

AUTOMATIC POWER, INC & TIDELAND SIGNAL CORPORATION LED LANTERN INSTALLATION & SERVICING INSTRUCTIONS

The Coast Guard has purchased 320 additional LED lanterns from Tideland Signal Corporation and Automatic Power, Inc. (API) for the purpose of expanding the field test and evaluation on both fixed and floating aids to navigation. These LED lanterns are intended as replacements for 155mm red and green (only) lanterns currently with a 4-5 nautical mile range (*see the section titled Range/Service Life*).



Tideland LED Lantern



API StaBrite LED Lantern

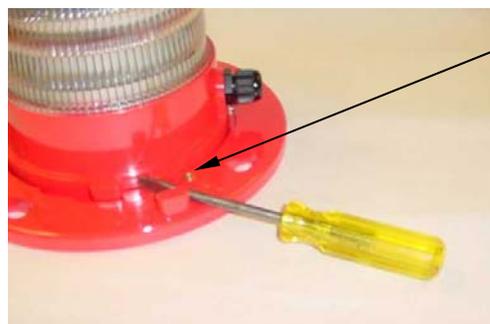
The LED lanterns do not have provisions for terminating wires from the battery and solar panel like our current 155mm lantern using a CG-181 and CG-6P lampchanger. Instead, they are equipped with a 3 meter power cable that is to be terminated in a LED Junction Box on buoys (Figure 4) or at the battery box on fixed aids (Figure 7). The junction box provides a convenient place to terminate the solar panel, lantern and battery without excessive cable runs. **Installation Note:** While only one lantern style is shown in each of the mounting details, both styles can be installed on buoys and fixed aids.

Programming

The beacons must be programmed to the proper flash rhythm before deployment. The beacons shall be programmed and bench tested in the shop prior to transit to the aid.

Tideland

Remove the locking screw on the base of the lantern with a Phillips screwdriver (Figure 1). Use the screwdriver, as shown in Figure 1, to pry the lantern counter clockwise to loosen the base. Align the tabs with the slots and separate the lantern from the base.



Locking Screw

Figure 1.

The flash rhythm must be set using the two rotary switches (labeled S2 and S1; see Figure 2) on the bottom circuit board. Each switch has a clear cover over the numbers/letters and a slot aligned with the “arrow” molded into the knob. Align the arrow or window to the desired character. The first code character refers to S1 and the second to S2. Set the rhythm by turning the knob to the desired code setting according to Table 1:

Rhythm	Code Setting	Rhythm	Code Setting
FL2.5 (0.3)	1C	Q	99
FL4 (0.4)	09	Mo(A)	E6
FL6 (0.6)	1D	Iso 2	51
Iso 6	55	FL (2) 6	23
FL (2+1) 6	4B	Oc 4	90
FL (2) 5	8D	Fix	00

Table 1.

The power cords for the Tideland lanterns were shipped to your unit/cutter separately. Remove the stuffing tube nut and feed the end of the power cord, one lug at a time, through the stuffing tube until the black outer jacket just protrudes inside the lantern. Be sure that the packing gland (rubber sleeve) remains in the stuffing tube. Slide the stuffing tube nut up the cable and secure to the stuffing tube. Attach the black wire to the PWR+ terminal and the white wire to the PWR- terminal. The yellow wires attached to the SS+ and SS- terminals are for the Tideland daylight control.

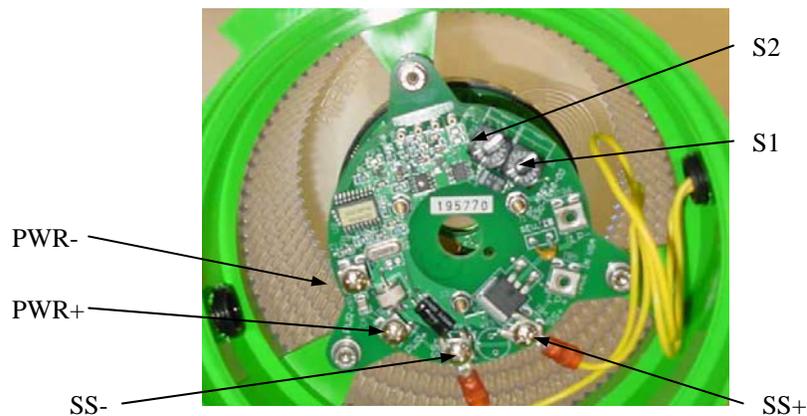


Figure 2.

Close the lantern by aligning the tabs in the slots and turning clockwise. Use the screwdriver, as shown in Figure 1, to securely lock the lantern in place. Reinstall the locking screw, if rough surf conditions exist and/or to discourage vandalism.

API (Note: The color is determined by the cap on the StaBrite assembly)

Open the lantern by loosening the three knobs securing the lens to the base. Determine the desired switch position using the chart on the side of the StaBrite housing. Turn the knob on the opposite side to the proper character. (Note: Fixed rhythm requires the use of an external daylight control, available from API, part number 9001-0317). Visually note if the StaBrite assembly is located in the center of the lantern and not leaning to one side. If the lantern bracket is bent, either replace it with a standard 155mm bracket or bend it so that the StaBrite assembly is centered. Close the lantern and secure by tightening the three knobs on the lens.

Note: The API lanterns were shipped with a power cable that is too large for the LED Lantern Junction Box. You have two options if the API lantern is intended to be installed on a buoy:

Option 1.

- Remove the lantern stuffing tube assembly from the bottom of the LED Lantern Junction Box (see Figure 6).
- Enlarge the lantern stuffing tube hole in the enclosure to 1-3/8" using either a UniBit-5 step drill, or a 1-3/8" hole saw with a 1" hole saw installed in the center on the same mandrel. The 1" saw centers the 1-3/8" saw in the smaller hole. Note: suggest wearing latex gloves, a mask and goggles when enlarging the hole as the fiberglass used to reinforce the enclosure is an irritant.
- Purchase a Size 4T, M19622/1-005 stuffing tube assembly via MILSTRIP, NSN 5975-00-989-5046 and a size 4D packing assembly, M19622/19-0004, NSN 5330-00-202-2594.
- Install the 4T stuffing tube in the enlarged hole. The O-ring goes between the box and spanner nut. Tighten using a spanner wrench, if available.

Option 2

- Replace the power cord in the API lantern with 12/2, 14/2 or 16/2 exterior cable with a diameter between 0.275" and 0.472". You could use ½ of the Tideland power cable, as it is longer than necessary.
- Replace the stuffing tube in the lantern with a size 3, M19633/3-003, NSN 5975-00-877-6955 and a size 3A packing, M19622/18-0018, NSN 5330-00-202-2590, or with a Tideland NavGrip cable gland, P/N 620.1004-04 and P/N 303.1071-04 packing (the same one that is included in the solar panel installation kit, but with the larger 303.1071-04 packing).

Bench Test

Bench test each beacon with a 12-volt DC power source to ensure proper operation. The recommended interval is 24 hours. Cover the daylight control with black electrical tape for this test. The daylight control for the Tideland lantern is located in the stuffing tube opposite the power cable, and on the API version it is on the sloping face of the StaBrite housing (Figure 3). Check to be sure that the lantern is flashing at the desired rhythm. Be sure to remove the black tape before deployment.

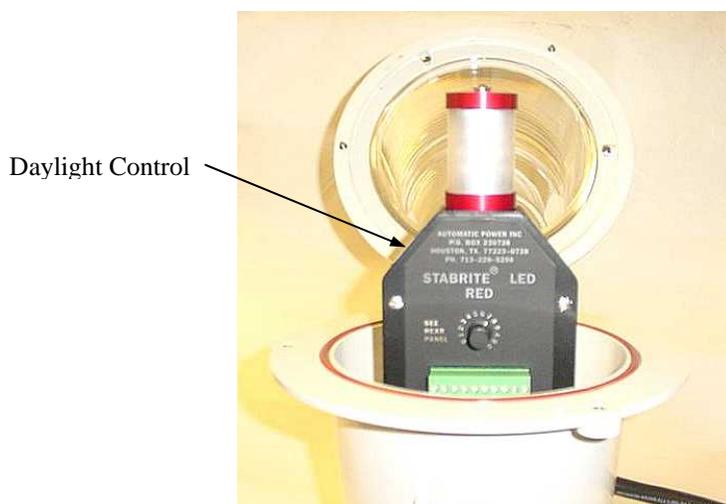


Figure 3.

Installation – Buoy

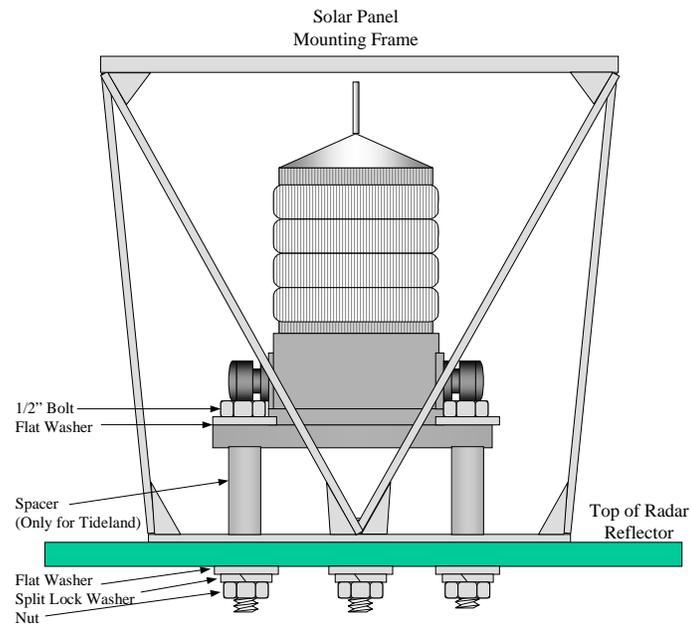


Figure 4.

Sandwich the panel stand between the lantern and buoy and attach with 1/2" threaded stainless steel bolts, flat washers, split lock washer and nuts. For the Tideland lantern, use the supplied spacers between the lantern stand and lantern to raise the focal height above the lantern ring on the buoy, if desired, as shown in Figure 4.

Install the appropriate solar panel using the solar panel installation kit and the appropriate number of batteries (see the Power System section for sizing info).

The LED Lantern Junction Box is used to gather the inputs from the solar panel, battery and LED lantern. It may be installed next to the lantern, or vertically on a radar reflector. Place the heavy paper template in the desired location on the buoy. Mark the four holes to be drilled on the radar reflector with a center punch. Be sure the area behind the radar reflector has room to install hardware (no cross ribs, vertical reflectors, etc.) Drill four 9/32" diameter holes through the reflector. Install the junction box using the provided hardware. Route the wires through the stuffing tubes, as shown in Figure 5. Tie the cables to adjacent support structures and cut off the excess in the box. Strip the ends of the wire and insert into the Euro type terminal strips and secure with a 3/16" flat blade screwdriver. The terminals are labeled and color coded black for positive and white for negative (see Figure 6). A barrier terminal strip is provided if multiple loads and/or panels are used on the aid (the Euro strip only accepts one wire). Place the desiccant bag inside the box, align cover and tighten evenly.

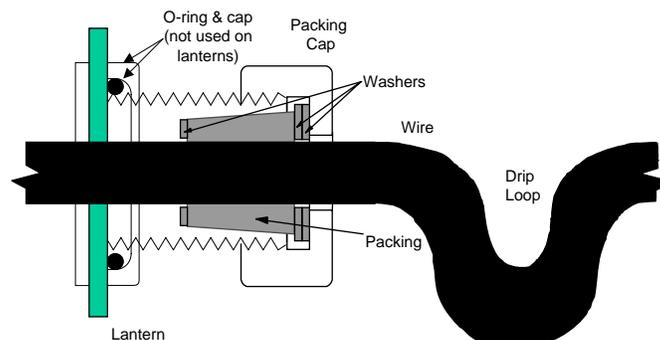


Figure 5.

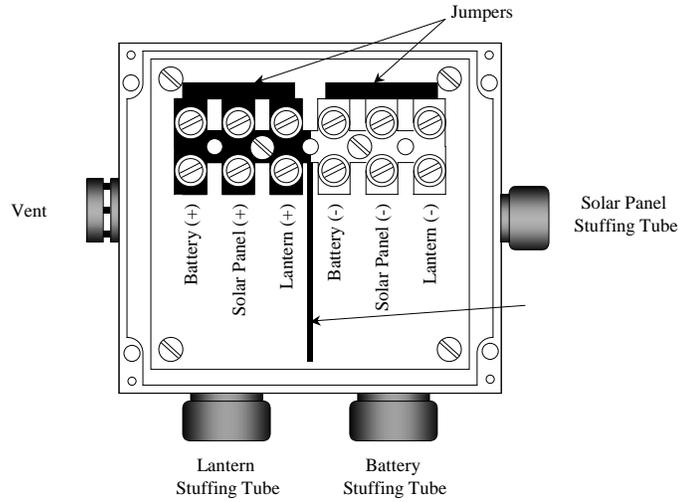


Figure 6.

Cover the photocell and check for proper operation.

Installation - Structures

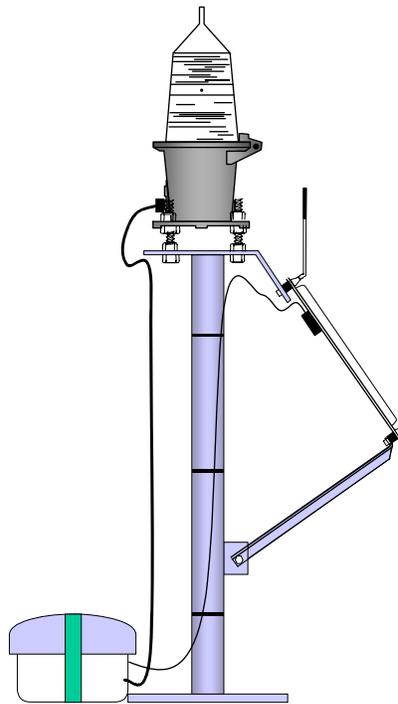


Figure 7.

Mount and level the lantern using three 1/2" stainless steel studs or bolts. Place a torpedo level on the base. Use the "T" method as shown in Figure 8 and adjust the nuts until level. After tightening, recheck using the level in both directions.

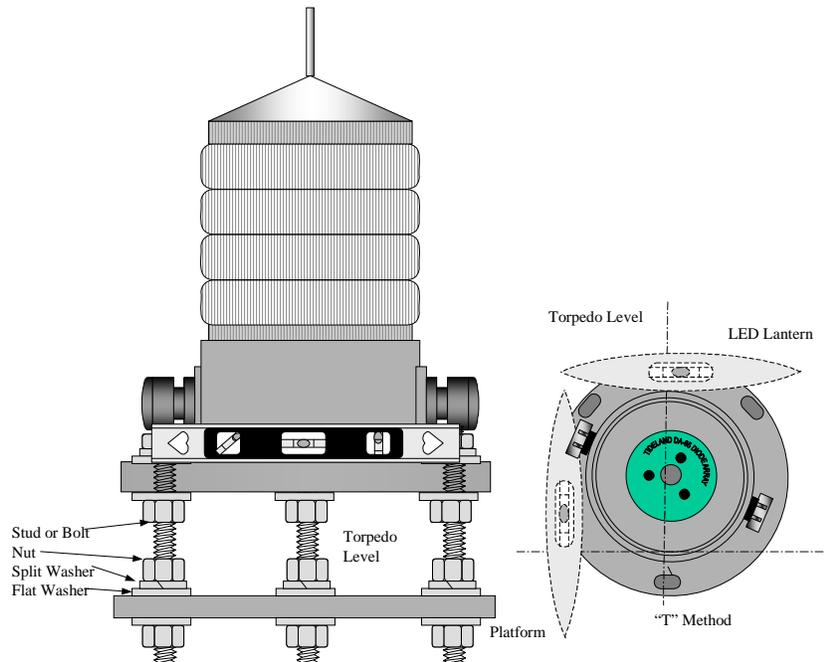


Figure 8.

Install the appropriate solar panel using the solar panel installation kit and the appropriate number of batteries, and connect as outlined in the Short Range Aids to Navigation Servicing Guide. Be sure the tilt angle is appropriate for the area and that the panel is facing the equator.

The leads from the lantern and solar panel should be terminated in the battery box. The wire on the API beacon may have to be extended/replaced with 12/2 SO if it doesn't reach the battery box. Route the wire and zip tie it along structural members then coil the excess inside the battery box. Crimp the proper ring lug onto each wire, and attach the black leads to the positive terminal on the battery and the white leads to the negative terminal on the battery. Apply No-ox grease or a suitable anticorrosion coating to the battery terminals.

Cover the daylight control and check for proper operation.

Close the lantern (API version) and secure with the knurled screws.

Power System

The solar sizing tables listed in the Solar Design Manual can be used to size the solar power system. Select the appropriate rhythm and pick the sizing for either a buoy or structure using the following lamp sizes:

API Red or Green	same sizing as a 0.77a lamp
Tideland Green	same sizing as a 0.25a lamp
Tideland Red	same sizing as a 0.55a lamp

Alternatively, if you would like to use the Solar Design or Solar Vertical spreadsheets, enter the following loads when using a LED lantern (the current remains the same regardless of the flash rhythm. You must enter the appropriate duty cycle. For number of flashers, enter 0, as the flasher load in these lanterns is negligible):

API Red or Green	0.690 amps	Tideland Green	0.210 amps	Tideland Red	0.500 amps
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Range/Service Life

The LED lantern's nominal range depends on the type, color and flash rhythm. The maximum service life is determined by the operational hours of the LEDs, limited by the durability of the lens and base. Listed below are tabulated values for each lantern and flash rhythm:

Flasher Rhythm	Duty Cycle	API Red	API Green	Tideland Red	Tideland Green	Service Life (yrs)
FIXED	100%	5 nmi	4 nmi	5 nmi	5 nmi	2 years
OC 4	75%	5	5	5	4	3
ISO 6	50%	5	5	5	4	5
ISO 2	50%	5	4	5	4	5
FL2.5(1)	40%	5	4	5	4	6
FL(2)6	33%	5	4	5	4	7
Mo(A)	30%	5	4	4	4	8
Q	30%	5	4	4	4	8
FL2(5)	16%	5	4	4	4	14
FL(2+1)6	15%	5	4	4	4	15
FL 2.5(.3)	12%	5	4	4	4	19
FL6(.6)	10%	5	4	4	4	23
FL4(.4)	10%	5	4	4	4	23

The fixed intensities of the lanterns are:

API Red – 99 candelas*

Tideland Red – 69 candelas

API Green – 59 candelas*

Tideland Green – 50 candelas

The effective intensity for flashed lights can be calculated using the following equation:

$$I_{\text{eff}} = (I_{\text{fixed}} * \text{flash length}) / (\text{flash length} + 0.2)$$

Where: I_{fixed} is the fixed intensity listed above,

Flash Length is the ON time in seconds (for Mo(A) its 0.4 sec)

*The fixed intensity for the API lanterns applies only for flash calculations. When used in the fixed-on mode, the intensity is automatically reduced to 76 candelas and 45 candelas for the red & green lanterns, respectively to prevent overheating the LEDs.

Servicing

- The lantern shall not be opened on-station as these units are sealed and doing so introduces salt air inside it.
- The service interval for aids is three years.
- The service life of the lantern depends on the operational duty cycle and durability of the lantern, discussed below. The lanterns will not burn out, but intensity degrades over time. The lanterns shall be removed from service at the point that intensity degrades to 80% of initial output, as indicated in the above table.
- Ensure that the lens is clean, not discolored or crazing. Wipe with a cloth dampened with mild soap and water, if necessary. Replace if not clear or cracks could compromise its strength or light transmission.
- Inspect the wiring and power system in accordance with the Short Range Aids to Navigation Servicing Guide. Load test the battery at the LED Lantern Junction Box or at the battery.
- Cover the lens (API only) or cover the daylight control to ensure that the lantern flashes on rhythm. Observe the LEDs around the lantern. Noticeable dark spots indicate that one or more LEDs are out. If one or more LEDs are out, the light will still produce about 70% of its rated intensity in that direction, but the lantern should be replaced at the earliest convenience after posting a local notice to mariners.

- If the lantern fails for any reason, replace it with another LED lantern or a conventional 155mm with a programmable flasher, lampchanger, DLC and lamps. Contact COMDT (G-SEC-2A) for its disposition.

Reporting Requirements

Report cards will not be issued for these lanterns and are hereby discontinued for the Vega, Zeni and Carmanah lanterns presently being tested. Instead, Units and Cutters shall enter the following information into ATONIS so that your district and CG Headquarters can monitor these lanterns. In the “Aid Light System – Lantern, Flasher, Changer, Lamps: Type, and DLC ” categories, enter “NSTD” (from the pull-down menu), and in the “Aid Light System Lantern – Remarks” category, enter the following description corresponding to the lantern deployed EXACTLY as printed below:

LED-API
LED-Carmanah 701
LED-Carmanah 702
LED-Carmanah 702-5
LED-Tideland
LED-Vega
LED-Zeni

In addition, specific problems, concerns, observations and questions may be directed to anyone on the COMDT (G-SEC-2A) staff via the website www.uscg.mil/systems/gse/gse2.