Sealite®
www.sealite.com

Apollo-155
Long Range Lantern Adjustable from 4-12nm+
Programming, Installation & Service Manual

Version 2.1

Apollo-155

Integrated bird deterrent spiked cap (colour of cap designates light colour)

Automatic night activation

Independently controlled LEDs can be configured to create flashing or rotating lantern

155mm diameter lens & integrated anodised aluminium heat sink (patents pending)

PC programming port

12v DC power supply

185
(7.3'')
158
(6.1'')
392
(15.4'')
235
(9.3'')

185
(7.3'')
158
(6.1'')
255
(10.0'')

Diam 15.9 x 25.4 slot
(0.63'' x 1'')
120°

Apollo-155 2-Tier **Apollo-155 1-Tier**

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Introduction

Congratulations! By choosing to purchase the APOLLO-155 lantern, you have become the owner of one of the most advanced LED marine lantern in the world.

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

As a commitment to producing the highest quality products for our customers, Sealite has been independently certified as complying with the requirements of ISO9001:2008 quality management system for the design and manufacture of marine lanterns.

Sealite lanterns comply with the 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 it's operating function.

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 and superior quality.

Optical Performance
Sealite manufactures a range of marine LED lenses moulded from multi-cavity dies. Complex shapes such as the SL70, BargeSafe™ and 16-segment multi-focus lenses are a testament to the company's superior in-house lens manufacturing capabilities and 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.

Apollo-155 Model

The Apollo-155 is the next generation in marine aids to navigation.

To utilise the latest technology, Sealite has designed a lantern using the world's most advanced LEDs. These highly efficient LEDs can be configured individually to create not just a flashing lantern, but also a sectored lantern, rotating lantern, and even more complex sectors with multiple flash codes in the same lantern.

The Apollo-155 incorporates a sophisticated thermal management system. Sealite's in-house engineers custom designed this complex aluminium extrusion which is used as a heat sink for the LEDs and LED driver board.

The distinct lens of the Apollo-155 has 16 optical elements controlling the light emissions for the LED in a two-dimensional manner; completely unique to the industry. The 16x LEDs in each lens individually cover 45° horizontally and 5° vertically.

The optic also facilitates internal sectoring across broad range of output requirements.

Like all Sealite marine lanterns the Apollo-155 has a specifically designed circuit board that controls automatic dusk to dawn operation, LED operation and many functions that can be specifically requested, such as current monitoring, GSM, GPS or radio-control.

The lantern can be configured using a simple, user-friendly computer program.

Sealite Apollo-NPS

Sealite's APOLLO SL-155-NPS non-precision sector lantern is adjustable from 4–9M+ and has been designed to suit a range of applications.

The distinctive lens of the SL-155-NPS has 16 optical elements controlling the light emissions for the LED in a two-dimensional manner; completely unique to the industry.

The optic facilitates internal sectoring across a broad range of output requirements.

Sealite can produce almost any combination of colours and angles and meet the requirements of our customers.

Customers need to identify each colour and angle, Flash codes, range and any other specific requirements.

The Apollo-NPS is hand built to each set of unique customer requirements. Due to the unique build of each light, the Apollo-NPS cannot be reconfigured as much as a standard Apollo.

SPECIFICATIONS •

Light Characteristics

Light Source	16 ultra bright LEDs per tier
Available Colours	Red, Green, White, Yellow, Blue
Intensity at maximum wattage (cd)†‡	1-tier: Red - 1140 Green - 2127 White - 2110 Yellow - 677 2-tier: Red - 2052 Green - 3743 White - 3587 Yellow - 1164
Visible Range (nm)	4–12+
Horizontal Output (degrees)	0° - 360°
Vertical Divergence (degrees)	5 ± 2.5° at 50% peak
Available Flash Characteristics	Up to 256 IALA recommended (PC programmed)
Intensity Adjustments	32 levels (PC programmed)
LED Life Expectancy (hours)	>100,000

Electrical Characteristics

Current Draw (mA)	Refer to Sealite Power Calculator
Circuit Protection	Polarity protected
Nominal Voltage (v)	12v DC only
Temperature Range	-40 to 80°C

Physical Characteristics

Body Material	Anodised 6060nSeries Aluminium
Lens Material	LEXAN® Polycarbonate – UV-stabilised
Lens Diameter (mm/inches)	155 / 6^1/$_8$
Lens Design	Sealite 16 segment, multi-focus LED lens (patents pending)
Mounting	3 & 4 hole bolt pattern on 200mm OD base
Height (mm/inches)	1-tier: 300 / 11^4/$_5$ 2-tier: 395 / 15^1/$_2$
Width (mm/inches)	1-tier: 235 / 9^1/$_3$ 2-tier: 235 / 9^1/$_3$
Mass (kg/lbs)	1-tier: 3.8 / 8^3/$_8$ 2-tier: 6 / 13.2
Product Life Expectancy	Up to 12 years

Certifications

CE	M091133
Quality Assurance	ISO9001:2008
Waterproof	IP68

Intellectual Property

Patents	Australian Provisional Patent 1004289015
Trademarks	SEALITE® is a registered trademark of Sealite Pty Ltd

Warranty *

3 years

Options Available

- Rotating beacon
- Sectored light
- Wreck marking light
- GPS Synchronisation
- RF Synchronisation
- AIS Remote Monitoring
- Radio Control System

CE

- Specifications subject to change or variation without notice
- Subject to standard terms and conditions
† Intensity setting subject to solar availability
‡ Higher outputs at increased current draw

Product Components

The following components come standard with each lantern:-

• Apollo-155 lantern
• USB drive (loaded with lantern programming software & other important information)
• Programming cable (to connect the lantern to your computer via serial port/comm port)
• Installation & service manual
• Warranty registration card

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 Instructions

The Apollo-155 lantern is available in a variety of LED colours (single or multiple colours) and sectors to meet a range of installation and regulatory requirements. The LED colour(s) are set within each lantern when manufactured, and then the lantern is pre-programmed to the customer's specific requirements for convenience (eg. flash & intensity setting, sectors etc).

The Apollo-155 is an extremely intelligent lantern with a number of features which can be programmed directly via a user-friendly computer program (as supplied on USB drive with every lantern). **The specific setup of your lantern will determine which features are programmable.**

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

1. Run the Programming Software

The programming software (Sealite Lantern Programmer) 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 "Sealite Lantern Programmer". A new window will appear displaying the Sealite Lantern Programmer

Saving the Programming Software to Computer Hard-Drive

• Connect the USB drive to your computer

• Navigate to the USB drive folder

• Right-mouse-click the file called "Sealite Lantern Programmer" and select "copy"

• 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 "Sealite Lantern Programmer". A new window will appear displaying the Sealite Lantern Programmer

PLEASE NOTE: other documents have been saved on the USB drive for your information & convenience including the latest product specifications sheet, power calculator, 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 Apollo-155.

IMPORTANT: the Sealite Lantern Programmer is designed for Windows Platforms only.
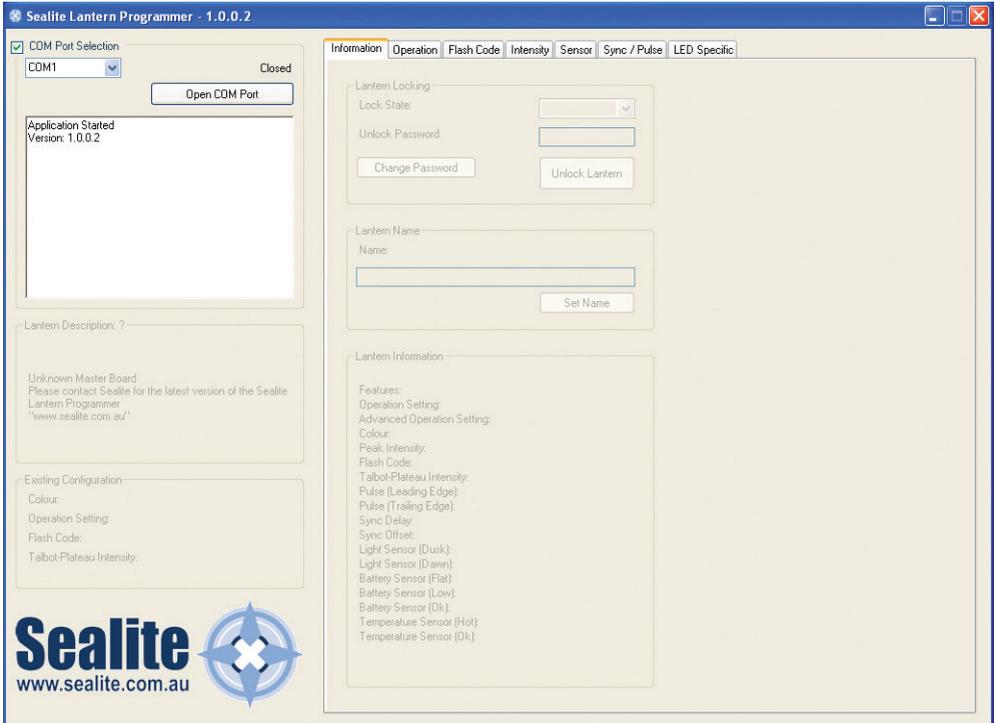
Image 1. Sealite Lantern Programmer

2. Connect the Apollo-155 Lantern to a Power Source & the Computer

Now that the programming software has been run, you will need to connect the Apollo-155 lantern to your computer & power supply so that it can receive programming commands.

Once connection is made, the software automatically determines whether the lantern is single or 2-Tier.

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

CAUTION: to avoid personal injury do not position the Apollo-155 lantern at eye level.

Connecting the Lantern to the Computer

- Plug the Bulgin connector end of the 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 Lantern Programmer 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.

- From the Sealite Lantern Programmer select the appropriate COM Port from the drop down field at the top left of the menu page
- Click the "Open COM Port" button to initiate the connection

The Sealite Lantern Programmer will then attempt to connect/interrogate the lantern.

Correct Connection Established

If the connection is established data about the lantern configuration will appear under the headings "Lantern Information" & "Existing Configuration" (eg. Lantern Colour, Peak Intensity, Operating Mode etc).

Connection NOT Established

If the connection is not available, the Sealite Lantern Programmer will not display any lantern specific information under the headings "Lantern Information" & "Existing Configuration" (eg. Lantern Colour = ?). 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 Lantern Programmer. The connection should now become established.

The Sealite lantern is now ready to be programmed to your specific requirements.
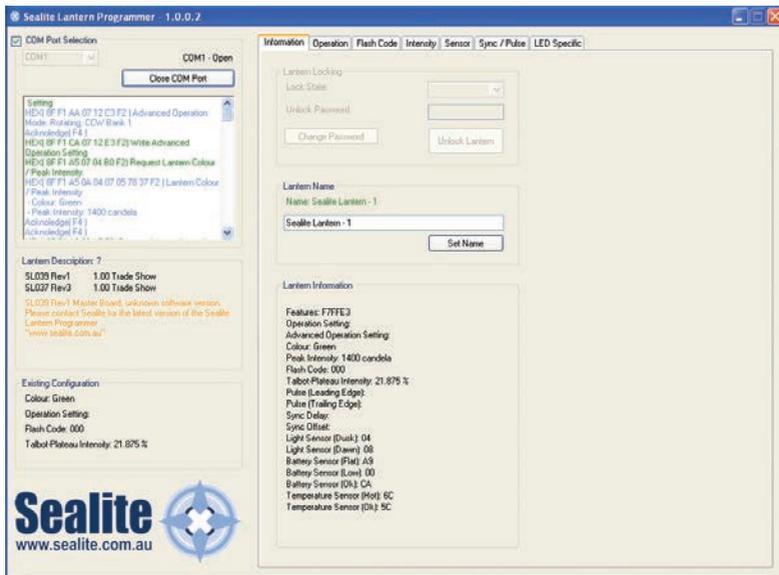
Sealite Lantern Programmer "Information" tab – showing COM Port connection established, Lantern Name & Lantern Information

Sealite Lantern Programmer Matrix.

Programming Operation	Apollo	Apollo-NPS
4.1 Naming the Lantern	✓	✓
4.2 Operation Setting	✓	✓
4.3 Advanced Operation Settings	✓	✗
4.4 Standard Flash Codes	✓	✓
4.5 Custom Flash Codes	✓	✗
4.6 Intensity Selection	✓	✓
4.7 Effective Intensity Correction	✓	✗
4.8 Light Sensor	✓	✗
4.9 Battery Sensor	✓	✗
4.10 Temperature Sensor	✓	✗
4.11 Pulse Shape	✓	✗
4.12 LED Specific – Programming for Advanced Users	✗	✓

4. Programming the Lantern

Now that the Sealite Lantern Programmer is running and connected to a specific lantern, the user may configure individual settings of the lantern to suit their particular requirements.

Programming Options Available Include:

- Naming the Lantern (up to 44 characters)
- Operation Setting
  - o Standby
  - o Always On
  - o Dusk to Dawn
- Advanced Operation Settings (configure individual banks of LEDs eg. sectored, rotating & wreck-marking lights)
- Standard Flash Codes (up to 304 pre-defined codes available)
  - o IALA Flash Characteristic Selection
  - o Sealite Flash Characteristic Selection
- Custom Flash Codes (set the lantern to your exact flash requirements)
- Intensity Selection
  - o Range (nm)
  - o Candela (cd)
  - o Pulse Width Modulation (PWM)/Talbot-Plateau Intensity
- Effective Intensity Correction
  - o Schmidt-Clausen
  - o Allard
  - o Blondel-Rey-Douglas
  - o Allard-Ohno-Couzin
- Lantern Sensor Thresholds
  - o Ambient Light Threshold/Lux Level (select the ambient light levels for lanterns set to Dusk to Dawn mode)
  - o Low Battery Sensor (select the battery voltage thresholds)
  - o Temperature Threshold (select the internal lantern temperature levels in which the lantern will automatically reduce it's intensity)
- Pulse Shape (select the way the light displays eg. soft glow of incandescent)
  - o Leading Edge
  - o Trailing Edge
- LED Specific Programming for sectored lights only (for advanced users, configure each individual LED to suit your specific requirements)
  - o Flash Code
  - o Intensity
  - o Sync Offset

The following information describes in detail how to customise/control each of the above lantern programming options.

IMPORTANT: the programmer will only send/update certain lantern features when the user clicks the relevant "SET" button. Eg. When navigating between different tab sections of the Sealite Lantern Programmer, ensure that you click the SET button of the feature before moving to the next tab.

The programmer will automatically gather/request information form the lantern on occasion. Please be aware that slight page update delays may occur when the programmer is refreshing the information on the screen.

4.1 Naming the Lantern

The user can allocate a specific name for each lantern for ease of recognition when programming. Eg. Sealite Lantern 01, North Cardinal #1 etc (see Image 2). This name may be up to 44 characters in length.

To program the lantern name (see Image 2):
- Click the "Information" tab at the top of the Sealite Lantern Programmer
- From the "Lantern Name" box, type in the name you wish to allocate to the lantern
- Click the "Set Name" button
- The lantern name will appear above where you typed the new name

4.2 Operation Setting

The user may select the operation setting in which they would like the lantern to be set (see Image 3). Options include:

Standby

The lantern is still with power but will not flash the selected flash code (this mode is NOT suitable for long term storage).

Always On

The lantern is active and will always flash the selected flash code day and night. The lantern will only turn off when the battery is flat.

Dusk to Dawn

The lantern will be active and flash the selected flash code only at night. During daylight hours the lantern will be in standby mode.

To program the lantern operation setting (see Image 3):
- Click the "Operation" tab at the top of the Sealite Lantern Programmer
- From the "Operation Setting" box, select the desired lantern operation setting from the drop down field
- Once selected from the drop down field, the lantern will automatically send the setup instruction to the lantern (eg. lantern will automatically change setup)

PLEASE NOTE: to test lantern setting for "Dusk to Dawn" mode, cover the lantern with a dark cloth/ jacket for approximately 1min. The lantern will then begin flashing to the selected flash code.

*IMPORTANT: when programming the lantern it may be necessary to use the "Always On" Operation Setting so there is no delay when sending a message to the lantern and viewing/testing the new setting. **To maximise the lantern operational life, Sealite recommends setting the lantern operation setting to dusk to dawn.***
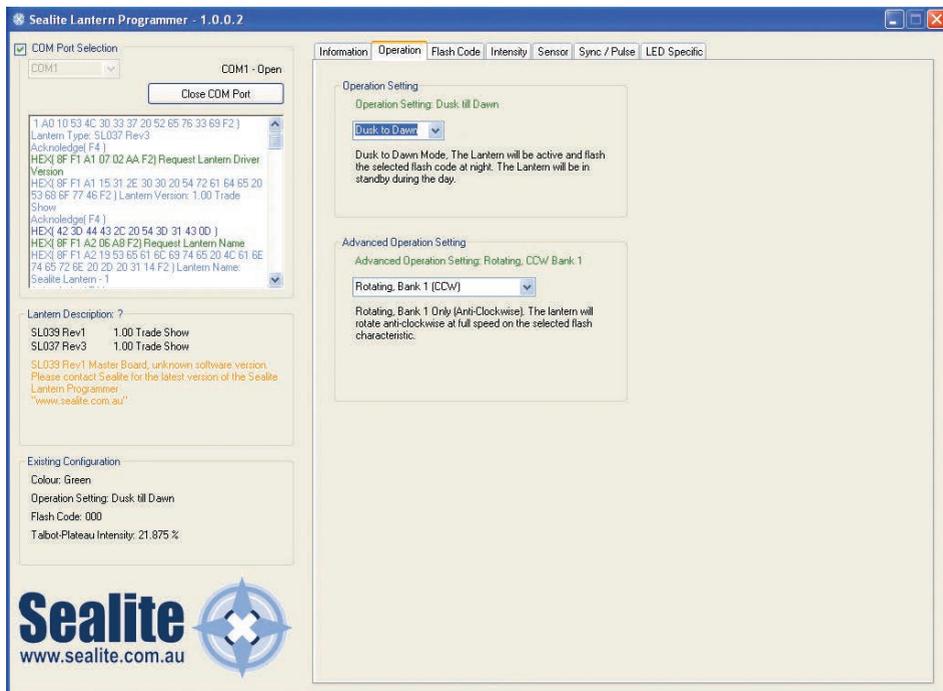
Image 3. Sealite Lantern Programmer "Operation" tab – showing Operation Setting & Advanced Operation Setting

4.3 Advanced Operation Settings

The Apollo-155 comes standard with 16 ultra bright 3watt CREE® LEDs and are available in a range of IALA recommended colours & configurations (eg. sectored lights or rotating beacons).

CREE® LEDs are leading the LED lighting revolution with their unprecedented lighting-class brightness, efficacy, lifetime and quality of light. These features provide a viable alternative to traditional lighting products, and save money with energy-efficiency and long service life.

Each individual LED within the Apollo-155 has a number of pre-defined "Advanced Operation Settings" (as determined by the positioning of the LEDs during manufacture and the programming set). Users may activate/deactivate particular advanced operation settings using the Sealite Lantern Programmer including:

All LEDs – the lantern will flash the selected flash code using all the LEDs. All LEDs will flash with the same flash characteristic, with the same sync offset, at the same intensity. This is the default configuration for the lantern.

Bank 1 Only – the lantern will flash the LEDs of Bank 1 only. All LEDs found in banks 2, 3 & 4 will be turned off. All LEDs in bank 1 will flash with the same flash characteristic, with the same sync offset, at the same intensity. This is used on a lantern that contains two or more coloured LEDs.

Bank 2 Only – the lantern will flash the LEDs of Bank 2 only. All LEDs found in banks 1, 3 & 4 will be turned off. All LEDs in bank 2 will flash with the same flash characteristic, with the same sync offset, at the same intensity. This is used on a lantern that contains two or more coloured LEDs.

Shipwreck 1,2 – alternating bank 1 & bank 2. The lantern will flash one complete flash characteristic using the LEDs of bank 1. It will then flash a complete flash characteristic using the LEDs of bank 2. It will then flash using the LEDs of bank 1 again. All LEDs positioned in banks 3 & 4 will be turned off. All LEDs in banks 1 & 2 will flash with the same flash characteristic, at the same intensity. This is used on a shipwreck lantern.

Cycle 1,2,3,4 – cycle bank 1 to 4. The lantern will flash one complete flash characteristic using the LEDs of bank 1. It will then flash a complete flash characteristic using the LEDs of bank 2. Then bank 3, and then bank 4. This was used to make a rudimentary rotating lantern; it has been included for legacy support only.

Sector – the lantern can flash a different flash characteristic on each sector. Each LED can be run at a different intensity.

Complex Sector – the lantern can flash a different flash characteristic, at a different sync delay, at a different intensity for each LED. This provides complete independent control over each LED on the lantern.

Rotating, Full Speed (CCW) – the lantern will rotate anti-clockwise at full speed on the selected flash character.

Rotating, Half Speed (CCW) – the lantern will rotate anti-clockwise at half speed on the selected flash character.

Rotating, Bank 1 (CCW) – using bank 1 LEDs only, the lantern will rotate anti-clockwise at full speed on the selected flash characteristic.

Rotating, Bank 2 (CCW) – using bank 2 LEDs only, the lantern will rotate anti-clockwise at full speed on the selected flash characteristic.

Rotating, Full Speed (CW) – the lantern will rotate clockwise at full speed on the selected flash character.

Rotating, Half Speed (CW) – the lantern will rotate clockwise at half speed on the selected flash character.

Rotating, Bank 1 (CW) – using bank 1 LEDs only, the lantern will rotate clockwise at full speed on the selected flash characteristic.

Rotating, Bank 2 (CW) – using bank 2 LEDs only, the lantern will rotate clockwise at full speed on the selected flash characteristic.

Rotating, VOR (CW) – the lantern will rotate clockwise as a VOR lantern on the selected flash characteristic. Bank 1 will rotating clockwise, bank 2 will flash in sync at time, t = zero.

To activate/deactivate a particular Advanced Operation Setting (see Image 3):

• Click the "Operation" tab at the top of the Sealite Lantern Programmer

• From the "Advanced Operation Setting" box, select the desired advanced operation setting required from the drop down field

• Once selected from the drop down field, the lantern will automatically send the setup instruction to the lantern (eg. lantern will automatically change setup)

PLEASE NOTE: advanced operation settings not supported will NOT display in the selection list available.

4.4 Standard Flash Codes

Using the Sealite Lantern Programmer, Sealite lanterns may be set to any of up to 304 pre-defined standard flash codes including a complete range of IALA recommended flash codes. The flash code may be programmed by selecting from the IALA Flash Characteristic range, or by typing in the specific Sealite Flash Characteristic setting (see Image 4).
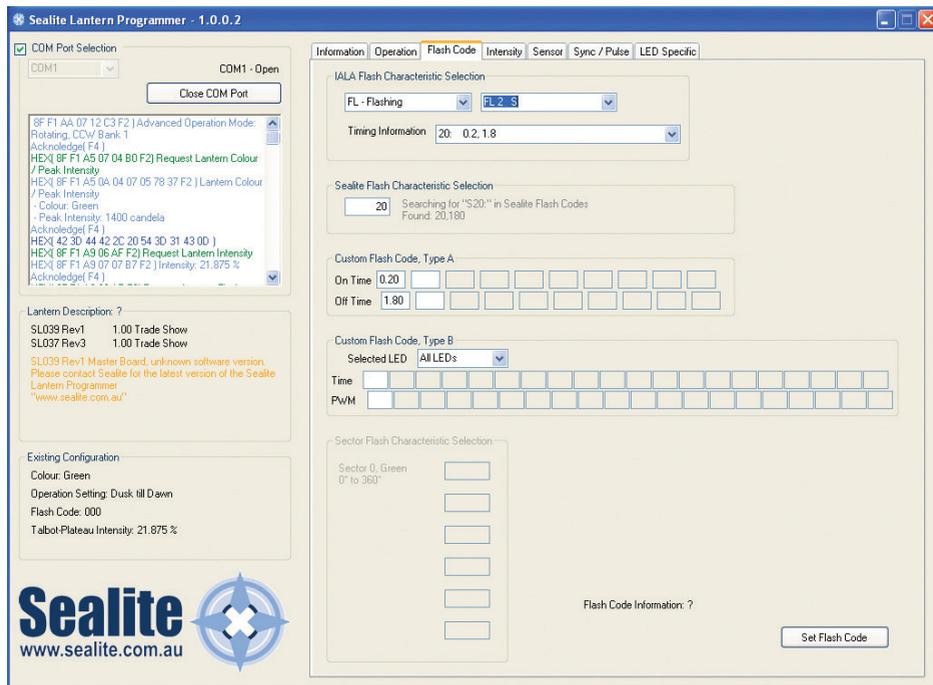
Image 4. Sealite Lantern Programmer "Flash Code" tab – showing IALA Flash Characteristic Selection, Sealite Flash Characteristic Selection & Custom Flash Codes

Option 1: IALA Flash Characteristic Selection

- Click the "Flash Code" tab at the top of the Sealite Lantern Programmer
- From the "IALA Flash Characteristic Selection" box, select the desired IALA flash characteristic class from the drop down field. Eg. FL
- Next select the desired flash timing interval from the subclass drop down field. Eg. FL 2 S will set the lantern to flash ON & then OFF once within a 2sec interval
- Next select the specific ON & OFF flash timing setting from the drop down field. Eg. 20: 0.2, 1.8 will set the lantern to flash for 0.2sec ON & 1.8sec OFF
- Click the "Set Flash Code" button at the bottom of the page to send the new setup instruction to the lantern

PLEASE NOTE: *when selecting the IALA Flash Characteristic, fields in the "Sealite Flash Characteristic" & "Custom Flash Code" fields below will populate with the particular information. Once set, information about the selected flash code will also be updated in the "Existing Configuration" box.*

IALA Flash Code Symbols

FL   Flash followed by number Eg. FL 1 S represents 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 represents 6 very quick flashes followed by a long flash, during a 10 second interval.

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

Option 2: Sealite Flash Characteristic Selection

• Click the "Flash Code" tab at the top of the Sealite Lantern Programmer

• From the "Sealite Flash Characteristic Selection" box, type in the desired Sealite flash code reference. Eg. 51 (this code may be up to 3 hexadecimal characters eg. 0 to 9 and A to F)

• Click the "Set Flash Code" button at the bottom of the page to send the new setup instruction to the lantern

PLEASE NOTE: when selecting the Sealite Flash Characteristic, fields in the "Custom Flash Code" fields below will populate with the particular information. Once set, information about the selected flash code will also be updated in the "Existing Configuration" box.

IMPORTANT: 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. Sealite recommends lantern flash setting to be set to the lowest duty-cycle appropriate to the actual needs of the application.

For a complete list of Sealite Flash Codes available, please refer to the "Flash Code Reference List" at the end of this manual.

4.5   Custom Flash Codes

If you cannot find the appropriate flash code from the Standard Flash Codes available, the user may custom set the lantern to flash in any sequence required. Any flash code characteristic up to 10 flashes with a total characteristic no longer than 10 minutes may be set.

To set a Custom Flash Code (see Image 4):

• Click the "Flash Code" tab at the top of the Sealite Lantern Programmer

• From the "Custom Flash Code, Type A" box, type in "ON time" and "OFF time" timing information required (in seconds – available in steps of 10 milliseconds (0.01))

• Click the "Set Flash Code" button at the bottom of the page to send the new setup instruction to the lantern

PLEASE NOTE: when a custom flash code is programmed into the lantern, the code will display as "FFF".

4.6 Intensity Selection

Using the Sealite Lantern Programmer, Sealite lanterns may be set to a standard light intensity to meet installation requirements. The desired intensity range may be set in nautical miles (nm - with dependence on listings of atmospheric transmissivity and background lighting conditions), candela (cd) or direct pulse width modulation (PWM) (see image 5).

Atmospheric Transmissivity (AT) – *when a light beam passes through the atmosphere the atmospheric transmissivity factor indicates how much light is absorbed by the atmosphere. For example, when AT = 0.85 this means that 85% of the original light intensity is visible after 1nm. Consequently 15% of light is lost to atmospheric absorption.*
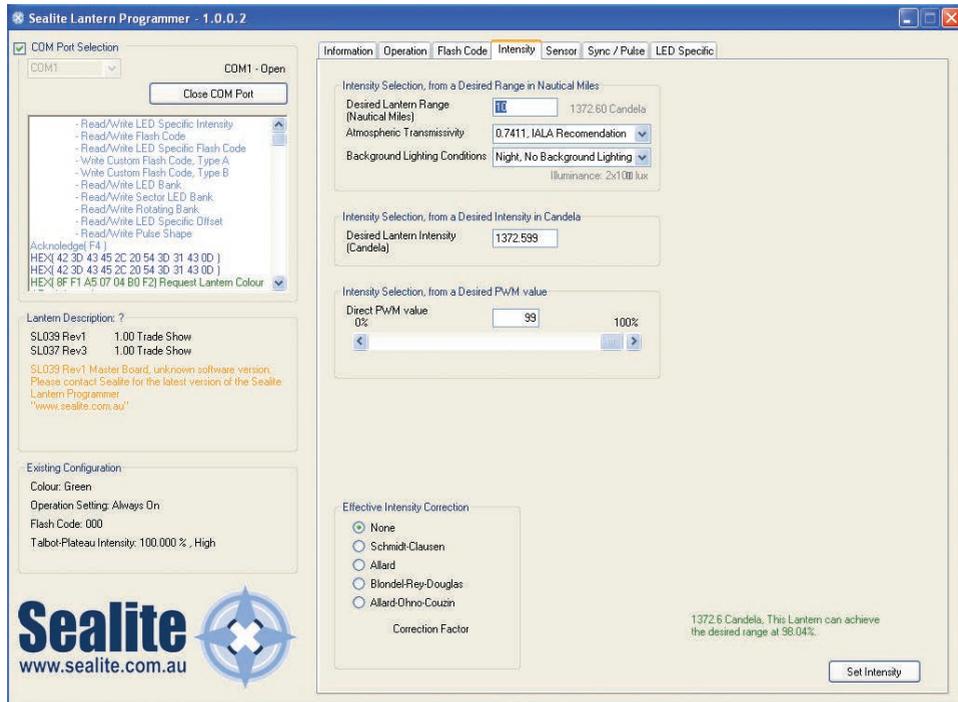

Image 5. Sealite Lantern Programmer "Intensity" tab – showing Intensity Selection (nm), Intensity Selection (cd), Intensity Selection (PWM) & Effective Intensity Correction

Option 1: Desired Lantern Range (Nautical Miles)

- Click the "Intensity" tab at the top of the Sealite Lantern Programmer
- From the "Intensity Selection" box, type in the desired lantern range (nautical miles)
- Next select the "Atmospheric Transmissivity" level from the drop down field
- Next select the "Background Lighting Conditions" level from the drop down field (for standard marine applications select "Night, No Background Lighting")
- Once selections entered/made, the lantern will automatically send the setup instruction to the lantern (eg. lantern will automatically change setup)

Option 2: Desired Lantern Intensity (Candela)

- Click the "Intensity" tab at the top of the Sealite Lantern Programmer
- From the "Intensity Selection" box, type in the desired lantern intensity (candela)
- Once selections entered, the lantern will automatically send the setup instruction to the lantern (eg. lantern will automatically change setup)

Option 3: Direct Pulse Width Modulation (PWM) Value

- Click the "Intensity" tab at the top of the Sealite Lantern Programmer
- From the "Intensity Selection" box, either type in the desired pulse width modulation value (%) into the field OR/ move the horizontal scroll bar to the desired PWM
- Once selections entered/made, the lantern will automatically send the setup instruction to the lantern (eg. lantern will automatically change setup)

For more information about intensity settings please review IALA Recommendation E-200 Part 2. Contact Sealite today for an electronic version.

4.7 Effective Intensity Correction

Depending on the flash code selected, the effective intensity may be adjusted.

As per IALA Recommendation E-200 Part 4, effective intensity is defined as: *"The luminous intensity of a fixed (continuous) light, of the same relative spectral distribution as a flashing light, which would have the same luminous range as a flashing light under identical conditions of observation".*

Sealite has provided you with the most common methods for effective intensity adjustment as follows:

- Schmidt-Clausen
- Allard
- Blondel-Rey-Douglas
- Allard-Ohno-Couzin

PLEASE NOTE: the lantern Effective Intensity Correction is set to "None" as default. No effective intensity correction will therefore be applied to the lantern setting.

To program the lantern Effective Intensity Correction (see Image 5):

- Click the "Intensity" tab at the top of the Sealite Lantern Programmer
- From the "Effective Intensity Correction" box, select the desired lantern effective intensity correction mode from the list available
- Click the "Set Intensity" button to send the new setup instruction to the lantern

For more information about intensity settings and effective intensity correction methods please review IALA Recommendation E-200 Part 4. Contact Sealite today for an electronic version.

4.8 Light Sensor

For lanterns set to the "Dusk to Dawn" operation setting, the user may program specific ambient light levels/Lux levels to suit their installation.

The ambient light threshold determines when the lantern will turn ON in the evening and OFF in the morning.

To program the lantern Ambient Light Thresholds (see Image 6):
- Click the "Sensor" tab at the top of the Sealite Lantern Programmer
- From the "Light Sensor" box, type in the desired dusk & dawn thresholds
- Click the "Set Light Sensor" button to send the new setup instruction to the lantern

4.9 Battery Sensor

This feature enables the user to adjust the battery voltage thresholds of the lantern including:

Flat Battery

The lantern will automatically shut off when the battery voltage reaches the set threshold (lanterns are factory set to 10v).

Low Battery

The lantern will automatically drop in intensity when the battery voltage reaches the set threshold (the factory setting is disabled).

Recovery Threshold

The recovery threshold determines the voltage the battery must be re-charged to before the lantern recovers from a "Low Battery" or "Flat Battery" condition (lanterns are factory set to 12v).

To program the lantern Battery Voltage Thresholds (see Image 6):
- Click the "Sensor" tab at the top of the Sealite Lantern Programmer
- From the "Battery Sensor" box, type in the desired flat, low & recovery battery thresholds (in volts)
- Click the "Set Battery Sensor" button to send the new setup instruction to the lantern

4.10 Temperature Sensor

The user may program the lantern to automatically reduce it's intensity level when the internal lantern temperature reaches a certain level.

To program the lantern Temperature Thresholds (see Image 6):
- Click the "Sensor" tab at the top of the Sealite Lantern Programmer
- From the "Temperature Sensor" box, type in the desired hot & recovery thresholds (in degrees Celsius)
- Click the "Set Temperature Sensor" button to send the new setup instruction to the lantern
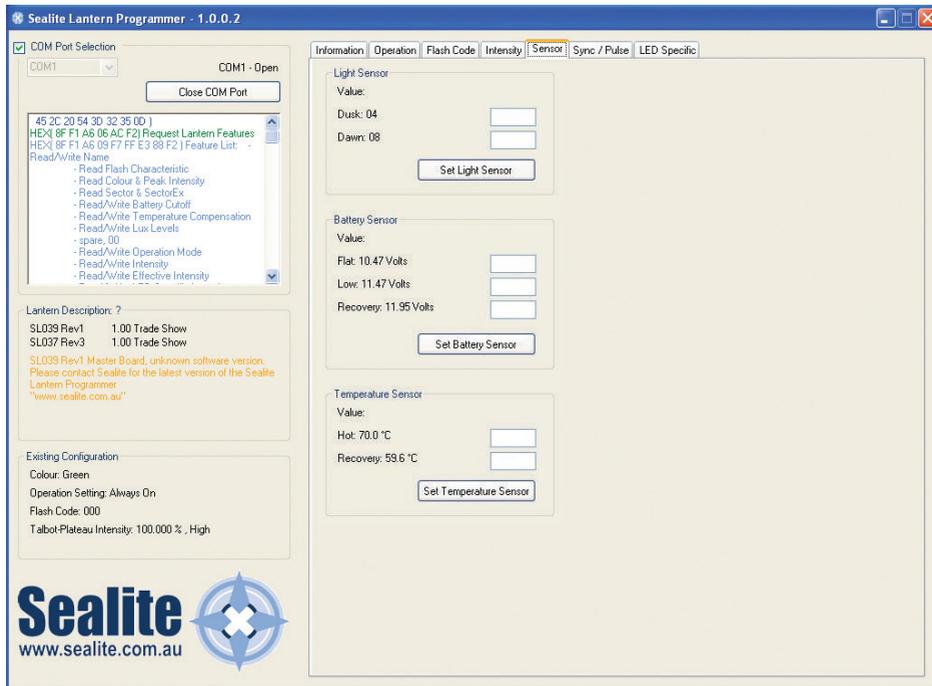
Image 6. Sealite Lantern Programmer "Sensor" tab – showing Light Sensor, Battery Sensor & Temperature Sensor

4.11   Pulse Shape

Pulse Shape is an advanced user option which enables the lantern to be programmed to achive a variety of lighting effects. These effects are created by changing the rise (leading edge) and fall (trailing edge) timing of each LED. Eg. a slow linear leading edge and slow linear trailing edge give the light more of a "glow" the way incandescent lighting technology displays. The "Leading Edge" and a "Trailing Edge" of the lantern LEDs may be programmed with a different pulse shape (eg. square leading edge & linear trailing edge) including:

Square – standard OFF to ON in 1 count

1 count = 9.6 milliseconds
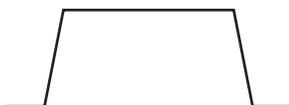
Linear, Very Fast - smoothes OFF to ON of each individual LED by 8 intensity level per count
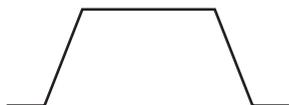
Linear, Fast - smoothes OFF to ON of each individual LED by 4 intensity level per count

Linear, Normal - smoothes OFF to ON of each individual LED by 2 intensity level per count
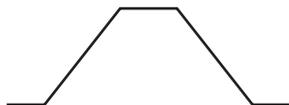
Linear, Slow – smoothes OFF to ON of each individual LED by 1 intensity level per count

PLEASE NOTE: programming the LEDs to have "linear slow" leading and trailing edges is particularly useful for rotating beacons as this emulates a smoother transition from one LED to the next, giving the impression of a mechanical rotating beacon without the drawback of moving parts.

To program the LED Pulse Shape (see Image 7):

- Click the "Sync/Pulse" tab at the top of the Sealite Lantern Programmer
- From the "Pulse Shape Selection" box, select the desired leading edge & trailing edge pulse shapes
- Once selections are made the lantern will automatically send the setup instruction to the lantern (eg. lantern will automatically change setup)

Image 7. Sealite Lantern Programmer "Sync/Pulse" tab – showing Sync Delay & Pulse Shape Selection

4.12   LED Specific – Programming for Advanced Users

The Sealite Lantern Programmer also enables users to individually set up specific configurations of each of the 16 LEDs in the Apollo-155. This feature is recommended for advanced users only, and those who require a unique configuration to suit their particular installation requirements.

The user may program each individual LED to a specific flash code, intensity & flash synchronisation offset (each LED may be set to an entirely different setting).

IMPORTANT: to enable LED specific setup, the "Advanced Operation Setting" must to set to either "Sector" (to program individual Flash Code & Intensity settings) or "Complex Sector" (to program individual Sync Offset settings). See Advanced Operation Setting section of this manual for details (under "Operation" tab of programmer – Image 3).

To program individual LED Specific characteristics (see Image 8):

• Click the "LED Specific" tab at the top of the Sealite Lantern Programmer. From this page/tab you will see a complete list of the 16 individual LEDs as well as their current flash code and intensity settings

• Program LED Specific characteristics – Flash Codes, Intensities & Sync Offsets, as per instructions listed below

1. Programming Individual LED Flash Codes

• In the "Flash Code" box, type in the desired flash codes for each LED (flash codes must be selected from the Sealite range available – see Flash Code Reference List of this manual. Fields that have not been specified will be set to 0 (steady-on))
• Click the "Set LED Flash Code" button to send the new setup instruction to the lantern

IMPORTANT: to enable LED specific setup of Flash Codes, the "Advanced Operation Setting" must be set to "Sector" or "Complex Sector" only. See Advanced Operating Setting section of this manual for details (Image 3).

2. Programming Individual LED Intensities

• In the "Intensity" column, type in the desired intensity for each LED (intensities must be listed with a value of 0 to 100, indicating the pulse width modulation percentage – see Intensity section of this manual for details. Fields that have not been specified will be set to 0 (0% intensity/OFF))
• Click the "Set LED Intensity" button to send the new setup instruction to the lantern

IMPORTANT: to enable LED specific setup of Intensities, the "Advanced Operation Setting" must be set to "Sector" or "Complex Sector" only. See Advanced Operating Setting section of this manual for details (Image 3).

3. Programming Individual LED Sync Offsets

• In the "Sync Offset" column, type in the desired synchronisation offset values for each LED (sync offset values must be listed in seconds. Fields that have not been specified will be set to 0 (0 second offset))
• Click the "Set LED Sync Offset" button to send the new setup instruction to the lantern

IMPORTANT: to enable LED specific setup with Sync Offset, the "Advanced Operation Settings" must be set to "Complex Sector" only. See Advanced Operating Settings section of this manual for details.
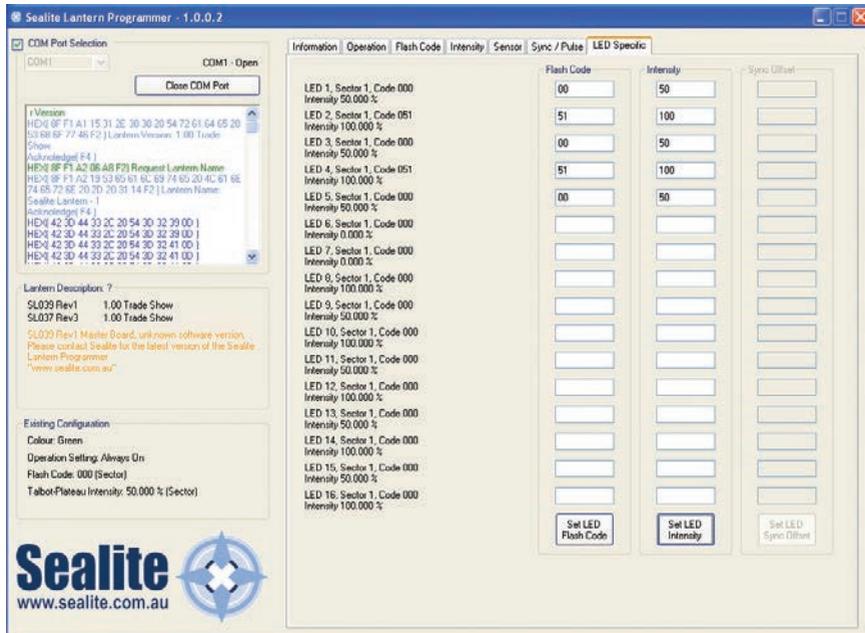
Image 8. Sealite Lantern Programmer "LED Specific" tab – showing Flash Code, Intensity & Sync Offset

5. Finalising the Lantern Programming

Now that you have programmed your Apollo-155 lantern it is important that you change the Operation Setting back to the desired setting required (at the start of this manual, Sealite recommended that all programming of the lantern be performed with the Operation Setting of "Always On", for ease of testing of each selected setting).

To program the lantern operation setting:

- Click the "Operation" tab at the top of the Sealite Lantern Programmer
- From the "Operation Setting" box, select the desired lantern operation setting from the drop down field
- Once selected from the drop down field, the lantern will automatically send the setup instruction to the lantern (eg. lantern will automatically change setup)

PLEASE NOTE: to test lantern setting for "Dusk to Dawn" mode, cover the lantern with a dark cloth/ jacket for approximately 1min. The lantern will then begin flashing to the selected flash code.

IMPORTANT: to maximise the lantern operational life, Sealite recommends setting the lantern operation setting to "Dusk to Dawn".

To close the Sealite Lantern Programmer:

- Click the red cross at the top right of the window

Now that you have exited the Sealite Lantern Programmer software, you may disconnect the lantern from your computer and the power source.

The Apollo-155 is now ready for final testing and then installation.

Power Requirements

Apollo-155 Power Requirements
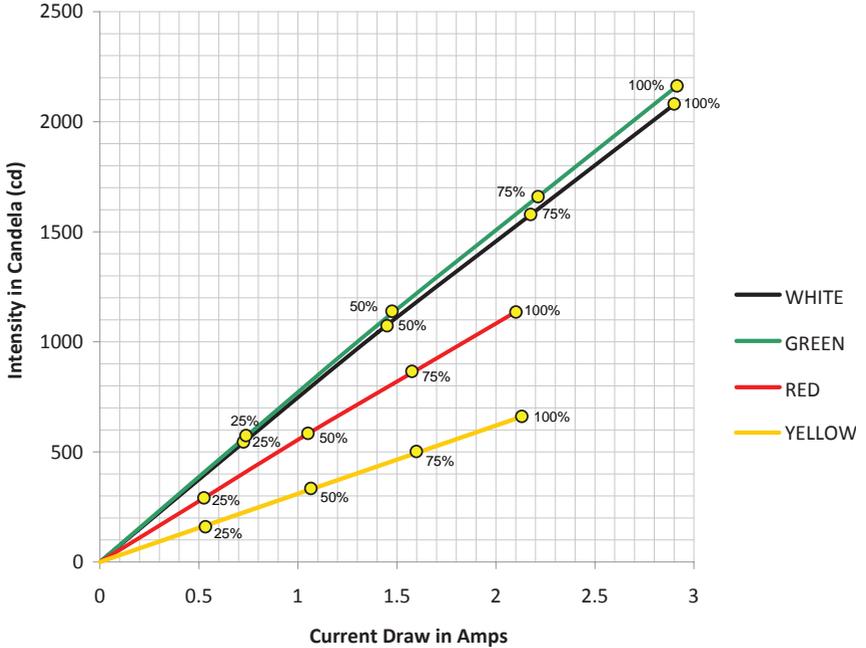
Graph 1. Power requirements of Apollo-155 1 tier lantern

	Apollo-155 1-Tier							
	WHITE		**GREEN**		**RED**		**YELLOW**	
%	Current Draw (Amps)	Intensity (cd)	Current Draw (Amps)	Intensity (cd)	Current Draw (Amps)	Intensity (cd)	Current Draw (Amps)	Intensity (cd)
0	0	0	0	0	0	0	0	0
25	0.691	528	0.708	533	0.507	286	0.55	168
50	1.391	1056	1.425	1064	1.011	570	1.05	338
75	2.138	1582	2.187	1594	1.543	854	1.55	507
100	2.886	2110	2.95	2127	2.075	1140	2.1	677

Lantern Testing

Now that the Apollo-155 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 Apollo-155:

- Connect the Apollo-155 to a 12v power supply or battery
- For lanterns programmed to "Dusk to Dawn" operation setting, cover lantern with a dark cloth or jack 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 Lantern Programmer 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 Apollo-155 may be installed with connection to mains power, or as a complete solar powered system (available from Sealite).

IMPORTANT: the Apollo-155 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 Apollo-155 to a 12v DC power supply:

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

IMPORTANT: it is important that a 15Amp AC-DC power supply is connected between the mains power and the lantern to maximise the life of your product. The AC-DC power supply should be no more that 20m from the lantern.

Option 2: Installation of Lantern to Solar Powered System

Sealite has an optional complete solar powered system available to purchase with the standard Apollo-155 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
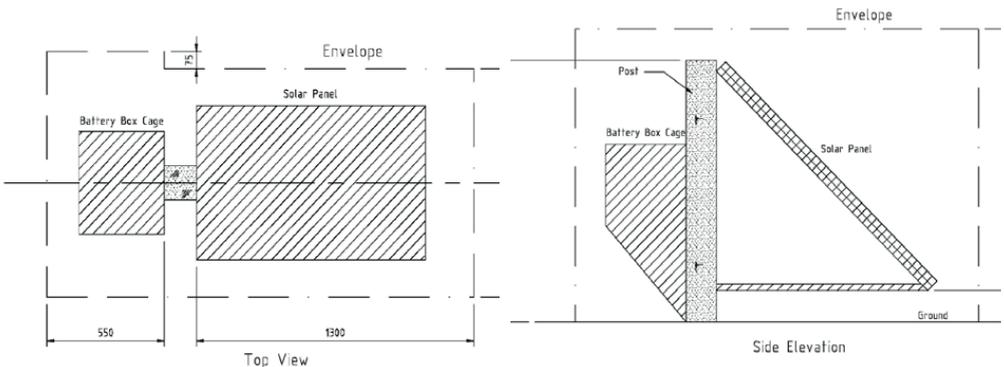
Figure 1. Panel & Cage Footprint

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
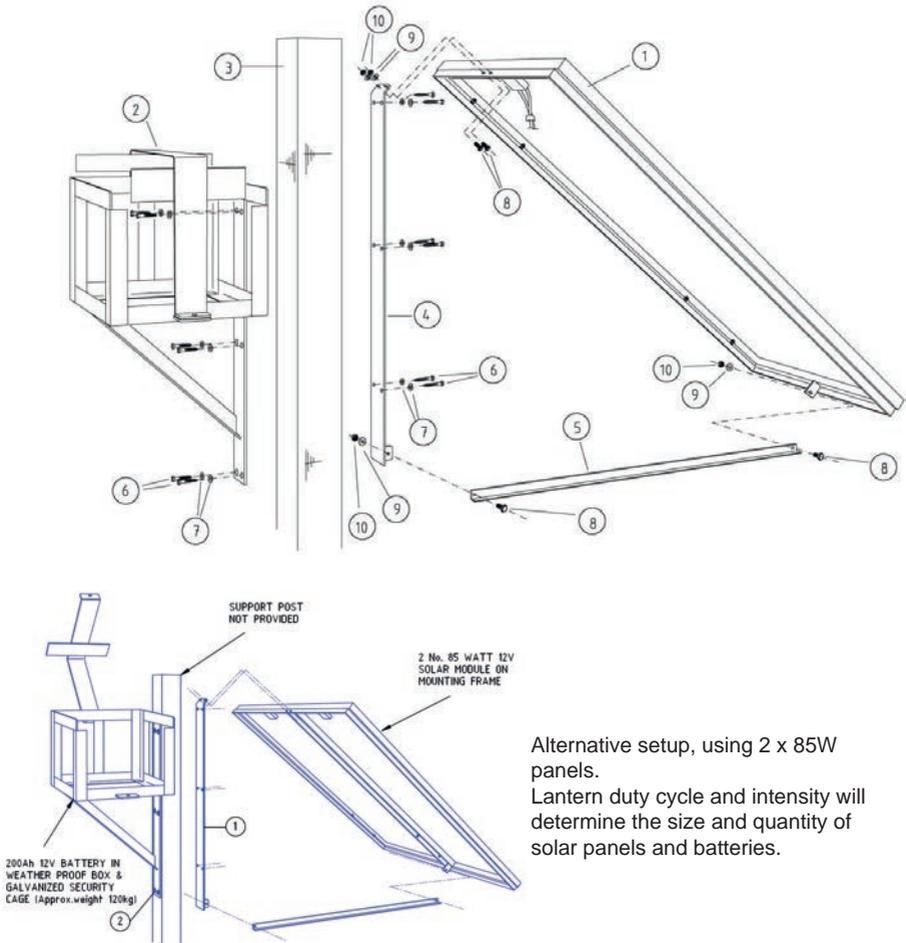
Alternative setup, using 2 x 85W panels.
Lantern duty cycle and intensity will determine the size and quantity of solar panels and batteries.

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
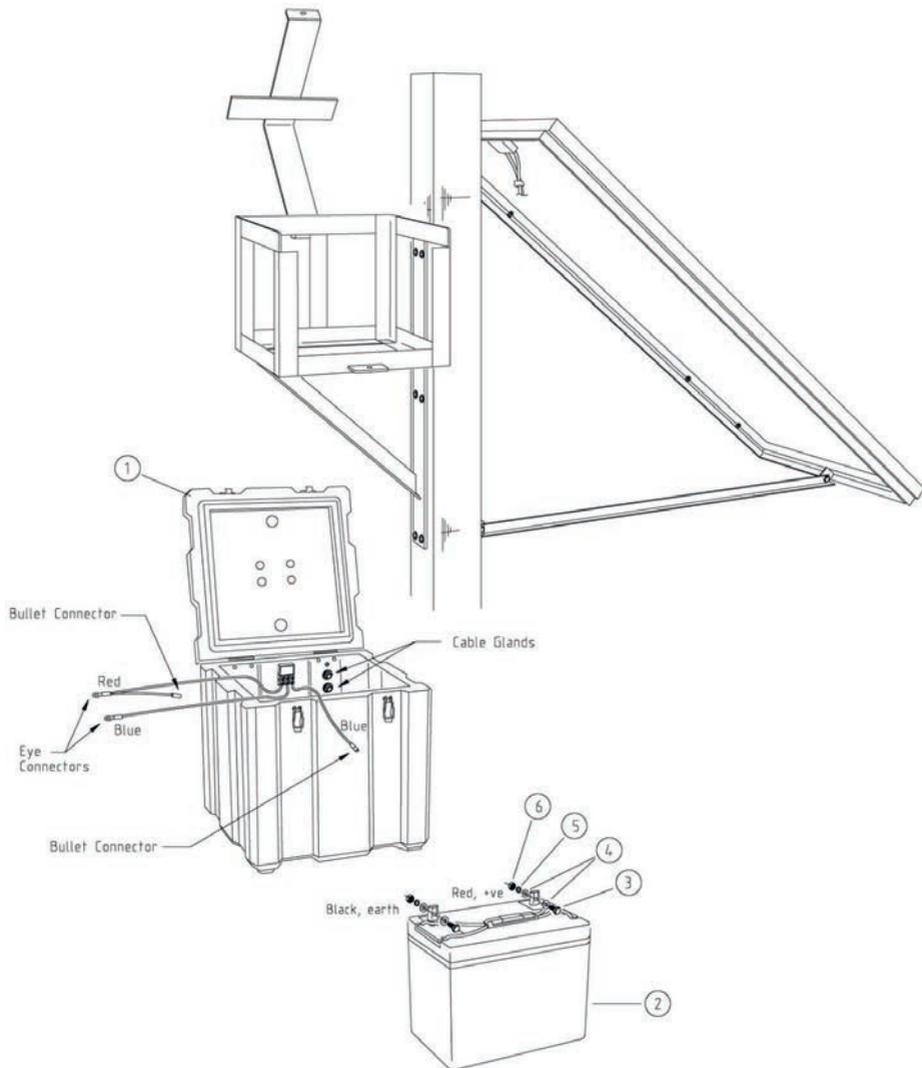
Figure 3. Battery and Battery Box

3.4 Connecting the Lantern

To connect the Apollo-155 to the solar powered system:

• Connect the blue negative wire of the lantern to the battery negative termainal

• Connect the brown positive wire of the lantern to the battery positive terminal

The lantern must to be connected to a 12v DC 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 it 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.

Flash Code Reference List

SEALITE® code reference is listed by number of flashes

For the latest version of this document check:

http://www.sealite.com
Email support@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.

Please note, Sealite models will retain full autonomy in normal operating conditions with duty-cycles up to approximately 30%. In applications whereby duty cycles exceed this limit, a reduction in lantern intensity is recommended. Please contact a Sealite consultant if assistance is required.

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		FLASH CODE	ON	OFF
A	B			
0	0	F (Steady light)		
D	3	VQ 0.5 S	0.2	0.3
E	3	VQ 0.6 S	0.2	0.4
F	3	VQ 0.6 S	0.3	0.3
7	3	Q 1 S	0.2	0.8
8	3	Q 1 S	0.3	0.7
9	3	Q 1 S	0.4	0.6
A	3	Q 1 S	0.5	0.5
8	4	Q 1 S	0.8	0.2
B	3	Q 1.2 S	0.3	0.9
9	4	Q 1.2 S	0.5	0.7
C	3	Q 1.2 S	0.6	0.6
F	4	FL 1.5 S	0.2	1.3
1	0	FL 1.5 S	0.3	1.2
0	5	FL 1.5 S	0.4	1.1
0	4	FL 1.5 S	0.5	1.0
2	0	FL 2 S	0.2	1.8
3	0	FL 2 S	0.3	1.7
4	0	FL 2 S	0.4	1.6
5	0	FL 2 S	0.5	1.5
6	0	FL 2 S	0.7	1.3
7	0	FL 2 S	0.8	1.2
1	2	ISO 2 S	1.0	1.0
8	0	FL 2.5 S	0.3	2.2
9	0	FL 2.5 S	0.5	2.0
D	6	FL 2.5 S	1.0	1.5
1	5	FL 3 S	0.2	2.8
A	0	FL 3 S	0.3	2.7
2	5	FL 3 S	0.4	2.6
B	0	FL 3 S	0.5	2.5
3	5	FL 3 S	0.6	2.4
C	0	FL 3 S	0.7	2.3
D	0	FL 3 S	1.0	2.0
2	2	ISO 3 S	1.5	1.5
5	4	OC 3 S	2.0	1.0
E	2	OC 3 S	2.5	0.5
4	6	OC 3.5 S	2.5	1.0
4	5	FL 4 S	0.2	3.8
5	5	FL 4 S	0.3	3.7
E	0	FL 4 S	0.4	3.6
F	0	FL 4 S	0.5	3.5
6	5	FL 4 S	0.6	3.4
0	1	FL 4 S	0.8	3.2
1	1	FL 4 S	1.0	3.0
2	1	FL 4 S	1.5	2.5
3	2	ISO 4 S	2.0	2.0
3	6	OC 4 S	2.5	1.5
F	2	OC 4 S	3.0	1.0
3	1	FL 4.3 S	1.3	3.0
8	5	FL 5 S	0.2	4.8
4	1	FL 5 S	0.3	4.7
5	1	FL 5 S	0.5	4.5
9	5	FL 5 S	0.9	4.1
6	1	FL 5 S	1.0	4.0

SWITCH		FLASH CODE	ON	OFF
A	B			
7	1	FL 5 S	1.5	3.5
4	2	ISO 5 S	2.5	2.5
8	2	LFL 5 S	2.0	3.0
0	3	OC 5 S	3.0	2.0
1	3	OC 5 S	4.0	1.0
2	3	OC 5 S	4.5	0.5
C	6	FL 6 S	0.2	5.8
B	5	FL 6 S	0.3	5.7
C	5	FL 6 S	0.4	5.6
8	1	FL 6 S	0.5	5.5
9	1	FL 6 S	0.6	5.4
A	1	FL 6 S	1.0	5.0
7	5	FL 6 S	1.2	4.8
B	1	FL 6 S	1.5	4.5
5	2	ISO 6 S	3.0	3.0
9	2	LFL 6 S	2.0	4.0
6	4	OC 6 S	4.0	2.0
3	3	OC 6 S	4.5	1.5
4	3	OC 6 S	5.0	1.0
A	4	FL 7 S	1.0	6.0
9	6	FL 7 S	2.0	5.0
5	6	OC 7 S	4.5	2.5
D	5	FL 7.5 S	0.5	7.0
C	1	FL 7.5 S	0.8	6.7
E	5	FL 8 S	0.5	7.5
B	4	FL 8 S	1.0	7.0
6	2	ISO 8 S	4.0	4.0
A	2	LFL 8 S	2.0	6.0
6	6	OC 8 S	5.0	3.0
B	2	LFL 8 S	3.0	5.0
F	5	FL 9 S	0.9	8.1
C	4	FL 9 S	1.0	8.0
7	6	OC 9 S	6.0	3.0
0	6	FL 10 S	0.2	9.8
1	6	FL 10 S	0.3	9.7
D	1	FL 10 S	0.5	9.5
2	6	FL 10 S	0.8	9.2
E	1	FL 10 S	1.0	9.0
1	4	FL 10 S	1.5	8.5
C	2	LFL 10 S	2.0	8.0
D	2	LFL 10 S	3.0	7.0
7	2	ISO 10 S	5.0	5.0
2	4	LFL 10 S	4.0	6.0
8	6	OC 10 S	6.0	4.0
5	3	OC 10 S	7.0	3.0
6	3	OC 10 S	7.5	2.5
F	1	FL 12 S	1.2	10.8
D	4	FL 12 S	2.5	9.5
3	4	LFL 12 S	2.0	10.0
0	2	FL 15 S	1.0	14.0
4	4	LFL 15 S	4.0	11.0
7	4	OC 15 S	10	5.0
A	6	LFL 20 S	2.0	18.0
E	4	FL 26 S	1.0	25.0

SWITCH		FLASH CODE	ON	OFF	ON	OFF
A	**B**					
0	A	FL (2) 4 S	0.5	1.0	0.5	2.0
E	B	VQ (2) 4 S	0.2	1.0	0.2	2.6
1	A	FL (2) 4.5 S	0.3	1.0	0.3	2.9
2	A	FL (2) 4.5 S	0.4	1.0	0.4	2.7
3	A	FL (2) 4.5 S	0.5	1.0	0.5	2.5
F	9	FL (2) 5 S	0.2	0.8	0.2	3.8
2	C	FL (2) 5 S	0.2	1.2	0.2	3.4
4	A	FL (2) 5 S	0.4	0.6	0.4	3.6
0	7	FL (2) 5 S	0.5	1.0	0.5	3.0
1	7	FL (2) 5 S	1.0	1.0	1.0	2.0
9	B	Q (2) 5 S	0.3	0.7	0.3	3.7
2	9	Q (2) 5 S	0.5	0.5	0.5	3.5
5	A	FL (2) 5.5 S	0.4	1.4	0.4	3.3
7	8	FL (2) 6 S	0.3	0.6	1.0	4.1
A	A	FL (2) 6 S	0.3	0.9	0.3	4.5
6	A	FL (2) 6 S	0.3	1.0	0.3	4.4
7	A	FL (2) 6 S	0.4	1.0	0.4	4.2
9	9	FL (2) 6 S	0.5	1.0	0.5	4.0
2	8	FL (2) 6 S	0.8	1.2	0.8	3.2
3	7	FL (2) 6 S	1.0	1.0	1.0	3.0
3	9	Q (2) 6 S	0.3	0.7	0.3	4.7
A	9	FL (2) 7 S	1.0	1.0	1.0	4.0
7	B	FL (2) 8 S	0.4	0.6	2.0	5.0
8	A	FL (2) 8 S	0.4	1.0	0.4	6.2
4	7	FL (2) 8 S	0.5	1.0	0.5	6.0
8	8	FL (2) 8 S	0.8	1.2	2.4	3.6
5	7	FL (2) 8 S	1.0	1.0	1.0	5.0
4	C	OC (2) 8 S	3.0	2.0	1.0	2.0
5	C	OC (2) 8 S	5.0	1.0	1.0	1.0
F	B	VQ (2) 8 S	0.2	1.0	0.2	6.6
9	A	FL (2) 10 S	0.4	1.6	0.4	7.6
9	8	FL (2) 10 S	0.5	0.5	1.5	7.5
6	7	FL (2) 10 S	0.5	1.0	0.5	8.0
7	7	FL (2) 10 S	0.5	1.5	0.5	7.5
6	9	FL (2) 10 S	0.5	2.0	0.5	7.0
8	7	FL (2) 10 S	0.8	1.2	0.8	7.2
B	9	FL (2) 10 S	1.0	1.0	1.0	7.0
9	7	FL (2) 10 S	1.0	1.5	1.0	6.5
4	9	Q (2) 10 S	0.6	0.4	0.6	8.4
B	A	FL (2) 12 S	0.4	1.0	0.4	10.2
C	9	FL (2) 12 S	0.5	1.0	0.5	10.0
D	9	FL (2) 12 S	1.5	2.0	1.5	7.0
A	8	FL (2) 15 S	0.5	1.5	2.0	11.0
A	7	FL (2) 15 S	1.0	2.0	1.0	11.0
8	B	Q (2) 15 S	0.2	0.8	0.2	13.8
C	A	FL (2) 20 S	1.0	3.0	1.0	15.0
D	A	FL (2) 25 S	1.0	1.0	1.0	22.0

SWITCH		FLASH CODE	ON	OFF	ON	OFF	ON	OFF
A	**B**							
7	9	Q (3) 5 S	0.5	0.5	0.5	0.5	0.5	2.5
5	9	VQ (3) 5 S	0.2	0.3	0.2	0.3	0.2	3.8
0	C	VQ (3) 5 S	0.3	0.2	0.3	0.2	0.3	3.7
E	9	VQ (3) 5 S	0.3	0.3	0.3	0.3	0.3	3.5
3	C	FL (3) 6 S	0.5	1.0	0.5	1.0	0.5	2.5
2	B	FL (2+1) 6 S	0.3	0.4	0.3	1.2	0.3	3.5

SWITCH A	B	FLASH CODE	ON	OFF	ON	OFF	ON	OFF
A	B	Q (3) 6 S	0.3	0.7	0.3	0.7	0.3	3.7
F	A	FL (3) 8 S	0.5	1.0	0.5	1.0	0.5	4.5
0	B	FL (3) 9 S	0.3	1.0	0.3	1.0	0.3	6.1
B	7	FL (3) 9 S	0.8	1.2	0.8	1.2	0.8	4.2
B	8	FL (3) 10 S	0.3	0.7	0.3	0.7	0.9	7.1
C	8	FL (3) 10 S	0.4	0.6	0.4	0.6	1.2	6.8
C	B	FL (3) 10 S	0.5	0.5	0.5	0.5	0.5	7.5
C	7	FL (3) 10 S	0.5	1.5	0.5	1.5	0.5	5.5
D	B	FL (3) 10 S	0.6	0.6	0.6	0.6	0.6	7.0
D	7	FL (3) 10 S	1.0	1.0	1.0	1.0	1.0	5.0
3	8	FL (2+1) 10 S	0.5	0.7	0.5	2.1	0.5	5.7
8	9	OC (3) 10 S	5.0	1.0	1.0	1.0	1.0	1.0
B	B	Q (3) 10 S	0.3	0.7	0.3	0.7	0.3	7.7
D	8	FL (2 + 1) 10 S	0.5	0.5	0.5	0.5	1.5	6.5
1	B	FL (3) 12 S	0.5	1.5	0.5	1.5	0.5	7.5
E	A	FL (3) 12 S	0.5	2.0	0.5	2.0	0.5	6.5
E	7	FL (3) 12 S	0.8	1.2	0.8	1.2	0.8	7.2
B	6	FL (3) 12 S	1.0	1.0	1.0	3.0	1.0	5.0
4	8	FL (2+1) 12 S	0.8	1.2	0.8	2.4	0.8	6.0
5	8	FL (2+1) 12 S	1.0	1.0	1.0	4.0	1.0	4.0
1	8	FL (2+1) 13.5 S	1.0	1.0	1.0	4.0	1.0	5.5
F	7	FL (3) 15 S	0.3	1.7	0.3	1.7	0.3	10.7
9	D	FL (3) 15 S	0.4	1.0	0.4	1.0	0.4	11.8
0	8	FL (3) 15 S	0.5	1.5	0.5	1.5	0.5	10.5
F	8	FL (2+1) 15 S	0.6	0.3	0.6	0.3	1.4	11.8
0	9	FL (2+1) 15 S	0.7	0.5	0.7	0.5	1.9	10.7
1	9	FL (2+1) 15 S	0.7	0.7	0.7	0.7	2.1	10.1
6	8	FL (2+1) 15 S	1.0	2.0	1.0	5.0	1.0	5.0
1	C	VQ (3) 15 S	0.1	0.5	0.1	0.5	0.1	13.7
4	B	FL (3) 20 S	0.5	3.0	0.5	3.0	0.5	12.5
3	B	FL (3) 20 S	0.5	1.5	0.5	1.5	0.5	15.5
5	B	FL (3) 20 S	0.8	1.2	0.8	1.2	0.8	15.2
6	B	FL (3) 20 S	1.0	1.0	1.0	1.0	1.0	15.0

SWITCH A	B	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF
B	F	VQ (4) 4 S	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.3
B	D	Q (4) 6 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	2.7
8	D	Q (4) 6 S	0.4	0.6	0.4	0.6	0.4	0.6	0.4	2.6
1	D	FL (4) 10 S	0.5	1.0	0.5	1.0	0.5	1.0	0.5	5.0
2	D	FL (4) 10 S	0.8	1.2	0.8	1.2	0.8	1.2	0.8	3.2
F	E	Q (4) 10 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	6.7
B	E	FL (4) 12 S	0.3	1.7	0.3	1.7	0.3	1.7	0.3	5.7
4	F	FL (4) 12 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8.5
C	E	FL (4) 12 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	5.5
3	D	FL (4) 12 S	0.8	1.2	0.8	1.2	0.8	1.2	0.8	5.2
A	D	Q (4) 12 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	8.7
4	D	FL (4) 15 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	8.5
8	E	FL (4) 15 S	1.0	1.0	1.0	1.0	1.0	1.0	1.0	8.0
7	D	FL (4) 15 S	1.5	0.5	0.5	0.5	0.5	0.5	0.5	10.5
D	E	FL (4) 16 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	9.5
C	D	FL (4) 20 S	0.3	3.0	0.3	3.0	0.3	3.0	0.3	9.8
5	D	FL (4) 20 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	13.5
0	D	FL (4) 20 S	0.5	1.5	0.5	1.5	0.5	4.5	0.5	10.5
3	F	FL (4) 20 S	1.5	1.5	1.5	1.5	1.5	1.5	1.5	9.5
0	F	Q (4) 20 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	16.5
E	E	Q (4) 28 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	24.5
6	F	FL (4) 30 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	26.5

SWITCH A	B	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
D	D	Q (5) 7 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	2.7
E	D	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	FL (5) 12 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5	0.5	3.5
5	F	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	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	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 A	B	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
F	D	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	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	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	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
6	E	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	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	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	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	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
8	F	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	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
4	E	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	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	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	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
1	E	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

SWITCH A	B	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF
		MORSE CODE ( ) INDICATES LETTER								
7	8	MO (A) 6 S	0.3	0.6	1.0	4.1				
7	B	MO (A) 8 S	0.4	0.6	2.0	5.0				
8	8	MO (A) 8 S	0.8	1.2	2.4	3.6				
B	8	MO (U) 10 S	0.3	0.7	0.3	0.7	0.9	7.1		
C	8	MO (U) 10 S	0.4	0.6	0.4	0.6	1.2	6.8		
D	8	MO (U) 10 S	0.5	0.5	0.5	0.5	1.5	6.5		
9	8	MO (A) 10 S	0.5	0.5	1.5	7.5				
8	9	MO (D) 10 S	5.0	1.0	1.0	1.0	1.0	1.0		
A	8	MO (A) 15 S	0.5	1.5	2.0	11.0				
F	8	MO (U) 15 S	0.6	0.3	0.6	0.3	1.4	11.8		
0	9	MO (U) 15 S	0.7	0.5	0.7	0.5	1.9	10.7		
1	9	MO (U) 15 S	0.7	0.7	0.7	0.7	2.1	10.1		
7	D	MO (B) 15 S	1.5	0.5	0.5	0.5	0.5	0.5	0.5	10.5

Maintenance and Servicing

Designed to be virtually maintenance-free, the Apollo-155 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 cooling fins of the aluminium extrusion are clean and free from foreign material that may reduce the cooling efficiency of the extrusion.
3. Ensure the external vent and programming port are free from foreign material.

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 lantern is connected to a 12volt power supply
Programming settings will not change	• 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)

For further support, please contact Sealite Pty Ltd

Email: support@sealite.com

Tel: +61 (0)3 5977 6128

Notes

Sealite LED Light Warranty V2.2

Activating the Warranty

Upon purchase, the Sealite Pty Ltd warranty must be activated for recognition of future claims. To do this you need to register on-line. Please complete the Online Registration Form at:

www.sealite.com

Sealite Pty Ltd will repair or replace your LED light in the event of electronic failure for a period of up to three years from the date of purchase, as per the terms & conditions below.

Sealite Pty Ltd will repair or replace any ancillary or accessory products in the event of failure for a period of up to one year from the date of purchase, as per the terms & conditions below.

The unit(s) must be returned to Sealite freight prepaid.

Warranty Terms

1. Sealite Pty Ltd warrants that any Sealite marine products fitted with telemetry equipment including but not limited to AIS, GSM, GPS or RF ("Telemetry Products") will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of twelve (12) months from the date of purchase by the original purchaser.
2. Sealite Pty Ltd warrants that any BargeSafe™ Series of LED barge light products ("BargeSafe™ Products") will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of twelve (12) months from the date of purchase by the original purchaser.
3. Sealite Pty Ltd warrants that any LED area lighting products ("Area Lighting Products") but not including sign lighting products will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of twelve (12) months from the date of purchase by the original purchaser.
4. Sealite Pty Ltd warrants that any ancillary products and accessories, not mentioned in other clauses in this section, will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of twelve (12) months from the date of purchase by the original purchaser.
5. Sealite Pty Ltd warrants that any LED sign lighting products ("Sign Lighting Products") will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of three (3) years from the date of purchase by the original purchaser.
6. Sealite Pty Ltd warrants that any Sealite marine lighting products other than the Telemetry Products, BargeSafe™ Products, and Area Lighting Products ("Sealite Products") will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of three (3) years from the date of purchase by the original purchaser.
7. Sealite Pty Ltd will repair or replace, at Sealite's sole discretion, any Telemetry Products, BargeSafe™ Products, Area Lighting Products or Sealite Products found to be defective in material and workmanship in the relevant warranty period so long as the Warranty Conditions (set out below) are satisfied.
8. If any Telemetry Products, BargeSafe™ Products, Area Lighting Products or Sealite Products are fitted with a rechargeable battery, Sealite Pty Ltd warrants the battery will be free from defect for a period of one (1) year when used within original manufacturer's specifications and instructions.
9. Buoy products are covered by a separate 'Sealite Buoy Warranty'.

Warranty Conditions

This Warranty is subject to the following conditions and limitations;
1. The warranty is applicable to lanterns manufactured from 1/1/2009.
2. The warranty is void and inapplicable if:
   a. the product has been used or handled other than in accordance with the instructions in the owner's manual and any other information or instructions provided to the customer by Sealite;
   b. the product has been deliberately abused, or misused, damaged by accident or neglect or in being transported; or
   c. the defect is due to the product being repaired or tampered with by anyone other than Sealite or

authorised Sealite repair personnel.

3. The customer must give Sealite Pty Ltd notice of any defect with the product within 30 days of the customer becoming aware of the defect.

4. Rechargeable batteries have a limited number of charge cycles and may eventually need to be replaced. Typical battery replacement period is 3-4 years. Long term exposure to high temperatures will shorten the battery life. Batteries used or stored in a manner inconsistent with the manufacturer's specifications and instructions shall not be covered by this warranty.

5. No modifications to the original specifications determined by Sealite shall be made without written approval of Sealite Pty Ltd.

6. Sealite lights can be fitted with 3rd party power supplies and accessories but are covered by the 3rd party warranty terms and conditions.

7. The product must be packed and returned to Sealite Pty Ltd by the customer at his or her sole expense. Sealite Pty Ltd will pay return freight of its choice. A returned product must be accompanied by a written description of the defect and a photocopy of the original purchase receipt. This receipt must clearly list model and serial number, the date of purchase, the name and address of the purchaser and authorised dealer and the price paid by the purchaser. On receipt of the product, Sealite Pty Ltd will assess the product and advise the customer as to whether the claimed defect is covered by this warranty.

8. Sealite Pty Ltd reserves the right to modify the design of any product without obligation to purchasers of previously manufactured products and to change the prices or specifications of any product without notice or obligation to any person.

9. Input voltage shall not exceed those recommended for the product.

10. Warranty does not cover damage caused by the incorrect replacement of battery in solar lantern models.

11. This warranty does not cover any damage or defect caused to any product as a result of water flooding or any other acts of nature.

12. There are no representations or warranties of any kind by Sealite or any other person who is an agent, employee, or other representative or affiliate of Sealite, express or implied, with respect to condition of performance of any product, their merchantability, or fitness for a particular purpose, or with respect to any other matter relating to any products.

Limitation of Liability

To the extent permitted by acts and regulations applicable in the country of manufacture, the liability of Sealite Pty Ltd under this Warranty will be, at the option of Sealite Pty Ltd, limited to either the replacement or repair of any defective product covered by this Warranty. Sealite will not be liable to Buyer for consequential damages resulting from any defect or deficiencies.

Limited to Original Purchaser

This Warranty is for the sole benefit of the original purchaser of the covered product and shall not extend to any subsequent purchaser of the product.

Miscellaneous

Apart from the specific warranties provided under this warranty, all other express or implied warranties relating to the above product is hereby excluded to the fullest extent allowable under law. The warranty does not extend to any lost profits, loss of good will or any indirect, incidental or consequential costs or damages or losses incurred by the purchaser as a result of any defect with the covered product.

Warrantor

Sealite Pty Ltd has authorised distribution in many countries of the world. In each country, the authorised importing distributor has accepted the responsibility for warranty of products sold by distributor. Warranty service should normally be obtained from the importing distributor from whom you purchased your product. In the event of service required beyond the capability of the importer, Sealite Pty Ltd will fulfil the conditions of the warranty. Such product must be returned at the owner's expense to the Sealite Pty Ltd factory, together with a photocopy of the bill of sale for that product, a detailed description of the problem, and any information necessary for return shipment.

Sealite
www.sealite.com

Other Sealite Products Available

**Marine Lanterns
(1–19NM)**

**Monitoring
& Control Systems**

Bridge & Barge Lights

**Marine Buoys
(up to 3mt in diameter)**

Area Lighting

**Mooring Systems
& Accessories**