



## **SL-RL Series** LED Range Light

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**INSTALLATION & SERVICE MANUAL**



| Version No. | Description                           | Date           | Author         | Approved     |
|-------------|---------------------------------------|----------------|----------------|--------------|
| 1.0         | Manual Launch                         | September 2015 | D. Tomaszewicz |              |
| 1.1         | Spec Table                            | October 2015   | M. Walker      |              |
| 1.2         | Trouble Shooting Guide updated ECR488 | September 2016 | Y. Chambers    |              |
| 1.3         | General Update                        | November 2016  | A. Dixon       | M. Nicholson |
| 1.4         | Product Update                        | April 2017     | C. Bernardo    | M. Nicholson |
| 1.5         | Update: Flash Codes                   | June 2017      | A. Dixon       | M. Nicholson |
| 1.6         | Pictorial Update                      | January 2019   | M. Nicholson   | J. Ohle      |
| 1.7         | Updates to screen shots               | March 2020     | Y. Chambers    | M. Nicholson |
| 1.8         | Earthing advice                       | April 2020     | M. Dutka       | M. Nicholson |
| 2.0         | Image updates                         | May 2020       | M. Dutka       | M. Nicholson |

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## Introduction

**Congratulations! By choosing to purchase a Sealite lantern you have become the owner of one of the most advanced LED marine lanterns in the world.**

Sealite Pty Ltd has been manufacturing lanterns for over 25 years, and particular care has been taken to ensure your lantern gives years of service.

As a commitment to producing the highest quality products for our customers, Sealite has been independently certified as complying with the requirements of ISO9001:2015 quality management system. Sealite lanterns comply with requirements of the US Coast Guard in 33 CFR part 66 for Private Aids To Navigation.

By taking a few moments to browse through this booklet, you will become familiar with the versatility of your lantern, and be able to maximise its operating function.

## Operating Principle

A microprocessor drives an array of ultra bright LED's through a DC/DC converter, which enables the LED's to operate within the manufacturer's specifications.

On darkness, the microprocessor will initiate a program check and after approximately 1 minute begin flashing to the set Flash Character.

The flasher unit has a low current requirement to optimise its use with external battery power supply systems.

## Technology

***Sealite is the world's fastest growing manufacturer of marine aids to navigation. We employ leading mechanical, optical, hardware & software engineers to create innovative products to service the needs of our customers worldwide, and offer the widest range of solar-powered LED lanterns in the marketplace.***

### **Electronics**

Sealite employs leading in-house electronic engineers in the design and development of software and related circuitry. All individual electronic components are sourced directly by Sealite procurement staff ensuring that only the highest quality components are used in our products.

### **LED Technology**

All marine lanterns use the latest advancements in LED (Light Emitting Diode) technology as a light source. The major advantage of LED's over traditional light sources is well established in that they typically have an operational life in excess of 100,000 hours, resulting in substantial savings to maintenance and servicing costs.

### **Precision Construction**

Commitment to investing in the design and construction of injection-moulded parts including optic lenses, light bases and a range of other components ensures that all Sealite products are of a consistent & superior quality.

### **Optical Performance**

Sealite manufactures a range of marine LED lenses moulded from multi-cavity dies. The company has superior in-house lens manufacturing capabilities to support outstanding optical performance.

### **Award-winning, Patented Technology**

Several United States and Australian patent registrations are held on Sealite's range of innovative designs, with other regional patents pending in Canada, United Kingdom and Europe.

## SL-RL Series LED Range Light

The Sealite SL-RL Series is a long range, high intensity range light designed to give vessels clear night and/or daytime navigation. A daytime range of over 5NM and a night-time range in excess of 23NM can be achieved.

### Long Range LED Optics with Ultra-Low Power Consumption

Providing over 400,000cd, the Sealite Range Light is extraordinarily efficient and ideal for solar power systems.

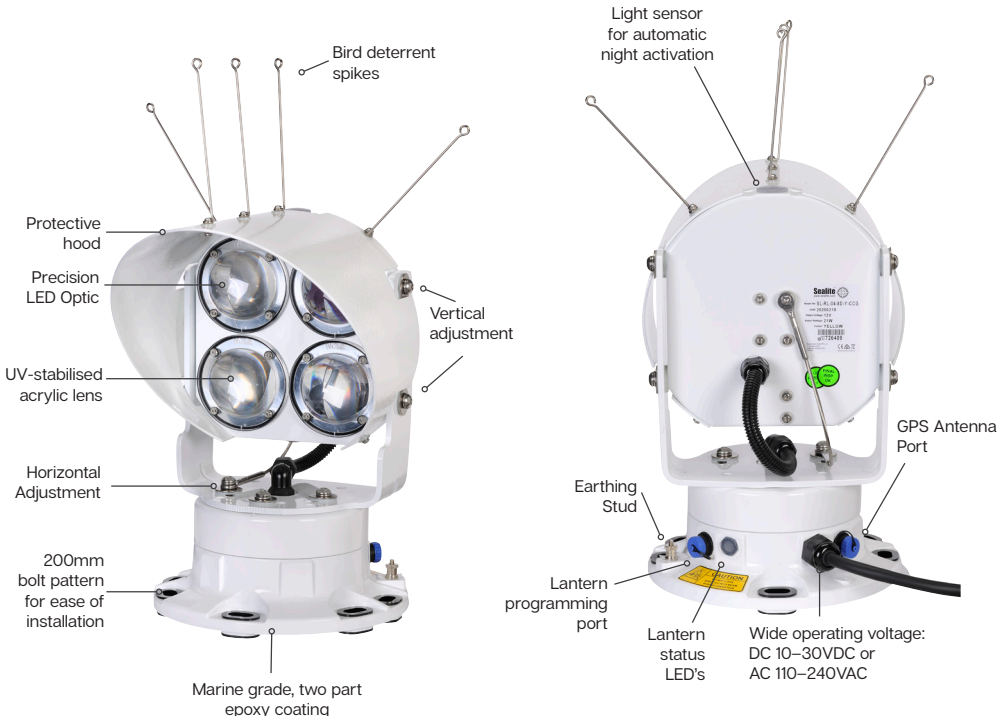
### Robust Construction

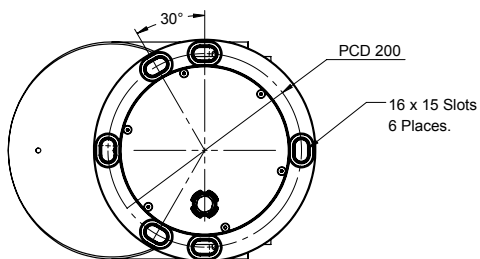
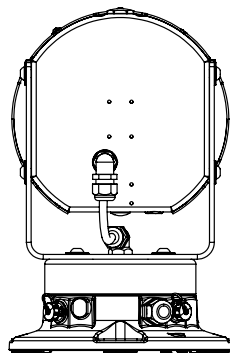
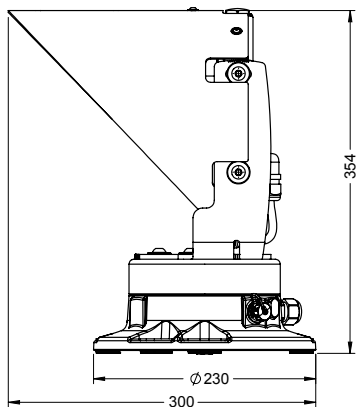
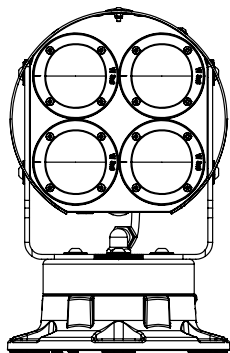
The Sealite Range Light is extremely robust and of high-quality construction. The unit is built from CNC machined marine grade aluminium alloy, subject to marine grade, two part epoxy coating. The IP67 rated enclosure offers maximum resistance to weather.

### Advanced PC or IR Programming

Sealite's convenient PC Configuration Tool or IR programmer allows a host of features to be user set including;

- Multiple intensity settings
- 310 flash settings including custom character
- GPS synchronisation offset
- Adjustable on/off lux levels
- Low battery threshold





# SPECIFICATIONS\*\*

## SL-RL-04

### Light Characteristics

Light Source  
Available Colours  
Maximum Luminous Intensity (cd)†  
Visible Range (NM)

Horizontal Output (degrees)  
Vertical Divergence (degrees)  
Available Flash Characteristics  
Intensity Adjustments  
LED Life Expectancy (hours)

### Electrical Characteristics

Power (W)  
Circuit Protection  
Nominal Voltage

### Physical Characteristics

Body Material  
Lens Material  
Lens Design  
Mounting  
Height (mm/inches)  
Width (mm/inches)  
Depth (mm/inches)  
Mass (kg/lbs)  
Service Life

### Environmental Standards

Shock

Vibration  
Ice Loading  
Wind Exposure  
Hail Impact  
Humidity  
Temperature Range

### Certifications

CE & Electrical

IALA

Quality Assurance  
Waterproof

### Intellectual Property

Trademarks

### Warranty \*

### Options Available

High efficiency LEDs  
White as standard. Other colours available on request  
Refer to table  
3deg vertical & 3deg horizontal, white:  
AT @ 0.74: 23.4NM night-time, 5NM daytime  
AT @ 0.85: 37.3NM night-time, 6.3NM daytime  
3° & 8° as standard. Other options available  
3° as standard. Other options available  
Up to 310 including 256 IALA recommended and 1 custom  
User adjustable  
>100,000

VDC Model: up to 29W      VAC Model: up to 38W, 50VA  
Polarity protected  
VDC Model: 10–30 VDC      VAC Model: 110–240 VAC, 50-60Hz

Marine grade, two-part epoxy coating  
UV-stabilised acrylic  
Multiple LED optic  
3 & 4 hole 200mm bolt pattern  
332 / 13  
226 / 9  
317 / 12½  
7.5 / 16.5  
15 years

MIL-STD-202G Test Condition H, Method 213B 30G vertical and 35G horizontal shock  
MIL-STD-202G, Test Condition B, Method 204D 5G in all axes  
Rated to withstand 22kg/m²  
Rated to withstand 140knots  
Rated to withstand 25mm diameter ice ball impact at 20m/s  
0 – 100%, condensing  
-40 to 80°C

FCC Part 15 Rules & ICES-003.  
EN61000-6-1: 2007 (IEC61000-6-1:2005) Part 6-1 Immunity.  
EN61000-6-3: 2007 (IEC61000-6-3: 2006) Electromagnetic compatibility (EMC) - Part 6-3 Emission.  
IEC61000-4-2: 2008 Ed 2 Part 4-2 Electrostatic discharge immunity test Level 4.  
IEC61000-4-3: 2010 Ed 3.2 Part 4-3. Radiated, radio-frequency, electromagnetic field immunity.  
IEC61000-4-6: 2008 Ed3. , Electromagnetic compatibility (EMC) - Part 4-6 Immunity.  
Signal colours compliant to IALA E-200-1  
Ambient light levels compliant to IALA Guideline No. 1038  
ISO9001:2008  
IP67

SEALITE® is a registered trademark of Sealite Pty Ltd  
3 years

- GPS Synchronisation
- AIS Type 1 or Type 3
- GSM Monitoring & Control System (External for AC, Internal for DC)
- RS232/422/485 Port
- Hard-wire Synchronisation
- Variety of solar/battery configurations
- Multiple divergence lens
- Bird deterrent spikes



\* Specifications subject to change or variation without notice  
† Subject to standard terms and conditions  
‡ Intensity setting subject to solar availability



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## Product Components

The following components come standard with each lantern:-

- Range Light
- IR Programmer
- Installation & service manual

These components are securely packaged within foam in a carton, and shipped to you.

***PLEASE NOTE:*** *The programming cable provided is suitable for use with PC's. If you require connection to your notebook/laptop, a Serial Port to USB cable may need to be purchased.*

**Please check that ALL of these components are included with your order, and contact your Sealite representative as soon as possible if anything is missing.**



# Programming the Lantern

## PC Configuration Tool

The lantern is pre-programmed to the customer's specific requirements for convenience (eg. flash, intensity setting etc).

The SL-RL Series are extremely intelligent lanterns with a number of features which can be programmed directly via a user-friendly computer program (as supplied on USB drive with every lantern).

To change/update the settings of your lantern, please read the following instructions.

### 1. Run the Programming Software

The programming software may be run directly from the USB drive provided, or you may copy the software to your computer hard-drive for future use.

#### Running the Programming Software from the USB Drive

- Connect the USB drive to your computer
- Navigate to the USB drive folder & double-click the file called "LanternConfig.exe". A new window will appear displaying the PC Configuration Tool.

#### Saving the Programming Software to Computer Hard-Drive

- Connect the USB drive to your computer
- Navigate to the USB drive folder
- Copy the file called "LanternConfig.exe" and the ".dll" files
- Navigate to the hard-drive location where you would like to save this program, and then right-mouse-click and select "paste". A copy of the programming software will now be saved to your computer hard-drive (to add the programmer to your computer desktop for ease of future access, right-mouse-click and select "Send to desktop")
- Double-click the file called "LanternConfig.exe". A new window will appear displaying the PC Configuration Tool

**PLEASE NOTE:** Other documents have been saved on the USB drive for your information & convenience including the latest product specifications sheet and an electronic version of the installation and service manual. You may wish to view these documents to read more about the innovative features and benefits of the SL-RL Series of lanterns.

**IMPORTANT:** the Sealite PC Configuration Tool is designed for Windows Platforms only.

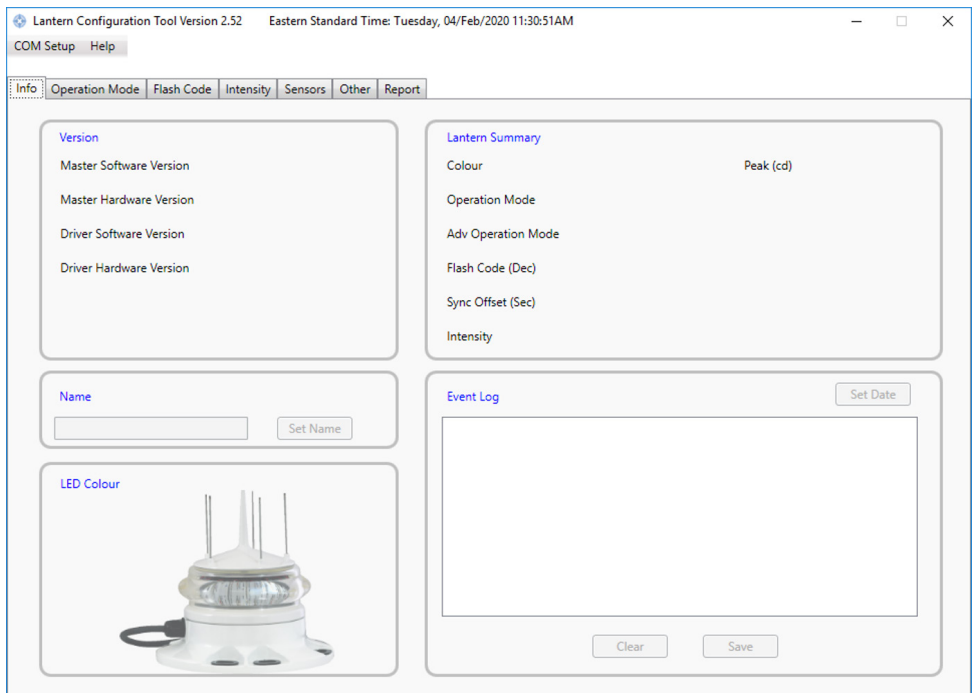
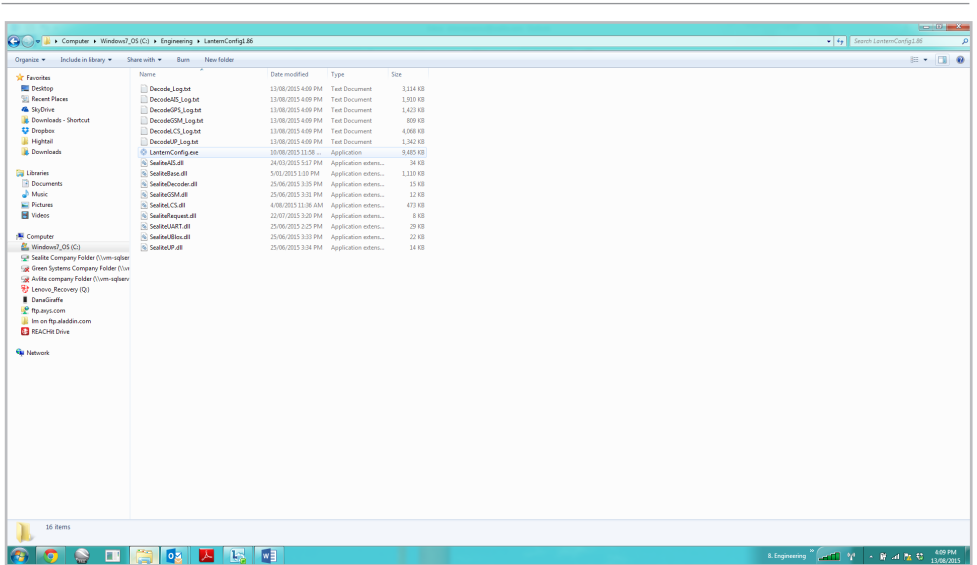


Image 1. Sealite PC Configuration Tool

## 2. Connect the SL-RL Series Lantern to a Power Source & the Computer

Now that the programming software has been run, you will need to connect the lantern to your computer & power supply so that it can receive programming commands.

**Once connection is made, the software automatically determines the colour and pre programmed settings of the lantern.**

### Connecting the Lantern to a Power Source

#### Option 1: Battery

- Connect the blue negative wire of the lantern to the battery negative terminal
- Connect the brown positive wire of the lantern to the battery positive terminal

#### Option 2: 12V Power Supply

- Connect the blue negative wire of the lantern to the power supply negative terminal
- Connect the brown positive wire of the lantern to the power supply positive terminal



**CAUTION:** to avoid personal injury do not position the lantern at eye level.

### Connecting the Lantern to the Computer

- Plug the Bulgin connector end of the programming cable into the lantern PC Programming Port, and the serial port end of the cable into your computer serial/communication port (RS232-E)

**PLEASE NOTE:** The programming cable provided is suitable for use with desktop PC's. If you require connection to your notebook/laptop, a Serial Port to USB cable may need to be purchased.

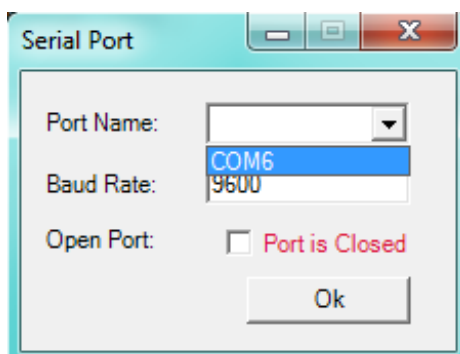
## 3. Establish the Programmer-to-Lantern Computer Connection (COM Port)

Now that the lantern is connected to the computer and the Sealite PC Configuration software has been run, the user must create the programmer-to-lantern connection.

The COM Port is the hardware port which the computer accesses when communicating with the lantern.

- Click the "COM Setup" at the top left of the PC Configuration Tool to open the "Serial Port" dialogue box
- In the "Serial Port" dialogue box select the appropriate COM Port from the drop down field for "Port Name"
- Check the "Open Port" check box to open the port
- Click the "OK" button to initiate the connection

The Sealite PC Configuration Tool will then attempt to connect/interrogate the lantern.

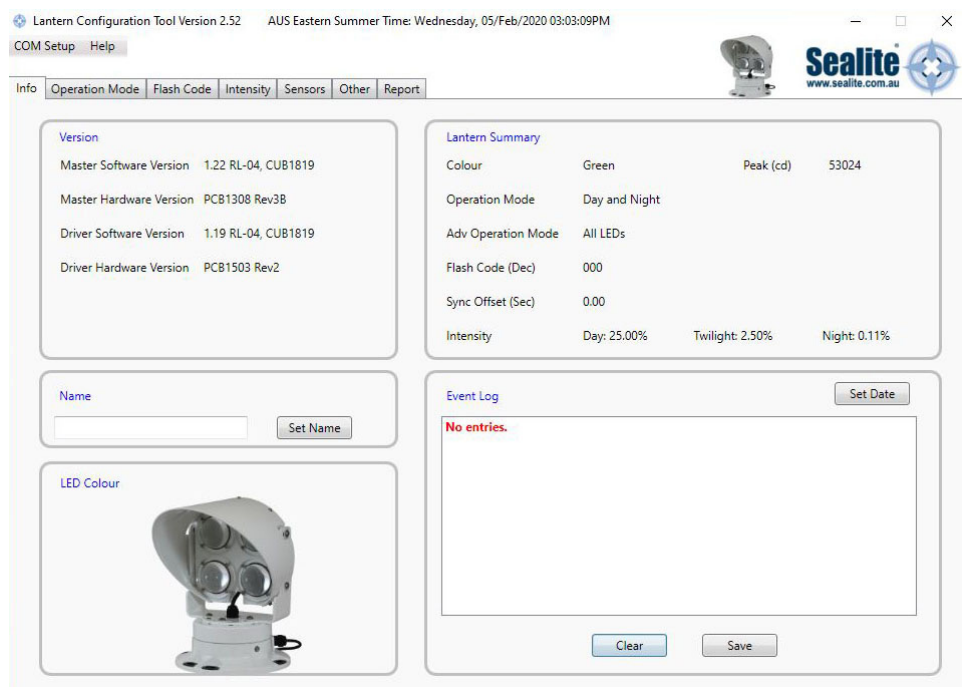


**Image 2. Serial Port dialogue box**



## Correct Connection Established

If the connection is established data about the lantern configuration will appear on the “Info” tab under the headings “Version” & “Lantern Summary” (eg. Lantern Colour, Flash Code, Intensity etc).



**Image 3. Sealite Configuration Tool “Info” tab – showing COM Port connection established, Version & Lantern Summary information**

## Connection NOT Established

If the connection is not available, the Sealite PC Configuration Tool will not display any lantern specific information under the headings “Version” & “Lantern Summary”. If this error occurs, please check the following:

- Reconnect the lantern to the computer
- Check that the lantern power supply has sufficient charge (eg. battery is charged), and then reconnect it to the lantern
- Re-run the Sealite PC Configuration Tool and follow the information in step 3. The connection should now become established.

The Sealite lantern is now ready to be programmed to your specific requirements.

## Info Tab

Lantern Configuration Tool Version 2.52    AUS Eastern Summer Time: Wednesday, 05/Feb/2020 03:03:09PM

COM Setup   Help

Info   Operation Mode   Flash Code   Intensity   Sensors   Other   Report

**Version**

Master Software Version   1.22 RL-04, CUB1819

Master Hardware Version   PCB1308 Rev3B

Driver Software Version   1.19 RL-04, CUB1819

Driver Hardware Version   PCB1503 Rev2

**Lantern Summary**

Colour   Green   Peak (cd)   53024

Operation Mode   Day and Night

Adv Operation Mode   All LEDs

Flash Code (Dec)   000

Sync Offset (Sec)   0.00

Intensity   Day: 25.00%   Twilight: 2.50%   Night: 0.11%

**Name**

  Set Name

**LED Colour**



**Event Log**   Set Date

No entries.

Clear   Save

Provides a summary of the lantern configuration settings, hardware and software versions, and event log.

### Version

Is an information panel that identifies the Lantern's internal electronic hardware and firmware versions.

### Lantern Summary

Is an information panel that displays a summary of the key lantern settings: colour, operation mode, Peak Intensity setting, Advance Operational Mode, Flash Code, Flash Sync offset and Intensity setting. Refer to the Information, Operation Mode Flash Code, and Intensity Tabs for a description of these parameters.

### Name

A user defined name, comprising alphanumeric characters (and -, \$, #,@) can be typed into dialogue box and by pressing and stored within the lantern's non-volatile memory by pressing the 'Write Name' button.

### LED Colour

A generic picture of the lantern model and colour that the software tool is communicating with is displayed in this panel.

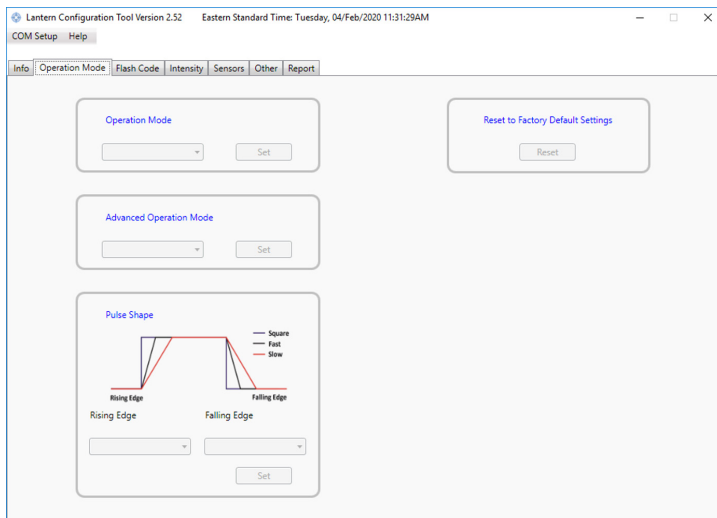
### Event Log

Displays the alarm events recorded by the lantern firmware. Possible alarms (flat battery, low battery, LED failure, high temperature). All alarm events are recorded irrespective of whether the lantern has been configured to respond to an alarm.

- To set the date, click 'Set Date', choose date and time, press 'Send'
- To clear the event log, click 'Clear' and select 'Yes'.



## Operation mode Tab



### Pulse Shape

The pulse shape of each flash can be altered to produce a softer light, whereby the intensity will ramp up and down at the beginning and end of each flash.

### Operational Mode

Defines the lanterns mode of operation of which there are four possibilities:

- **Standby**

The lantern is configured in a minimum current state in which the LEDs are always off and the internal GPS (if installed) is disabled.

- **Always On**

The daylight sensor is disabled and the lantern operates according to the set flash character and intensity levels.

- **Dusk till Dawn**

The daylight sensor is monitored and the lantern will only operate at night time.

- **Day and Night**

The daylight sensor is monitored and the lantern will operate according to the set flash character and intensity levels for Day, Twilight and Night.

### **Adv Op Mode**

This is an advanced user mode and typically only used if the lantern is to be used as a special navigational aid such as emergency wreck mark.

### **All**

Default on setting. All LEDs are operated in unison and configured by the Operation Mode, Flash Code and Intensity Tabs.

### **Reset**

By clicking Reset, the factory set default parameters are restored.



## Flash Code

Lantern Configuration Tool Version 2.52 Eastern Standard Time: Tuesday, 04/Feb/2020 11:32:32AM

COM Setup Help

Info Operation Mode Flash Code Intensity Sensors Other Report

**Mariner Characteristic Selection**

Mariner Code

Flash Code Name

Flash Code (Dec): Timing

Current Code

**Sealite Code Selection**

☒ IR Flash Code ☐ Switch Flash Code

Current Code (Dec)

**Sync Offset (Sec) (Max=5.1Sec)**

(Note: GPS antenna must be connected to utilise this feature.)

Current Sync Offset

**Manual Entry Custom Flash Code (999) Timings**

| On (Sec)             | Off (Sec)            | On (Sec)             | Off (Sec)            |
|----------------------|----------------------|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
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| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

(Note: Choose FFF or 999 to enable a special flash code.)

### **Marine Characteristic Selection**

The flash character is defined by first selecting the Mariner code, then the Flash code name and finally timing.

### **Sealite Code Selection**

This is an alternative method to select the lantern flash code by using either the Sealite IR remote control numerical figure or if known the Sealite rotary switch flash character. Refer to the IR remote control section for valid flash characters.

### **Sync Offset**

This panel is used to set a fixed delay to the commencement of the flash character. The built-in GPS receiver and advanced software of the Sealite synchronised lanterns allow for the adoption of SeaFlare™ channel marking – a unique system that cascades the flash synchronisation of channel lanterns in a uni- or bi-directional flash pattern. By default this figure is set to zero.

### **Manual Entry Custom Flash Character**

In this panel one, custom flash characteristics can be defined with up to 10 individual on/off times.



## Intensity

### Lantern Intensity

The lantern intensity level can be set by either defining the operating range on the lantern (in nautical miles) or by entering a desired peak candela or by entering a percentage of maximum peak intensity level. It can be set in steps of 0.1%, eg 53.7%

If an intensity level is selected that is beyond the specification of the lantern, the entered figure will be displayed in red coloured text, and the lantern will be configured to its maximum.



## Sensors

Lantern Configuration Tool Version 2.52 Eastern Standard Time: Tuesday, 04/Feb/2020 11:33:13AM

COM Setup Help

Info | Operation Mode | Flash Code | Intensity | **Sensors** | Other | Report

**Battery Sensor** (Note: Advanced users ONLY)

| Flat (V) | Low (V) | OK (V) | Master (V) |
|----------|---------|--------|------------|
| 10.0     | 11.5    | 12.0   | 0          |

Default (V) 10.0 11.5 12.0

When battery voltage is low:

- ☐ Reduce intensity to 75% of current value.
- ☐ Turn off GPS.
- ☐ Trigger alarm relay.

Set

**LED Sensor**

When an LED has failed:

- ☐ Turn off all LEDs.
- ☐ Trigger alarm relay.

Set

**Temperature Sensor** ☒ °C/°F (Note: Advanced users ONLY)

| High (°C) | OK (°C) | External | Master (°C) | Slave (°C) |
|-----------|---------|----------|-------------|------------|
| 70        | 65      |          | 0           | 0          |

Default (°C) 70 65

| High (°C) | OK (°C) | Internal | Master (°C) | Slave (°C) |
|-----------|---------|----------|-------------|------------|
| 70        | 65      |          | 0           | 0          |

Default (°C) 70 65

When temperature is high:

- ☐ Reduce intensity to 75% of current value.
- ☐ Trigger alarm relay.

Set

**Light Sensor** (Note: Use current value to set up external light sensor.)

| Day (Dawn) | Night (Dusk) | Current | Default |
|------------|--------------|---------|---------|
| 150        | 100          | 0       | 150 100 |

Internal (Lux)

| Day (Dawn) | Night (Dusk) | Current | Default |
|------------|--------------|---------|---------|
| 150        | 100          | 0       | 150 100 |

External (Raw Data) 69 37 0 150 100

When light sensor fails:

- ☐ Turn off all LEDs.
- ☐ Turn on all LEDs.
- ☐ Trigger alarm relay.

Set

### Battery sensors

The SL-RL series of lantern continuously monitors its input voltage using three definable thresholds.

- For voltages greater than “OK” level, the lantern reports via IR Remote control requests or the GSM that the input voltage is satisfactory.
- For voltages below “low” the lantern can be configured to operate the internal alarm relay and /or reduce the intensity level by 25% as a measure to extend the operation of the lantern until it reaches the “Fail” voltage.
- At “Fail” the lantern shuts down entirely, and turns of the GPS and the mains LEDs. The lantern will only commence operation once the input voltage has exceeds the “OK” voltage level.

The three thresholds: Flat, Low and OK are user definable.

### Temperature

The SL-RL utilises two temperature sensors. One that monitors the temperature of the master board, and one that monitors the temperature of the driver board.

Each sensor has two configurable temperature thresholds: “High” and “OK”. There are also two configurable options for when the “High” temperature threshold is exceeded.

- “Reduce intensity to 75% of current value”.
- “Trigger alarm relay”.

When the “High” temperature threshold is exceeded for either board, any of the selected options will be acted upon.

The enabled options will remain active until the board temperatures both reduce to below the “OK” threshold.

## LED Sensor

Built into the SL-RL lantern, is a closed loop monitoring system for each LED within the lantern. In the event of a single LED failure, the lantern can be configured to trigger the internal alarm relay which in turn can be connected externally to trigger other devices, such as redundant light source.

## Light Sensor

The SL-RL lantern has its own external light sensor and whose day/twilight/twilight/night thresholds are defined in LUX. These levels can be customised by entering in separate values as a measure of LUX.

### NOTE:

Twilight: this refers to the time between Day and Night

Twidark: this refers to the time between Night and Day

Due to the placement of some Aids to Navigation in regards to the position of the sun, some ports may find it advantageous to adjust these settings accordingly.

Lantern Configuration Tool Version 2.52 Eastern Standard Time: Tuesday, 04/Feb/2020 11:33:29AM

COM Setup Help

Info Operation Mode Flash Code Intensity Sensors **Other** Report

**Relay Mode**

Set

**GPS Mode**

Watch Circle (Meters) Set

**GPIO Options**

☐ Output based on the state of the light sensor.

☐ Input overrides the OpMode.

Set

**Hibernation**

☐ Enable Hibernation.

On Date Month  Day

(Note: This is the date when the lantern will switch back on and begin to operate.)

Off Date Month  Day

(Note: This is the date when the lantern will enter GPS hibernation, it will remain in hibernation until the On Date above is reached.)

Set



---

## **Relay Mode**

The lantern contains an internal relay. This can be configured to send a signal to a third party alarm. The relay can be configured to be in one of three states Normal, Inverted and Off.

### **Normal Mode**

The relay is energised during operation. The relay draws 16mA when in operation

### **Inverted Mode**

The relay is only energised when an alarm event is triggered by the lantern.

### **Off Mode**

The relay is disabled.

## **GPS Mode (Advanced Users)**

The Lantern has four modes of GPS operation. Off, Normal, Fast and On. These modes can be selected either the IR remote control or via the GSM Module (if fitted)

In Off mode the GPS module is disabled, the Lantern will not sync with other lights if the GPS is turned off.

In Normal mode the GPS is turned off for 15 minutes at night and 30 minutes during the day.

In Fast Mode the GPS is turned off for 5 minutes at night and 15 minutes during the day.

In On mode the GPS is always on.

## **GPI0 Options**

### **Hibernation Mode**

For situations where the lantern is put into storage for a known period, the lantern can be placed into Hibernation Mode for a user programmable date range.

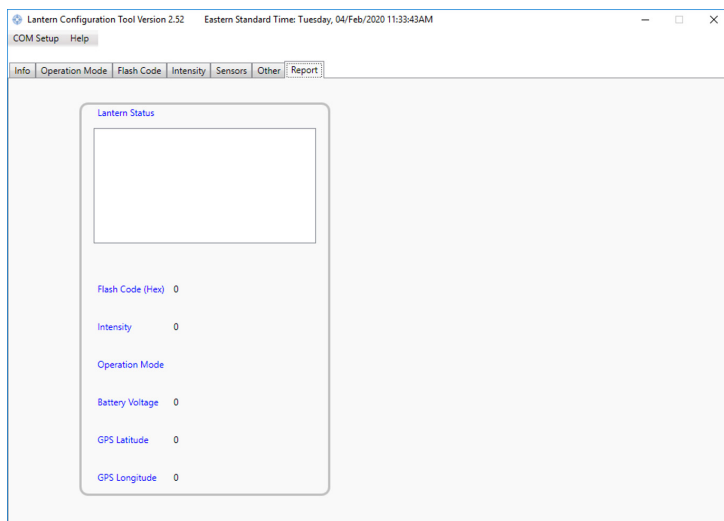
Hibernation Mode maximises conservation of the battery power by disabling the light (will not activate at night) and shutting off the GPS receiver to rely on the internal clock for date checking. Power consumption is only conserved by physically disconnecting the battery supply.

The two settings are:

- Always On (Default setting)
- Hibernate

Enter the dates (MM/DD) on which the lantern should not operate.

## AIS Report



### Lantern Status

This panel displays the lantern's AIS message that is output via the serial communications port every 10 seconds. Typically this message is processed by an externally installed AIS module, however by itself is a quick summary of the lantern's operating status. This detail is also displayed on the INFO tab.



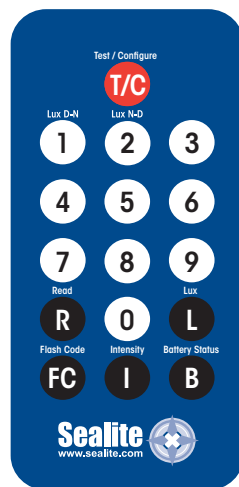
# IR Programmer

The IR programmer is used to communicate with Sealite lighting products that have an IR sensor fitted. The remote control is used for the following functions:

- Flash Code: read the current flash code, configure a new flash code.
- Lamp Intensity: read the current lamp intensity, configure a new intensity level.
- Ambient Light Thresholds: read the current light thresholds, configure new ambient light thresholds.
- Perform a battery health check.

On receiving a valid key signal from the IR Programmer, the light will flash once. The user should wait until the light responds to each keypress before pressing another key. If there is no response to the keypress after 3 seconds, it has not been detected by the light and the key can be pressed again.

If an invalid key is detected, the light will flash quickly 5 times. In this case, the command will have to be restarted.



## Sealite IR Programmer / Universal Remote Compatibility

If you lose your Sealite IR Programmer, the following Universal Remote Controller has been tested for compatibility: RCA Type RCR312WR programmed for Phillips TV Type Code 10054

| Sealite Key | Universal Remote Key |
|-------------|----------------------|
| T           | Power                |
| 1           | 1                    |
| 2           | 2                    |
| 3           | 3                    |
| 4           | 4                    |
| 5           | 5                    |
| 6           | 6                    |
| 7           | 7                    |
| 8           | 8                    |
| 9           | 9                    |
| 0           | 0                    |
| R           | Channel+             |
| L           | Mute                 |
| FC          | Volume+              |
| I           | Volume-              |
| B           | Channel-             |

## IR Programmer Functions

### Test Mode / Configure



Pressing the T/C button for up to 5 seconds places the light in Test Mode. The light will flash once in response to the T/C button being pressed and then turn off.

### Normal Operation

The light will return to normal operation once it has not detected a valid key press for 30 seconds. The light will flash once to indicate it is returning to normal operation.

### Read

Pressing the Read followed by one of the configuration keys shall cause the light to flash the configured value.

For example if the current Flash Code is set to 51 via the AB switches, the lamp will flash number 081. For a flash code set to 01, the lamp will flash 001.

### **Example Key Sequences:**

-    The light flashes the 'IR Remote' number belonging to the currently set Flash Code. Refer to the Flash Code tables to match the 'IR Remote' flash number to the Flash Code.
-    The light flashes the current intensity setting: 1 flash for 25%, 2 for 50%, 3 for 75% and 4 for 100%.
-    The light flashes the current battery status.
-    The light flashes the sunset level in Lux, followed by a 2 second gap, followed by the sunrise level. Levels are in the range of 1 to 5.
-     The lantern flashes the current GPS Mode.
-     The lantern flashes the current Operational Mode.



## **Flash Code**



This key sets the flash code on the light.

**Example Key sequence:**



This sets the flash code to value 123. The light responds by flashing one long flash to indicate the command was successful.

## **Flash Code Numbers**

The lamp flashes numbers as follows: Hundreds, Tens, Ones. A value of 125 will be flashed as: 1 flash, followed by a delay, 2 flashes, followed by a delay, 5 flashes.

The flash for number 0 is one long flash.

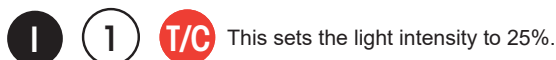
## **Intensity**

This function sets the light intensity based on the lantern's daytime operational range of the lantern.

The twilight and night time intensities are then calculated and applied by the lantern.

Valid intensity values are 1 for 25%, 2 for 50%, 3 for 75% and 4 for 100%.

**Example Key sequence:**



This sets the light intensity to 25%.

The intensities are based on the intensity values that have been programmed in the lantern. The maximum allowable range is dependent on the lantern's vertical divergence, LED colour and flash character.

Using the selected operational range and current flash character, the lantern uses the Schmidt-Clausen Method, as described in IALA E200-4 to determine the peak intensity.

If the flash character is changed, the peak intensity is automatically adjusted.

**Note:** To set different intensities for Day, Twilight and Night time please use the PC Configuration Tool.

## **Battery Status**



This function reads the battery status. The response from the light is High Voltage: 4 flashes, Good Voltage: 3 flashes, Low Voltage 2 flashes, Cutoff Voltage or below: 1 flash.

**Example Key sequence:**





## **Error / Acknowledge Indication**

If the key sequence is invalid, or an out of bounds value is entered, the light flashes 5 times quickly.  
(The command then needs to be re-entered from the start.)



**Example key sequence:** (Set the intensity level to 5 – undefined.)

The lantern flashes five times quickly.

When a key sequence has been entered successfully the light will respond acknowledgement with a long flash.

## **Configuration Settings**

The intensity and flash codes can be changed using the switches on the lantern circuit board or with the IR Remote Control. The lantern intensity and flash code settings are set to the last detected change, carried out with the IR Remote Control or by changing the switch positions.

**Example #1:** If the intensity is set at 100% with the intensity switches, and is then set to 50% using the IR Remote Control, the intensity setting will change to 50%. If the intensity is then set to 75% using the switches, the new intensity value will be 75%.

In order to change intensity settings using the IR Remoter Control, the lantern must be powered.

The lantern can detect a change in switch settings if they are changed while the lantern is powered down.

**Example #2:** The flash code is set according to the switch settings: A=5, B = 1. The operator changes the flash code to 65 (A=4, B=1) using the IR Remote Control. The new flash code is now configured to A=4, B=1.

The lantern is powered down and the operator changes the flash code switches to A=3, B=1 and powers on the lantern. The new flash code is now A=3, B=1. If the flash code is read from the lantern using the IR Remote Control, the lantern will flash 49 which is the corresponding number for switches A=3, B=1.

Use the IR Remote Control to read the current lantern intensity setting and flash code.



---

### Operational Mode (Advanced users)

The lantern has four modes of operation: *Always on, Day & Night, Standby Mode and Dusk-to-Dawn* mode. These modes can be selected either via the IR remote control or via the GSM module (if fitted).

- In Always On mode, the daylight sensor is disabled and the lantern will remain ON.
- In Standby mode, the lantern is turned off and the daylight sensor is disabled. This mode does not affect the operation of the GSM module.
- In Dusk-to-Dawn, the daylight sensor is enabled.

**B** **I** **1** **T/C** Always on mode

**B** **I** **2** **T/C** Standby mode

**B** **I** **3** **T/C** Dusk-to-Dawn mode

**B** **I** **6** **T/C** Day and Night

### GPS Mode (Advanced Users)

The Lantern has four modes of GPS operation. **Off, Normal, Fast** and **On**. These modes can be selected either the IR remote control or via the GSM Module (if fitted).

- **In Off mode** the GPS module is disabled, the Lantern will not sync with other lights if the GPS is turned off.
- **In Normal mode** the GPS is turned off for 15 minutes at night and 30 minutes during the day.
- **In Fast Mode** the GPS is turned off for 5 minutes at night and 15 minutes during the day.
- **In On mode** the GPS is always on.

**L** **F/C** **0** **T/C** GPS Mode Off

**L** **F/C** **1** **T/C** GPS Mode Normal

**L** **F/C** **2** **T/C** GPS Mode Fast

**L** **F/C** **3** **T/C** GPS Mode On

## Power Basics

- (a) Power is a measure of the rate in which electrical energy is transferred within an electrical circuit and is measured in Watts (W). For DC (Direct Current) electrical circuits it is expressed as:  

$$\text{Power (Watts)} = \text{Voltage (Volts, V)} \times \text{Current (Amps, A)}$$
 where volts & current are instantaneous values.
- (b) Peak Power is the maximum power rating of a Lantern. In an instant of time, this is the maximum power the lantern will consume. It is determined when all a lantern's features are on and the LEDs intensity is at 100%.
- (c) Average Power is a measure of Power over a period of time. In raw terms, it is expressed as  

$$\text{Average Power (Watts)} = \text{Peak power (Watts)} \times \text{MULTIPLIER (\%)}$$
 where the MULTIPLIER (%) = Flash Character duty cycle (%) x Intensity level (%)
- (d) The SL-RL-04 lanterns intensity setting are available in 1000 steps from 0% to 100% with a step size of 0.1% (or 1/1000%).

### SL-RL-04

|                     |           | Red      | Green    | White    | Yellow   |
|---------------------|-----------|----------|----------|----------|----------|
| Peak Power @ 12V    |           | 29W      | 29W      | 29W      | 29W      |
| Peak intensity (cd) | 3 Degrees | 120,000  | 150,000  | 424,000  | 150,000  |
|                     | 8 Degrees | 60,000   | 53,000   | 140,000  | 50,000   |
| Voltage range (VDC) |           | 12 to 24 | 12 to 24 | 12 to 24 | 12 to 24 |

### Electrical Consumption of Control and Flasher

| SL-RL-04 Series at 12V |       |      |                                           |
|------------------------|-------|------|-------------------------------------------|
| Parameter              | (mA)  | (W)  | Description                               |
| Iq, Quiescent current  | 75.31 | 0.9  | Consumption during the day and night time |
| Ie, Eclipse Current    | 79.08 | 0.95 | Consumption between flashes               |
| Igps (average)         | 77.40 | 0.93 | Consumption over the entire day           |
| Irelay                 | 15    | 0.18 | Consumption when energized (Normal Mode)  |



## Earthing

A Protected Earth Point (⊥) has been provided on the base of the lantern, this provides the lantern with a low impedance path for any static or discharge faults that may occur. Electrically it is connected to both the Lanterns body (chassis) and the Negative Power Supply line (-Vbatt).

Pay particular attention to eliminate any ground loops that may form between the Lantern Body, the Lantern Power supply lines and the lantern's Mounting platform.



### ATTENTION

Electrically, the Protect Earth Point is connected directly to the negative supply line (-VBATT).

Pay particular attention to eliminate all electrical ground loops between the Protected Earth Point, the negative power supply line (-VBATT) and power supply.

Sealite recommends that installers perform a holistic review of the installation's grounding paths, the lantern and its power supply paths with the purpose of dissipating electrostatic charge build up and eliminating grounding loops. If this is not done there can be a serious safety risk to personnel and equipment.



# Lantern Testing

Now that the SL-RL has been programmed to suit the project requirements, it's important that the lantern is tested prior to installation, including flash code and intensity settings.

To test the SL-RL:

- Connect the SL-RL to a 12V power supply or battery.
- For lanterns programmed to "Dusk to Dawn" operation setting, cover lantern with a dark cloth or jacket in darkness for more than 1 minute. After this time the lantern will activate.
- Next, check that the lantern is flashing to the required flash code and intensity.
- If the settings are correct, disconnect from the 12V power supply or battery.
- If the settings are incorrect, following the Programming Instructions of this manual to re-configure lantern characteristics, and then re-test prior to installation.

**IMPORTANT:** When lantern is being programmed using the Sealite PC Configuration Tool software, it is recommended that the operation setting is set to "Always On" for ease of testing/viewing new settings. Once the programming is complete, remember to change the operation mode back to your specific installation requirement (Sealite recommend "Dusk to Dawn" mode).

# Lantern Installation

The Sealite SL-RL may be installed with connection to mains power, or as a complete solar powered system (available from Sealite).

**IMPORTANT:** The SL-RL must be installed appropriately where the lantern is not blocked by buildings, trees or other shadows that may affect the visibility of the lantern or the ambient light.

## Option 1: Installation of Lantern to Mains Power

To connect the SL-RL to a 12VDC power supply:

- Connect the blue negative wire of the lantern to the power supply negative terminal
- Connect the brown positive wire of the lantern to the power supply positive terminal

**IMPORTANT:** It is important that a minimum 5Amp AC-DC power supply is connected between the mains power and the lantern to maximise the life of your product.



## **Option 2: Installation of Lantern to Solar Powered System**

Sealite has an optional complete solar powered system available to purchase with the standard SL-RL lantern. Detailed instructions for installation of the solar system are listed as follows:

### **1. Unpacking Instructions**

Unpack all hardware and verify container contents in accordance with Figure 2. Please contact your Sealite representative if there is any hardware missing.

### **2. Initial Inspection**

Inspect all hardware for damage. If there is any damage, please contact your Sealite representative.

### **3. Installation**

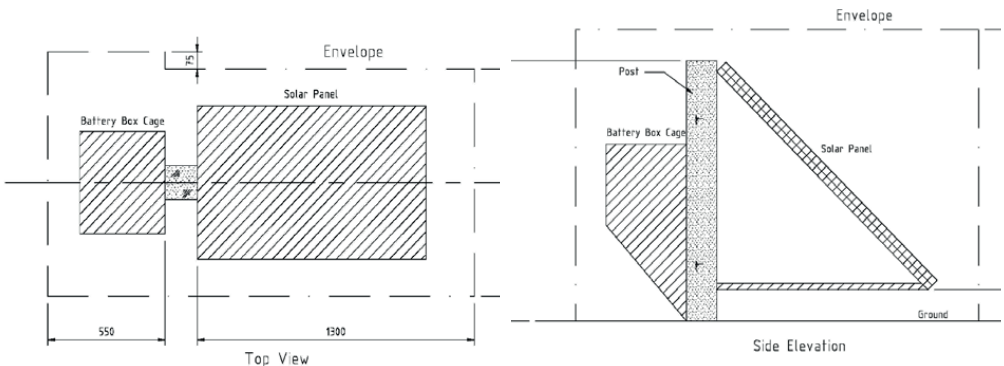
Refer to Figure 1 "Panel & Cage Footprint" and Figure 2 "Installation of Solar Panel & Battery Box Cage" during installation of the panel and cage.

#### **3.1 Installing the Post**

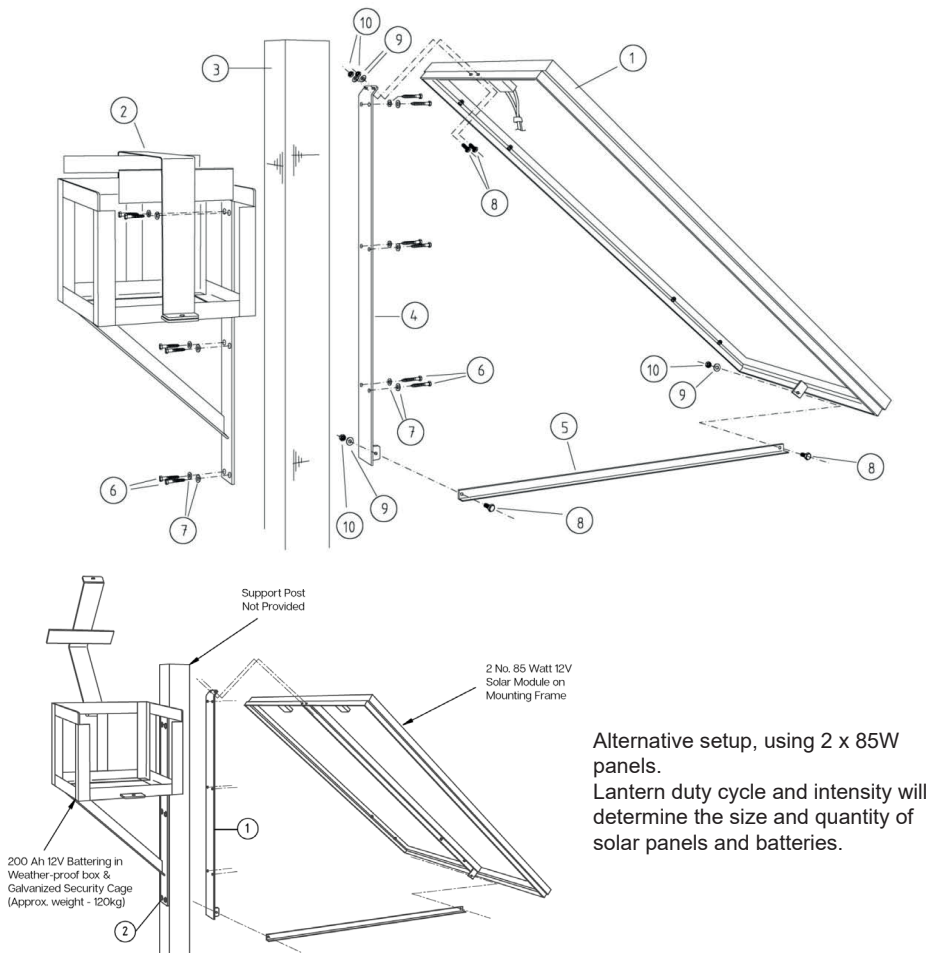
*A suitable mounting point for the Solar Panel and Battery Box Cage is to be provided by the client. It is usual to use a purpose installed post.*

The following should be observed:-

- The post should be of a durable timber, or other durable material.
- Recommended minimum post size is 150mm x 150mm, or larger if the battery box cage needs to be installed immediately beneath the solar panel.
- The length of post required is the sum of exposed length (normally 1.25m) plus the required depth into the ground which is dependent on local soil conditions (recommended depth 850 minimum).
- The faces of the post must be aligned with the cardinal points of the compass. This will allow the solar panel to be aligned with the equator and sun.
- The post should not be more than 20m from the lantern, and should not be located so as to place the solar panel in shade for a significant time.
- The solar panel is tempered glass, so the post should be located away from any objects which might fall on the installation.
- The post and equipment footprint should be at least 300mm clear of any shading under all conditions.



| Ref No. | Description              | No. Required    |
|---------|--------------------------|-----------------|
| 2.1     | 140W Solar Panel & Frame | 1               |
| 2.2     | Battery Box Cage         | 1               |
| 2.3     | Post, 150x150 minimum    | Client Supplied |
| 2.4     | Steel Support            | 1               |
| 2.5     | Steel Brace              | 1               |
| 2.6     | Screw, 12mm x 75         | 12              |
| 2.7     | Washer, 12mm             | 12              |
| 2.8     | Bolt, 10mm x 25          | 4               |
| 2.9     | Washer, 10mm             | 4               |
| 2.10    | Self Locking Nut, 10mm   | 4               |



**Figure 2. Installation of Solar Panel & Battery Box Cage**



### 3.2 Installing the Solar Panel & Battery Box Cage

The battery box cage (Ref 2.2) and the steel support bracket (Ref 2.4) are attached to the post (Ref 2.3) using coach screws and washers (Ref 2.6, 2.7).

- a. Drill the post for the steel support bracket (6 places) and install using supplied screws

**IMPORTANT:** *The Solar Panel must face the equator. Locate the solar panel support bracket accordingly.*

- b. Drill the post for the battery box cage (6 places) on the opposite side to the solar panel and install using supplied screws.
- c. Install the solar panel and frame (Ref 2.1) and the brace (Ref 2.5) to the steel support bracket using bolts (Ref 2.8), washers (Ref 2.9) and nuts (Ref 2.10).

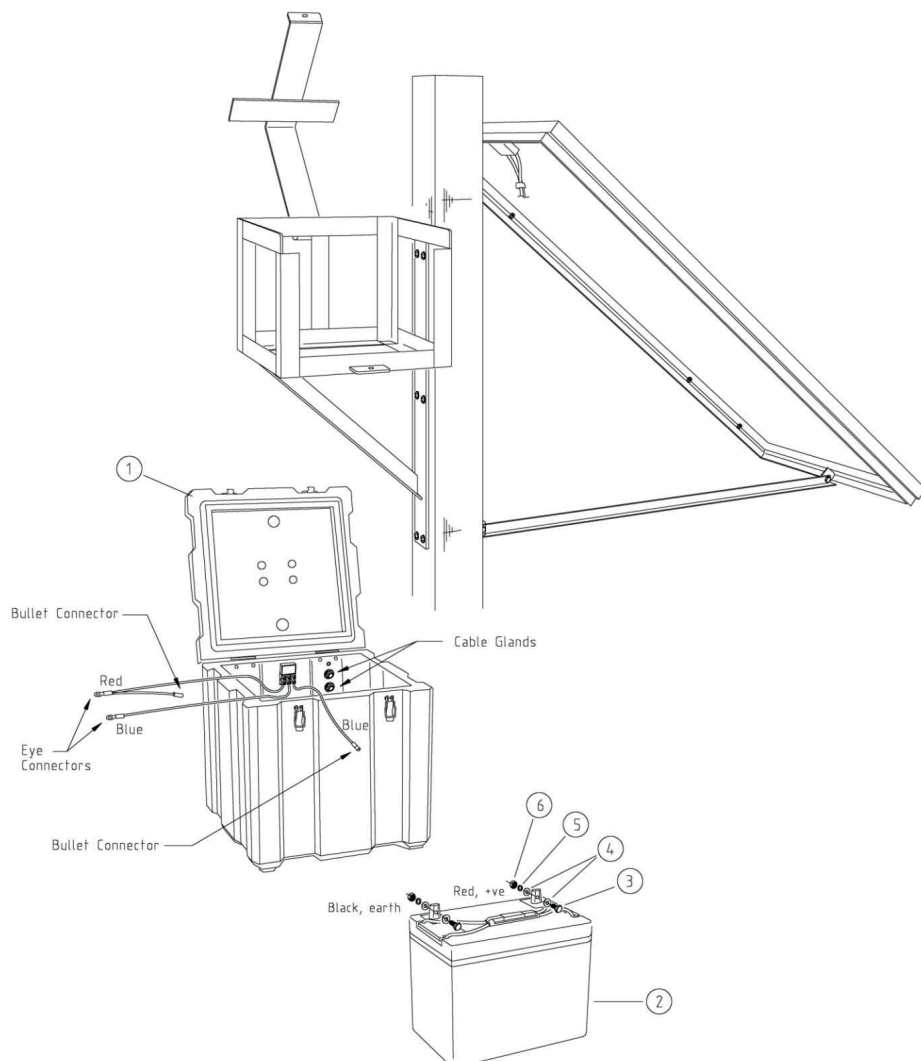
### 3.3 Installing the Battery Box

Refer to Figure 3 “Battery and Battery Box” during installation of the battery and battery box.

- a. Open the battery box cage door and place the battery case (Ref 3.1) into the cage with the hinge of the case adjacent to the hinge of the cage.
  - b. Open the battery case and lower the battery into the case ensuring the battery terminals are upright.
  - c. Insert one bolt (Ref 3.3) with a washer (Ref 3.4) under the head through each of the battery terminals.
  - d. Place the red eye connector over the tail of the bolt protruding through the red battery terminal.
  - e. Fit a washer (Ref 3.4), spring washer (Ref 3.5) and nut (Ref 3.6) on the terminal bolt. Tighten.
  - f. Place the blue eye connector over the tail of the bolt protruding through the black battery terminal. Fit a washer (Ref 3.4), spring washer (Ref 3.5) and nut (Ref 3.6) on the terminal bolt. Tighten.
  - g. Insert the end of the cable from the solar panel through one of the cable glands in the back of the battery case. Join bullet connectors, red to red and blue to blue.
- 
- Test the lantern. Cover the lantern completely to resemble night time. Allow 60 seconds for the lantern to activate.
  - Uncover the lantern and it will turn off after 60 seconds.



| Ref No. | Description                     | No. Required |
|---------|---------------------------------|--------------|
| 3.1     | Battery Case, SPC353534         | 1            |
| 3.2     | Battery, 12V 70AH or equivalent | 1            |
| 3.3     | Bolt, battery                   | 2            |
| 3.4     | Washer, battery                 | 4            |
| 3.5     | Spring Washer, battery          | 2            |
| 3.6     | Nut, battery                    | 2            |



**Figure 3. Battery and Battery Box**



---

### 3.4 Connecting the Lantern

To connect the SL-RL to the solar powered system:

- Connect the blue negative wire of the lantern to the battery negative terminal.
- Connect the brown positive wire of the lantern to the battery positive terminal.

The lantern must to be connected to a 12VDC power supply.

Please ensure the solar panel array has been installed appropriately. To maximise solar collection, the solar panel array should be installed facing the equator and in a location that ensures it will not be shaded by buildings, trees or other structures. **Solar panels will significantly reduce in efficiency if a small shadow is positioned over the solar panel.**

***IMPORTANT:** It is important to work with the team at Sealite when determining the quantity and size of both batteries and solar panels for this lantern. Duty cycle, intensity and local solar conditions are important factors to take into consideration when building a solar powered battery supply.*

***Sealite solar marine lanterns will give years of trouble free service if installed correctly initially.***

- Please ensure all connections are tight.
- Please ensure that solar panels are always clean and free from bird droppings and shade and that the solar array is pointed toward the sun to maximise solar collection.
- Please ensure that battery box covers are latched properly and that cages are secured appropriately, to prevent theft and vandalism.

**Please contact your Sealite representative if you have any questions regarding the installation and service of the lantern.**

# Optional GPS Synchronisation

The lanterns can be fitted with an external GPS module, and provide the user with the ability to install independently operating lanterns that all flash in synchronisation.

No additional power supplies or control systems are required, and with its microprocessor-based system, the GPS option is specifically designed to provide maximum reliability and performance over a wide range of environmental conditions.

## Operating Principle

Each light operates independently and requires no operator intervention. A minimum of 4 satellites need to be in view for the built-in GPS receiver to collect time data. At dusk, the light sensor will turn the light on. If time data is available the light will come on synchronised to every other light with the same selected flash code.

Synchronisation is achieved using an internal algorithm based on the highly accurate time base and time data received from the satellites. The satellite data is provided from a number of earth stations using atomic clocks as the time base. Continuous self-checking ensures that the light will continue to run in synchronisation.

## Operation Mode

The Lantern has four modes of GPS operation. **Off**, **Normal**, **Fast** and **On**. These modes can be selected either the IR remote control or via the GSM Module (if fitted). Please see pg. 27 for an detailed example. In **Normal** mode the GPS is turned off for 15 minutes at night and 30 minutes during the day. In **Fast** Mode the GPS is turned off for 5 minutes at night and 15 minutes during the day. In **On** mode the GPS is always on. In **Off** Mode the GPS is always disabled.

## Light Activation

At power-up the microprocessor checks that the internal GPS module is programmed correctly and is able to provide valid time base and time data.

Once outside with a clear view of the sky, valid data should become available within 20 minutes.

## Daylight Operation

During daylight hours the microprocessor is in idle mode to reduce power consumption. Time data continues to be updated once per second. The microprocessor will automatically exit the idle mode as soon as dark conditions are detected.

## Dark Operation

When dark conditions are detected the light:

- Checks for valid time data and is turned on after a delay based on the current time and the length of the selected flash code;
- If valid time data is not detected the light will turn on after approximately 10 seconds. This light will not be synchronised.
- If the light turns on unsynchronised it will continually check for valid time data. Once valid data is found the light will automatically synchronise.

**Note:** Lights will not synchronise if different flash codes are selected.



## Optional GSM Monitoring & Control System

The lanterns may also be fitted with GSM Cell-Phone Monitoring and Control – enabling users to access real-time diagnostics data and change lantern settings via cell-phone.

The system can also be configured to send out alarm SMS text messages to designated cellular telephone numbers.

Users can also have alarms and reports sent to designated email addresses.

Please contact Sealite for further information and instructions.

## Maintenance & Servicing

Designed to be virtually maintenance-free, the SL-RL Series will require minimal attention.

However, the following maintenance and servicing information is provided to help ensure the life of your Sealite product:

1. Cleaning Lens - occasional cleaning of the lantern lens may be required. Using a cloth and warm soapy water, wipe off any foreign matter before rinsing the lens with fresh water.
2. Ensure the external vent and programming port are free from foreign material.

# Trouble Shooting

| Problem                                    | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unable to communicate with lantern via USB | <ol style="list-style-type: none"> <li>1. Connect the USB drive provided by Sealite to the PC and open to view files.</li> <li>2. Double-click on the file: Configx.xx.exe (note, version number may vary).</li> <li>3. Extract the executable file.</li> <li>4. Connect the lantern to a power source.</li> <li>5. Connect the lantern to the PC.</li> <li>6. Click "COM Setup".</li> <li>7. Select the appropriate COM Port from the drop down menu in the "Serial Port" dialogue box.</li> <li>8. Ensure the "Open Port" check box is selected and "Port is Open" is displayed.</li> <li>9. Click "OK".</li> <li>10. Lantern should be connected and ready for programming.</li> </ol> |
| Lantern will not activate.                 | <ul style="list-style-type: none"> <li>• Ensure lantern is in darkness.</li> <li>• Wait at least 60 seconds for the program to initialise in darkness.</li> <li>• Ensure battery terminals are properly connected.</li> <li>• Ensure lantern is connected to a 12volt power supply.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                            |
| Programming settings will not change       | <ul style="list-style-type: none"> <li>• Check programming cable is properly connected to both lantern and computer, and check that the lantern is connected correctly to a power source (and that the power source is charged eg. battery).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                   |



# Trouble Shooting

| Problem                                                                 | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Understanding the Alarm Event Log</b>                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Is the date set automatically?                                          | <p>Yes, but only if a GPS antenna is installed.</p> <p>When the lantern is powered up, the lantern will default the date &amp; time as 1/Jan/2000 00:00 GMT. However this setting will be overwritten once Valid GPS data is detected and the lantern synchronizes with GPS satellite data or manually entered by the user via the LCT.</p> <p>GPS Synchronisation can be confirmed by viewing the contents of the LCT Report tab as illustrated below:</p> <p>Note: It may take up to 12.5min for Valid GPS to be detected and the lantern to synchronize with GPS satellite data.</p> |
| Can the customer set the date?                                          | <p>Yes, the customer can manually enter date and time via the Lantern Configuration Tool (LCT).</p> <p>However these values will be overridden if a valid GPS data is detected and the lantern synchronizes with GPS satellite data.</p> <p>When programming the date and time via the LCT into a lantern that is not fitted with a GPS, it will store date and time as referenced back to GMT time and not the PC's local time. The LCT determines GMT from the laptop's time and date settings.</p>                                                                                   |
| How often does the event log update information?                        | <p>At the instant an alarm event is detected, the lantern stores the alarm event, current date and time into the event log.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| When the log is updated is that the date and time the event occurred?   | <p>Yes.</p> <p>The date and time stamped in the event log are referenced to GMT time. This is true whether the date and time was manually entered by the customer using the LCT or obtained it from GPS satellites.</p> <p>Therefore to determine the local time of the event, the record GMT event time needs to be converted to local time.</p> <p>For example: For a New York installed lantern, 4hours will need to be subtracted from the recorded event time to convert it to local NY time. This is because NY is four hours behind GMT.</p>                                     |
| What happens to the lantern's internal date/time when there is not GPS? | <p>When the lantern is powered up, the lantern will default the date &amp; time as 1/Jan/2000 00:00 GMT. This clock continues to count forward from this setting until power is removed or the date/time are overridden via the LCT or valid GPS data.</p>                                                                                                                                                                                                                                                                                                                              |

There are two status LED's located on the master circuit board.

The RED status LED is used to indicate the health of the lantern's power system, eg. battery voltage. The YELLOW status LED is used to indicate the operational status of the lantern, eg. GPS synchronisation. These indicator LEDs can be viewed through the side of the base of the lantern.

| Yellow LED                                                | Lantern Status                     | Lantern | Comment                                                                                                                                                                                            |
|-----------------------------------------------------------|------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OFF                                                       | Normal                             | OFF     | Lantern is in Daylight and in Dusk till Dawn mode or in Standby Mode                                                                                                                               |
| Flashing<br>ON 0.15 seconds<br>OFF 0.15 seconds           | Normal                             | OFF     | Light is activating and will turn on after detecting 30 seconds of continuous darkness.                                                                                                            |
| Flashing<br>2 x quick flashes every 2 seconds (Heartbeat) | Normal                             | ON      | Lantern is in Normal operating condition. It is not connected to any GPS synchronisation.                                                                                                          |
| Flashing<br>ON 1.5 seconds<br>OFF 1.5 seconds             | Normal                             | ON      | Normal operating condition. Lantern is synchronised to GPS-enabled lanterns.                                                                                                                       |
| Flashing<br>1 x quick flash every 2 seconds               | Normal                             | ON      | Lantern is 're-syncing' with GPS. The lantern re-sync's with the GPS every 15 minutes.                                                                                                             |
| Flashing<br>2 x quick flashes every 11 seconds            | Normal                             | ON      | Lantern is a Hard Wire Synchronisation Slave.                                                                                                                                                      |
| Red LED                                                   | Lantern Status                     | Lantern | Comment                                                                                                                                                                                            |
| OFF                                                       | Normal                             | ON      | Normal Battery Voltage                                                                                                                                                                             |
| Flashing once every 1.6 seconds                           | Battery Voltage is 12 – 12.5V      | ON      | Battery Voltage is between 12 – 12.5V                                                                                                                                                              |
| Flashing twice every 2 seconds                            | Battery Voltage is 11.5 – 12V      | ON      | Battery Voltage is between 11.5 – 12V                                                                                                                                                              |
| Flashing 3 x times every 2 seconds                        | Battery Voltage is 10.5 – 11.5V    | ON      | Battery Voltage is between 10.5 – 11.5V                                                                                                                                                            |
| Flashing 4 x times every 2.5 seconds                      | Battery Voltage is 10.0 – 10.5V    | ON      | Battery Voltage is between 10.0 – 10.5V                                                                                                                                                            |
| Flashing 5 x times every 3 seconds                        | Battery Voltage is less than 10.0V | ON      | Battery Voltage is at less than 10.0V                                                                                                                                                              |
| Fixed-on                                                  | Flat Battery (<10V)                | OFF     | Flat Battery cut-off is now operational and the lantern will be off. Battery must receive charge (above 12V) and lantern must see daylight for at least 1 minute before resuming normal operation. |
| Flashing<br>ON 1.5 seconds<br>OFF 1.5 seconds             | Battery Voltage is above 13.5V     | ON      | Battery Voltage is above 13.5V. this may indicate a problem with the solar regulator.                                                                                                              |



# Appendix

## Flash Codes

Sealite marine lanterns may be set to any of 310 IALA recommended flash settings which are user-adjustable on site without the need for external devices.

**SEALITE® code reference is listed by number of flashes**

**For the latest version of this document visit [www.sealite.com](http://www.sealite.com)  
or email [info@sealite.com](mailto:info@sealite.com)**

### Symbols

|     |                                                             |
|-----|-------------------------------------------------------------|
| FL  | Flash followed by number Eg. FL 1 S, one flash every second |
| F   | Fixed                                                       |
| Q   | Quick flash                                                 |
| VQ  | Very quick flash                                            |
| OC  | Occulting; greater period on than off                       |
| ISO | Isophase; equal period on and off                           |
| LFL | Long flash long                                             |
| MO  | Morse code ( ) contains letter                              |

For example, VQ (6) + LFL 10 S means 6 very quick flashes followed by a long flash, during a 10-second interval.

The amount of power your lantern draws through the night depends on the duty cycle, i.e. the amount of time on as a proportion to the timing cycle. For example, 0.5 seconds on and 4.5 seconds off equals a 10% duty cycle.

It is best to operate at the lowest duty cycle appropriate to the actual needs of the application.

### Recommended Rhythm for Flashing Light - IALA Regions A and B

| MARK DESCRIPTION                        | RHYTHM                                                                                  |
|-----------------------------------------|-----------------------------------------------------------------------------------------|
| <b>Port Hand &amp; Starboard Marks:</b> | Any, other than Composite Group Flashing (2+1)                                          |
| <b>Preferred Channel Starboard:</b>     | Composite Group Flashing (2+1)                                                          |
| <b>Preferred Channel Port:</b>          | Composite Group Flashing (2+1)                                                          |
| <b>North Cardinal Mark:</b>             | Very quick or quick                                                                     |
| <b>East Cardinal Mark:</b>              | Very quick (3) every 5 seconds or quick (3) every 10 seconds                            |
| <b>South Cardinal Mark:</b>             | Very quick (6) + long flash every 10 seconds or quick (6) + long flash every 15 seconds |
| <b>West Cardinal Mark:</b>              | Very quick (9) every 10 seconds or quick (9) every 15 seconds                           |
| <b>Isolated Danger Mark:</b>            | Group flashing (2)                                                                      |
| <b>Safe Water Mark:</b>                 | Isophase, occulting, one long flash every 10 seconds or Morse Code "A"                  |
| <b>Special Marks:</b>                   | Any, other than those described for Cardinal, Isolated Danger or Safe Water Marks       |



| IR     |            |            |                  |      |      |
|--------|------------|------------|------------------|------|------|
| SWITCH | Controller | FLASH CODE | ON               | OFF  |      |
| A      | B          |            |                  |      |      |
| 0      | 0          | 000        | F (Steady light) |      |      |
| D      | 3          | 211        | VQ 0.5 S         | 0.2  | 0.3  |
| -      | -          | 274        | VQ 0.5 S         | 0.25 | 0.25 |
| E      | 3          | 227        | VQ 0.6 S         | 0.2  | 0.4  |
| F      | 3          | 243        | VQ 0.6 S         | 0.3  | 0.3  |
| 7      | 3          | 115        | Q 1 S            | 0.2  | 0.8  |
| 8      | 3          | 131        | Q 1 S            | 0.3  | 0.7  |
| 9      | 3          | 147        | Q 1 S            | 0.4  | 0.6  |
| A      | 3          | 163        | Q 1 S            | 0.5  | 0.5  |
| 8      | 4          | 132        | Q 1 S            | 0.8  | 0.2  |
| B      | 3          | 179        | Q 1.2 S          | 0.3  | 0.9  |
| -      | -          | 293        | FL 1.2 S         | 0.4  | 0.8  |
| 9      | 4          | 148        | Q 1.2 S          | 0.5  | 0.7  |
| C      | 3          | 195        | Q 1.2 S          | 0.6  | 0.6  |
| F      | 4          | 244        | FL 1.5 S         | 0.2  | 1.3  |
| 1      | 0          | 16         | FL 1.5 S         | 0.3  | 1.2  |
| 0      | 5          | 5          | FL 1.5 S         | 0.4  | 1.1  |
| 0      | 4          | 4          | FL 1.5 S         | 0.5  | 1.0  |
| 2      | 0          | 32         | FL 2 S           | 0.2  | 1.8  |
| 3      | 0          | 48         | FL 2 S           | 0.3  | 1.7  |
| 4      | 0          | 64         | FL 2 S           | 0.4  | 1.6  |
| 5      | 0          | 80         | FL 2 S           | 0.5  | 1.5  |
| 6      | 0          | 96         | FL 2 S           | 0.7  | 1.3  |
| 7      | 0          | 112        | FL 2 S           | 0.8  | 1.2  |
| 1      | 2          | 18         | ISO 2 S          | 1.0  | 1.0  |
| 8      | 0          | 128        | FL 2.5 S         | 0.3  | 2.2  |
| 9      | 0          | 144        | FL 2.5 S         | 0.5  | 2.0  |
| D      | 6          | 214        | FL 2.5 S         | 1.0  | 1.5  |
| 1      | 5          | 21         | FL 3 S           | 0.2  | 2.8  |
| A      | 0          | 160        | FL 3 S           | 0.3  | 2.7  |
| 2      | 5          | 37         | FL 3 S           | 0.4  | 2.6  |
| B      | 0          | 176        | FL 3 S           | 0.5  | 2.5  |
| 3      | 5          | 53         | FL 3 S           | 0.6  | 2.4  |
| C      | 0          | 192        | FL 3 S           | 0.7  | 2.3  |
| D      | 0          | 208        | FL 3 S           | 1.0  | 2.0  |
| 2      | 2          | 34         | ISO 3 S          | 1.5  | 1.5  |
| 5      | 4          | 84         | OC 3 S           | 2.0  | 1.0  |
| E      | 2          | 226        | OC 3 S           | 2.5  | 0.5  |
| 4      | 6          | 70         | OC 3.5 S         | 2.5  | 1.0  |
| 4      | 5          | 69         | FL 4 S           | 0.2  | 3.8  |
| 5      | 5          | 85         | FL 4 S           | 0.3  | 3.7  |
| E      | 0          | 224        | FL 4 S           | 0.4  | 3.6  |
| F      | 0          | 240        | FL 4 S           | 0.5  | 3.5  |
| 6      | 5          | 101        | FL 4 S           | 0.6  | 3.4  |
| 0      | 1          | 1          | FL 4 S           | 0.8  | 3.2  |
| 1      | 1          | 17         | FL 4 S           | 1.0  | 3.0  |
| 2      | 1          | 33         | FL 4 S           | 1.5  | 2.5  |
| 3      | 2          | 50         | ISO 4 S          | 2.0  | 2.0  |
| 3      | 6          | 54         | OC 4 S           | 2.5  | 1.5  |
| F      | 2          | 242        | OC 4 S           | 3.0  | 1.0  |
| 3      | 1          | 49         | FL 4.3 S         | 1.3  | 3.0  |
| 8      | 5          | 133        | FL 5 S           | 0.2  | 4.8  |
| 4      | 1          | 65         | FL 5 S           | 0.3  | 4.7  |
| -      | -          | 279        | FL 5 S           | 0.4  | 4.6  |
| 5      | 1          | 81         | FL 5 S           | 0.5  | 4.5  |
| 9      | 5          | 149        | FL 5 S           | 0.9  | 4.1  |
| 6      | 1          | 97         | FL 5 S           | 1.0  | 4.0  |
| 7      | 1          | 113        | FL 5 S           | 1.5  | 3.5  |

| IR     |            |            |          |     |      |
|--------|------------|------------|----------|-----|------|
| SWITCH | Controller | FLASH CODE | ON       | OFF |      |
| A      | B          |            |          |     |      |
| 4      | 2          | 66         | ISO 5 S  | 2.5 | 2.5  |
| 8      | 2          | 130        | LFL 5 S  | 2.0 | 3.0  |
| 0      | 3          | 3          | OC 5 S   | 3.0 | 2.0  |
| 1      | 3          | 19         | OC 5 S   | 4.0 | 1.0  |
| 2      | 3          | 35         | OC 5 S   | 4.5 | 0.5  |
| C      | 6          | 198        | FL 6 S   | 0.2 | 5.8  |
| B      | 5          | 181        | FL 6 S   | 0.3 | 5.7  |
| C      | 5          | 197        | FL 6 S   | 0.4 | 5.6  |
| 8      | 1          | 129        | FL 6 S   | 0.5 | 5.5  |
| 9      | 1          | 145        | FL 6 S   | 0.6 | 5.4  |
| A      | 1          | 161        | FL 6 S   | 1.0 | 5.0  |
| 7      | 5          | 117        | FL 6 S   | 1.2 | 4.8  |
| B      | 1          | 177        | FL 6 S   | 1.5 | 4.5  |
| 5      | 2          | 82         | ISO 6 S  | 3.0 | 3.0  |
| 9      | 2          | 146        | LFL 6 S  | 2.0 | 4.0  |
| 6      | 4          | 100        | OC 6 S   | 4.0 | 2.0  |
| 3      | 3          | 51         | OC 6 S   | 4.5 | 1.5  |
| 4      | 3          | 67         | OC 6 S   | 5.0 | 1.0  |
| -      | -          | 280        | FL 7 S   | 0.4 | 6.6  |
| A      | 4          | 164        | FL 7 S   | 1.0 | 6.0  |
| 9      | 6          | 150        | FL 7 S   | 2.0 | 5.0  |
| 5      | 6          | 86         | OC 7 S   | 4.5 | 2.5  |
| D      | 5          | 213        | FL 7.5 S | 0.5 | 7.0  |
| C      | 1          | 193        | FL 7.5 S | 0.8 | 6.7  |
| E      | 5          | 229        | FL 8 S   | 0.5 | 7.5  |
| B      | 4          | 180        | FL 8 S   | 1.0 | 7.0  |
| 6      | 2          | 98         | ISO 8 S  | 4.0 | 4.0  |
| A      | 2          | 162        | LFL 8 S  | 2.0 | 6.0  |
| 6      | 6          | 102        | OC 8 S   | 5.0 | 3.0  |
| -      | -          | 294        | OC 8 S   | 6.0 | 2.0  |
| B      | 2          | 178        | LFL 8 S  | 3.0 | 5.0  |
| F      | 5          | 245        | FL 9 S   | 0.9 | 8.1  |
| C      | 4          | 196        | FL 9 S   | 1.0 | 8.0  |
| 7      | 6          | 118        | OC 9 S   | 6.0 | 3.0  |
| 0      | 6          | 6          | FL 10 S  | 0.2 | 9.8  |
| 1      | 6          | 22         | FL 10 S  | 0.3 | 9.7  |
| -      | -          | 281        | FL 10 S  | 0.4 | 9.6  |
| D      | 1          | 209        | FL 10 S  | 0.5 | 9.5  |
| 2      | 6          | 38         | FL 10 S  | 0.8 | 9.2  |
| E      | 1          | 225        | FL 10 S  | 1.0 | 9.0  |
| 1      | 4          | 20         | FL 10 S  | 1.5 | 8.5  |
| C      | 2          | 194        | LFL 10 S | 2.0 | 8.0  |
| D      | 2          | 210        | LFL 10 S | 3.0 | 7.0  |
| 7      | 2          | 114        | ISO 10 S | 5.0 | 5.0  |
| 2      | 4          | 36         | LFL 10 S | 4.0 | 6.0  |
| 8      | 6          | 134        | OC 10 S  | 6.0 | 4.0  |
| 5      | 3          | 83         | OC 10 S  | 7.0 | 3.0  |
| 6      | 3          | 99         | OC 10 S  | 7.5 | 2.5  |
| -      | -          | 303        | FL 11 S  | 1.0 | 10.0 |
| -      | -          | 302        | FL 12 S  | 1.0 | 11.0 |
| F      | 1          | 241        | FL 12 S  | 1.2 | 10.8 |
| D      | 4          | 212        | FL 12 S  | 2.5 | 9.5  |
| 3      | 4          | 52         | LFL 12 S | 2.0 | 10.0 |
| 0      | 2          | 2          | FL 15 S  | 1.0 | 14.0 |
| 4      | 4          | 68         | LFL 15 S | 4.0 | 11.0 |
| 7      | 4          | 116        | OC 15 S  | 10  | 5.0  |
| A      | 6          | 166        | LFL 20 S | 2.0 | 18.0 |
| E      | 4          | 228        | FL 26 S  | 1.0 | 25.0 |



|        |   | IR         |              | FLASH CODE | ON  | OFF | ON   | OFF |
|--------|---|------------|--------------|------------|-----|-----|------|-----|
| SWITCH |   | Controller |              |            |     |     |      |     |
| A      | B |            |              |            |     |     |      |     |
| 0      | A | 10         | FL (2) 4 S   | 0.5        | 1.0 | 0.5 | 2.0  |     |
| E      | B | 235        | VQ (2) 4 S   | 0.2        | 1.0 | 0.2 | 2.6  |     |
| 1      | A | 26         | FL (2) 4.5 S | 0.3        | 1.0 | 0.3 | 2.9  |     |
| 2      | A | 42         | FL (2) 4.5 S | 0.4        | 1.0 | 0.4 | 2.7  |     |
| 3      | A | 58         | FL (2) 4.5 S | 0.5        | 1.0 | 0.5 | 2.5  |     |
| -      | - | 277        | FL (2) 4.6 S | 0.3        | 0.3 | 0.3 | 3.7  |     |
| F      | 9 | 249        | FL (2) 5 S   | 0.2        | 0.8 | 0.2 | 3.8  |     |
| 2      | C | 44         | FL (2) 5 S   | 0.2        | 1.2 | 0.2 | 3.4  |     |
| 4      | A | 74         | FL (2) 5 S   | 0.4        | 0.6 | 0.4 | 3.6  |     |
| -      | - | 282        | FL (2) 5 S   | 0.4        | 1.1 | 0.4 | 3.1  |     |
| 0      | 7 | 7          | FL (2) 5 S   | 0.5        | 1.0 | 0.5 | 3.0  |     |
| 1      | 7 | 23         | FL (2) 5 S   | 1.0        | 1.0 | 1.0 | 2.0  |     |
| -      | - | 257        | FL (2) 5 S   | 0.3        | 1.0 | 0.3 | 3.4  |     |
| 9      | B | 155        | Q (2) 5 S    | 0.3        | 0.7 | 0.3 | 3.7  |     |
| 2      | 9 | 41         | Q (2) 5 S    | 0.5        | 0.5 | 0.5 | 3.5  |     |
| -      | - | 305        | FL (2) 5 S   | 0.5        | 0.7 | 0.5 | 3.3  |     |
| 5      | A | 90         | FL (2) 5.5 S | 0.4        | 1.4 | 0.4 | 3.3  |     |
| 7      | 8 | 120        | FL (2) 6 S   | 0.3        | 0.6 | 1.0 | 4.1  |     |
| A      | A | 170        | FL (2) 6 S   | 0.3        | 0.9 | 0.3 | 4.5  |     |
| 6      | A | 106        | FL (2) 6 S   | 0.3        | 1.0 | 0.3 | 4.4  |     |
| 7      | A | 122        | FL (2) 6 S   | 0.4        | 1.0 | 0.4 | 4.2  |     |
| -      | - | 283        | FL (2) 6 S   | 0.4        | 1.2 | 0.4 | 4.0  |     |
| 9      | 9 | 153        | FL (2) 6 S   | 0.5        | 1.0 | 0.5 | 4.0  |     |
| 2      | 8 | 40         | FL (2) 6 S   | 0.8        | 1.2 | 0.8 | 3.2  |     |
| -      | - | 256        | FL (2) 6 S   | 0.8        | 0.8 | 0.8 | 3.6  |     |
| 3      | 7 | 55         | FL (2) 6 S   | 1.0        | 1.0 | 1.0 | 3.0  |     |
| 3      | 9 | 57         | Q (2) 6 S    | 0.3        | 0.7 | 0.3 | 4.7  |     |
| -      | - | 295        | LFL + FL 6 S | 3.0        | 1.0 | 1.0 | 1.0  |     |
| -      | - | 273        | FL (2) 6.5 S | 0.5        | 1.0 | 0.5 | 4.5  |     |
| -      | - | 283        | FL (2) 7 S   | 0.4        | 1.2 | 0.4 | 5.0  |     |
| -      | - | 311        | FL (2) 7 S   | 0.5        | 1.5 | 0.5 | 4.5  |     |
| A      | 9 | 169        | FL (2) 7 S   | 1.0        | 1.0 | 1.0 | 4.0  |     |
| 7      | B | 123        | FL (2) 8 S   | 0.4        | 0.6 | 2.0 | 5.0  |     |
| 8      | A | 138        | FL (2) 8 S   | 0.4        | 1.0 | 0.4 | 6.2  |     |
| -      | - | 285        | FL (2) 8 S   | 0.4        | 1.7 | 0.4 | 5.5  |     |
| 4      | 7 | 71         | FL (2) 8 S   | 0.5        | 1.0 | 0.5 | 6.0  |     |
| -      | - | 297        | FL (2) 8 S   | 0.5        | 0.5 | 1.5 | 5.5  |     |
| 8      | 8 | 136        | FL (2) 8 S   | 0.8        | 1.2 | 2.4 | 3.6  |     |
| 5      | 7 | 87         | FL (2) 8 S   | 1.0        | 1.0 | 1.0 | 5.0  |     |
| 4      | C | 76         | OC (2) 8 S   | 3.0        | 2.0 | 1.0 | 2.0  |     |
| 5      | C | 92         | OC (2) 8 S   | 5.0        | 1.0 | 1.0 | 1.0  |     |
| F      | B | 251        | VQ (2) 8 S   | 0.2        | 1.0 | 0.2 | 6.6  |     |
| -      | - | 286        | FL (2) 9 S   | 0.4        | 1.7 | 0.4 | 6.5  |     |
| 9      | A | 154        | FL (2) 10 S  | 0.4        | 1.6 | 0.4 | 7.6  |     |
| -      | - | 287        | FL (2) 10 S  | 0.4        | 2.2 | 0.4 | 7.0  |     |
| 6      | 7 | 103        | FL (2) 10 S  | 0.5        | 1.0 | 0.5 | 8.0  |     |
| 7      | 7 | 119        | FL (2) 10 S  | 0.5        | 1.5 | 0.5 | 7.5  |     |
| 6      | 9 | 105        | FL (2) 10 S  | 0.5        | 2.0 | 0.5 | 7.0  |     |
| -      | - | 298        | FL (2) 10 S  | 0.5        | 0.5 | 1.5 | 7.5  |     |
| 8      | 7 | 135        | FL (2) 10 S  | 0.8        | 1.2 | 0.8 | 7.2  |     |
| B      | 9 | 185        | FL (2) 10 S  | 1.0        | 1.0 | 1.0 | 7.0  |     |
| 9      | 7 | 151        | FL (2) 10 S  | 1.0        | 1.5 | 1.0 | 6.5  |     |
| 4      | 9 | 73         | Q (2) 10 S   | 0.6        | 0.4 | 0.6 | 8.4  |     |
| B      | A | 186        | FL (2) 12 S  | 0.4        | 1.0 | 0.4 | 10.2 |     |
| C      | 9 | 201        | FL (2) 12 S  | 0.5        | 1.0 | 0.5 | 10.0 |     |
| D      | 9 | 217        | FL (2) 12 S  | 1.5        | 2.0 | 1.5 | 7.0  |     |
| A      | 8 | 168        | FL (2) 15 S  | 0.5        | 1.5 | 2.0 | 11.0 |     |
| A      | 7 | 167        | FL (2) 15 S  | 1.0        | 2.0 | 1.0 | 11.0 |     |
| 8      | B | 139        | Q (2) 15 S   | 0.2        | 0.8 | 0.2 | 13.8 |     |
| C      | A | 202        | FL (2) 20 S  | 1.0        | 3.0 | 1.0 | 15.0 |     |
| D      | A | 218        | FL (2) 25 S  | 1.0        | 1.0 | 1.0 | 22.0 |     |

| SWITCH |     | IR<br>Controller | FLASH CODE   | ON  | OFF | ON  | OFF | ON  | OFF |
|--------|-----|------------------|--------------|-----|-----|-----|-----|-----|-----|
| A      | B   |                  |              |     |     |     |     |     |     |
| 7      | 9   | 121              | Q (3) 5 S    | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 2.5 |
| 5      | 9   | 89               | VQ (3) 5 S   | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 3.8 |
| 0      | C   | 12               | VQ (3) 5 S   | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 3.7 |
| E      | 9   | 233              | VQ (3) 5 S   | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 3.5 |
| -      | -   | 308              | FL (3) 5 S   | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 3.7 |
| 0.3    | 3.7 | 60               | FL (3) 6 S   | 0.5 | 1.0 | 0.5 | 1.0 | 0.5 | 2.5 |
| 2      | B   | 43               | FL (2+1) 6 S | 0.3 | 0.4 | 0.3 | 1.2 | 0.3 | 3.5 |

| SWITCH |   | IR<br>Controller | FLASH CODE        | ON   | OFF  | ON   | OFF  | ON   | OFF  |
|--------|---|------------------|-------------------|------|------|------|------|------|------|
| A      | B |                  |                   |      |      |      |      |      |      |
| A      | B | 171              | Q (3) 6 S         | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 3.7  |
| F      | A | 250              | FL (3) 8 S        | 0.5  | 1.0  | 0.5  | 1.0  | 0.5  | 4.5  |
| -      | - | 301              | FL (3) 8 S        | 1.5  | 0.5  | 0.5  | 0.5  | 0.5  | 4.5  |
| -      | - | 266              | Q (3) 9 S         | 0.5  | 0.5  | 0.5  | 1.0  | 0.5  | 6.0  |
| 0      | B | 11               | FL (3) 9 S        | 0.3  | 1.0  | 0.3  | 1.0  | 0.3  | 6.1  |
| -      | - | 306              | FL (3) 9 S        | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 4.5  |
| B      | 7 | 183              | FL (3) 9 S        | 0.8  | 1.2  | 0.8  | 1.2  | 0.8  | 4.2  |
| B      | 8 | 184              | FL (3) 10 S       | 0.3  | 0.7  | 0.3  | 0.7  | 0.9  | 7.1  |
| C      | 8 | 200              | FL (3) 10 S       | 0.4  | 0.6  | 0.4  | 0.6  | 1.2  | 6.8  |
| -      | - | 290              | FL (3) 10 S       | 0.4  | 0.8  | 0.4  | 0.8  | 0.4  | 7.2  |
| C      | B | 203              | FL (3) 10 S       | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 7.5  |
| C      | 7 | 199              | FL (3) 10 S       | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 5.5  |
| D      | B | 219              | FL (3) 10 S       | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 7.0  |
| -      | - | 278              | FL (3) 10 S       | 0.9  | 1.1  | 0.9  | 1.1  | 0.9  | 5.1  |
| D      | 7 | 215              | FL (3) 10 S       | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 5.0  |
| -      | - | 261              | FL (3) 10 S       | 0.35 | 0.65 | 0.35 | 0.65 | 0.35 | 7.65 |
| 3      | 8 | 56               | FL (2+1) 10 S     | 0.5  | 0.7  | 0.5  | 2.1  | 0.5  | 5.7  |
| 8      | 9 | 137              | OC (3) 10 S       | 5.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  |
| B      | B | 187              | Q (3) 10 S        | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 7.7  |
| D      | 8 | 216              | FL (2 + 1) 10 S   | 0.5  | 0.5  | 0.5  | 0.5  | 1.5  | 6.5  |
| -      | - | 288              | FL (3) 12 S       | 0.4  | 2.1  | 0.4  | 2.1  | 0.4  | 6.6  |
| 1      | B | 27               | FL (3) 12 S       | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 7.5  |
| E      | A | 234              | FL (3) 12 S       | 0.5  | 2.0  | 0.5  | 2.0  | 0.5  | 6.5  |
| E      | 7 | 231              | FL (3) 12 S       | 0.8  | 1.2  | 0.8  | 1.2  | 0.8  | 7.2  |
| B      | 6 | 182              | FL (3) 12 S       | 1.0  | 1.0  | 1.0  | 3.0  | 1.0  | 5.0  |
| 4      | 8 | 72               | FL (2+1) 12 S     | 0.8  | 1.2  | 0.8  | 2.4  | 0.8  | 6.0  |
| 5      | 8 | 88               | FL (2+1) 12 S     | 1.0  | 1.0  | 1.0  | 4.0  | 1.0  | 4.0  |
| -      | - | 272              | FL (3) 12.5 S     | 0.5  | 1.0  | 0.5  | 1.0  | 0.5  | 9.0  |
| -      | - | 289              | FL (3) 13 S       | 0.4  | 2.1  | 0.4  | 2.1  | 0.4  | 7.6  |
| -      | - | 296              | LFL + FL(2) 13 S  | 6.0  | 1.0  | 2.0  | 1.0  | 2.0  | 1.0  |
| 1      | 8 | 24               | FL (2+1) 13.5 S   | 1.0  | 1.0  | 1.0  | 4.0  | 1.0  | 5.5  |
| -      | - | 307              | FL (3) 14.5 S     | 0.5  | 1.0  | 1.5  | 3.0  | 0.5  | 9.0  |
| F      | 7 | 247              | FL (3) 15 S       | 0.3  | 1.7  | 0.3  | 1.7  | 0.3  | 10.7 |
| 9      | D | 157              | FL (3) 15 S       | 0.4  | 1.0  | 0.4  | 1.0  | 0.4  | 11.8 |
| 0      | 8 | 8                | FL (3) 15 S       | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 10.5 |
| -      | - | 259              | FL (3) 15 S       | 0.5  | 2.0  | 0.5  | 2.0  | 0.5  | 9.5  |
| -      | - | 260              | FL (3) 15 S       | 1.0  | 1.0  | 1.30 | 1.0  | 1.0  | 10.0 |
| F      | 8 | 248              | FL (2+1) 15 S     | 0.6  | 0.3  | 0.6  | 0.3  | 1.4  | 11.8 |
| 0      | 9 | 9                | FL (2+1) 15 S     | 0.7  | 0.5  | 0.7  | 0.5  | 1.9  | 10.7 |
| 1      | 9 | 25               | FL (2+1) 15 S     | 0.7  | 0.7  | 0.7  | 0.7  | 2.1  | 10.1 |
| 6      | 8 | 104              | FL (2+1) 15 S     | 1.0  | 2.0  | 1.0  | 5.0  | 1.0  | 5.0  |
| -      | - | 265              | FL (2+1) 15 S     | 1.3  | 0.7  | 1.3  | 0.7  | 3.3  | 7.7  |
| -      | - | 264              | FL (2+1) 15.75 S  | 0.55 | 0.35 | 0.55 | 0.35 | 1.45 | 12.5 |
| 1      | C | 28               | VQ (3) 15 S       | 0.1  | 0.5  | 0.1  | 0.5  | 0.1  | 13.7 |
| -      | - | 313              | FL (2) + LFL 16 S | 2.0  | 2.0  | 2.0  | 2.0  | 6.0  | 2.0  |
| 4      | B | 75               | FL (3) 20 S       | 0.5  | 3.0  | 0.5  | 3.0  | 0.5  | 12.5 |
| 3      | B | 59               | FL (3) 20 S       | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 15.5 |
| -      | - | 263              | FL (3) 20 S       | 0.5  | 2.0  | 0.5  | 2.0  | 0.5  | 12.0 |
| 5      | B | 91               | FL (3) 20 S       | 0.8  | 1.2  | 0.8  | 1.2  | 0.8  | 15.2 |
| 6      | B | 107              | FL (3) 20 S       | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 15.0 |



|        |            | IR  |               | FLASH CODE | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  |      |  |  |  |  |  |  |  |  |
|--------|------------|-----|---------------|------------|------|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|--|
| SWITCH | Controller |     |               |            |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |
| A      | B          |     |               |            |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |  |
| -      | -          | 271 | VQ (4) 2 S    | 0.10       | 0.13 | 0.10 | 0.13 | 0.10 | 0.13 | 0.10 | 0.13 | 0.10 | 1.21 |  |  |  |  |  |  |  |  |
| B      | F          | 191 | VQ (4) 4 S    | 0.3        | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 2.3  |  |  |  |  |  |  |  |  |
| B      | D          | 189 | Q (4) 6 S     | 0.3        | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 2.7  |  |  |  |  |  |  |  |  |
| 8      | D          | 141 | Q (4) 6 S     | 0.4        | 0.6  | 0.4  | 0.6  | 0.4  | 0.6  | 0.4  | 0.6  | 0.4  | 2.6  |  |  |  |  |  |  |  |  |
| -      | -          | 299 | FL (1+3) 8 S  | 1.5        | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 3.5  |  |  |  |  |  |  |  |  |
| -      | -          | 309 | FL (4) 7 S    | 0.3        | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 3.7  |  |  |  |  |  |  |  |  |
| 1      | D          | 29  | FL (4) 10 S   | 0.5        | 1.0  | 0.5  | 1.0  | 0.5  | 1.0  | 0.5  | 1.0  | 0.5  | 5.0  |  |  |  |  |  |  |  |  |
| 2      | D          | 45  | FL (4) 10 S   | 0.8        | 1.2  | 0.8  | 1.2  | 0.8  | 1.2  | 0.8  | 1.2  | 0.8  | 3.2  |  |  |  |  |  |  |  |  |
| F      | E          | 254 | Q (4) 10 S    | 0.3        | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 6.7  |  |  |  |  |  |  |  |  |
| -      | -          | 300 | FL (4) 10 S   | 1.5        | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 4.5  |  |  |  |  |  |  |  |  |
| -      | -          | 312 | FL (4) 11 S   | 0.5        | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 4.5  |  |  |  |  |  |  |  |  |
| B      | E          | 190 | FL (4) 12 S   | 0.3        | 1.7  | 0.3  | 1.7  | 0.3  | 1.7  | 0.3  | 1.7  | 0.3  | 5.7  |  |  |  |  |  |  |  |  |
| 4      | F          | 79  | FL (4) 12 S   | 0.5        | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 8.5  |  |  |  |  |  |  |  |  |
| C      | E          | 206 | FL (4) 12 S   | 0.5        | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 5.5  |  |  |  |  |  |  |  |  |
| 3      | D          | 61  | FL (4) 12 S   | 0.8        | 1.2  | 0.8  | 1.2  | 0.8  | 1.2  | 0.8  | 1.2  | 0.8  | 5.2  |  |  |  |  |  |  |  |  |
| A      | D          | 173 | Q (4) 12 S    | 0.3        | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 8.7  |  |  |  |  |  |  |  |  |
| 4      | D          | 77  | FL (4) 15 S   | 0.5        | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 8.5  |  |  |  |  |  |  |  |  |
| 8      | E          | 142 | FL (4) 15 S   | 1.0        | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 8.0  |  |  |  |  |  |  |  |  |
| 7      | D          | 125 | FL (4) 15 S   | 1.5        | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 10.5 |  |  |  |  |  |  |  |  |
| D      | E          | 222 | FL (4) 16 S   | 0.5        | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 9.5  |  |  |  |  |  |  |  |  |
| -      | -          | 314 | FL (3+1) 18 S | 1.5        | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 4.5  |  |  |  |  |  |  |  |  |
| -      | -          | 304 | FL (4) 19 S   | 0.3        | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 15.7 |  |  |  |  |  |  |  |  |
| C      | D          | 205 | FL (4) 20 S   | 0.3        | 3.0  | 0.3  | 3.0  | 0.3  | 3.0  | 0.3  | 3.0  | 0.3  | 9.8  |  |  |  |  |  |  |  |  |
| 5      | D          | 93  | FL (4) 20 S   | 0.5        | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 13.5 |  |  |  |  |  |  |  |  |
| 0      | D          | 13  | FL (4) 20 S   | 0.5        | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 1.5  | 0.5  | 10.5 |  |  |  |  |  |  |  |  |
| 3      | F          | 63  | FL (4) 20 S   | 1.5        | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 9.5  |  |  |  |  |  |  |  |  |
| 0      | F          | 15  | Q (4) 20 S    | 0.5        | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 16.5 |  |  |  |  |  |  |  |  |
| -      | -          | 263 | FL (4) 20 S   | 0.5        | 2.0  | 0.5  | 2.0  | 0.5  | 2.0  | 0.5  | 2.0  | 0.5  | 12.0 |  |  |  |  |  |  |  |  |
| E      | E          | 238 | Q (4) 28 S    | 0.5        | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 24.5 |  |  |  |  |  |  |  |  |
| 6      | F          | 111 | FL (4) 30 S   | 0.5        | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 26.5 |  |  |  |  |  |  |  |  |

| IR     |            |     |             |     |     |     |     |     |     |     |     |     |      |
|--------|------------|-----|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| SWITCH | Controller |     | FLASH CODE  | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF  |
| A      | B          |     |             |     |     |     |     |     |     |     |     |     |      |
| D      | D          | 221 | Q (5) 7 S   | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 2.7  |
| -      | -          | 310 | Q (5) 9 S   | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 4.5  |
| E      | D          | 237 | Q (5) 10 S  | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 5.7  |
| E      | 8          | 232 | FL (5) 12 S | 0.5 | 1.5 | 0.5 | 1.5 | 0.5 | 1.5 | 0.5 | 1.5 | 0.5 | 3.5  |
| -      | -          | 276 | FL (5) 16 S | 0.5 | 1.5 | 0.5 | 1.5 | 0.5 | 1.5 | 0.5 | 1.5 | 0.5 | 7.5  |
| 5      | F          | 95  | FL (5) 20 S | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 15.5 |
| 9      | F          | 159 | FL (5) 20 S | 0.8 | 1.2 | 0.8 | 1.2 | 0.8 | 1.2 | 0.8 | 1.2 | 0.8 | 11.2 |
| 9      | E          | 158 | FL (5) 20 S | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 11.0 |

|        |            | IR         |             |     |     |     |     |     |     |     |     |     |     |     |  |
|--------|------------|------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| SWITCH | Controller | FLASH CODE | ON          | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF |  |
| A      | B          |            |             |     |     |     |     |     |     |     |     |     |     |     |  |
| F      | D          | 253        | Q (6) 10 S  | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 |  |
| A      | F          | 175        | FL (6) 15 S | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 |  |
| 7      | F          | 127        | FL (6) 15 S | 0.5 | 1.0 | 0.5 | 1.0 | 0.5 | 1.0 | 0.5 | 1.0 | 0.5 | 1.0 | 0.5 |  |

|        |   | IR         |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
|--------|---|------------|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|
| SWITCH |   | Controller | FLASH CODE        | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  |  |  |
| A      | B |            |                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| 6      | E | 110        | VQ (6) + LFL 10 S | 0.2  | 0.3  | 0.2  | 0.3  | 0.2  | 0.3  | 0.2  | 0.3  | 0.2  | 0.3  | 0.2  | 0.3  | 0.2  | 0.3  |  |  |
| 7      | E | 126        | VQ (6) + LFL 10 S | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  |  |  |
| 2      | F | 47         | Q (6) + LFL 15 S  | 0.2  | 0.8  | 0.2  | 0.8  | 0.2  | 0.8  | 0.2  | 0.8  | 0.2  | 0.8  | 0.2  | 0.8  | 0.2  | 0.8  |  |  |
| 2      | E | 46         | Q (6) + LFL 15 S  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  | 0.3  | 0.7  |  |  |
| 3      | E | 62         | Q (6) + LFL 15 S  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  | 0.6  |  |  |
| -      | - | 258        | FL (6 + 1) 15 S   | 0.35 | 0.65 | 0.35 | 0.65 | 0.35 | 0.65 | 0.35 | 0.65 | 0.35 | 0.65 | 0.35 | 0.65 | 0.35 | 0.65 |  |  |
| -      | - | 292        | FL (6) + LFL 15 S | 0.4  | 0.8  | 0.4  | 0.8  | 0.4  | 0.8  | 0.4  | 0.8  | 0.4  | 0.8  | 0.4  | 0.8  | 0.4  | 0.8  |  |  |
| -      | - | 262        | FL (6) + LFL 15 S | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  |  |  |
| 8      | F | 143        | VQ (6) + LFL 15 S | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  | 0.3  |  |  |

|        |            | IR         |                 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|--------|------------|------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| SWITCH | Controller | FLASH CODE |                 | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF  |
| A      | B          |            |                 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
| -      | -          | 275        | FL (3+5) 12.2 S | 0.9 | 0.3 | 0.9 | 1.0 | 0.9 | 0.3 | 0.3 | 0.3 | 0.3 | 1.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 4.5 | -   | -    |
| 4      | E          | 78         | VQ (9) 10 S     | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 5.8  |
| 5      | E          | 94         | VQ (9) 10 S     | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 4.9  |
| 1      | F          | 31         | Q (9) 15 S      | 0.2 | 0.8 | 0.2 | 0.8 | 0.2 | 0.8 | 0.2 | 0.8 | 0.2 | 0.8 | 0.2 | 0.8 | 0.2 | 0.8 | 0.2 | 0.8 | 0.2 | 6.8  |
| 0      | E          | 14         | Q (9) 15 S      | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 0.7 | 0.3 | 6.7  |
| -      | -          | 267        | Q (9) 15 S      | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 6.5  |
| 1      | E          | 30         | Q (9) 15 S      | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 4.8  |
| -      | -          | 291        | FL (9) 32.92 S  | 0.4 | 0.8 | 0.4 | 0.8 | 0.4 | 0.8 | 0.4 | 0.8 | 0.4 | 0.8 | 0.4 | 0.8 | 0.4 | 0.8 | 0.4 | 0.8 | 0.4 | 22.9 |

|                                 |            | IR  |             | FLASH CODE | ON  | OFF | ON   | OFF | ON   | OFF | ON   | OFF |
|---------------------------------|------------|-----|-------------|------------|-----|-----|------|-----|------|-----|------|-----|
| SWITCH                          | Controller |     |             |            |     |     |      |     |      |     |      |     |
| A                               | B          |     |             |            |     |     |      |     |      |     |      |     |
| MORSE CODE ( ) INDICATES LETTER |            |     |             |            |     |     |      |     |      |     |      |     |
| 7                               | 8          | 120 | MO (A) 6 S  | 0.3        | 0.6 | 1.0 | 4.1  |     |      |     |      |     |
| 7                               | B          | 123 | MO (A) 8 S  | 0.4        | 0.6 | 2.0 | 5.0  |     |      |     |      |     |
| 8                               | 8          | 136 | MO (A) 8 S  | 0.8        | 1.2 | 2.4 | 3.6  |     |      |     |      |     |
| B                               | 8          | 184 | MO (U) 10 S | 0.3        | 0.7 | 0.3 | 0.7  | 0.9 | 7.1  |     |      |     |
| C                               | 8          | 200 | MO (U) 10 S | 0.4        | 0.6 | 0.4 | 0.6  | 1.2 | 6.8  |     |      |     |
| D                               | 8          | 216 | MO (U) 10 S | 0.5        | 0.5 | 0.5 | 0.5  | 1.5 | 6.5  |     |      |     |
| 9                               | 8          | 152 | MO (A) 10 S | 0.5        | 0.5 | 1.5 | 7.5  |     |      |     |      |     |
| 8                               | 9          | 137 | MO (D) 10 S | 5.0        | 1.0 | 1.0 | 1.0  | 1.0 | 1.0  |     |      |     |
| A                               | 8          | 168 | MO (A) 15 S | 0.5        | 1.5 | 2.0 | 11.0 |     |      |     |      |     |
| F                               | 8          | 248 | MO (U) 15 S | 0.6        | 0.3 | 0.6 | 0.3  | 1.4 | 11.8 |     |      |     |
| 0                               | 9          | 9   | MO (U) 15 S | 0.7        | 0.5 | 0.7 | 0.5  | 1.9 | 10.7 |     |      |     |
| 1                               | 9          | 25  | MO (U) 15 S | 0.7        | 0.7 | 0.7 | 0.7  | 2.1 | 10.1 |     |      |     |
| 7                               | D          | 125 | MO (B) 15 S | 1.5        | 0.5 | 0.5 | 0.5  | 0.5 | 0.5  | 0.5 | 10.5 |     |



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## Notes

## Sealite LED Light Warranty

Refer to Sealite website: [sealite.com](http://sealite.com)



We believe technology improves navigation™

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