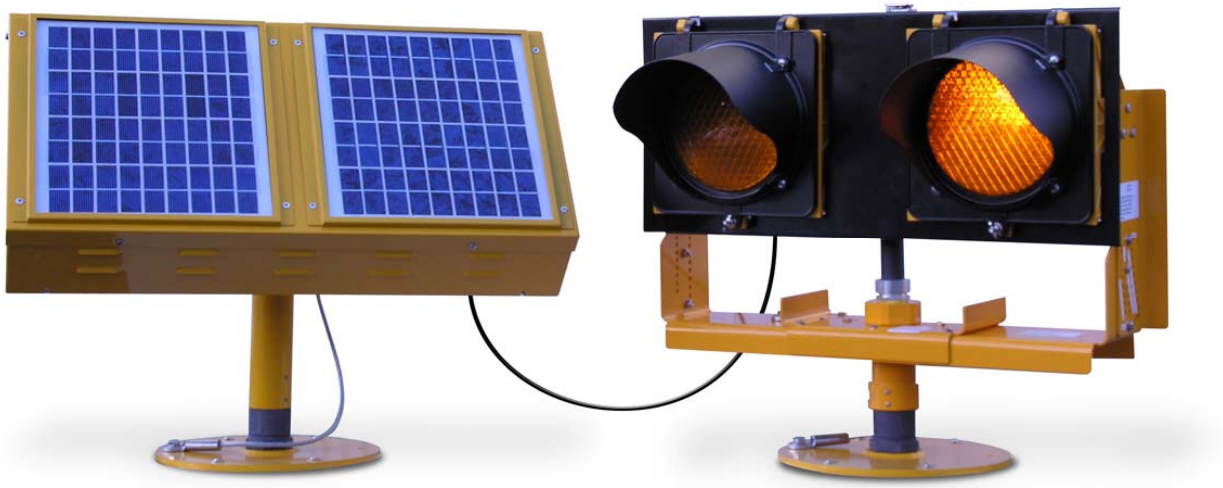
ERGL OWNER'S MANUAL

Elevated Runway Guard Light (ERGL)



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50746

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1.0 Precautions

WARNING: Exercise caution when handling the batteries. They are capable of generating enormous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, rings) before attempting to handle or remove the batteries.

ESD Precautions and Proper Handling Procedures

- Dissipate static electricity before handling any system components (Energy Management System, LED lights) by touching a grounded metal object, such as the unpainted metal housing on the system unit.
- If possible, use antistatic devices, such as wrist straps.
- Avoid touching the contacts and components on the Energy Management System.
- 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. Misaligned connector pins can cause damage to system components at power-on.
- **Failure to observe proper ESD handling procedures can void your warranty**

2.0 Introduction

Congratulations on purchasing the Carmanah Elevated Runway Guard Light, the world's most advanced solar LED elevated runway guard light.

Carmanah's Elevated Runway Guard Light (ERGL) is a 24-hour flashing, unidirectional LED lamp fixture combined with a remotely mounted solar engine.

Using Carmanah's advanced Energy Management System, the unit is designed to operate reliably with no scheduled maintenance for up to five (5) years except for routine cleaning.

2.1 *How it Works*

The ERGL is completely power-autonomous. It operates using solar-charged batteries that are maintenance-free for up to five (5) years; therefore no wiring to an external power supply is required. The solar panels, Energy Management System and batteries are housed in the solar engine. The LED lights are housed in a separate housing that can be placed up to twenty (20) feet from the solar engine. The ERGL is designed for continuous, 24-hour flashing operation with user-configurable LED intensity settings.

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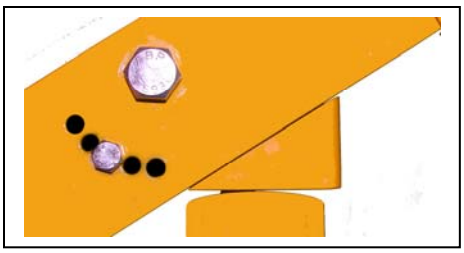
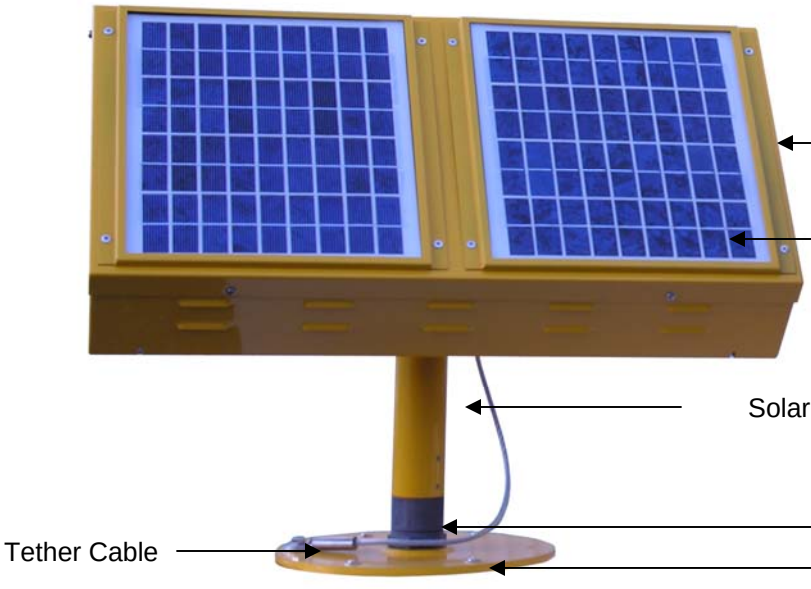
3.0 Component Identification

3.1 *Unidirectional Lamp Fixture*



0° to 60° Solar Engine Pivot

3.2 *Solar Engine*



3.3 *20-foot connector harness (not shown)*

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4.0 Tools and Materials Required

- Imperial socket set
- Crescent wrench with opening to 2.5"
- Compass
- Multi-bit screwdriver
- 1/8" hex driver
- If the connection harness between the lamp fixture and solar engine is to be buried, a shovel or trenching equipment will be required

5.0 Product Assembly

Installation time can be budgeted at approximately ten (10) minutes in the shop plus thirty (30) minutes in the field per ERGL.

5.1 *Assemble Your System*

Your ERGL Solar Engine and LED Lamp Fixture ship factory-assembled except for the base plates, tethers, frangible couplings, and the solar engine mounting post. You will need to connect these before installing your light.

WARNING: The solar engine and LED lamp fixture are heavy. Handle with caution to avoid tipping during assembly and installation.

5.1.1 Solar Engine Assembly

1. Remove the two central fasteners and tether from the bracket (located on the bottom of the solar engine). See Figure 5.0.

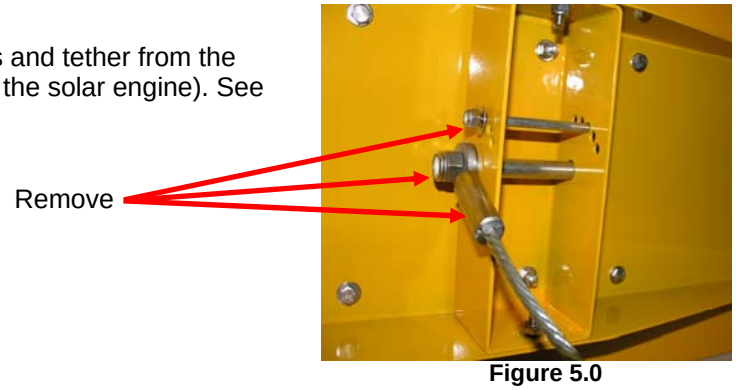

Figure 5.0

2. Slip the post into the bracket, and reinstall the fasteners and tether. Do not tighten the fasteners at this point. See Figure 5.1.

Figure 5.1

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3. Install anti-rotation plate.
4. Thread the frangible coupling into the base plate and tighten securely. See Figure 5.2.

Figure 5.2

5. Place the solar engine assembly onto the frangible coupling and temporarily tighten the six set screws. See Figure 5.3.

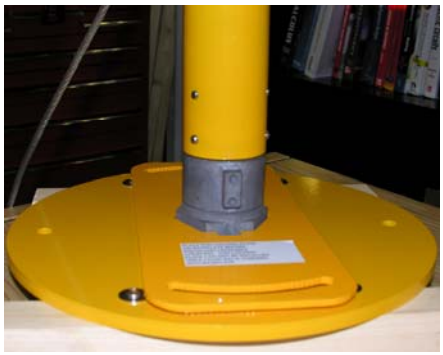

Figure 5.3

5.1.2 LED Lamp Housing

1. Install anti-rotation plate.
2. Thread the frangible coupling into the base plate and tighten securely. See Figure 5.4.

Figure 5.4

3. Place the LED lamp housing onto the frangible coupling and temporarily tighten the six set screws. See Figure 5.5.

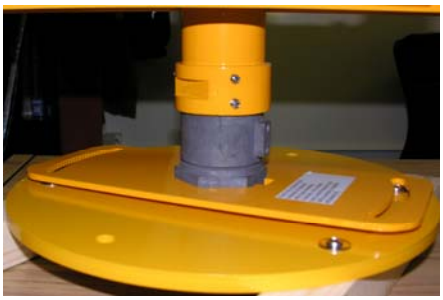

Figure 5.5

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6.0 Configuration

6.1 *Brightness Configuration*

Note: Your ERGL is factory configured for brightness and does not typically need additional configuration. Carmanah recommends speaking with a qualified Carmanah representative before setting the brightness.

Important: Light intensity (brightness) is user-configurable; however, setting light intensity with energy requirements greater than the available solar energy will result in automatically reduced brightness (Automatic Light Control), reduced system efficiency, reduced battery lifetime, or even complete system failure. Contact your Carmanah representative if you need guidance in adjusting your settings for your geographic location and solar conditions.

Contact Carmanah prior to adjusting the brightness settings.

WARNING: When adjusting the brightness, the harnesses **MUST** be disconnected from the Energy Management System (EMS) in the following sequence:

Harness Disconnection Sequence

1. Disconnect the solar panel connections.
2. Disconnect the batteries.
3. Disconnect the LED lamps.

This sequence minimizes any potential safety hazard. Once the brightness is adjusted reconnect the harnessing in the order shown below:

3. Connect the LED lamps.
4. Connect the batteries.
    a. If the batteries are charged and the EMS is connected, the LED lamps will begin to flash.
5. Connect the solar panel connections.

Should you need to adjust the brightness of your ERGL follow the steps outlined on the next page.

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6.1.1 Adjusting Brightness

1. To adjust the brightness on your ERGL, open the hinged solar engine cover by removing the two fasteners located on the front face of the housing (use prop on left-hand side to support cover).
2. Inside you will see two batteries, an Energy Management System (EMS) and harnessing. See figure 6.0.

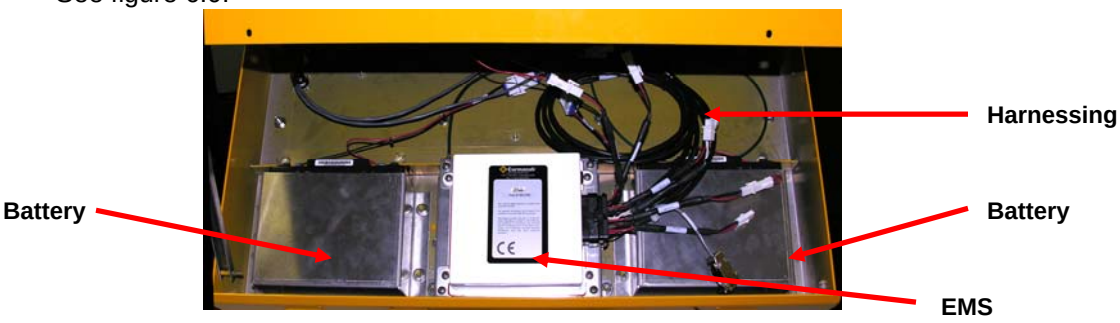

Figure 6.0

3. Disconnect the solar panel connections.
4. Disconnect the batteries.
5. Disconnect the LED lamps.
6. Disconnect the large harness connector from the EMS. See Figure 6.1.

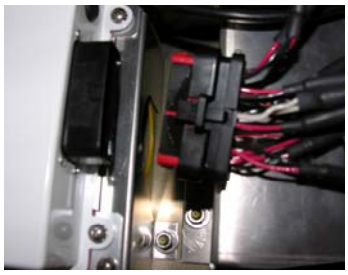

Figure 6.1

7. Remove the four fasteners securing the EMS to the housing. See Figure 6.2.
8. Remove the EMS and turn it over.

WARNING: Follow ESD precautions when handling the EMS. Refer to **Section 1.0 Precautions** for more information. **Failure to observe proper ESD handling procedures can void your warranty**

Figure 6.2

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On the circuit board within the EMS housing, there is a rotary dial SW2. See Figure 6.3.

9. To adjust brightness, use a small, flat-headed screwdriver to turn SW2 to the desired setting. Refer to Table 6.0 for brightness settings.

Table 6.0: LED Brightness Settings

Setting	Brightness Level	Approx Intensity
0	0	25cd
2	2	65cd
3	3	100cd

(cd = Candela)

WARNING: Do not exceed a brightness setting of "3"

SW2: Brightness Setting

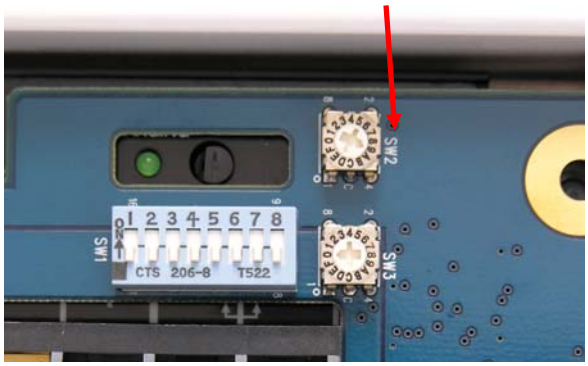

Figure 6.3

10. Once the brightness is adjusted, return the EMS to its location in the solar engine housing.
11. Secure the four fasteners.
12. Reconnect the large harness connector to the EMS.
13. Reconnect the LED lamps.
14. Reconnect the batteries.
15. Reconnect the solar panel connections.
16. Close the solar engine cover and refasten.

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7.0 Installation

Evaluate the suitability of your installation location. Your ERGL is solar powered and, for optimal performance, the solar engine should be installed in a location that is shade-free and allows for unobstructed solar charging. If you trenching between the lamp fixture and solar engine is required, it is recommended to perform the trenching prior to installation to avoiding damaging the system.

1. Install your ERGL using the supplied base plates, anti-rotation plates, tethers and mounting hardware by securing the solar engine assembly and LED lamp housing onto standard airport light bases.

Note: Leave one fastener out when installing the base plate to the light base. This provides a location for the tether.

2. When the base plate is secured to the light base, place the tether over the remaining hole and securely tighten using the supplied hardware.

3. If you are located in the northern hemisphere face the solar panels south. If you are located in the southern hemisphere face the solar panels north. Use the compass if you are unsure. When the solar engine is correctly oriented, tighten the six set screws located near the base.

Calculating Solar Engine Tilt Angle
If your ERGL is located at a latitude 15° or greater from the equator, calculate the solar engine tilt angle by adding 15° to the absolute value of your latitude. If your ERGL is located at a latitude less than 15° from the equator the tilt angle will be 0°.

4. Remove the small fastener from the solar engine bracket and adjust the engine as close as you can to the tilt angle you calculated. (Note the solar engine bracket has adjustment from 0° to 60° in 15° increments). Securely tighten the fastener. See Figure 7.0.

WARNING: The solar engine is heavy, use caution when tilting.

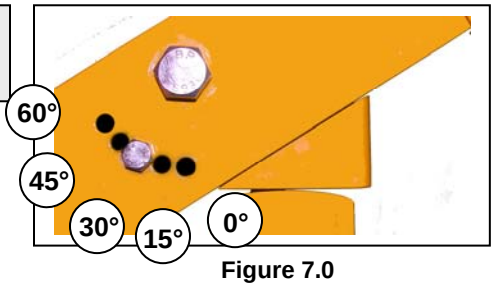

Figure 7.0

5. Adjust the horizontal and vertical settings for the lamp housing as desired. Securely tighten the six set screws near the base.

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8.0 Activation

To activate your ERGL connect the harnesses as outlined below. If you need to trench, the bury the harness once you have adjusted the length as described below. If potential animal damage is a concern, you may consider running the harness through a suitable conduit.

1. Connect the supplied 20 foot (6.1 meter) harness coming from the LED lamp housing to the underside of the solar engine. See Figures 8.0 and 8.1.

Figure 8.0

Figure 8.1

2. If the solar engine and lamp housing are mounted less than twenty feet apart, the gland nut on the lamp housing may be loosened and the slack harness coiled inside the housing to take up the slack. See Figures 8.2 to 8.4.

Figure 8.2

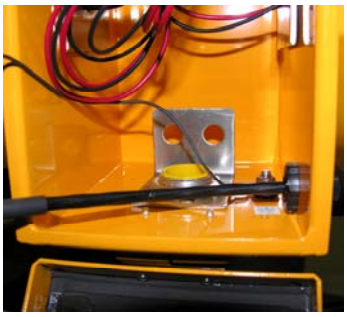

Figure 8.3

Figure 8.4

3. Remove the two fasteners securing the cover of the solar engine.

4. Open the solar engine cover. The ERGL is shipped with the large harness connector already connected to the EMS. Plug in the other harnesses in the following order:
    a. Connect LED lamps.
    b. Connect batteries.
    c. Connect solar panel connections.

5. Your ERGL will now begin to flash. Close the cover and secure the fasteners. Your light is ready for use.

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9.0 Maintenance and Product Care

Although your ERGL is designed to be maintenance free, optimum performance can be achieved by cleaning the solar panels and lamp lenses as required. Clean on a regular basis, or whenever the panels are 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 panels as soon as possible to allow maximum charging efficiency.

WARNING: Pressure washers should **not** be used. Water may be forced up into the ventilating louvers and soak internal components.

Following this check list will help to ensure your ERGL performs optimally:

1. Clean the solar panels more frequently during drier months, as they may become soiled more quickly.
2. Check all electrical and mechanical connectors yearly to ensure they are clean, secure and undamaged.
3. The solar engine has several vents and drain holes. Ensure that they are free of debris.
4. Visual inspection – check over exterior for cracks, missing or broken hardware or other potential problems.

Battery Lifetime
Your ERGL's battery lifetime depends on the ambient temperature in the location it is installed. Typical battery lifetimes for your ERGL are outlined in Table 9.0.

Table 9.0: Battery Lifetime

Average Annual Ambient Temperature	Approximate Expected Battery Lifetime
20°C	3.0 – 5.0 years
25°C	2.0 – 3.0 years
30°C	1.1 – 1.7 years
More than 30°C	1.1 years or less

WARNING: Remember, exercise caution when handling the battery packs. They are capable of generating enormous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, rings) before attempting to handle or remove the battery packs.

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!

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10.0 Troubleshooting

If the Light is not Flashing

1. Check the battery connection and the LED array connection to ensure the connectors are fully inserted. As the light is designed to function as soon as the battery and LED lamps are connected, this should be fairly simple to diagnose.
2. Try disconnecting and reconnecting the harnesses from the Energy Management System (EMS) in the sequence outlined below.

   Disconnect the harnesses in the following sequence:
   a. Disconnect the solar panel connections.
   b. Disconnect the batteries.
   c. Disconnect the LED lamps.

   Now reconnect the harnesses in the following sequence:

   a. Connect the LED lamps.
   b. Connect the batteries.
   c. Connect the solar panel connections.

3. Inspect the connection harness for damage. If the harness has been buried without protective conduit, there is a possibility of animal damage.

If The Light is Exhibiting Irregular Flash Patterns

Your Carmanah ERGL may exhibit irregular flasher patterns under certain conditions. If you notice that your ERGL is flashing irregularly, it may be a result of one of the following conditions:

1. Low battery condition: Under a low battery condition, the ERGL will exhibit the following repeating flash pattern: on 0.1 seconds, off 2.5 seconds. If your light is exhibiting this flash pattern you will need to charge the batteries. This can be done in two ways. In both cases, disconnect the LED lamps to prevent additional battery drain. The first method, if there is sufficient sunlight, is to allow the unit to charge for three to five days in the ambient light. The second method is to charge the batteries by placing the solar engine under high-powered halogen flood lights for three days.

Warning: Maintain at least 18 to 24 inches between the lamp and solar panels to prevent heat damage.

   When your ERGL is operational again, if you had previously increased the brightness, you will need to consider lowering the brightness setting as it is likely the unit is drawing more energy than the solar input can provide.

2. The solar engine has not been exposed to sunlight in 24 hours: Under this condition, the ERGL will exhibit the following repeating flash pattern: on 0.1 seconds, off 0.5 seconds. In this situation it is best to expose the unit to sunlight or high-powered halogen flood lamps. It is not necessary to disconnect the LED lamps as the unit should recover quickly.

If your ERGL continues to experience a problem, please contact either Carmanah Technologies Corp. (See Section 11.0 for contact information) or your distributor.

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11.0 Service and Additional Products

11.1 *Customer Service*

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

Carmanah products are covered by a standard 3-year pro-rated warranty. A warranty card is supplied with each unit. The warranty can also be viewed online at:

http://www.carmanah.com/content/products/warranty/

To contact Carmanah's Customer Service Department:

Mail: Carmanah Technologies Corp.
Building 4, 203 Harbour Rd.
Victoria, BC Canada V9A 3S2

Phone: 1-250-380-0052
1-877-722-8877 (U.S. and Canada Toll-Free)

Fax: 1-250-380-0062

Email: info@solarairportlights.com
customerservice@carmanah.com

Website: www.carmanah.com

11.2 *Additional Products*

Carmanah offers a variety of solar-powered and energy-efficient LED lighting products. For aviation applications, Carmanah also manufactures solar LED runway lights, as well as LED General Illumination products. For more information, please visit our website at: http://www.solarairportlights.com.

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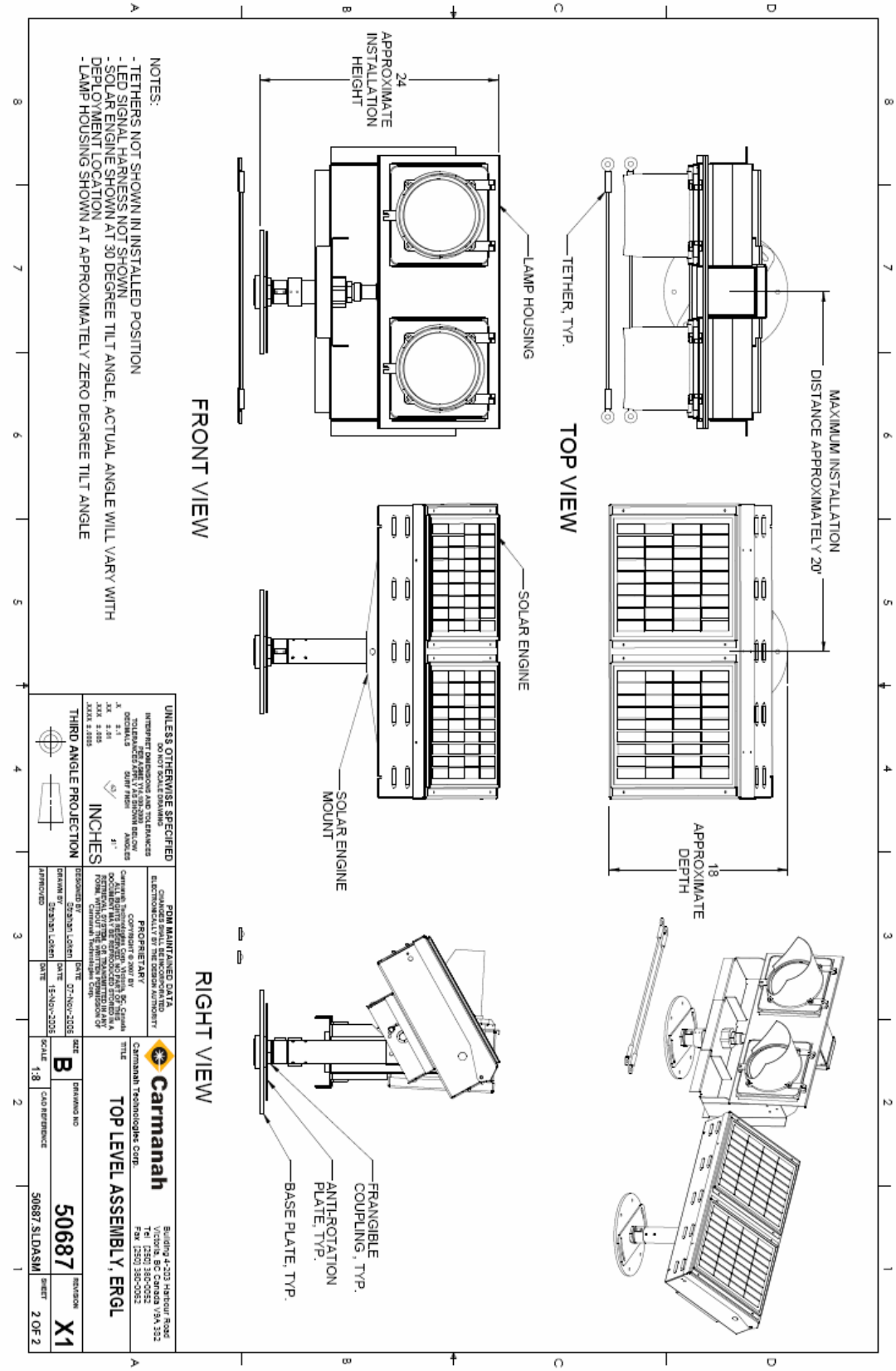
12.0 Product Specifications



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