

Avlite[®]
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AV-OL-310

Solar Low Intensity Obstruction Light

FAA - L-810

ICAO - Low Intensity Type A and B (ILAB)

INSTALLATION & SERVICE MANUAL



Version No.	Description	Date	Reviewed	Approved	Design
1.0	AV-OL-310 Manual Launch	December 2019	P. Naidu	W. Evans	M. Sugars

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1.0 Introduction

Congratulations! By choosing to purchase an Avlite obstruction product, you have become the owner of one of the most advanced LED obstruction products in the world.

Avlite Systems draws on more than 25 years experience in the design and manufacture of navigation aids, and particular care has been taken to ensure your product gives years of trouble free service.

As a commitment to producing the highest quality products for our customers, Avlite has been independently certified as complying with the requirements of ISO 9001:2015 quality management system.

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

Please remember to complete the Avlite warranty registration card accompanying your product.

2.0 Technology

Avlite Systems is a world-class solar lighting systems manufacturer with a proven reputation for rapid, innovative, and agile technology solutions designed specifically for defense, government, civil and humanitarian aid operations in the most remote, toughest environments.

Electronics

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

LED Technology

All Avlite lights 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 Avlite products are of a consistent and superior quality.

Optical Performance

Avlite manufactures a range of aviation 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 Avlite's range of innovative designs, with other regional patents pending in Canada, United Kingdom and Europe.



3.0 AV-OL-310 Models L-810 and ILAB

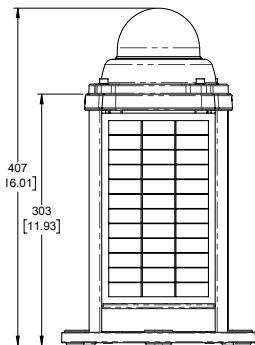
Avlite's self-contained solar light fixture is a low intensity LED obstruction light designed to comply with FAA L-810 or ICAO LIOL Type A and B requirements. The model can be used for marking obstacles of up to 45 meters above ground level such as telecommunication towers, wind turbines, buildings and other tall structures.

Specifically designed to withstand the harshest environments, the AV-OL-310 features a composite top and base and an aluminium internal chassis. The solar chassis is available in three chassis heights; Compact, Standard and Extended, all of which come with upgraded solar panels and a maximum power point tracker (MPPT) to optimise solar input into the 12Ah (Compact model) or 24Ah battery (Standard and Extended models) for longer run time. Each chassis is available with an optional ON/OFF switch and/or external charging port to for supplementary battery charges.

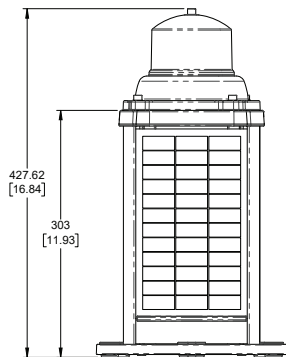
The LED optic comes compliant to either FAA or ICAO standards and is available with remote monitoring via either Satcom or GSM as options. The high impact resistant polycarbonate lens ensures even light distribution.



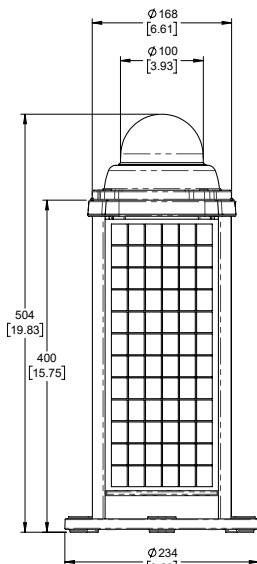
AV-OL-310 Base Compact



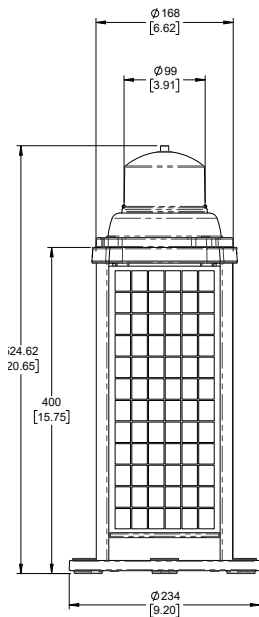
AV-OL-310 Remote Monitoring Compact



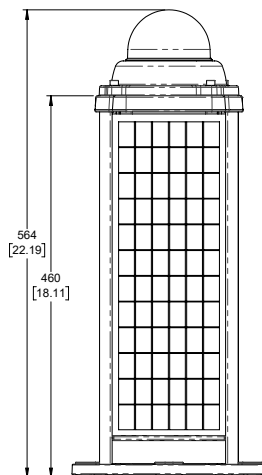
AV-OL-310 Base Standard



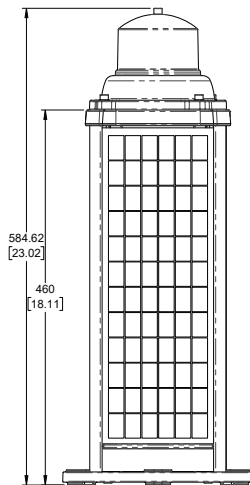
AV-OL-310 Remote Monitoring Standard

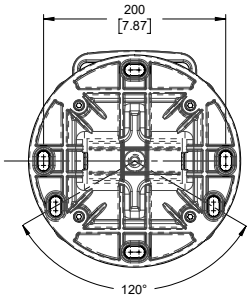


AV-OL-310 Base Extended



AV-OL-310 Remote Monitoring Extended





Base

3.1 Available options

- External ON/OFF switch
- External Battery Charging Port
- Remote Monitoring and Control

Avlite offers remote Star2M monitoring via GSM or SATCOM. Operators can remotely monitor the status of their installation from a compatible device. The system can also be configured to send out SMS text messages or e-mail alerts to designated operators should alarm conditions be triggered, such as low voltage or light failure.

- Solar Booster™

4.0 AV-OL-310 Data Sheet

AV-OL-310	Compact	Standard	Extended
Light Characteristics			
Peak Intensity (cd)*	Complies with FAA L-810 obstruction lights. Complies with ICAO Low Intensity Type A & B: 2009;		
Horizontal Output (degrees)	360		
Vertical Divergence (degrees)	L810 variant: As per FAA L-810 obstruction light specification. ILAB variant: As per ICAO Type A/B specification.		
Reflector Type	Single LED Optic		
LED Life Expectancy (hours)	>100,000		
Electrical Characteristics			
Circuit Protection	Integrated		
Operating Voltage	12		
Temperature Range	-40 to 55°C		
Solar Characteristics			
Solar Module	Monocrystalline		
Output (watt)	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	
Nominal Voltage (VDC)	12		
Physical Characteristics			
Body Material	Composite Polymer		
Lens Material	LEXAN® Polycarbonate – UV stabilized		
Lens Diameter (mm/inches)	107 / 4¼		
Lens Design	Single LED Optic		
Mounting	4 hole 200mm bolt pattern		
Height - Base (mm/inches)	407 / 16	504 / 19 ½	564 / 22 ¼
Height - Remote Monitoring (mm/inches)	428 / 16 ¾	525 / 20 ¾	585 / 23
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
Product Life Expectancy	12 years plus		
Environmental Factors			
Humidity	0 to 100%, MIL-STD-810F		
Wind Speed	Up to 160kph / 100mph		
Shock	MIL-STD-202G, Test Condition G, Method 213B		
Vibration	MIL-STD202G, Test Condition B, Method 204		



AV-OL-310	Compact	Standard	Extended
Compliance			
CE		EN61000-6-3 EN61000-6-1	
Quality Assurance		ISO9001:2015	
ICAO		Low Intensity Obstruction Light Type A & B	
FAA (Photometrics)		L-810 Low Intensity Obstruction Light (Qualified by Intertek)	
DGAC		L-810 Low Intensity Obstruction Light (Qualified by Intertek)	
Waterproof		IP68	
Intellectual Property			
Trademarks		AVLITE® is a registered trademark of Avlite Systems Patents Pending	
Warranty *		3 year warranty	
Options Available		<ul style="list-style-type: none"> • SATCOM Remote Monitoring • GSM Cell-Phone Monitoring • External Battery Charging Port <ul style="list-style-type: none"> • External Switch • Solar Booster™ 	

5.0 Safety Information

Before proceeding with installation or service, make sure the following conditions are met:

- Ensure the tower or mast is grounded (NO RF OR SHOCK HAZARD)
- Check the mast lighting circuit is not faulty
- Ensure power lines are not 'live' (NO ELECTRICAL HAZARD)
- Avoid touching live circuits!
- Avoid touching any component or any part of the circuitry while the unit is operating. Do not change components or make adjustments inside the unit with power on.
- Make sure the light fixture mounting is vertically aligned to guarantee the required beam pattern of the obstruction light.
- Make sure any nearby obstacles do not impede the lights' beam pattern.
- When installing, comply with all local electrical code(s).
- Mains power should always be disconnected when work is being done in close proximity to electrical fittings, and electrical work should only be done by a licensed electrician.
- Operate the light only within the indicated electrical ratings and product usage instructions.
- To ensure that the light and peripheral equipment function safely and correctly, use cable in compliance with the effective local electrical code.
- Do not stare at the LED or shine the LED into your eyes or those of another person.
- Dispose of the product according to the local laws and regulations for your region, for example, at a recycling centre that accepts electronic devices.



6.0 Operation and Setup

Avlite's AV-OL-310 is a robust, completely self-contained solar powered LED light. The solar module of the light converts sunlight to an electrical current that is used to charge the battery during daylight hours. The battery provides power to operate the light at night. For optimum solar charge performance it is recommended that the unit is orientated with the solar panels facing East-West.

FAA: By default, the lights are designed to turn ON when the ambient light decreases to not less than 35 foot-candles (376.7 lux) and turn OFF when the ambient light increases to not more than 60 foot-candles (645.8 lux). These limits can be factory adjusted, if required.

ICAO: By default, the lights are designed to turn ON when the ambient light decreases to not less than 100 lux and turn OFF when the ambient light increases to not more than 150 lux. These limits can be factory adjusted, if required.

6.1 AV-OL-310

External ON/OFF Switch

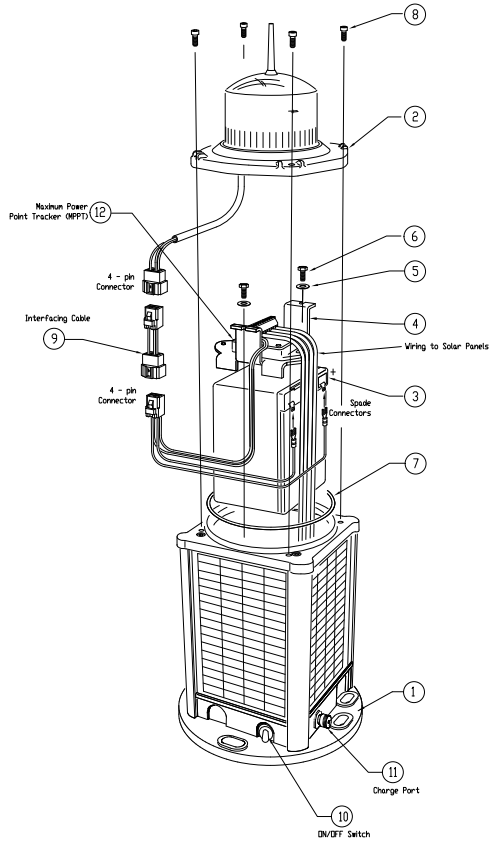
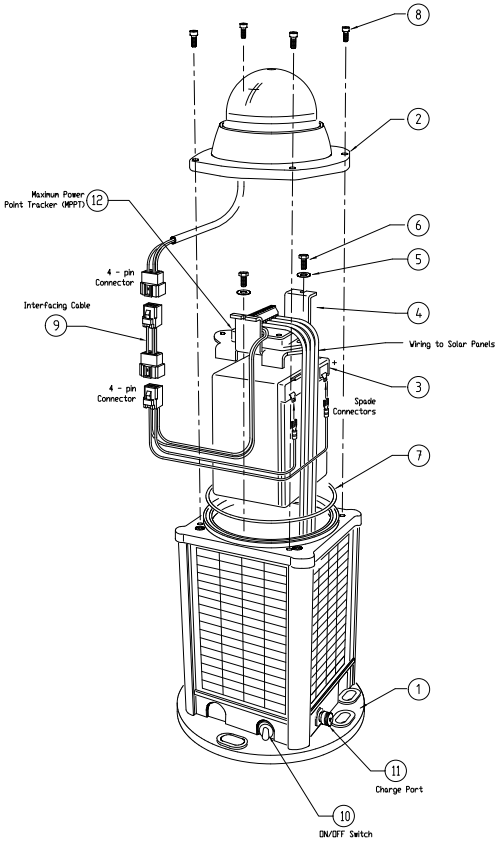
The lights can be fitted with an external ON/OFF switch below the solar panel at the base of the unit. The ON/OFF switch may be useful if the unit is only required for short periods (i.e. it is being moved or needs to be stored often), and disconnecting the battery is not viable.

External Battery Charging Port

The lights can be fitted with an external battery charging port which can be found below the solar panel at the base of the unit. This can be used to recharge the battery if the light is being stored for more than 1 month or if the amount of sunlight is limited (e.g. in challenging solar locations or during Winter months). Please see 'Long Term Battery Storage & Maintenance' in the Maintenance & Servicing section of this manual. A suitable battery charger may be purchased separately from Avlite.

Remote Monitoring and Control

Avlite offers remote monitoring via GSM or SATCOM. Operators can remotely monitor the status of their installation from a compatible device. The system can also be configured to send out SMS text messages or e-mail alerts to designated operators should alarm conditions be triggered, such as low voltage or light failure.



Compact models shown

Item	Description	Quantity
1	AV-OL-310 Composite Base	1
2	AV-OL-310 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 M4 x 16	4
9	Interfacing Cable	1
10	ON/OFF Switch	1
11	Charge Port	1
12	Maximum Power Point Tracker (MPPT)	1



Lantern Status

Two status LED's on the main printed circuit board provide the operator with an indication of the lantern status. These are positioned near the Rotary Switches and can be viewed at the base of the lens. 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.

Refer to the tables below to help determine the lantern's 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		Normal Battery Voltage
Flashing once every 1.6 seconds	Battery Voltage is 12 – 12.5V		Battery Voltage is between 12 – 12.5V
Flashing twice every 2 seconds	Battery Voltage is 11.5 – 12V		Battery Voltage is between 11.5 – 12V
Flashing 3 x times every 2 seconds	Battery Voltage is 10.0 – 11.5V		Battery Voltage is between 10.0 – 11.5V
Flashing 4 x times every 2.5 seconds	Battery Voltage is <10.0V	OFF	Battery Voltage is less than 10.0V
Fixed-on	Flat Battery (<10V)		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		Battery Voltage is above 13.5V. this may indicate a problem with the solar regulator.

6.1.1 GPS Synchronisation

Avlite has utilised the latest advancements in GPS technology to develop an internal synchronisation system that is incorporated into the lights. Using overhead satellites, multiple obstruction lights set to the same flash pattern will flash in unison. 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 dusk conditions are detected.

Night Operation

When dusk conditions are detected the light will carry out the following:

- Check for valid time data and turn 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.



6.1.2 Operation Mode and Preset Configurations

The AV-OL-310 comes pre-set to the correct intensity for either an FAA L-810 or ICAO Type A and B steady burning, red obstruction light in Dusk-till-Dawn mode. Please note that the ICAO compliant fixture comes preset to the Type A configuration.

If the customer should need to change the operation mode or preset configuration settings, they can do this by changing the INTENSITY DIP switch.

Please refer to table below for DIP switch settings for both the FAA L-810 and ICAO Type A and B compliant fixtures.

Position 2	Position 1	Light Intensity	
		FAA L-810	ICAO Type A and B
OFF	OFF	FAA L-810 Low Intensity Obstruction Light, dusk-till-dawn mode-DEFAULT	Type A Low Intensity Obstruction Light, Dusk-till-Dawn mode-DEFAULT
OFF	ON	FAA L-810 Low Intensity Obstruction Light, Always on mode	Type A Low Intensity Obstruction Light, Always on mode
ON	OFF	-	Type B, Low intensity Obstruction Light, Dusk-till-Dawn mode
ON	ON	-	Type B, Low Intensity Obstruction Light, Always on mode

7.0 Unpacking, Installation, Wiring and Setup

7.1 Unpacking

Unpack all hardware and inspect for damage. If there is any damage, please contact your Avlite Office.

Retain original packing material for possible future use in shipping.

7.2 Installation



WARNING:

Confirm that the power switch is toggled to the OFF position when power is connected. **DO NOT** connect power to the PCU when the control panel power switch is toggled to the PWR position. This may result in damage to the power sources.



WARNING:

DO NOT connect directly to the DC output of a generator, or any other unregulated power source. Connecting to an unregulated source may result in damage.



WARNING:

Do not stare into light emitting diode (LED) beams.



CAUTION:

LED lights contain glass components. **Do Not Drop.**

Always follow the instructions outlined in the product manual when cleaning the equipment. Improper cleaning methods and use of unauthorized cleaning agents can damage equipment.



7.2.1 Location

For best light performance, the light fixtures should be installed in an area where the solar modules are not covered and are in clear view of the sky with no shadows.

7.2.2 Factory Configuration

Prewired and preassembled AV-OL-310 solar light fixture

7.2.3 Selecting Operation Mode and Preset Configuration (FAA L-810 and ICAO Type A and B)

Refer to section 'AV-OL-310' for appropriate diagrams.

1. Remove the 4 socket-head screws on the lens assembly.
2. Remove the 6 Philips Head Screws from the underside of the light head and remove the Access Cover (GSM and Satcom models also require the removal of the communications board with four Philips Head Screws).
3. Set the DIP switch to the required settings. The operation mode and preset configuration of the light is adjusted by setting the INTENSITY DIP switch which controls the Operational Mode and the Type of Obstruction Light required. Refer to section 'Operation Mode and Preset Configuration Setting' for DIP switch settings.
4. Replace the Access Cover and connect the lantern power connector to the interfacing cable to power up the unit. (Replace the communications board if applicable).
5. Place the top lens assembly back onto the light body and replace the 4 x socket head screws. Avlite recommends that the Light Head be tightened to the Solar Chassis Base using the 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 4 Hex Bolts should be sufficient enough to ensure that the Light Head Base is secured firmly, but not over tightened with excessive force. Recommended torque settings for fitment of light heads to solar base units using the supplied 4 Hex Bolts is 3Nm for a satisfactory seal.
Note: Applying a higher torque setting is not recommended and may void warranty. If in doubt, please contact your local Avlite representative.
6. Check the O-ring and ensure that it is fitted correctly in the O-ring groove.
7. The unit is now ready for normal operation once placed in darkness.
8. To test, place a dark cover (towel or jacket) on top of the light to activate the sensor and ensure that the light turns on.

Charging the Battery

New lights should be left in the sun for several days to ensure battery is charged before placing in service.

7.2.4 Installation Recommendations

The AV-OL-310 is able to be installed on any appropriately reinforced mounting point with a 200 PCD. Alternatively, the appropriate mounting accessories can be purchased from Avlite.

8.0 Maintenance and Servicing

Designed for minimal maintenance, the AV-OL-310 requires minimal attention, though the following maintenance and servicing information is provided to help ensure the life of your Avlite Systems 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, and replace if necessary. The O-ring should be a rubber texture to ensure a complete and even seal.

Service Tools

- 1 x M2 Allen Key
- 1 x M5 Allen Key
- 1 x 13mm Combination Wrench
- 1 x M8 Allen Key
- 1 x 10mm Combination Wrench
- 1 x Silicone Grease

Long Term Battery Storage & Maintenance

If the AV-OL-310 is to be placed in storage for an extended period please follow the below information.

The Sealed Lead Acid batteries inside the lights must always be stored in a fully charged state.

Always make sure the ON/OFF switch is in the OFF position.

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 the battery regularly and recharge if necessary. If required, charge the battery via the external charging port on the base of the unit. Only attach the plug with your hand, do not use multi-grips to attach the plug.

Turn the ON/OFF switch to the ON position and place unit in the sun for 2-4 days.

The AV-OL-310 is fitted with a 12 volt charge port that can be used to charge the battery and test the battery voltage.



Replacing the Battery

The AV-OL-310 has an internal battery compartment, which provides the user with the ability to change the battery after years of operation.

1. Remove the four socket-head screws on the top lens assembly and separate the AV-OL-310 lens assembly from the body/base section.
2. Remove 2 x M2 SHCS & washers from the top battery bracket.
3. Separate the light head at the connectors.
4. Lift the upper battery bracket out of the AV-OL-310.
5. Disconnect the old battery
6. Remove the old battery from the chassis.
7. Discard old battery in a safe manner.
8. Reconnect the new battery.
9. Place battery back inside light body, and position the upper battery bracket in the top of the chassis.
10. Secure using 2 x M4 Cap screws & washers.
11. Feed all wiring back inside light body, and make sure the O-ring is properly placed at the top of the light body.
12. Please realign bidirectional indicators on the base with the light head to ensure correct alignment of the light output on the runway.
13. Place the top lens assembly back onto the light 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.
- It is recommended that the bolts for holding the light heads to the Solar Base units have a torque setting applied of 3Nm for a satisfactory seal. Applying a higher Torque setting is not recommended and may void warranty. If in doubt, please contact your local Avlite representative.
14. To test place dark cover (towel or jacket) on top of light 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.**

Safe Battery Handling

Charging and Discharging

- Always ensure batteries are fully charged when installing new lights. The light will be dispatched from the Avlite factory fully charged. However if time has elapsed between dispatch and installation, battery voltage must be checked.
- Never short-circuit or reverse polarity of a battery, damage to the battery and device may occur, and there is a risk of fire.
- Do not use different types of batteries in the same battery assembly. Sealed lead acid and NIMH do not mix.
- If the battery has been deep-discharged, a prolonged charging time is required to bring the battery back to full capacity.

Installing the Light Head Assembly on the Solar Unit

After servicing, it will be necessary to reinstall the light head on the solar unit.

1. Connect the 4 bullet connectors
2. Ensure the O-ring seal on the top of the solar chassis is in place, clean and lightly greased
3. Feed the wires into the corner of the solar unit
4. Locate the light head onto the solar unit in the correct orientation to the runway. The light head is fitted with reflective tape indicators to show light output. This colour indication should be aligned with the colour indication on the solar unit to ensure correct alignment.
5. Fit the 4 x M6 x 20 SHCS
6. Tighten the SHCS evenly and firmly.
 - It is recommended that the bolts for holding the light heads to the Solar Base units have a torque setting applied of 3Nm for a satisfactory seal. Applying a higher Torque setting is not recommended and may void warranty. If in doubt, please contact your local Avlite representative.
7. Remove all tools, nuts and bolts from the installation area.

Battery Voltage States of Charge

Avlite has provided the following guides for battery states of charge:

Battery Voltage: 12 Volt Sealed Lead Acid	
State of Charge	Voltage
100%	12.70+
90%	12.5
80%	12.42
70%	12.32
60%	12.2
50%	12.05
40%	11.9
30%	11.75
20%	11.58
10%	11.31
0%	10.5



9.0 Trouble Shooting

Problem	Remedy
Light will not activate.	<ul style="list-style-type: none">• Ensure light is in darkness.• Wait at least 60 seconds for the program to initialise in darkness.• Ensure Dip switch setting is correct• Ensure battery terminals are properly connected.• Ensure battery voltage is above 12volts.• Check the Status LED's on the base of the PCB to determine what type of fault the light is activating.
Light will not operate for the entire night.	<ul style="list-style-type: none">• Expose light to direct sunlight and monitor operation for several days. Avlite products typically require 2.5 hours of direct sunlight per day to retain full autonomy. From a discharged state, the light may require several days of operational conditions to 'cycle' up to full autonomy.• Reducing the light output intensity will reduce current draw on the battery.• Ensure solar module is clean and not covered by shading during the day.

Notes

Avlite Solution Verticals available



Airfield



Heliport



Obstruction



We believe technology improves navigation™

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