SL-C310
Compact 3-5NM+ Solar Marine Lantern

INSTALLATION & SERVICE MANUAL

V5-1

Version No.	Description	Date	Author	Approved
5.0	Major product update including SATCOM & SL-410/415 consolidation	January 2020	M.Sugars & M.Dutka	M.Nicholson
5.1	Update to battery charging process	October 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 maximize its operating function.

Operating Principle

The solar module of the lantern converts sunlight to an electrical current that is used to charge the battery. The battery provides power to operate the lantern at night.

The flasher unit has very low current requirements. A microprocessor drives multiple ultra-bright LED's (Light Emitting Diodes) through a DC/DC converter, which enables the LED's to operate within the manufacturer's specifications. The battery is protected from over-charging within the circuit to ensure maximum battery life.

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

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 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 consistent and 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-C310
Compact 3-5NM+ Solar Marine Lantern

The SL-C310 range are robust, completely self-contained 3-5NM+ Solar LED Lantern marine lanterns. They are specifically designed to withstand the tough marine environment to provide years of reliable, low maintenance service. The 3 & 4 hole bolt pattern base fits directly onto existing 200mm bolt pattern industry standard mounts for ease of installation. They are available in three chassis size configurations; compact, standard and extended to accommodate larger battery capacity and additional solar charging capability. Satellite connectivity is available as an option.

The four (4) premium-grade solar modules are integrated into the assembly, and mounted to collect sunlight at all angles. The base and top of the lanterns are made from composite moulded polymer with UV-stabilised rubber corners and gaskets providing a superior IP68 water ingress rating – the best in the industry. A handle is incorporated into the chassis for safe lifting.
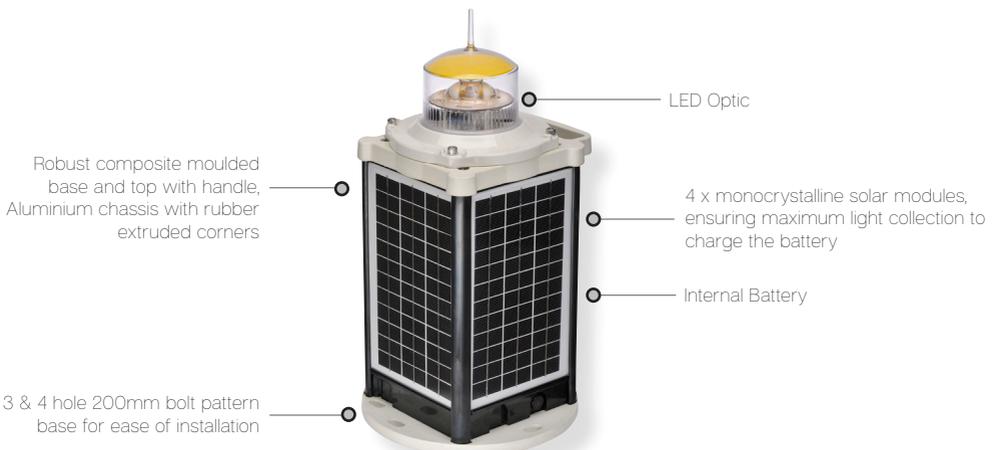
The tough, polycarbonate lens is specifically designed for use with LEDs and incorporates an environmentally-friendly spike to deter unwelcome bird life.

The SL-C310 is available with GPS Synchronisation as standard. Two (2) or more lights can be synchronised to flash in unison via an internal GPS module.

The SL-C310 may also be fitted with Satellite Communications Module or GSM Module – enabling users to access real-time diagnostic data and two-way monitoring and control through the Star2M® portal. The system can also be configured to send out alarm messages to designated phone numbers. Users can also have alarms and reports sent to designated email addresses.

These models have an IR sensor which also allows them to be operated via Sealite's IR remote control.

All this is backed by Sealite's industry leading 3-year warranty.

LED Optic

Robust composite moulded base and top with handle, Aluminium chassis with rubber extruded corners

4 x monocrystalline solar modules, ensuring maximum light collection to charge the battery

Internal Battery

3 & 4 hole 200mm bolt pattern base for ease of installation

Product Components

The following components come as standard with each lantern:

- SL-LA310 lantern

- SL-SBA 310 Chassis

- Quick Start Guide

Optional

- IR programmer remote

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

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.

SL-C310 Datasheet

SL-C310	Compact	Standard	Extended
Light Characteristics			
Light Source	LED		
Available Colours	Red, Green, White, Yellow, Blue		
Typical Maximum Intensity	Red - 121, Green - 88, White - 156, Yellow - 95		
Visible Range (NM)	AT @ 0.74: 3–5		
Horizontal Output (degrees)	360		
Vertical Divergence (degrees)	>7		
Available Flash Characteristics	Up to 310 IALA recommended (user adjustable)		
Intensity Adjustments	Multiple intensity settings		
LED Life Expectancy (hours)	>100,000		
Electrical Characteristics			
Current Draw (mA)	Refer to Sealite Solar Calculator		
Circuit Protection	Integrated		
Nominal Voltage (V)	12		
Autonomy (nights)	>60 (14 hour darkness, 12.5% duty cycle)	>110 (14 hour darkness, 12.5% duty cycle)	
Solar Characteristics			
Solar Module Type	Monocrystalline		
Output (watts)	20 (4 x 5watt)	28 (4 x 7watt)	33.6 (4 x 8.4watt)
Charging Regulation	MPPT		
Power Supply			
Battery Type	SLA (Sealed Lead Acid)		
Battery Capacity (Ah)	12	24	
Physical Characteristics			
Body Material	Aluminium chassis with UV-stabilised rubber corners & gaskets. Polymer composite-moulded top and base		
Lens Material	LEXAN® Polycarbonate – UV stabilised		
Lens Diameter (mm/inches)	99 / 3 ⅞		
Lens Design	Single LED Optic		
Mounting	3 and 4 hole 200mm bolt pattern		
Height - Base Model (mm/inches)	484 / 19 ¹/₁₆	581 / 22 ⅞	640 / 25 ¹³/₆₄
Height - SATCOM Model (mm/inches)	504 / 19 ²⁷/₃₂	601 / 23 ²¹/₃₂	660 / 25 ⁶³/₆₄
Width (mm/inches)	234 / 9 ¼	234 / 9 ¼	234 / 9 ¼
Mass (kg/lbs)	9.1 / 20	13.9 / 30 ½	14.6 / 32 ¼
Service Life	15 years^		
Environmental Standards			
Shock	MIL-STD-202G Test Condition H, Method 213B 30G vertical and 35G horizontal shock		
Vibration	MIL-STD-202G, Test Condition B, Method 204D 5G in all axes		
Ice Loading	Rated to withstand 22kg/m^2		
Salt Fog	MIL-STD-810F Method 509.4		
Rain Test	MIL-STD-810F Method 506.4 procedure 1		
Wind Exposure	Rated to withstand 140 knots		
Humidity	MIL-STD-810F method 507.4 (0 – 100%, condensing)		
Temperature Range	-30 to 50°C		
Compliance			
CE	EN61000-6-2:2005, IEC61000-4-2:2008, IEC61000-4-3:2010, IEC61000-6-1:2016		
IALA	Signal colors compliant to IALAE-200-1		
Quality Assurance	ISO 9001:2015		
Ingress Protection	IP68		
Intellectual Property			
Trademarks	SEALITE® is a registered trademark of Sealite Pty Ltd		
Warranty *	3 years		
Options Available	· 50mm pole mount adapterplate · Satellite Communications · GSM Cell-Phone Monitoring · External Battery Charging Port · External ON/OFF Switch		

SL-C310 Base Model

168
99
581
400
640
460
484
303
Ø 234
Ø 200
120°
Base

Compact

Standard

Extended
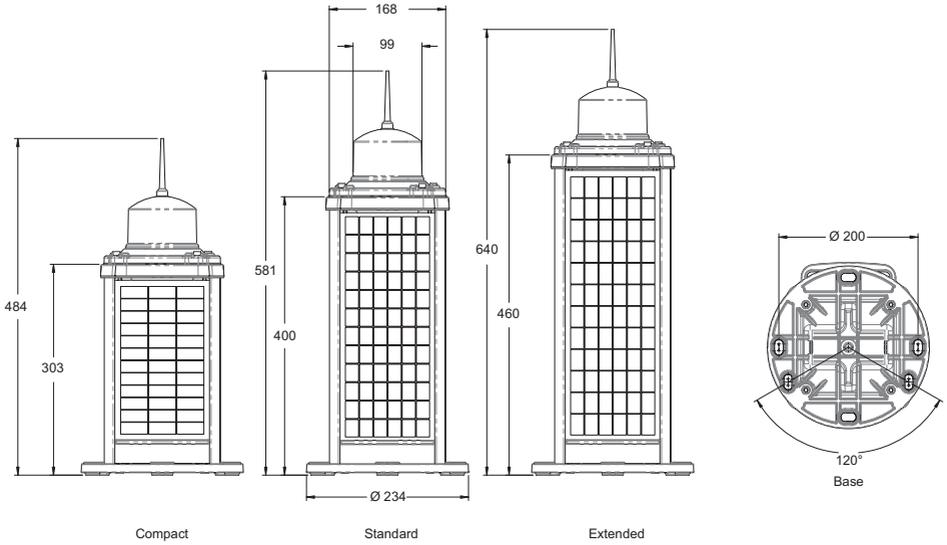
SL-C310 with Satellite Module

168
99
601
400
660
460
504
303
Ø 234
Ø 200
120°
Base

Compact

Standard

Extended
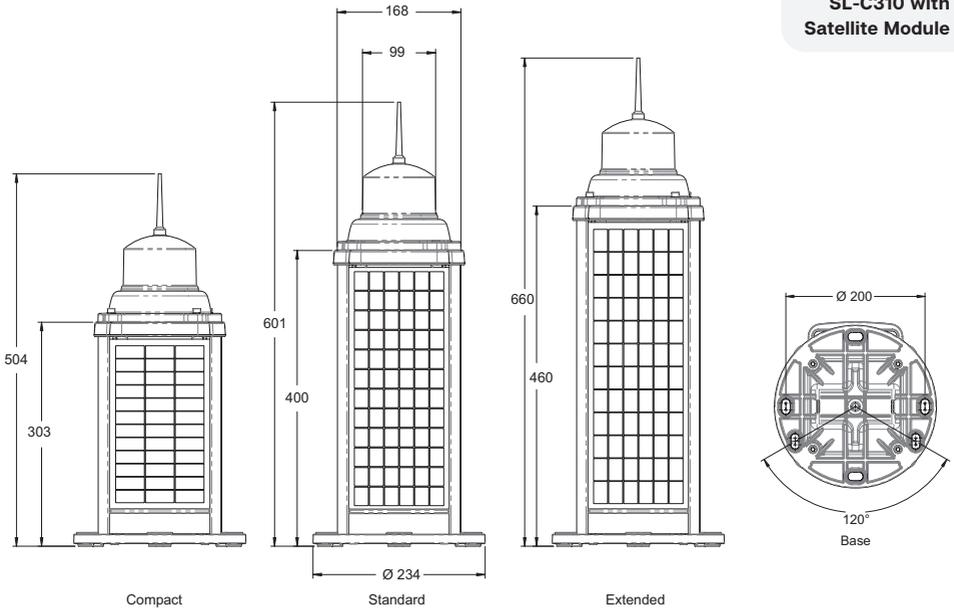
Item	Description	Quantity
1	SL-C310 Composite Base	1
2	SL-C310 Lens Assembly	1
3	Battery 12V	1
4	Battery Clamp	1
5	Washer M4	2
6	M2 Cap Screw	2
7	O-Ring, ID 145 x 4.0	1
8	Socket Head Screw M5 x 16	4
9	Interfacing Cable	1
10	ON/OFF Switch	1
11	Charge Port	1
12	Maximum Power Point Tracker (MPPT)	1
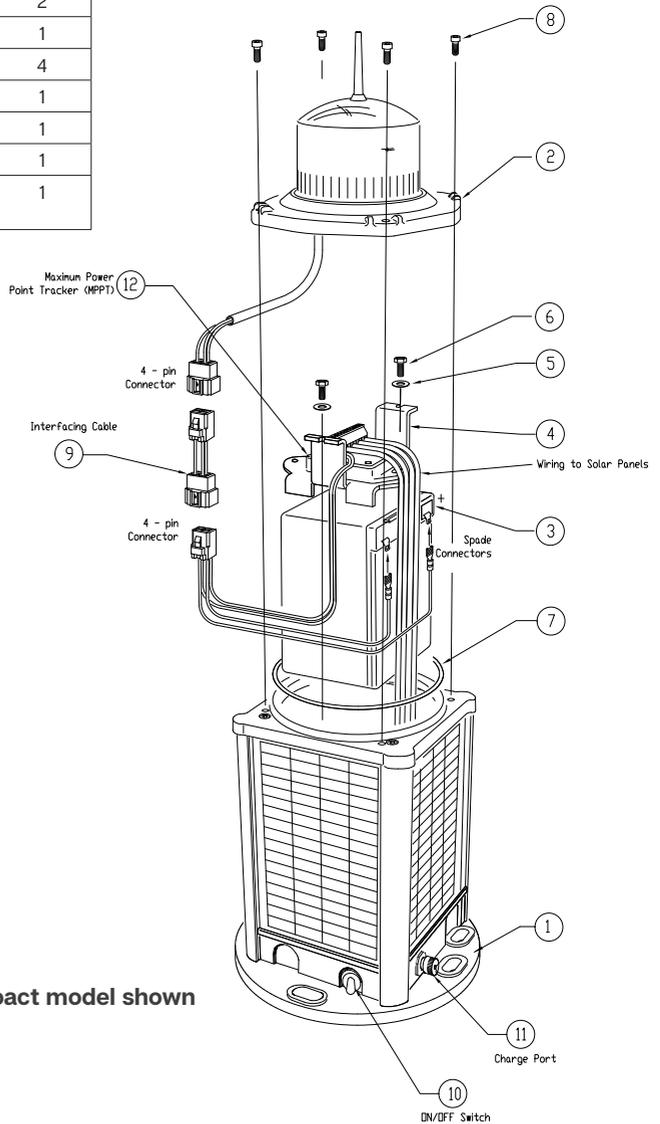
Compact model shown

Installation

Charging the Battery

For optimal performance, new lanterns must be left in full sun for 1-2 days with the lantern head connected to the battery to charge. Prior to installation, ensure battery voltage is >13V before placing into service.

Preferred Installation Location

For best lantern performance, ensure solar modules are not covered and are in clear view of the sky with no shadows.

Lantern Installations Settings

The lantern can be programmed via 3 methods,
1. Via the Star2M Portal for satellite connected devices - visit star2m.com for further guidance;
2. Via DIP switch settings. Instructions are included in this manual.
3. Via the optional Sealite IR Controller (optional). Instructions are included in this manual.

Lantern Operation

The lantern is activated by connecting the 4-Pin Connector between the battery and the regulator. Flash Codes and Intensity settings need to be set via one of the three methods identified above.

1. Remove the four socket-head screws on the top of the lens assembly and lift the SL-C310 (light head) assembly from the solar chassis.

2. Join the 4-Pin connector together to join the battery and the solar panels to the light head. The battery is disconnected to reduce discharge during transportation and for long term storage.

3. Feed all wiring back inside the solar chassis and make sure the O-ring is properly placed.

4. Replace the SL-C310 (light head) assembly and the four (4) socket head screws. Sealite recommends that the light head be tightened onto the solar chassis base using a general purpose "grip tool", similar in shape to a screwdriver, however with the appropriate hex key head fitted. The torque setting applied to each of the four (4) hex bolts, be applied sufficient enough, to ensure that the light head base is secured firmly, but not over tightened with excessive force.

To achieve a satisfactory seal, it is recommended that a torque of 3Nm is applied to the bolts used for holding down the Light Head to the Solar Base and that only the supplied bolts are used.

Applying a higher torque setting is not recommended and may void warranty. If in doubt, please contact your local Sealite representative.

5. To test, place a dark cover (towel or jacket) on top of the light to activate sensor. The light will come on within thirty seconds.

6. Ensure that the unit is bolted to an even, flat surface.

Setting Intensity/Power Settings Using DIP Switches

Intensity/power settings on Sealite lanterns operate via DIP switches, located near the rotary switches on the flasher unit. The intensity/power settings may be used to reduce the power consumption and intensity of the lantern. Setting the lantern to 25% intensity will reduce the power consumption to 25% of the normal 100% setting and the range by 20% - 40% depending on the maximum intensity. Refer to Sealite power calculator to confirm reduced range. This setting may be used to adjust the current draw of the light to local sunlight conditions.

The following diagrams indicate intensity/power settings:-
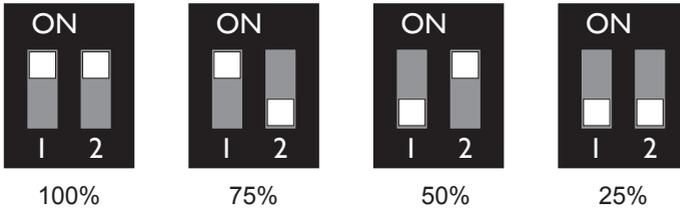
Intensity Setting	Power	White cd	Green cd	Red cd	Yellow cd
100%	120mA	156	88	121	95
75%	94mA	132	66	90	71
50%	64mA	88	44	60	48
25%	35mA	44	22	30	24

Model	Total power used per night (mAh)		Solar Panel Charge (mA)		Number of full sunlight hours required to break even (the amount of time it will take for the solar to replace what the light took out overnight)
SL-C310 Compact		/	277	=	
SL-C310 Standard		/	435	=	
SL-C415 Extended		/	554	=	

If the number of Full Sunlight hours is less than 2.5-3.0 hours, please consider reducing the intensity (Power) or reducing the Duty Cycle.

Automatic Intensity Reduction for Fixed-On Character

- When the flash code is configured to 00 or 'Steady On', the maximum intensity is set to 50%. If a higher intensity is previously set when the lamp is on, the intensity will automatically fall to the 50% setting when flash code 00 is configured.

- The intensity settings available for lamps with a flash code set to 00 are 25% and 50%. The lamp will flash an error condition if an intensity setting greater than 50% is selected with the IR Remote Control.

- If the flash code is changed from 00 to another value, the maximum allowable intensity reverts back to 100%.

Selecting a Flash Code - Rotary Switches A & B

All lanterns have 2 rotary switches marked A and B on the flasher unit. Turning the small arrows to the appropriate number or letter will set the code. The unit may take up to one minute to activate a new flash code. A comprehensive list of available flash codes is listed on in the 'Flash Codes' section of this manual.

Example:

SWITCH		FLASH CODE	ON	OFF
A	B			
A	0	FL 3 S	0.3	2.7

Note – if setting the lantern to a demanding duty-cycle such as steady-on, the power setting must be reduced to ensure reliable operation
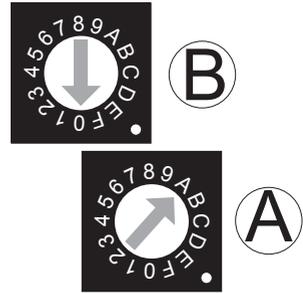
Flash Codes

Sealite marine lanterns may be set to any of 256 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
or email 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
Port Hand & Starboard Marks:	Any, other than Composite Group Flashing (2+1)
Preferred Channel Starboard:	Composite Group Flashing (2+1)
Preferred Channel Port:	Composite Group Flashing (2+1)
North Cardinal Mark:	Very quick or quick
East Cardinal Mark:	Very quick (3) every 5 seconds or quick (3) every 10 seconds
South Cardinal Mark:	Very quick (6) + long flash every 10 seconds or quick (6) + long flash every 15 seconds
West Cardinal Mark:	Very quick (9) every 10 seconds or quick (9) every 15 seconds
Isolated Danger Mark:	Group flashing (2)
Safe Water Mark:	Isophase, occulting, one long flash every 10 seconds or Morse Code "A"
Special Marks:	Any, other than those described for Cardinal, Isolated Danger or Safe Water Marks

SWITCH A	B	IR Controller	FLASH CODE	ON	OFF
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

SWITCH A	B	IR Controller	FLASH CODE	ON	OFF
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

SWITCH A	SWITCH B	IR Controller	FLASH CODE	ON	OFF	ON	OFF
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
-	-	284	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 A	B	IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF
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 A	B	IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF
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

SWITCH		IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF
A	B										
-	-	271	VQ (4) 2 S	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	2.3
B	D	189	Q (4) 6 S	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	2.6
-	-	299	FL (1+3) 8 S	1.5	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	3.7
1	D	29	FL (4) 10 S	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	3.2
F	E	254	Q (4) 10 S	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	4.5
-	-	312	FL (4) 11 S	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	5.7
4	F	79	FL (4) 12 S	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	5.5
3	D	61	FL (4) 12 S	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	8.7
4	D	77	FL (4) 15 S	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	8.0
7	D	125	FL (4) 15 S	1.5	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	9.5
-	-	314	FL (3+1) 18 S	1.5	1.5	1.5	1.5	1.5	4.5	1.5	4.5
-	-	304	FL (4) 19 S	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	9.8
5	D	93	FL (4) 20 S	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	4.5	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	9.5
0	F	15	Q (4) 20 S	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	12.0
E	E	238	Q (4) 28 S	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	26.5

SWITCH		IR 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

SWITCH		IR 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	4.7
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	9.7
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	7.0

SWITCH A	B	IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
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	2.0	5.0
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	2.0	4.4
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	2.0	7.0
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	2.0	7.0
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	2.0	5.8
-	-	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	1.05	7.95
-	-	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	2.0	5.8
-	-	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	2.0	7.0
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	2.0	9.4

SWITCH A	B	IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
-	-	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	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	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	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	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	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	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	22.9

SWITCH A	B	IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF
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

The following flash characters can only be set via the IR Programmer (sold separately). Please refer to the IR section of this manual for set up instructions.

| IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
336	F1 8 S	0.4	7.6																
337	Q (9) 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	0.4	0.8	0.4	5
338	Mo(A) 9 S	0.5	0.5	1.5	6.5														
339	Mo(A) 11 S	0.5	0.5	1.5	8.5														
340	Mo(C) 13 S	1.5	0.5	0.5	0.5	1.5	0.5	0.5	7.5										
341	Mo(C) 17 S	1.5	0.5	0.5	0.5	1.5	0.5	0.5	11.5										
342	Mo(D) 10 S	1.5	0.5	0.5	0.5	0.5	6.5												
343	Mo(D) 13 S	1.5	0.5	0.5	0.5	0.5	9.5												

Optional IR Remote Control

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.
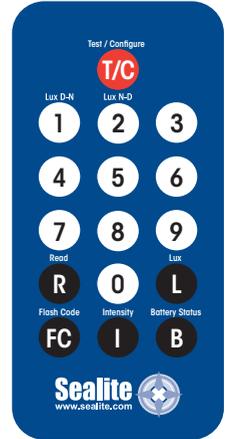
IR Controller Functions

Test Mode / Configure

T/C

Pressing the T/C button 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.

Example Key Sequences:

R **FC** **T/C** 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.

R **I** **T/C** The light flashes the current intensity setting: 1 flash for 25%, 2 for 50%, 3 for 75% and 4 for 100%.

R **B** **T/C** The light flashes the current battery status.

R **L** **T/C** 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.

Flash Code

FC

This key sets the Flash Code on the light.

FC **1** **2** **3** **T/C**

Example Key sequence:
This sets the Flash Code to value 123. The light responds by flashing the Flash Code value.

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.

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.

Intensity

I

This function sets the light intensity. Valid intensity values are 1 for 25%, 2 for 50%, 3 for 75% and 4 for 100%.

Example Key sequence:

I **1** **T/C**

This sets the light intensity to 25%.

Battery Status

B

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.

R **B** **T/C**

Lux

L

This key sets the ambient light threshold levels.

The format is where 'x' is the desired setting from the table below.

L **X** **T/C**

There are 5 programmable lux levels which are set together for the sunset and sunrise transitions.

Level	Sunset (Dusk)	Sunrise (Dawn)
1	65	100
2*	**100**	**150**
3	150	240
4	240	370
5	370	600
6	250	320
* Default / Factory Preset		

Example key sequence:

Assume the current Lux settings are at the factory preset values of 2.

L **1** **T/C**

This sets the ambient light level to be lower than the default 100 lux. The light will turn on when its surroundings are darker.

The light responds by acknowledgement with a long flash.

Error / Acknowledge Indication

If the key sequence is invalid, or an out of bounds value is attempted to be set, the light flashes 5 times for 1 second. (The command then needs to be sent from the start.)

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

I **5** **T/C**

The light flashes 5 times for 1 second.

When a key sequence has been entered successfully the light will respond acknowledgement with a long 1 second flash.

Configuration Settings

The intensity and Flash Codes can be changed using the switches on the lamp circuit board or with the IR Remote Control. The lamp 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 lamp must be powered. The lamp can detect a change in switch settings if they are changed while the light 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 lamp is powered down and the operator changes the flash code switches to A=3, B=1 and powers on the light. The new Flash Code is now A=3, B=1.

If the Flash Code is read from the light using the IR Remote Control, the lamp will flash 49 which is the corresponding number for switches A=3, B=1.

Use the IR Remote Control to read the current lamp intensity setting and Flash Code.

Operational Mode (Advanced users)

The lantern has three modes of operation: Always on, 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

Hibernation Mode (Advanced users)

L **I**

For situations where the lantern is put into storage for a known period, the IR Remote Control can be used to configure the lantern 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. The IR sensor is still monitored in Hibernation Mode. Power consumption is only improved by physically disconnecting the battery supply.

Hibernation Mode is defined by a start date and end date that are programmed into the lantern via the IR Remote Control.

Using the IR Remote Control

The lantern must be in Test Mode prior to pressing any of the following key sequences. However, the lantern will return to Normal Operation if it has not detected a valid key press for a period of 15 seconds. When the lantern exits from Test Mode it will either enter Dusk to Dawn mode, Hibernation Mode, or Storage Mode, if enabled.

Store Hibernation Mode Date Range

The following details the key press sequence that defines the start and end dates of Hibernation Mode:

where **ddmm** is the numerical representation of the month (01=January, 08=August) of the start date,

(L) (I) (d) (d) (m) (m) (D) (D) (M) (M) (T/C)

and **DDMM** is the numerical representation of the end date.

E.g 9th of December is represented by the number sequence 0912. The lantern will acknowledge and respond by flashing a long flash. This operation only stores the start & end dates into the lantern's memory and Hibernation Mode still must be enabled to commence its operation.

Enable Hibernation Mode

Pressing the following key sequence will enable (turn on) Hibernation Mode:

The lantern will respond with a single flash.

(L) (I) (1) (T/C)

The lantern will take a new GPS reading, determine the calendar month, and then enter Hibernation Mode and depending on the current calendar month setting, will either Hibernate or enter Dusk-to Dawn mode.

By default, Hibernation Mode is disabled. Note you can only use this command once a valid hibernation start & end date has been stored in the lantern.

Disable Hibernation / Mode

Pressing the following key sequence will disable (turn off) both Hibernation Mode and Seasonal Hibernation:

(L) (I) (0) (T/C)

The lantern will respond with a single long flash.

Momentarily Wake Up from Hibernation Mode

(T/C)

Pressing the T/C button will wake up the lantern, at which point the lantern will remain awake for a further 15 seconds to process other commands from the IR Controller. If no IR commands are received for a period of 15 seconds, the lantern will return to Hibernation Mode.

Read Stored Hibernation Dates

By pressing the following key sequence the lantern will respond with the stored start and end dates for Hibernation:

(R) (L) (I) (1) (T/C)

Read Hibernation

By pressing the following key sequence the lantern will respond with status of Hibernation Mode.

(R)(L)(I)(0) **T/C**

Where:

• A single long flash = Hibernation Mode is Enabled
• Two quick flashes = Hibernation Mode is Disabled.

User Case Example: Configuring the lantern for Hibernation

In this example, we want the lantern to hibernate each year from Dec 10th, through to February 15th, and the lantern is located inside a storage warehouse.

The required key sequence is:

Command	IR Controller Key Press
Store the Hibernation Date Range	(L)(I)(1)(0)(1)(2)(1)(5)(0)(2) **T/C**
Enable Hibernation	(L)(I)(1) **T/C**

Storage Mode (Advanced users)

For situations where the lantern is put into storage but with access to daylight, the IR Remote Control can be used to configure the lantern into Storage Mode.

This mode manually forces the lantern to turn off, but with access to daylight it will still charge battery pack. However the lantern will not keep track of the date.

In Storage Mode, the GPS is disabled however the lantern will still respond to IR commands.

The lantern will automatically enter Storage Mode, if it is hibernating and it has not detected any light for 20 hours.

Enter Storage Mode

By pressing the following key sequence the lantern will enter Storage Mode:

(L)(B)(1) **T/C**

The lantern will leave storage mode when exposed to daylight or if the power switch is turned OFF and ON again.

IR Controller Security PIN

The IR Controller allows to create a four-digit numbers security access PIN, this will prevent accessing or modifying the SL-C310 settings. Once the Security PIN is set this it will lock the lantern immediately.

In order to access the light settings, the Unlock PIN command needs to be used, this will allow access to the light settings for 30 minutes then the light will re-lock again. If the entered Security PIN does not match, the lantern will respond with 5 quick flashes indicating the PIN is incorrect.

Pressing the following key sequence will set the light Security PIN:

(L) (L) (I) (X) (X) (X) (X) (T/C)

Where: X = 0 to 9-digit numbers

(R) (L) (L) (I) (X) (X) (X) (X) (T/C)

Pressing the following key sequence will unlock the light for 30 minutes:

Where: X = 0 to 9-digit numbers

Clear or set a new IR Security PIN

(L) (L) (I) (FC) (FC) (FC) (FC) (T/C)

To clear the security access PIN the light requires to be switched off then on. The action will allow to enter the following key commands to clear the existing Security PIN:

Once the security access PIN is cleared a new PIN can be entered using the Security PIN set command.

NOTE: The above key command requires to be entered within four minutes, once the time elapses the light will PIN lock again.

GPS Synchronisation

The SL-C310 compact, standard and extended models come with GPS fitted as standard, and provide the user with the ability to install independently operating lanterns that all flash in synchronisation.

No additional power supplies, aerials 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.

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 Iridium® Satellite Monitoring & Control System

The SL-C310 may also be fitted with Satellite Monitoring and Control – enabling users to access real-time diagnostics data and change lantern settings via your portable device or desktop. The Star2M Portal can also be configured to send out alarm SMS text messages to designated cellular telephone numbers. The user can also have alarms and reports sent to designated email addresses.

Please contact Sealite for further information regarding satellite monitoring and control via the Star2M Portal. Alternatively, visit the Star2M website at star2m.com.

FEATURES

- Monitor lantern status using any cell-phone, email address or Sealite's secure web portal, Star2M;

- Reports alarm conditions to designated cell-phone numbers (SMS text) & email addresses or within the Star2M portal;

- View daily/monthly/yearly lantern diagnostics or receive the information via email;

- Enables proactive maintenance scheduling;

- Lantern only responds to authorised users;

- Low cost monitoring;

- Worldwide functionality.

For details on the advanced functionality that can be achieved via Sealite's satellite enabled marine lanterns, visit star2m.com or speak with your Sealite representative.

Internal Satellite Module

SL-C310 model with Optional Satellite Module

Optional GSM Monitoring & Control System

The SL-C310 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. The user can also have alarms and reports sent to designated email addresses. Please contact Sealite for further information and instructions.

FEATURES

· Monitor lantern status using any cell-phone, email address or Sealite's secure web portal;

· Reports alarm conditions to designated cell-phone numbers (SMS text) & email addresses;

· View daily/monthly/yearly lantern diagnostics or receive the information via email;

· Enables proactive maintenance scheduling;

· Lantern only responds to authorised users.

Internal GSM Module

SL-C310 model with Optional GSM Module

Lantern Status

Two status LED's on the main printed circuit board provide the operator with an indication of the lantern status. There is one red and one yellow status LED. The red status LED is used to indicate the health of the lantern's power system. The yellow status LED is used to indicate the operational status of the lantern. These indicator LED's can be viewed at the base of the lens.

All Sealite boards are fitted with two Indicator LED's. Use the table below to help determine operational status.

Yellow LED	Lantern Status	Lantern	Comment
OFF	Normal	OFF	Lantern is in Daylight and in Dusk till Dawn mode or in Standby Mode
Flashing ON 0.15 seconds OFF 0.15 seconds	Normal	OFF	Light is activating and will turn on after detecting 30 seconds of continuous darkness.
Flashing 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 ON 1.5 seconds OFF 1.5 seconds	Normal	ON	Normal operating condition. Lantern is synchronised to GPS-enabled lanterns.
Flashing 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 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 10.0 – 11.5V	ON	Battery Voltage is between 10.0 – 11.5V
Flashing 4 x times every 2.5 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 ON 1.5 seconds 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.

Maintenance & Servicing

Designed to be almost maintenance-free, the SL-C310 requires minimal attention, though the following maintenance and servicing information is provided to help ensure the life of your Sealite product.

1. Cleaning Solar Panels- Occasional cleaning of the solar panels may be required. Using a cloth and warm soapy water, wipe off any foreign matter before rinsing the panels with fresh water.

2. Battery Check- Inspection of batteries should be performed every three years (minimum) to ensure that the charger, battery and ancillary electronics are functioning correctly. Using a voltage meter, check that the battery voltage is at least 12 volts under 100mA load and ensure all terminals are clear of foreign matter.

3. O-Ring Check- Inspect the condition of the O-ring for damage, wear or if it is brittle. Replace if necessary. The O-ring should be a rubber texture to ensure a complete and even seal.

Replacing the Battery

The SL-C310 have an internal battery compartment, which provides the user with the ability to change the battery after years of operation. Contact Sealite should a replacement battery required.

1. Remove the four socket-head screws on the top lens assembly and separate the SL-C310 lens assembly from the body/base section.

2. Remove 2 x M4 cap screws & washers from the top of the chassis.

3. Disconnect the light head and battery via the 4-Pin connector.

4. Lift the upper battery bracket out of the SL-C310.

5. Remove the old battery from the chassis.

6. Discard old battery in a safe manner.

7. Reconnect the new battery.

8. Place battery back inside lantern body, and position the upper battery bracket in the top of the chassis.

9. Secure using 2 x M4 cap screws & washers.

10. Feed all wiring back inside lantern body, and make sure the O-ring is properly placed at the top of the lantern body. Reconnect the 4-Pin connector.

11. Place the top lens assembly back onto the lantern body and replace 4 socket head screws. Half tighten all 4 socket head screws, and then fully tighten each socket head screw to ensure an even seal. To achieve a satisfactory seal, it is recommended that a torque of 3Nm is applied to the bolts used for holding down the Light Head to the Solar Base and that only the supplied bolts are used. Applying a higher Torque setting is not recommended and may void warranty. If in doubt, please contact your local Sealite representative.

12. To test, place dark cover (towel or jacket) on top of the lantern to activate sensor, light will come on. Care must be taken to observe the polarity of each wire before they are connected. To ensure waterproofing of the unit, make sure that there is an even seal.

Long Term Battery Storage

If the SL-C310 is to be placed in storage for an extended period please follow the below information. The sealed lead acid batteries inside the lantern must always be stored in a fully charged state. Always make sure to disconnect the light head from the solar unit. All batteries will discharge over time and the rate of discharge is dependent on temperature. If the light is being stored in temperatures greater than 40°C the battery will discharge faster. Please check battery regularly and recharge if necessary. Re-connect the light head and battery and place unit in the sun for 2-4 days.

Solar Panel Replacement

The SL-C310 range is built around an internal aluminium chassis. The solar panels can be user-replaced in the unlikely event that one is broken or damaged during the product's life.

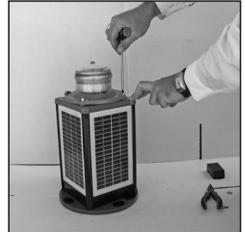Follow the steps below or contact support@sealite.com for more details.

1. Remove 4 x M6 x 20 socket head cap screws and 4 x M6 nylon washers and disconnect the light head from the chassis

2. Remove the 2 x M4 x 20 socket head cap screws, 2 x M4 spring washers and 2 x M4 penny washers. Remove the upper battery bracket containing regulator

3. Disconnect the battery

4. Remove 4 x M6 x 35 socket head cap screws, to remove the top casting from the chassis.

Note: Be careful not to damage the o-rings on each of these screws. If replacements are required please use standard 6x1.0mm o-ring.

5. Slide the rubber corner out of the chassis, it may be necessary to lubricate the edges of the solar panels with grease or oil based lubricant if this is difficult to remove.

6. Unscrew the affected panel wires from the regulator and remove the solar panel from the chassis.

7. Clean any silicon off the chassis from the solar panel junction box hole and add a new seal to ensure the solar panel is watertight when assembled.

8. Repeat the process in the reverse order to replace a new panel.

Note: Make sure the O-rings on the top casting and 4 x M6 x 35 socket head cap screws are coated in silicon grease before re-assembling.

To achieve a satisfactory seal, it is recommended that a torque of 3Nm is applied to the bolts used for holding down the Light Head to the Solar Base and that only the supplied bolts are used. Applying a higher Torque setting is not recommended and may void warranty. If in doubt, please contact your local Sealite representative.

The replacement of a solar panel should only be performed by a confident technician. Sealite cannot guarantee the chassis will remain waterproof, if it not performed by Sealite staff. To test for any leaks remove the gore vent and pressurise the assembled Light to 1.5psi.

How to Change the Regulator

1. Remove the 4 x M6 x 20 socket head cap screws and 4 x M6 nylon washers, then disconnect the light head from the chassis.

2. Remove the 2 x M4 x 20 socket head cap screws, 2 x M4 spring washers and 2 x M4 penny washers then remove the upper battery bracket containing the regulator.

3. Disconnect the battery.

4. Take note of the wire colours and location in the regulator.

5. Disconnect the wires from the regulator.

6. Remove the 2 x M4 CSK screws, 2 x M4 nylock nuts and 2 x M4 penny washers that retain the regulator to the top battery bracket and remove the regulator.

7. Fit the new regulator using the 2 x M4 CSK screws, 2 x M4 penny washers and 2 x M4 nylock nuts.

8. Connect the solar positive wires to the S points on the regulator.

9. Connect the solar negative wires to the S points on the regulator.

10. Connect the battery positive wires to the B point on the regulator.

11. Connect the battery negative wire to the B point on the regulator.

12. Reconnect the battery.

13. Refit the battery top bracket into the solar unit using the 2 x M4 x 20 socket head cap screws.

14. Ensure the top O-ring is sitting correctly into the top casting. Refit the light head and tighten the M6 x 20 socket head cap screws with the 4 x M6 nylon washers evenly.

DO NOT OVERTIGHTEN.

Use the label to ensure correct location of wires during assembly

SL10 AMP Regulator shown when correctly fitted

Trouble Shooting

Problem	Remedy
Lantern will not activate.	· Ensure Lantern is in darkness; · Wait at least 60 seconds for the program to initialise in darkness; · Ensure battery terminals are properly connected; · Ensure battery voltage is above 12volts; · Check the status of the LED's on the base of the PCB to determine what type of fault the light is acting (see Lantern Status section of this manual).
Lantern will not operate for the entire night.	· Expose the lantern to direct sunlight and monitor operation for several days. · Sealite products typically require 1.5 hours of direct sunlight per day to retain full autonomy. From a discharged state, the lantern may require several days of operational conditions to 'cycle' up to full autonomy; · Reducing the light output intensity or duty cycle (Flash Code) will reduce current draw on the battery; · Ensure solar module is clean and not covered by shading during the day.

Sealite LED Light Warranty

Refer to Sealite website: sealite.com

Sealite®

We believe technology improves navigation™

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