcone over the basket frame



2. Pull the fabric windcone up over the basket until the mouth of the windcone is aligned with the mouth of the basket



3. Ensure the drain holes in the windcone are on the underside to allow water to drain freely from inside the windcone



4. Secure the fabric windcone to the basket frame using the plastic zip straps provided.



5. Using sharp cutters, trim excess zip strap



2.2.13 Drilling Holes on the Poles (L-806 and L-807)

NOTE

It is very important that you plan carefully for where the holes are drilled. The placement of the holes must be such that **the EverGEN-30 faces the equator when the pole is fully tightened into its base**

1. Orient the solar panel so it is facing toward the equator (That is, facing south if it is being installed in the Northern Hemisphere, or facing north if it is being installed in the Southern Hemisphere).



2. Mark and drill four holes in the post



3. Insert the two carriage bolts (provided) and tighten using the washer, lock washer and nut in that order.

The bottom carriage bolt is designed for its head to tighten against the pole top adapter, while the top carriage bolt that fits through the larger diameter hole is designed to tighten against the surface of the post itself.



3.0 Product Care

Although the solar engine is designed to be maintenance free, you can achieve optimum performance by cleaning the solar panel and luminaire lens as required. Clean them on a regular basis or whenever the panel is visibly dirty. Use water and a soft sponge or cloth for cleaning, and a mild, non-abrasive cleaning agent for more stubborn residue. Rinse well. In the event of heavy snowfall, clear the solar panel as soon as possible to allow maximum charging efficiency.



Do not use a pressure washer to clean the windssock.

Follow this check list to help ensure the solar engine performs optimally:

1. Clean the solar panel frequently during drier months, as it may become soiled quickly. Dust, if allowed to accumulate, will reduce the power output of the solar panel.
2. Ensure that the vents and drain holes in the solar engine are free of debris.
3. Check the exterior of the solar engine for cracks, missing or broken hardware, or other potential problems.

3.1 Batteries



Exercise caution when handling the batteries; they are capable of generating enormous short-circuit currents.
Remove all jewelry (bracelets, metal-strap watches, rings) before handling batteries.

The 12-volt batteries are sealed, rechargeable lead acid. Consult your local municipal bylaws for information on recycling the batteries when replacing. Do not discard these batteries in the garbage – please recycle!

4.0 Troubleshooting

If your system does not operate according to its specifications, check the following:

- Ensure the solar panel is not obscured, shaded, or dirty – all these factors greatly affect charging capacity.
- Check that the solar panel is not being illuminated by an external source of light or obscured by debris.
- Check the unit externally for any obvious signs of damage.
- Try disconnecting and reconnecting the main wiring harness on the EMS

The system can be tested during the daytime by covering the solar panel for more than 10 seconds – the luminaire should turn on. Uncover the solar panel and the luminaire should then turn off after approximately 10 seconds. If the amount of sunlight has been much less than normal, it is possible that the solar engine has entered the Low Battery Cutoff state. The luminaire will not light up until the batteries have recharged to at least 50% capacity. In the Low Battery Cutoff state, the LED fixture will flash briefly once per minute.

If the unit is still inoperable, contact Carmanah for customer support. Refer to the following section for more information on contacting Carmanah Support.

Prepare the following information prior to contacting Carmanah:

- Model
- Serial #
- New installation. Yes/No
- Battery voltage
- Description of problem
- Location

5.0 Warranty and Customer Service

This product is covered by the Carmanah warranty. Visit www.carmanah.com/content/products/warranty/ for additional information or to register your product online.

Before contacting Carmanah's customer service department, please have the serial numbers of your windssock 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 Corp.
Building 4, 203 Harbour Road
Victoria, BC Canada V9A 3S2

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