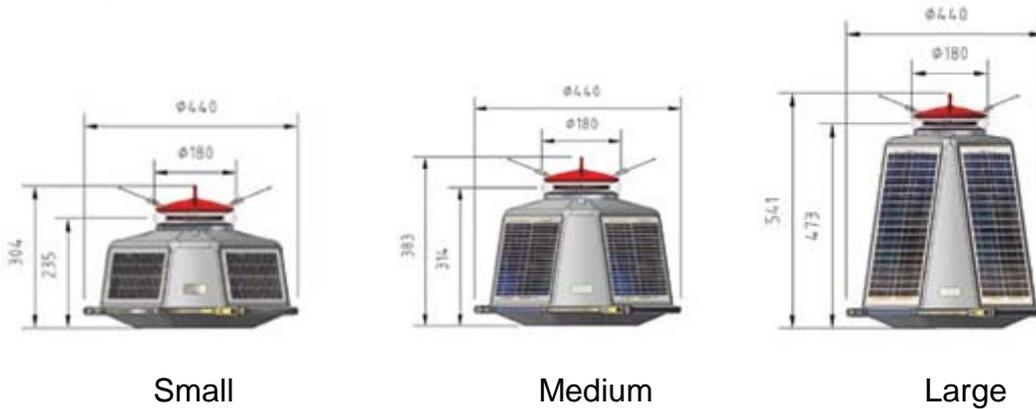


# VEGA INDUSTRIES SELF-CONTAINED LED LANTERN INSTALLATION & SERVICING INSTRUCTIONS

The Coast Guard purchased 120 self contained LED lanterns from Vega Industries, Inc., of New Zealand. These LED lanterns are intended as replacements for 155mm red and green lanterns currently using 0.55a and 0.77a lamps. The lantern has four intensity settings (very high, high, medium and low), providing adjustable effective intensities of 77, 60, 40 and 27 candelas (for all flash characteristics) for use on both fixed and floating aids to navigation.



The lantern is completely self-contained and has three solar panels (two on fixed aids), LED optic head and a lead-acid non-spill rechargeable battery.

## Intensity

The lantern can be programmed for low, medium, high and very high intensity settings. The default setting is medium. Range is 4 nautical miles for all rhythms in either low or medium intensity setting and 5 nautical miles in either high or very high intensity setting. The lantern uses a Schmidt-Clausen correction feature which maintains constant intensity regardless of flash rhythm.

Flash Rhythm	Intensity (Low)	Intensity (Medium)	Intensity (High)	Intensity (Very High)
FL(2)6	27 Candelas	40 Candelas	60 Candelas	77 Candelas
FL6(.6)	27	40	60	77
FL4(.4)	27	40	60	77
FL2.5(.3)	27	40	60	77
FL(2+1)6	27	40	60	77
FL(2)5	27	40	60	77
Q	27	40	60	77

When replacing a 155mm lantern with a LED lantern, it is generally a good idea to target a LED lantern effective intensity that is at least equal to that of the 155mm lantern it

replaces. For comparison, the effective intensities of 155 mm lanterns are shown below and are detailed on the Vega solar sizing program discussed below:

<b>155mm Red(Green) Lantern Effective Intensities in Candelas</b>				
<b>Flash Rhythm</b>	<b>0.55a Lamp</b>	<b>0.77a Lamp</b>	<b>1.15a Lamp</b>	<b>2.03a Lamp</b>
FL(2)6	30(35)	40(55)	60(75)	110(140)
FL6(.6)	25(30)	35(45)	50(65)	95(120)
FL4(.4)	20(25)	30(40)	40(55)	75(90)
FL2.5(.3)	20(20)	25(35)	35(40)	55(70)
FL(2+1)6	20(20)	25(35)	35(40)	55(70)
FL(2)5	20(20)	25(35)	35(40)	55(70)
Q	20(20)	25(35)	35(40)	55(70)

## **Solar Sizing**

The lanterns, for this shipment, are available in two colors (red and green), two types (buoy and fixed) and three sizes, small, medium and large. The small, medium and large lanterns use 12, 18 and 35 amp-hour batteries, respectively. The progressively larger housings have more solar panel surface area and are capable of generating more power.

A solar sizing program for the Vega lanterns is available on our website: <http://www.uscg.mil/systems/gse/gse2/Publications.htm>. This program will determine which size lantern must be used at a particular location based on the color, intensity level and flash rhythm. **Do not assume that the same size red or green lantern will be used in the same waterway; you must perform a solar sizing.**

## **Programming/Battery Charging**

The lanterns must be programmed to the proper flash rhythm and intensity setting before deployment. The lanterns are shipped with the battery terminals disconnected and the lanterns will operate when power is applied. Therefore, the lanterns should be programmed and bench tested in the shop prior to transit to the aid.

The lantern will turn off if it does not see a day/night transition for 24 hours. So storage back in the box will ultimately turn the light off. Alternatively, a cover can be placed over the lens, or the lantern can be stored in a dark room or storage closet. If you leave the battery connected and plan to store the lantern for long periods, it must remain dark. If you open the closet or uncover the lantern in a lit room, it will operate for 24 hrs after it returns to darkness, depleting the battery. If in doubt, disconnect the battery.

Unscrew the three Allen bolts securing the V-band to the base using a 3/16" T-Handle Allen wrench. Back-out the bolts just to the point that a few threads remain inside the cylindrical nut in the clamp. If the bolt is removed, be sure not to lose the cylindrical nut in the clamp as it will fall out (future versions will have longer bolts). Remove the V-band and set aside. Pull the top of the lantern off the base (it may stick) and lay it on its side. On the small and medium lanterns, remove the protective caps on the battery terminals.

Determine the state of charge of the battery by measuring the open circuit voltage (no leads connected to the battery). Batteries shall be above 12.8 volts (80% state of charge) prior to deployment (up to two months). Below is a table detailing the state of charge for a range of corresponding battery voltages.

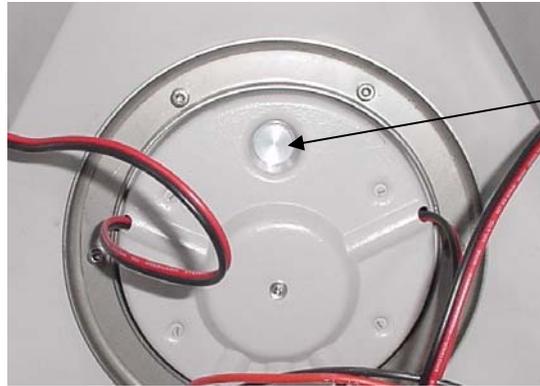
<u>Battery Voltage</u>	<u>State of Charge</u>
>12.80 volts	80-100%
12.5-12.8	60-80%
12.2-12.5	40-60%
11.9-12.2	20-40%
<11.9	0-20%

If the battery is below 12.8 volts, charge the battery using a Schumacher Ship'n Shore Speed Charge, Model SSC-1000A <http://store.schumachermart.com/ssc-1000a.html> or equivalent with provisions for Absorbed Glass Mat (AGM) battery technology and adjustable charge rate down to 2 amperes. With the lantern leads disconnected, connect the charger to the battery, plug it in and select the battery type (AGM/Gelled) and charge rate (2 amps for the small and medium lantern, and 6 amps for the large lantern). You can change the display mode to show the state of charge and continue charging the battery until 100% is shown on the display. It is recommended that you do not charge at the 10 amp rate as the battery could be damaged. After the display shows 100%, **unplug the charger first, and then remove the clamps** to prevent sparks near the battery.

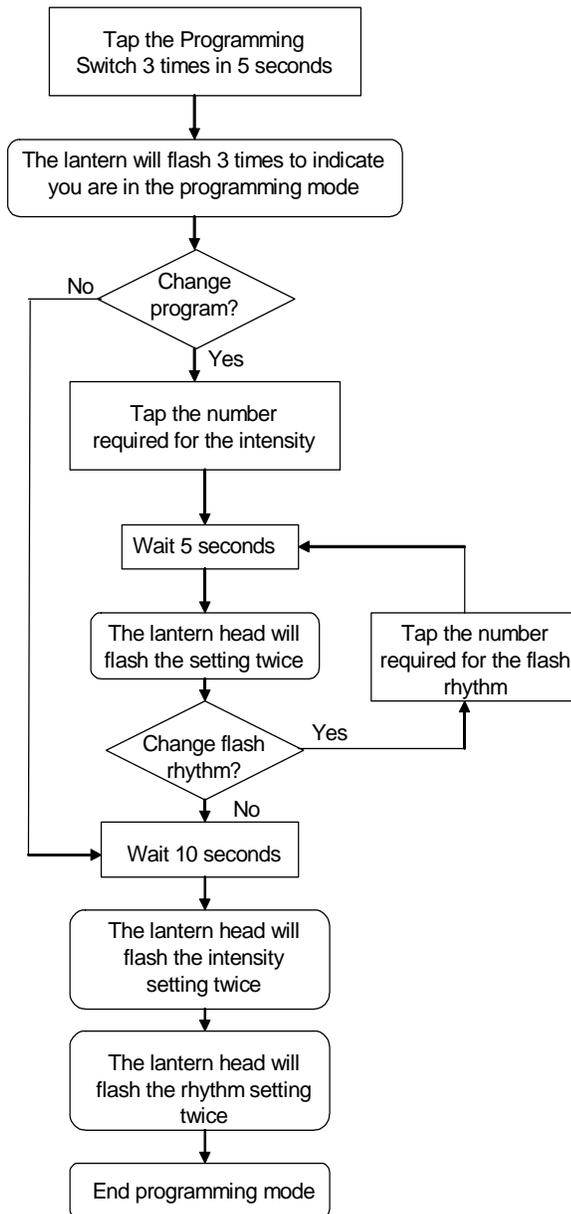
On the small and medium lanterns, push the lugs completely on the terminals. On the large lantern, connect the lugs to the terminals using the supplied nut and bolt using two 7/16" wrenches. **Connect the red wire to the positive terminal and the black to the negative terminal of the battery.** Lead acid batteries are a source of almost unlimited current. **Use care to prevent shorting terminals with metal tools.**

The lantern should turn on if the lantern head is partially covered or operated in a dimly lit room to simulate nighttime. Now set the intensity and flash rhythm using the following procedure.

The lantern is programmed using a tap switch located on the bottom of the LED head. The switch is recessed and may seem difficult to access, but does not require excessive force to initiate a program sequence. **DO NOT USE A TOOL** to program the lantern. The force from your finger is sufficient.



Tap Switch



Intensity	Taps/Flashes
Low	1
Medium	2
High	3
Very High	4

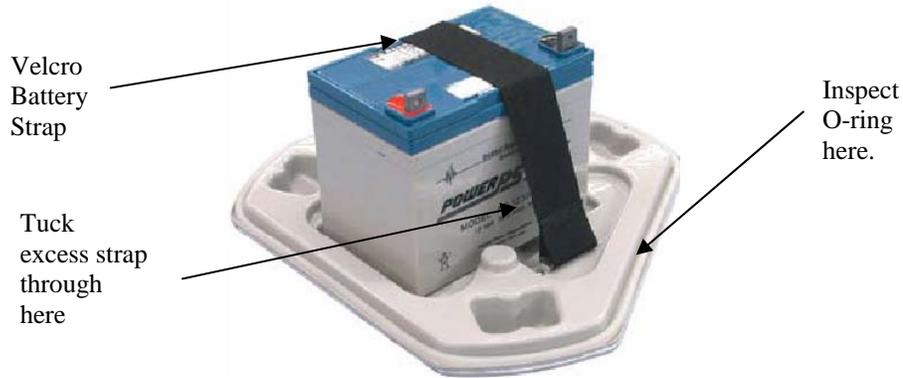
Rhythm	Taps/Flashes
FL2.5 (0.3)	1
FL4 (0.4)	2
FL6 (0.6)	3
FL (2+1) 6	4
FL (2) 6	6
Q	7
Fix	8

**Notes on programming:**

To check an existing program, tap 3 times and wait 10 seconds. The lantern will display the intensity setting, then the flash rhythm.

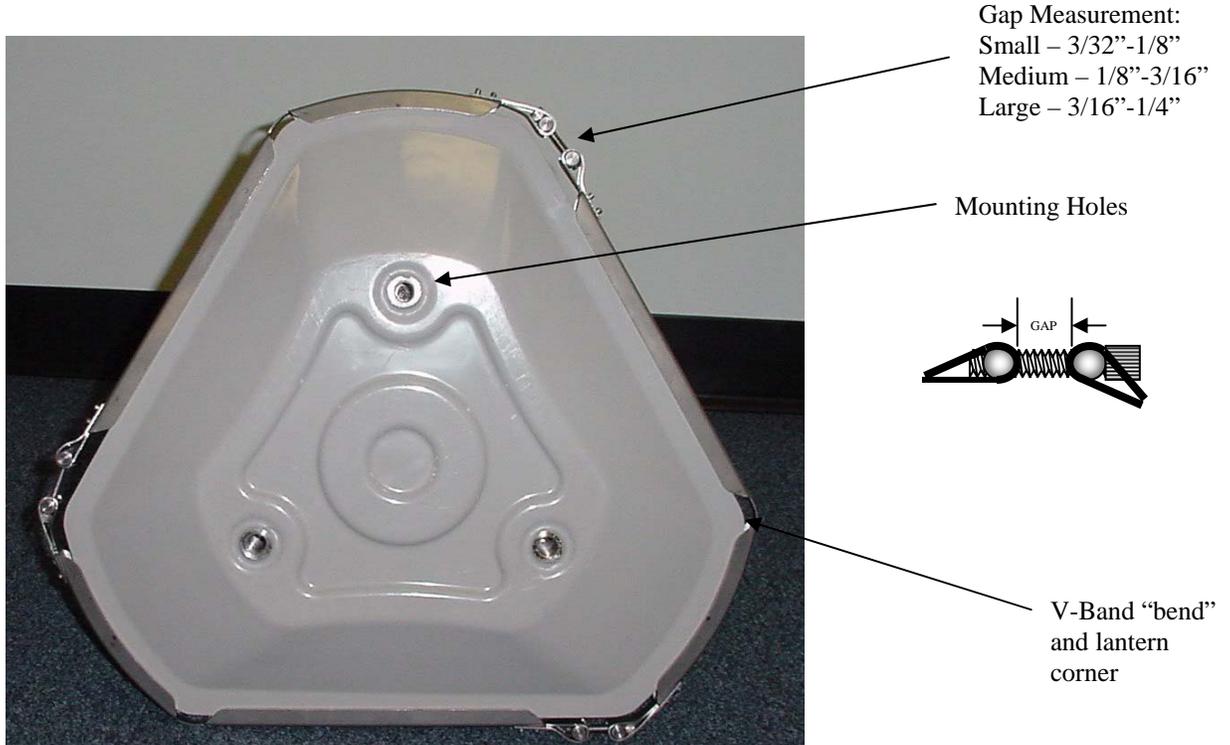
If you make an error, wait 10 seconds and reenter programming mode (tap 3 times) and try again.

Before reassembly, inspect the O-ring to be sure that it is aligned along the perimeter of base. Also be sure that the Velcro battery strap is tight. Tuck any excess strap through the hold down to prevent it from getting pinched between the top and base.



Carefully tuck the wires inside the lantern to prevent them from getting pinched and lower the top on the base. Orientation is not important (unless the lantern is already installed on a fixed aid as there are only two solar panels and they must face southeast/southwest.)

Lower the V-band over the lantern and align the ‘bends’ in the band over the corners on the lantern, as shown below:



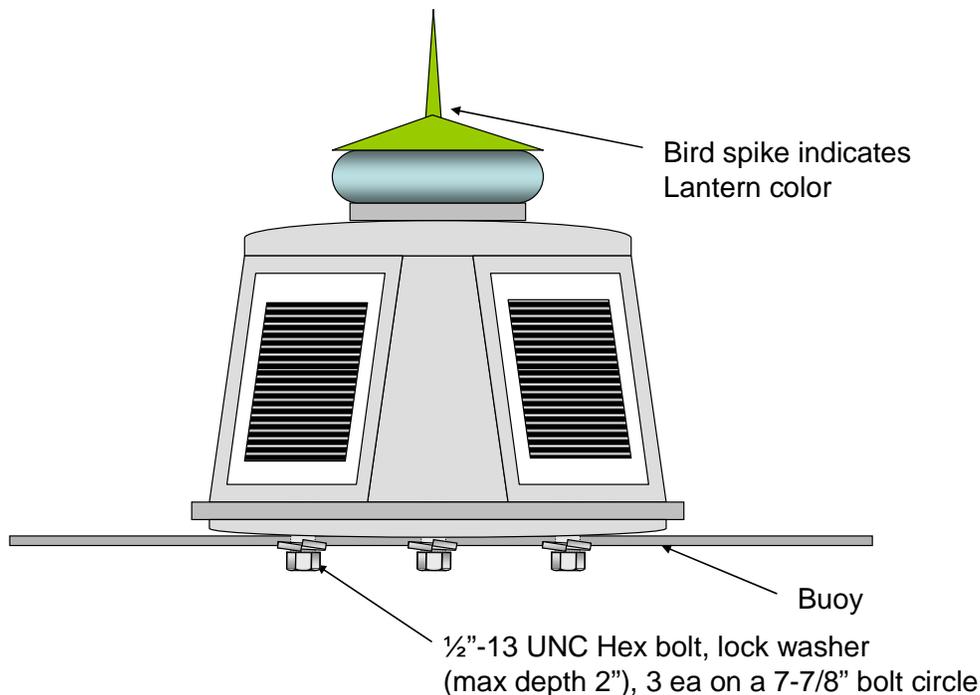
*Gently* tap the V-band onto the base on all six sides using a rubber mallet or no-bounce hammer. Tighten the Allen bolts using a T-handle Allen wrench evenly until the gap between the three clamps are as specified (see previous page).

## Bench Test

Bench test each beacon at the selected intensity and flash rhythm for 24 hours in a darkened room (the daylight control is located behind the lens and may be covered to simulate darkness.)

At the conclusion of the 24 hour test, store the lantern in the original shipping container, a dark storage area or place an opaque (no light shines through) cover over the lens. The lantern may be stored in a programmed state for up to two months as long as it stays dark, otherwise disconnect the battery. The lantern will retain the last programmed settings so that all you have to do is reconnect the battery.

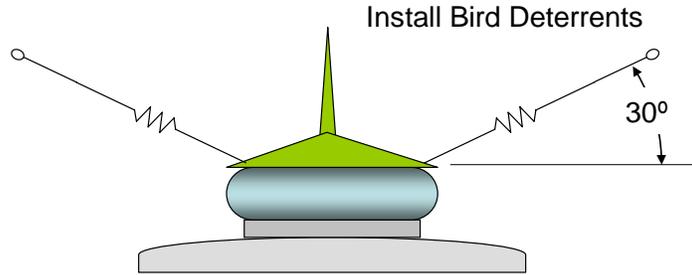
## Installation – Buoy



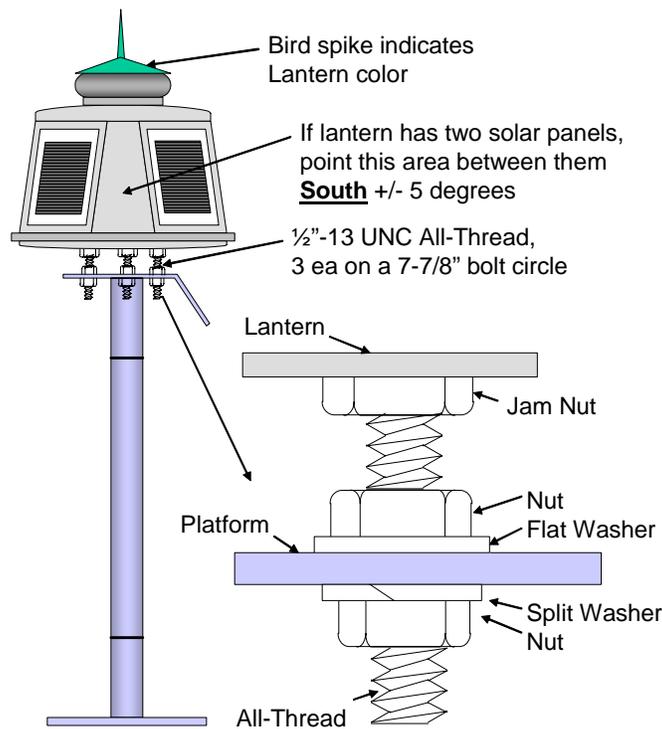
The lantern has provisions for a conventional 3-hole mount on a 7-7/8" bolt circle; however the lantern is fastened by blind holes in the base. Use three 316 stainless-steel 2" x 1/2" -13 coarse thread bolts with split lock washers as shown above. If the top-plate is warped, insert three stainless steel or nylon flat washers between the lantern and buoy to prevent distortion of the base. **Hint:** insert a stud in one of the base holes to position the lantern on the buoy. Remove the stud and insert a bolt after the other two bolts are installed.

Cover the lantern with a jacket and note if it turns on and flashes at the correct rhythm.

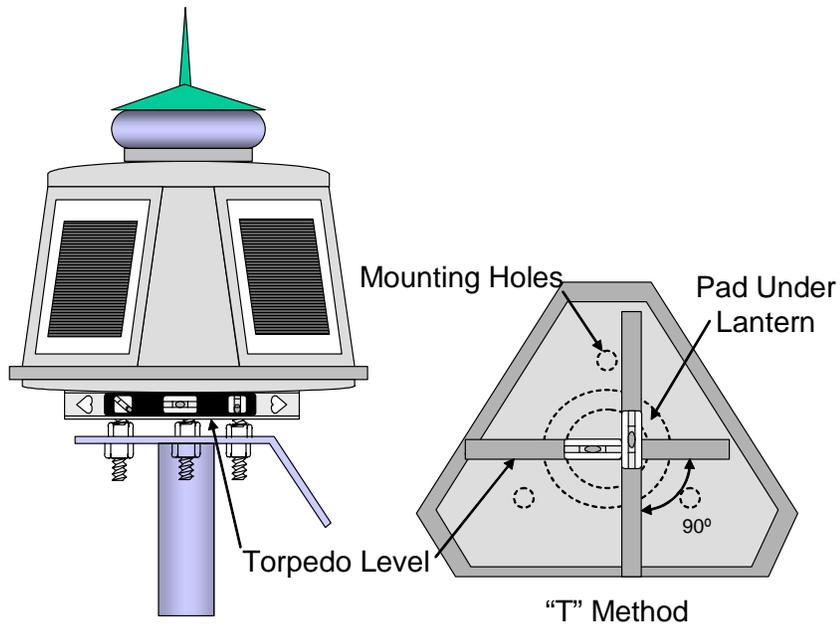
Install the three bird deterrents by pushing the supplied springs into the holes on top of the lantern at approximately a 30 degree angle.



### Installation - Structures



Insert three 6" lengths of stainless steel 1/2"-13 UNC All-Thread in the base of the lantern as far as they will go (about 2"). Thread three 1/2" stainless steel nuts and tighten against the base of the lantern. These act as jam nuts and prevent the All-Thread from loosening in the lantern. Thread three stainless steel 1/2" nuts about half-way up the All-Thread. Place three stainless steel flat washers on the platform, then install the lantern on the platform.

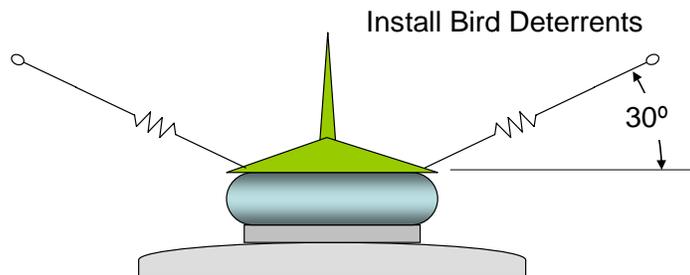


Place a torpedo level on the bottom of the lantern (there is a circular pad in the center) in-line with two of the mounting holes. Using the “T” method taught at the NATON School, level the lantern using one or both of the nuts on top of the platform corresponding to those two mounting holes. Turn the level 90 degrees and level the lantern in that direction by turning the one nut on top of the platform opposite the other two nuts. The lantern should be level in both directions.

Install a stainless steel split lock washer and nut on the bottom of the All-Thread and secure the lantern to the platform. If the nothing moved, the lantern should still be level; check with the torpedo level and adjust, if necessary.

Cover the lantern with a jacket and note if it turns on and flashes at the correct rhythm.

Install the three bird deterrents by pushing the supplied springs into the holes on top of the lantern at approximately a 30 degree angle.



## **Servicing**

Servicing should be performed in accordance with the standard cycle established for the aid. The recommended cycle is every 2 or 3 years. The service life of the lantern is 12 years (depending on durability of housing) with battery replacement at 6 year intervals.

Ensure that the solar panels and lens cover are clean. Wipe with a cloth dampened with mild soap and water, if necessary.

Cover the lantern with a jacket and note if it turns on and flashes at the correct rhythm.

## **Troubleshooting**

If the lantern is reported discrepant, inspect it for obvious signs of damage; broken lens cover, broken solar panels or evidence of water behind the lens. Replace the lantern.

If solar panels are just covered in bird guano, clean with soap and water. Add additional bird deterrents and allow the lantern to remain on station, or remove from service and recharge at CG Base.

If the daylight control fails (lantern will not turn off in daylight), replace the lantern.

*Back at CG Base or on the Cutter:*

Open the lantern and measure the battery voltage. If below 12.8 volts, charge the battery as discussed in the Programming/Battery Charge section.

If the battery voltage is acceptable, disconnect one battery lead, wait 10 seconds to reset the processor, and then reconnect. Test the lantern by placing a cover over the lens and note if it flashes on-rhythm.

If the battery was discharged for an extended period (0-20% for two or more weeks), or the battery will not accept a charge from the charger, or the voltage after the battery stabilizes after the charger is removed is not above 12.8 volts, replace the battery.

If the lantern fails to operate with a known good battery, contact Commandant (CG-432A) for its disposition.

## Battery replacement



To replace the battery pack, open the lantern as described in the Programming/Battery Charging section. Disconnect the battery leads and unstrap the battery. Lift the battery out, but be sure that the mounting pad or feet remain in the base. This reduces the transmission of vibration and shock to the battery.

The batteries are manufactured by Power-Sonic and have the following part numbers:

Small – PS-12120 (12 volt, 12 amp-hours)

Medium – PS-12180F (12 volt, 18 amp-hours)

Large – PS-12350 (12 volt, 35 amp-hours)

Batteries may be purchased from your local supplier or online from Mouser Electronics ([www.mouser.com](http://www.mouser.com)). At this time, do not use “cross match” batteries as they have not been tested in the lantern and some have the wrong terminals.

## Battery Disposal

These batteries are lead-acid, similar to the Delco-2000 and Sunlyte 12-5000. Recycle these batteries the same way you are currently disposing of conventional solar batteries.

## Service/Contact Info

Technical questions, including replacement components are available from:

Blue Crane, LLC  
Attn: Rob Loesch  
571-723-9430

## Questions/Comments

Questions and comments about this lantern and instructions should be directed to Mr. Jon Grasson at 202-475-5629 email [jon.t.grasson@uscg.mil](mailto:jon.t.grasson@uscg.mil) or Mr. Larry Jaeger at 202-475-5624 email [larry.e.jaeger@uscg.mil](mailto:larry.e.jaeger@uscg.mil).