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AV-PAPI Series 3

Precision Approach Path Indicator

Voltage Powered Systems
FAA - Style A
ICAO

INSTALLATION & SERVICE MANUAL

V2.7

Version No.	Description	Date	Reviewed	Approved	Design
2.6	Manual Launch	June 2020	J. Putaansuu	R. Williams	R. Crosby
2.7	Added 'Supplied' measurements to Mounting Heights	July 2020	J. Putaansuu	J. Putaansuu	R. Crosby

Table of Contents

1 - Warnings and Cautions

WARNING indicates that serious bodily harm or death may result if precautions are not followed.

CAUTION indicates that damage to equipment may result if instructions are not followed.

1.1 Handling Light Emitting Diodes (LEDs)

WARNING

DO NOT look into lenses that are actively emitting LED or infrared light.
The PAPI can emit both visible and infrared lighting that is harmful to the eyes.

1.2 Handling Batteries

WARNING

Use caution when handling the PAPI light.
The PAPI can generate enormous short-circuit currents.
Remove any bracelets, watches or rings before attempting to handle or remove batteries.

CAUTION

Periodically charge batteries to avoid permanent damage or reduced capacity.

Battery usage depends upon weather. Warmer weather causes the batteries to discharge more quickly than colder weather. A full battery charge is required for any lights that have been stored for long periods of time. To accurately assess battery health, ensure power is off, and store lights in a dark location for a minimum of 24 hours.

1.3 Handling Light Head Assemblies (LHA)

CAUTION

Always follow these instructions when handling the AV-PAPI:

- The LHAs contain glass components. **Do not drop!**
- The LHA is designed to be transported in the horizontal position.
- Do not store, carry or use the Battery Box Assembly (BBA) in any position other than top side up.
- Do not step on the top of the LHA, BBA, or Power Control Unit (PCU).
- When cleaning lenses, apply light pressure only. Grit on the lens is hard and sharp and will scratch the surface of the lenses.

1.4 Improper Cleaning Agents

CAUTION

Improper cleaning methods and unauthorized cleaning agents can injure personnel and damage equipment.
Do not use standard commercial glass window cleaners on the exit windows. While the lens itself is hard, the outer surface is coated and the cleaner may remove or scratch the coating.
If necessary, use a standard lens cleaning fluid.

1.5 Inclinometer

CAUTION

DO NOT install battery backwards.
To ensure accurate readings, calibrate the digital inclinometer before using. Refer to instructions included with the inclinometer.

1.6 Power Sources

CAUTION

DO NOT connect the PCU directly to the DC output of a generator or any unregulated power source.

Ensure that the PCU Power switch on the PCU control panel is toggled to the **OFF** position before connecting power to the PCU.
Failure to toggle the Power switch to **OFF** may result in damage to the power sources or the PCU.

1.7 Heated Lens

CAUTION

Heated lens option **required** for all PAPIs used in sub-zero or arctic conditions.

2 - Product Configurations and Options

AV-PAPI-[X]-[XX]-[XX]-[XX]-[X]

Standard/Size:
A = ICAO Abbreviated-PAPI 2-LHA
2 = FAA 2-LHA
4 = FAA/ICAO 4-LHA

Mounting:
P0 = Permanent
P1 = Portable

Input Voltage:
UM = 100-240VAC *(FAA Style A)*
24 = 24VDC

Options:
0 = None
1 = Radiofrequency Control
2 = Infrared Only
3 = Infrared and Radiofrequency Control
4 = Heated Lens
5 = Radiofrequency Control and Heated Lens
6 = Infrared and Heated Lens
7 = Infrared, Radiofrequency Control, and Heated Lens
8 = Tilt Switch
9 = Radiofrequency Control and Tilt Switch
10 = Infrared and Tilt Switch
11 = Infrared, Radiofrequency Control, and Tilt Switch
12 = Heated Lens and Tilt Switch *(Standard FAA Version)*
13 = Radiofrequency Control, Heated Lens, and Tilt Switch
14 = Infrared, Heated Lens, and Tilt Switch
15 = Infrared, Radiofrequency Control, Heated Lens, and Tilt Switch

Color:
0 = FAA Orange
1 = ICAO Yellow
2 = Marine Grade Orange
3 = Marine Grade Yellow
4 = Desert Sand
5 = NATO Green
6 = Marine Grade Desert Sand
7 = Marine Grade NATO Green

3 - AV-PAPI Series 3 Components

AV-PAPI Kit Contents	Quantity	
	4 Box	2 Box
Light Head Assembly: Pre-Wired With 6 ft. Lengths Of Power And Control Cables	4	2
Power Control Unit	1	1
Photocell (Optional)	1	1
PCU Column (Frangible EMT)	1	1
3/4 in. Liquidtite Flexible Conduit (50 ft.)	1	1
10 AWG Machine Tool Wire, Red (150 ft.)	1	1
10 AWG Machine Tool Wire, Black (150 ft.)	1	1
6 Conductor 22 AWG Wire (150 ft.)	1	1
Mounting Legs for LHA 12-3/4" Long with Frangible	4	2
Mounting Legs for LHA 14" Long with Frangible	8	4
2 in. Flanges	13	7
Weatherproof Junction Boxes with Lid	5	3
Digital Inclinometer with Mounting Screws	1	1

Optional AV-PAPI Solar Kit for DC Voltage (4 Box)	Quantity
Solar Battery Boxes	1
Solar Panels	4
Solar Brackets	2
Frangible Bolts (4 Per Box)	3 Boxes

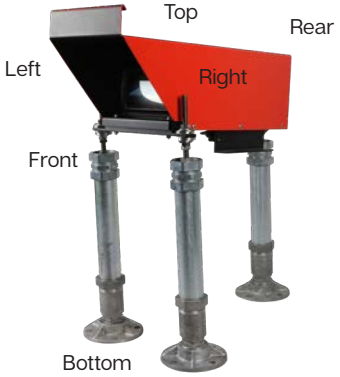
4 - Acronyms and Abbreviations

BBA	Battery Box Assembly
DC	Direct Current
EMT	Electrical Metallic Tubing
FAA	United States Federal Aviation Administration
ft.	foot
Hz	Hertz
ICAO	International Civil Aviation Organization
in.	inches
IR	Infrared
kg	kilogram
lb.	pound
LED	Light Emitting Diode
LHA	Light Head Assembly
mm	millimeter
PAPI	Precision Approach Path Indicator
OD	Outside Diameter
PCB	Printed Circuit Board
PCU	Power Control Unit
RCT	Remote Control Transmitter
RF	Radio Frequency
SHCS	Socket Head Cap Screw
SS	Stainless Steel
V	Volt
VAC	Volts, Alternating Current
VDC	Volts, Direct Current

5 - Limitations of Scope

This manual provides information specific to voltage powered systems pertaining to assembly, installation and operation.

6 - Location References



Throughout this manual, the terms front, rear, top, bottom, left and right, are used as reference terms to describe specific locations on the Light Head Assemblies (LHA).

- Glass lenses are located on the front panel.
- The power connector and manufacturer's labels are located on the rear panel.
- The right side is the side to the right when looking at the front of the LHA, and the left side is the side to the left when looking at the front of the LHA.

7 - Disclaimer

The information in this manual is believed to be accurate and up to date, however, Avlite assumes no liability for damages or injuries that may result from errors or omissions, or from the use of information presented herein. Avlite reserves the right to modify this manual at its own discretion without notification to any person or organization. For questions regarding this disclaimer please contact Avlite at:

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61 Business Park Drive
Tilton, New Hampshire 03276
USA
Email: usa@avlite.com
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8 - Regulations

This manual is not a substitute for federal, state, and local regulations, including FAA and ICAO. Refer to and perform all actions/operations outlined in this manual in accordance with federal, state, and local regulations. The following FAA, UFC, and ICAO regulations were referenced while writing this manual:

- UFC 3-535-01
- FAA AC 150/5345-28H Style A, Class I
- FAA AC 150/5340-30D
- ICAO Annex 14 Part 1

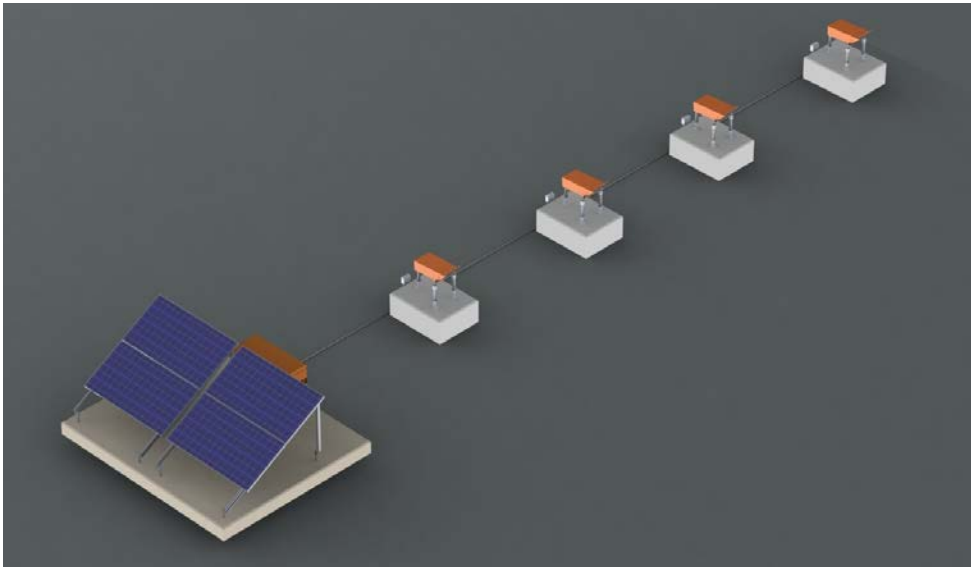
9 - Scope

This manual contains installation, operation, and maintenance information for the AC and DC versions of the LED Precision Approach Path Indicator (AV-PAPI), Precision Approach Path Indicator Series 3 (AV-PAPI Series 3) and Abbreviated Precision Approach Path Indicator (AV-APAPI).

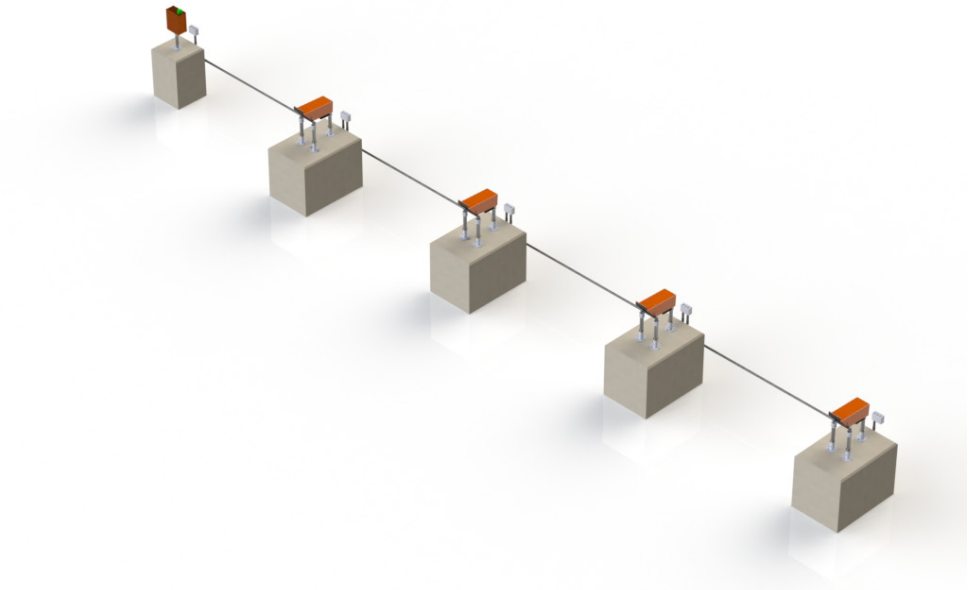
10 - Equipment Overview

10.1 Equipment Characteristics, Capabilities, and Features

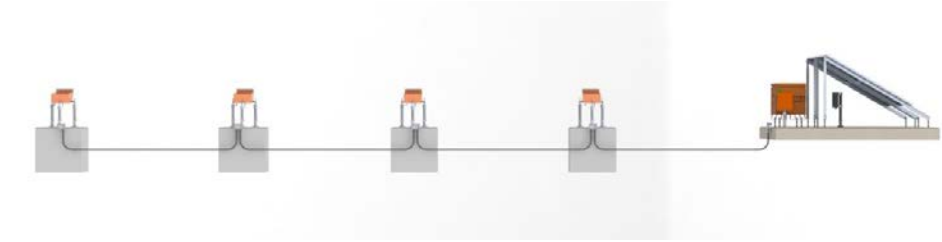
The AV-PAPI Series 3 guides pilots on approach to landing by indicating an aircraft's vertical position with respect to proper glideslope. LEDs provide corridors of red and white lights emanating from a location off to the left of the landing zone. The AV-PAPI Series 3 system includes one PCU and four LHAs. Each LHA projects beams of steady white and steady red light.



Fully Assembled AV-PAPI System with Optional Solar System – Overhead View



Fully Assembled AV-PAPI System with AC Input – Overhead View



Fully Assembled AV-PAPI System with Optional Solar System – Rear View

10.2 Major Components

The AV-PAPI Series 3 is comprised of the following major components:

- 2 or 4 Light Head Assemblies (LHA)
- Power Control Unit (PCU)

Also included are:

- Inclinometer
- Connection wire
- Flex conduit
- Junction boxes
- Frangible mounting system

NOTE: Heated lens option **required** for all PAPIs used in sub-zero or arctic conditions.

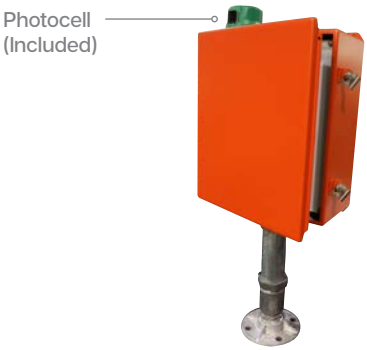
10.2.1 Light Head Assembly (LHA)

Please refer to *Section 12, Specifications*, in this manual for exact LHA dimensions.

Light Head Assembly

10.2.2 Power Control Unit (PCU)

Please refer to *Section 12, Specifications*, in this manual for exact PCU dimensions.



The LHA is powered and controlled from the PCU. The PCU has two power options:

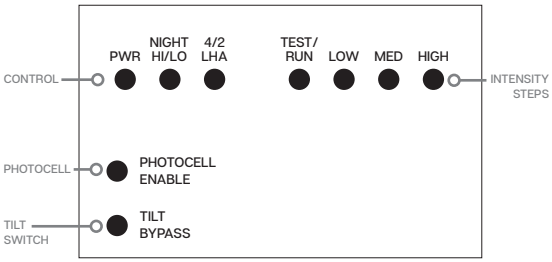
- AC 120-240V 50/60Hz
- 24 VDC

The PCU control panel includes switches for:

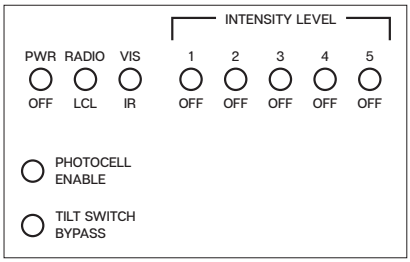
- System on-off control
- Radio remote or local operation
- Visible or infrared operation
- Five choices for intensity levels

Intensity Levels	ICAO	FAA
Intensity Step 5	100%	
Intensity Step 4	20%	
Intensity Step 3	4%	100%
Intensity Step 2	0.8%	20%
Intensity Step 1	0.16%	5%

The PCU control panel also includes toggle switches for tilt switch bypass, and enabling photocell operation. If an optional feature, for example IR or Tilt Switch Bypass, is not installed, that opening on the control panel will be plugged, or is not present.



Control Panel: FAA Version



Control Panel: ICAO Version

The PCU includes an input conduit attachment for power from AC or a regulated 24 VDC source, and single input for 5 intensity levels on its lower right hand bottom as viewed from the front. Pre-wired 6 ft. lengths of wire are also included for power and signal. The conduit fitting for the power and signal to the LHAs is located on the other side bottom panel.

Photocell included is required for automatic dusk to dawn operation.

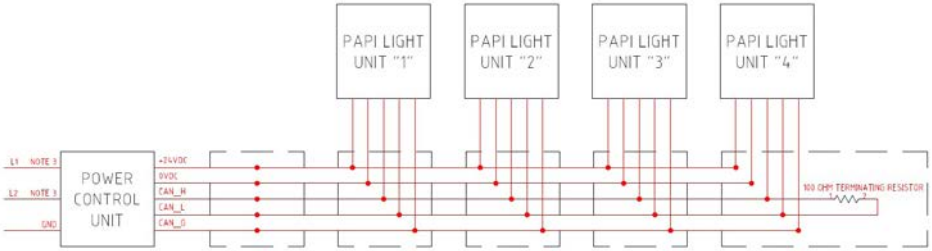
NOTE: Heated lens option **required** for all PAPIs used in sub-zero or arctic conditions.

10.2.3 Inclinometer

A digital inclinometer is included to set the side-to-side level and tilt angles for the LHA. Refer to the Owner's Manual included with the digital inclinometer for user instructions.

Digital Inclinometer

10.3 System Overview



NOTES:

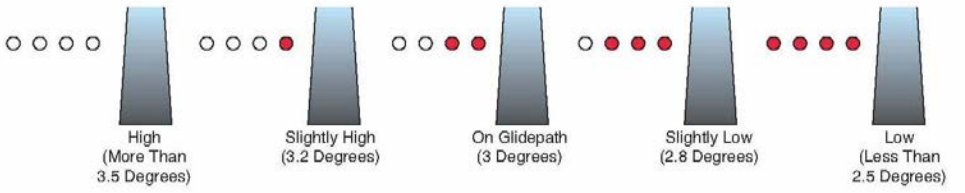
1. ALL WIRE TERMINATIONS TO BE MADE IN NEMA RATED JUNCTION BOXES SUITABLE FOR WET LOCATIONS, OR WATERPROOF SPLICES IN BASE CAN.
2. DELETE UNITS 3 & 4 FOR 2-BOX SYSTEM, TERMINATING RESISTOR TO BE INSTALLED IN JUNCTION BOX OF LIGHT UNIT #2.
3. UNIVERSAL AC INPUT, 100-250 VAC 50/60HZ.

System Level Block Diagram

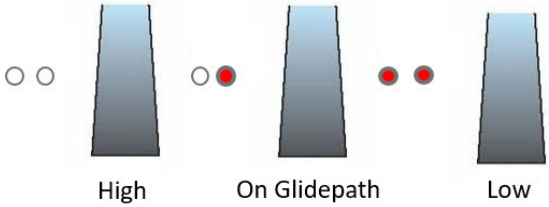
11 - Theory of Operation

11.1. Light Head Assemby (LHA)

LHAs use a row of high power LEDs to generate light of the required color: red for the bottom corridor, or white for the top corridor. The signal format seen by the pilot is illustrated in the figure below.



Signal Format As Seen By Pilot On Approach To Landing For The 4-Box Configuration



APAPI 2-Box Configuration

LEDs provide corridors of red and white lights emanating from a location off to the left side of the landing zone. Each LHA projects beams of steady white and steady red light.

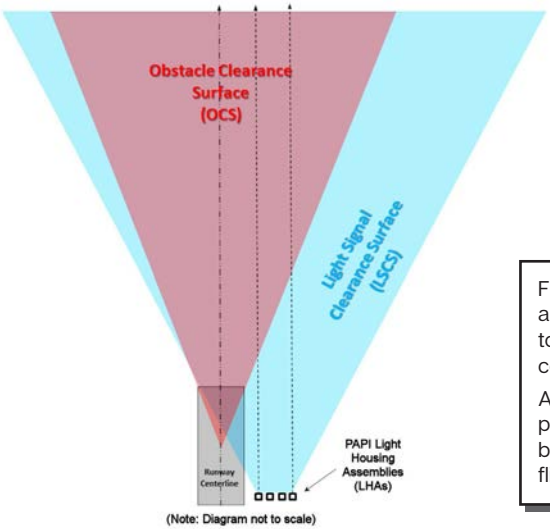
There are four different combinations of red and white lights used to indicate degree of glideslope:

- Two LHAs showing a red light, and the other two showing a white light, indicate **proper** glideslope on approach to landing.
- White lights for all four LHAs, indicate the aircraft is **well above** the proper glideslope.
- White lights from three LHAs, and a red light from one LHA, indicate the aircraft is **above** the proper glideslope.
- Red lights from three LHAs, and a white light from one LHA, indicate that the aircraft is **below** the proper glideslope.
- Red lights emanating from all four LHAs, indicate that the aircraft is **well below** the proper glideslope.

Light Combination	Degree of Glideslope
○ ○ ● ●	**PROPER** glideslope on approach to landing
○ ○ ○ ○	**WELL ABOVE** the proper glideslope
○ ○ ○ ●	**ABOVE** the proper glideslope
○ ● ● ●	**BELOW** the proper glideslope
● ● ● ●	**WELL BELOW** the proper glideslope

11.2 External Baffles

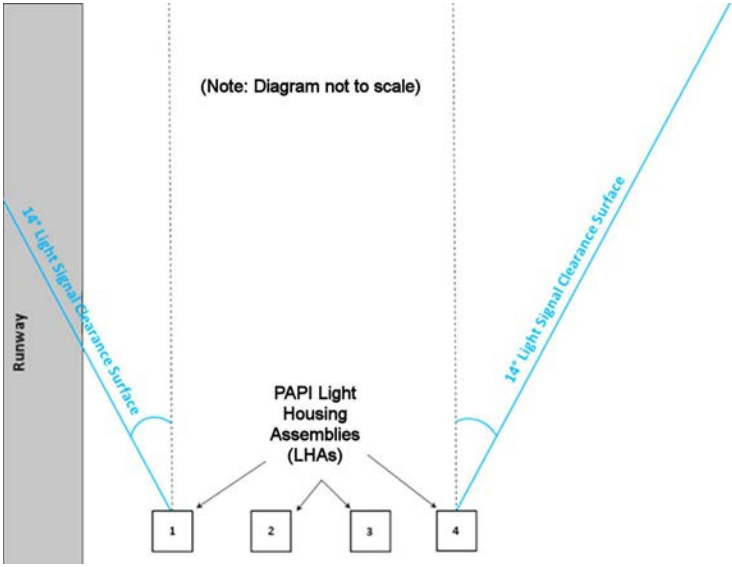
External Baffles (also known as Blanking Devices) are available to modify the horizontal light beam coverage of the PAPI for obstacle avoidance in the approach area and light signal obstruction clearance zone.



Flight checks are always required to verify accurate configuration of LHA.

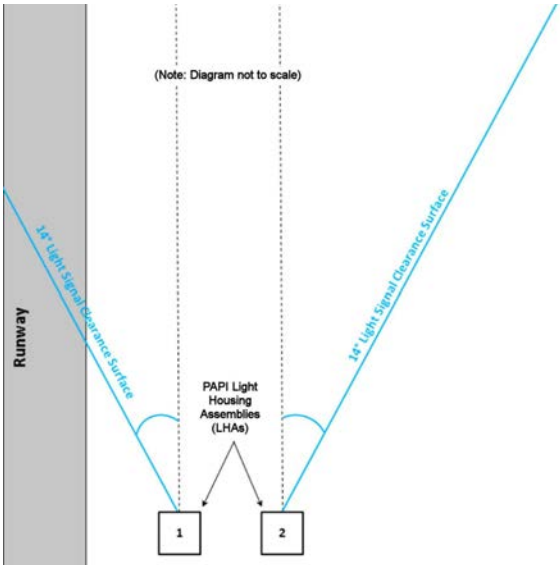
Accurate Baffle placements should be configured during flight check.

PAPI Obstacle Clearance Surface (OCS) and Light Signal Clearance Surface (LSCS)[1]

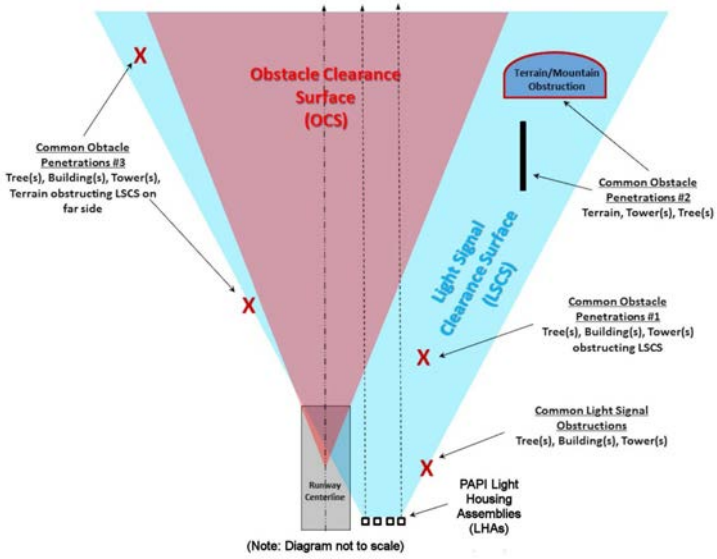


L-880 PAPI LSCS [1]

[1] Kodsi, Khalil E. "FAA Engineering Brief No. 95, Additional Siting and Survey Considerations for Precision Approach Path Indictor (PAPI) and Other Visual Glide Slope Indicators (VGSI) ." Federal Aviation Administration, 19 Dec. 2017.



L-881 PAPI LSCS[1]



Common LSCS Obstacles[1]

Contact Avlite Customer Support for specific installation recommendation. Additional citing and survey considerations can be found in FAA Engineering Brief No. 95.

11.3 Tilt Switch

The efficacy of PAPI systems is contingent on all the beams of LHAs angled correctly with respect to one another and with respect to the desired glideslope.

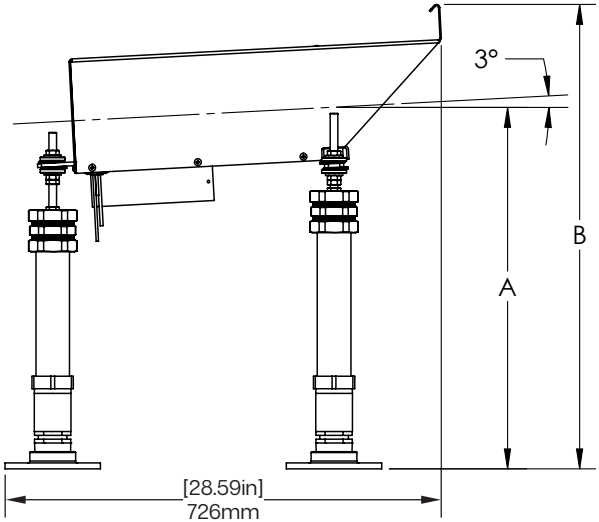
If a PAPI's angle is incorrect, it could provide an incorrect glideslope indication to the aviator, so PAPIs are designed to operate in a "fail safe" manner. By using electromechanical tilt switches to detect a PAPI's angle, the system will only emit light if all LHAs are in the correct angular position as per the prescribed system configuration and set up. Each LHA is equipped with a single tilt switch, and all LHA tilt switches are wired in series to form an electrical loop. If any one LHA deviates from its angular set position or if any tilt switch fails, the power to all LHAs will be disconnected. This type of "fail safe" protection can be used with 2-LHA and 4-LHA systems.

11.4 Heated Lens

The Lens Heater circuit is microprocessor controlled to eliminate rapid on/off cycling thereby minimizing power consumption. It will be activated to ON when temperatures fall below set point (of 50 degrees Fahrenheit). The heater will turn OFF above set point.

[1] Kodsi, Khalil E. "FAA Engineering Brief No. 95, Additional Siting and Survey Considerations for Precision Approach Path Indictor (PAPI) and Other Visual Glide Slope Indicators (VGSI) ." Federal Aviation Administration, 19 Dec. 2017.

12 - Specifications



	EMT Rear	EMT Front	A	B
Minimum (inches/mm)	4.6 / 117	5.85 / 149	15.52 / 394	22.27 / 566
Supplied (inches/mm)	12.75 / 324	14 / 356	23.67 / 601	30.42 / 773
Maximum (inches/mm)	25 / 635	26.25 / 667	35.92 / 912	42.67 / 1083

Elevation View Showing PAPI Series 3 Mounting Heights

AV-PAPI Series 3	AC†		DC	
Electrical Characteristics				
Input Voltage	90-264VAC		24V Nominal (21 - 28 VDC)	
Input Frequency	50/60 Hz		N/A	
Power Consumption				
ICAO/FAA L-880 (4-Box)	328 VA		267 W	
FAA L-881 (2-Box)	161 VA		134 W	
ICAO APAPI	85 VA		70 W	
Physical Characteristics				
Body Material	Epoxy painted aluminum chassis with aviation orange standard; yellow and other colors available			
Hardware Material	Stainless steel & anodized aluminum			
Lens Design	Optical glass lens			
Mounting	Permanent and portable			
Dimensions (LHA Only)	**Height (inches/mm)**	**Width (inches/mm)**	**Length (inches/mm)**	**Weight (lb/kg)**
Permanent	**Minimum:** 22.27 / 566 **Supplied:** 30.42 / 773 **Maximum:** 42.67 / 1083	12.75 / 324	26.87 / 682	17.8 / 8.07
Portable	**Extended:** 19.45 / 494 **Collapsed:** 14.2 / 360	13.22 / 335	26.47 / 672	25 / 11.34
Environmental Factors				
Temperature	-31 to 131 °F (-35 to +55 °C) - Ambient -67 to 176 °F (-55 to +80 °C) - Storage			
Wind Loading	100 mph (45 m/s)			
Certifications and Compliance				
CE	EN61000-6-3:2007 EN61000-6-1:2007			
Quality Assurance	ISO 9001:2015			
ICAO	Annex 14 Part 1 PAPI (2 & 4 LHA) & APAPI (2 LHA) Compliant			
FAA	L-880/881 (2 & 4 LHA) AC 150/5345-28H Certified Style A Class I			
UFC	3-535-01 (4 LHA) Compliant			
DGAC	Pending			
Intellectual Property				
Patents	U.S. Patent No. US 9,863,601 B2			
Trademarks	AVLITE® is a registered trademark of Avlite Systems			

Warranty *	Avlite PAPI systems (AV-PAPI) are warranted against mechanical and physical defects in design or manufacture for a period of 12 months from date of installation or 24 months from shipment date; and are warranted against electrical defects in design or manufacture of the LED or LED specific circuitry for a period of 4 years per FAA EB67 (applicable edition).
Options Available	• IR mode • Solar power supply • Generator kit • Battery kit • 2.4 GHz, PALC/ARCAL • Hardwired control • Mounting solutions • Marine grade stainless steel • External baffles (blanking devices)

Power Control Unit (PCU)	
Physical Characteristics	
Height (inches/mm)	8 / 203
Width (inches/mm)	9.75 / 248
Depth (inches/mm)	0.125 / 3
Weight (lb/kg)	26 / 11.79

CE • Specifications subject to change or variation without notice. * Subject to standard terms and conditions.
† FAA 150/5345-28H Certified

NOTE: Heated lens option **required** for all PAPIs used in sub-zero or arctic conditions.
Heated Lens and Tilt Switch **required** for FAA Certified.

13 - Compliance

FAA 150/5345-28H, and ICAO Annex 14 Part 1, 5.3.4.10 – 5.3.4.2

14 - Unpacking, Installation, Assembly, and Setup

List of High-Level Steps Required for Installing the AV-PAPI Series 3:
Research federal, state, and local requirements for concrete pad, conduit and PAPI installation. Refer to *Section 8, Regulations* of this manual for some, but not all, of the the applicable regulations.
Install electrical underground electrical conduit that will connect the LHAs to each other, the PCU, and the power supply.
Pour concrete pads for the LHAs, PCU, and power supplies depending upon AV-PAPI configuration.
Install PCU.
Install LHAs.
Install power.
Complete wiring.

14.1 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.

14.2 Tools Required (Not Supplied)

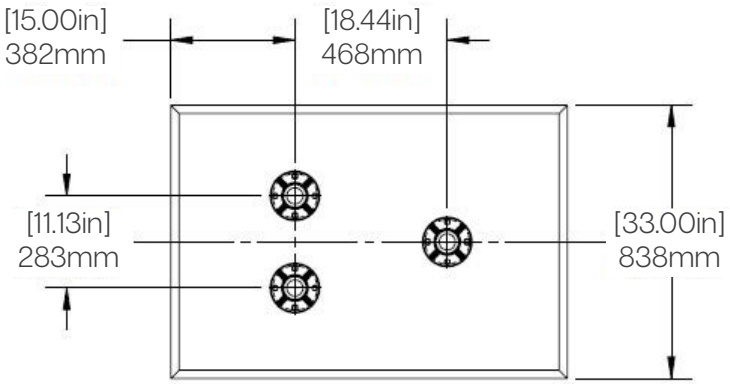
Tools Required (Not Supplied)	Quantity
#1 Phillips Screwdriver	1
#2 Phillips Screwdriver	1
Large Flat Bladed Screwdriver with 5/16" (8mm) tip	1
Small Flat Bladed Screwdriver with 1/8" (3mm) tip	1
3/16" Cabinet Tip Flat-Bladed Screwdriver	1
9/16" (15mm) Combination Wrench, socket, or adjustable spanner	1
3/4" (19mm) Combination Wrench, or adjustable spanner	2
3-3/8" (85mm) Capacity Adjustable Spanner or Pliers	1
10" Tongue and Groove Pliers	1
Wire Stripper(s) for use with 22 AWG (0.3mm^2) and 12 AWG wire (3.3mm^2)	1
Crimper for Insulated Terminals	1
Utility Knife	1
Electrical Tape	1
Hack Saw with Metal Cutting Blade	1
Hammer Drill	1
5/8" (16mm) Drill Bit for use with Hammer Drill	1
Multi-meter capable of measuring voltage and current	1
Conduit and fittings suitable for burying electrical conductors	As required

14.3 Site Requirements

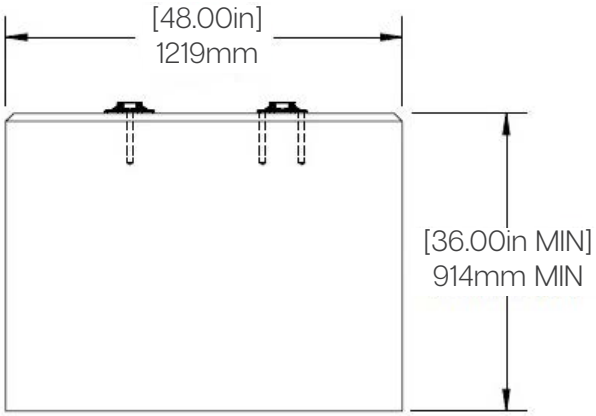
The length and width of the concrete pad should extend 12" [305 mm] beyond the LHA weather cover in all directions. The depth of the foundation shall be a minimum of 36" [914 mm] or 12" [305 mm] below the frost line, whichever is greater.

The distance between the two front supports is 11.13 inches.

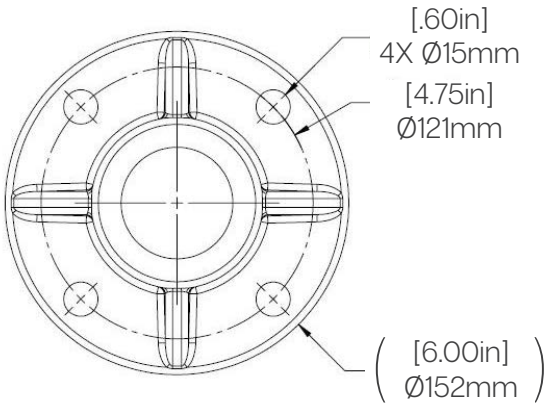
Aiming angle and location of the LHAs shall be as indicated on the runway plans or other contract documents.



Plan View Indicating The Distances Between The Three Front Legs Of The LHA



Elevation View

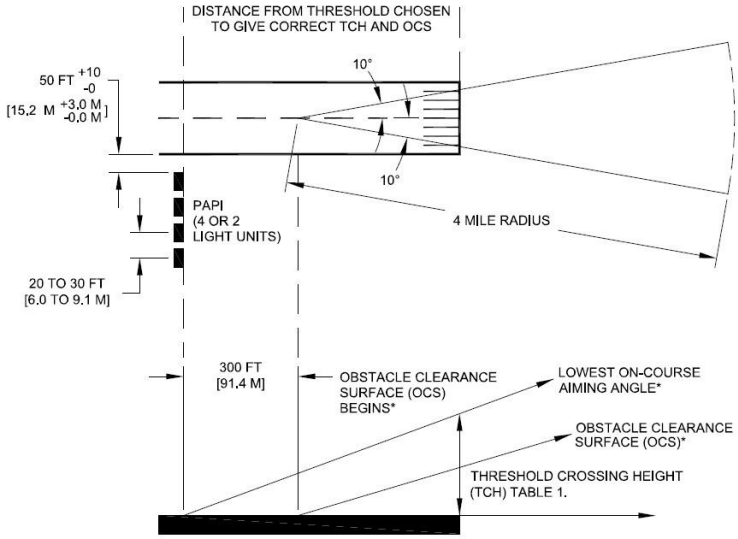


Plan View of Flanges

Position the AV-PAPI Series 3 near the runway in accordance with specifications from either FAA or ICAO. Refer to *Section 14.4 Positioning the LHAs* for more information. An example of typical placement involves positioning the AV-PAPI Series 3 to the left of the runway as seen by the approaching aircraft across from the touchdown zone. Location is determined based on:

- Aircraft type
- Runway grade
- Nominal glideslope angle
- LHA height above ground

Site requirements are more complex than shown in the following illustration. Aircraft type, grade of runway, and whether or not there is an Instrument Landing System (ILS) are just a few factors to consider. Additionally, there are different rules for general aviation runways used by non-jet aircraft.



PAPI OCS ANGLE = LOWEST ON-COURSE AIMING ANGLE - 1 DEGREE

The above diagram shows an example of a runway layout for placement of PAPI LHAs from FAA AC 150/5340-30D. **The installer is responsible for positioning the LHA in accordance with specifications from all appropriate regulatory agencies.**

NOTES: 1. The visual glide path angle is the center of the on-course zone, and is a nominal 3 degrees when measured from the horizontal surface of the runway.

A. For non-jet runways, the glide path may be raised to 4° maximum to provide obstacle clearance.

B. If the PAPI glide path is changed to a higher angle from the nominal 3°, it must be communicated in a notice to airman (NOTAM) and published in the airport facility directory.

2. PAPI Obstacle Clearance Surface (OCS).
    A. The PAPI OCS provides the pilot with a minimum approach clearance.
    B. The PAPI must be positioned and aimed so no obstacles penetrate its surface.
        i. The OCS begins 300 ft. in front of the PAPI system.
        ii. The OCS is projected into the approach zone one degree less than aiming angle of the third light unit from the runway for an L-880 system, or the outside light unit for an L-881 system.

14.4 Positioning the LHAs

Position the LHAs nearest the runway, with the front facing toward the approach end of the runway (the approach end is the end from which the aircraft will be coming). The sides of the LHA should be parallel to the runway at a distance from the runway as specified by the appropriate regulatory agency.

Ensure that the location of the first light head assembly (LHA-1) and tolerances on the placement of LHA-1 comply with the appropriate regulatory agency. For example, the tolerance on azimuthal aiming in UFC 3-535-01 and AC 150/5340-30D is ±0.5 deg. Adjust the incline angle of LHA-1 with the procedure in *Section 14.8, Aiming the Light Head Assemblies*. Note: standard FAA installation dictates that the LHA nearest the runway is set at an incline that is 30 arcminutes (0.5°) above the glide path within ±3 arcmin (0.05 deg).

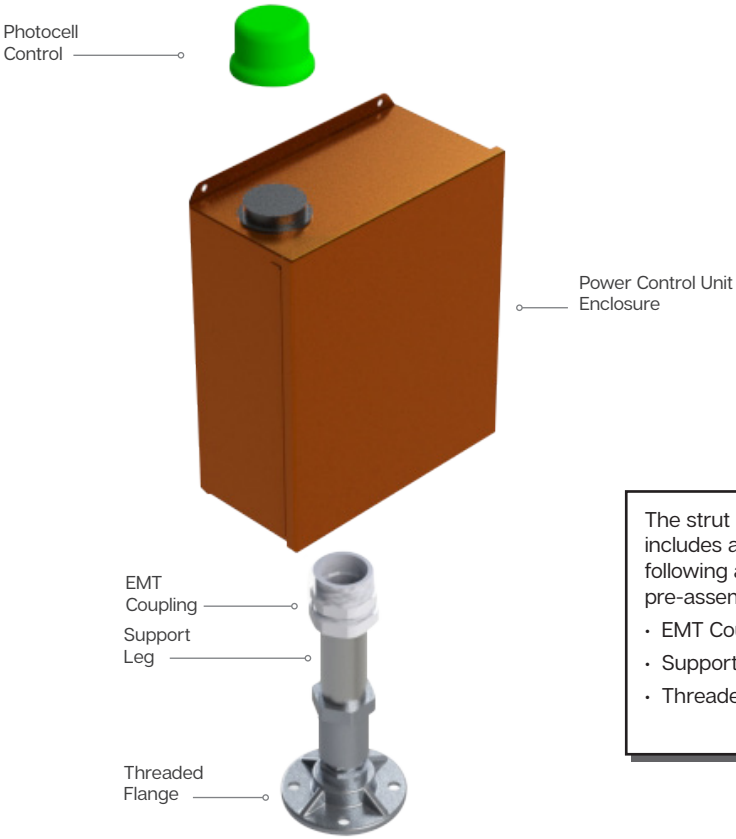
Place the second light head assembly (LHA-2) further from the runway edge than the first LHA, with its front facing towards the approach end of the runway and with its sides parallel to the runway at a distance from LHA-1 as specified by the appropriate regulatory agency. Ensure that the location and tolerances on the placement for LHA comply with appropriate regulatory agency regulations. For example, the tolerance on azimuthal aiming in UFC 3-535-01 and AC 150/5340-30D is ±0.5 deg and the beam centers for all of the LHA must be within ±1 inch of a horizontal plane. Adjust the incline angle of LHA-2 with the procedure in *Section 14.8, Aiming the Light Head Assemblies*, except that for a standard FAA installation, LHA-2 is set at an incline that is 10 arcminutes (0.17°) above the glide path within ±3 arcmin (0.05 deg).

Place the third and fourth light head assemblies further from the runway adjacent to LHA-2 and spaced with the same distance as between LHA-1 and LHA-2. The locations for LHA-3 and LHA-4 and tolerances on their placement must comply with the appropriate regulatory agency regulations. For example, the tolerance on azimuthal aiming in UFC 3-535-01 and AC 150/5340-30D is ±0.5 deg and the beam centers of all of the LHA must be within ±1 inch of a horizontal plane. Adjust the incline angle of LHA-3 with the procedure in *Section 14.8, Aiming the Light Head Assemblies*, except that for a standard FAA installation, LHA-3 is set at an incline that is 10 arcminutes (0.17°) below the glide path within ±3 arcmin (0.05 deg). Adjust the incline angle of LHA-4 with the procedure in *Section 14.8, Aiming the Light Head Assemblies,* except that for a standard FAA installation, LHA-4 is set at an incline that is 30 arcminutes (0.5°) below the glide path within ±3 arcmin (0.05 deg).

There must not be any obstructions in front of (towards the approaching aircraft) the four LHAs to ensure pilot has clear visibility (of LHA) on approach to landing. Obstruction clearances must comply with the appropriate regulatory agency. The ICAO standards contain an obstacle protection surface 0.9° below the aim angle of the outer (lower) LHA.

External Baffles (also known as Blanking Devices) are available to modify the horizontal light beam coverage of the PAPI for obstacle avoidance in the approach area. Refer to *Section 11.2, External Baffles*.

14.5 PCU Setup



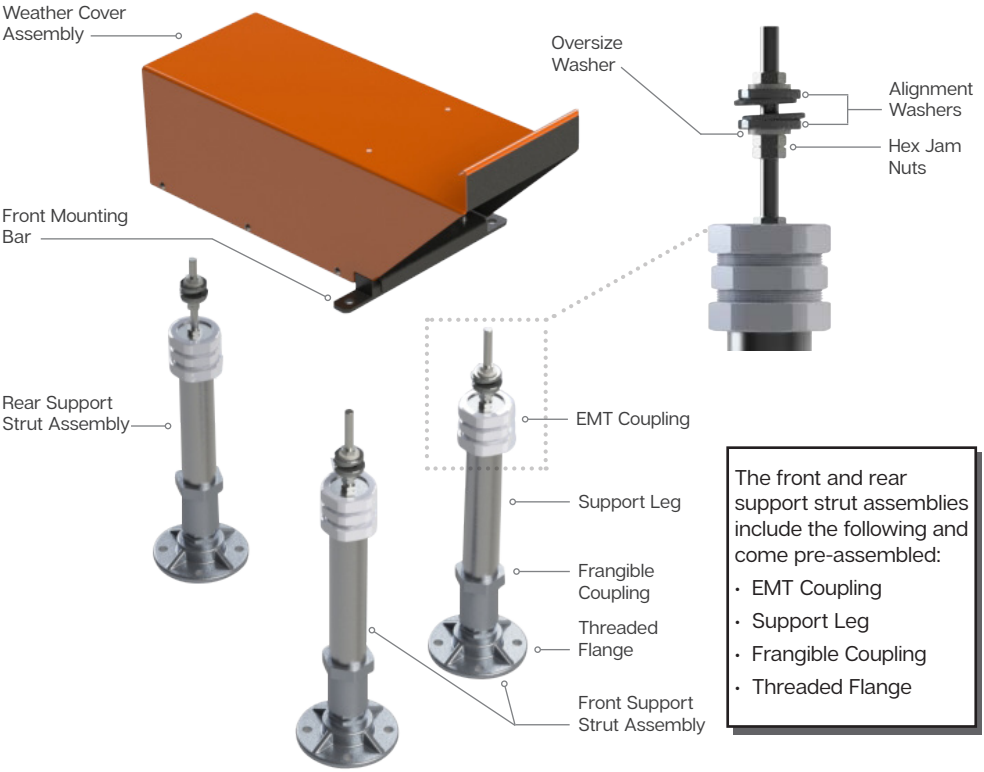
The strut assembly includes all the following and comes pre-assembled:

- EMT Coupling
- Support Leg
- Threaded Flange

1. Thread the strut assembly onto the PCU.
2. Install the PCU on a cement pad in accordance with FAA and ICAO regulations.
3. Enclose the input and output (red, black, and gray cables) cables in conduit.
4. Output from the PCU feeds to the junction box for the LHA positioned furthest from the runway. The wires from that LHA then feed to the next Junction box in the line.
5. Wire power and control in parallel.

14.6 Light Head Assembly (LHA) Setup

For permanent installation, mount each of the three LHA legs on concrete pads using frangible couplings, tubing, and threaded rod. Position the shorter leg on the rear flange and the longer legs on the front flanges. Use the following diagram to assemble the LHAs.



The front and rear support strut assemblies include the following and come pre-assembled:

- EMT Coupling
- Support Leg
- Frangible Coupling
- Threaded Flange

1. Using a 3/4 in. wrench, remove the top hex jam nuts, oversize washer, and alignment washers on each of the legs.
2. Position the bottom hex jam nuts, oversize washer, and alignment washers on the threaded rod on all three legs of each LHA near the middle of their adjustment range.
3. Orient each LHA so that the front (the side with the glass lenses) faces the approach end of the runway.
4. Lower the LHA housing onto the three sets of bottom hex jam nuts, oversize washers, and alignment washers on the threaded rods of the legs.
5. Install three other sets of hex jam nuts, oversize washers, and alignment washers onto the threaded rods.
6. Position each LHA on a line perpendicular to the runway centerline within ±6 in.

Fully assembled LHA (photo for demonstration purposes only)

14.7 Installation and Wiring of Junction Boxes

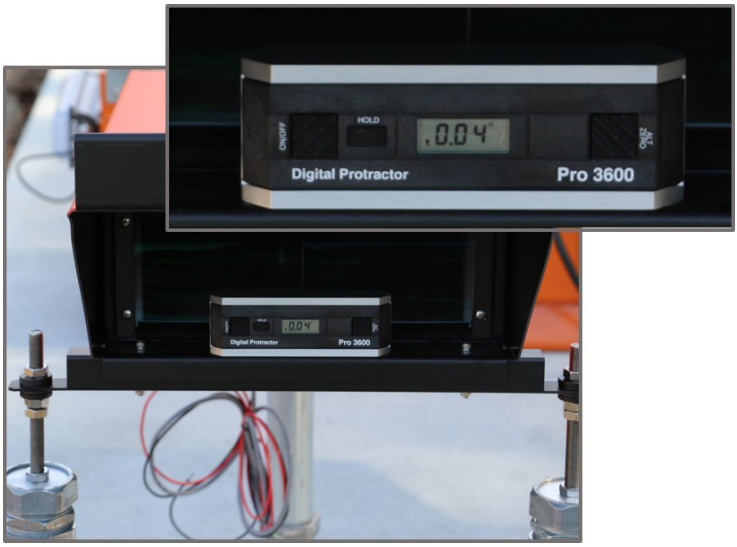
Wires from PCU				
Wire #	**Signal**	**Color**	**Size**	**Function**
1	24 VDC PWR	Red	12 AWG [3.3 mm^2]	Main DC Power Input
2	0 VDC PWR	Black	12 AWG [3.3 mm^2]	Main DC Power Ground Return
3	CAN_H	Red	22 AWG [0.3 mm^2]	High of the CAN Bus Signal Pair
4	CAN_L	White	22 AWG [0.3 mm^2]	Low of the CAN Bus Signal Pair
5	CAN_GND	Black	22 AWG [0.3 mm^2]	Ground Reference for the CAN Bus – Isolated From the Main DC Power Ground

A minimum 10 AWG wire must be used for 24VDC and 0VDC power wires between the LHAs and between the LHA and PCU. The PCU may be located a maximum of 100 feet [30 meters] from the nearest LHA.

14.8 Aiming the Light Head Assemblies

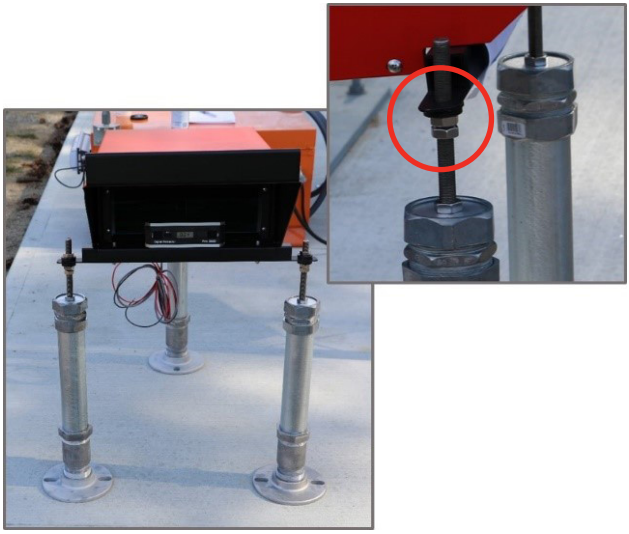
Follow these steps to set the LHA level side-to-side:

1. Center the inclinometer in the front of the base plate. If the optical head is dirty, clean the base plate in the spot where the inclinometer is placed.
2. Rotate the inclinometer so that it aligns with the front edge of the base plate, perpendicular to the runway direction.



Inclinometer positioned in the middle of the front of the base plate

3. Adjust the incline angle by turning the lower jam nuts on the threaded rods of the legs.



4. Use a 3/4 in. wrench to adjust the position of the jam nuts. To do this:
    a. Loosen all of the upper jam nuts.
    b. Adjust the leg height by turning the lower jam nuts adjacent to the spherical washers.
    c. Use the upper jam nuts to lock the position after the adjustment is complete.
5. Adjust one front leg shorter, and the other front leg longer until the inclinometer indicates level within ± 0.05° (3 arcmin).
6. Clean the inclinometer bracket.
7. Place the inclinometer on the top of the inclinometer bracket and tighten the thumb screws.

Inclinometer Positioned On Top Of The Inclinometer Bracket

8. Loosen the upper jam nut on the rear leg of the LHA.
9. Adjust the bottom jam nut on the rear leg of the LHA until the incline angle is proper according to the appropriate regulatory agency.
10. Set LHA-1 (nearest runway) to 3° 30 min.
11. Set LHA-2 (next adjacent) to 3° 10 min.
12. Set LHA-3 to 2° 50 min.
13. Set LHA-4 (outermost) to 2° 30 min.
14. Adjust until the inclinometer indicates the proper angle with ±0.05° (3 arcmin).

Inclinometer Incline Angles and Tolerances		
Position	**Incline Angle**	**Tolerance**
LHA-1	3° 30 min.	±0.05° (3 arcmin)
LHA-2	3° 10 min.	±0.05° (3 arcmin)
LHA-3	2° 50 min.	±0.05° (3 arcmin)
LHA-4	2° 30 min.	±0.05° (3 arcmin)

15. Move the inclinometer back to the position for measurement of the side-to-side level.
16. Repeat the level adjustment by moving one leg down and one leg up an equal amounts.
17. Move the inclinometer back to the inclinometer bracket.
18. If the incline angle has changed, repeat adjustment until properly set.
19. Continue adjustments until the incline angle and the side-to-side level are within tolerance.
20. Remove inclinometer from the optical head.

14.9 Focusing

Each LHA is focused at the factory. Focusing by the user is not possible.

14.10 Adjustment of Excessive Tilt Mechanism

The following procedure can only be performed successfully once the correct angle for each LHA has been determined and set in accordance to the desired glideslope angle.

Prior to aligning the Tilt Switch, ensure Tilt Switch Bypass on PCU is in the UP position.

Each LHA comes with a Tilt Switch, located in back of the bracket that holds the Inclinometer. This extinguishes the LEDs should LHA position be disturbed or changed. The Tilt Switch should be adjusted after LHAs are set at the correct angle.

To adjust Tilt Switch, loosen both screws that hold bracket and place digital inclinometer against bottom of Tilt Switch (see below photo).

NOTE: Inclinometer and Tilt Switch must be clean and free of debris to ensure accurate [tilt] angle is achieved.

The bracket can be rotated until the inclinometer reads 0 degrees. It may be necessary to tap the switch several times when in final position to settle the contact mercury. Recheck angle to verify position is correct.

Once the tilt switches in all the LHAs have been set in place, flip the “Tilt Switch Bypass” switch on the

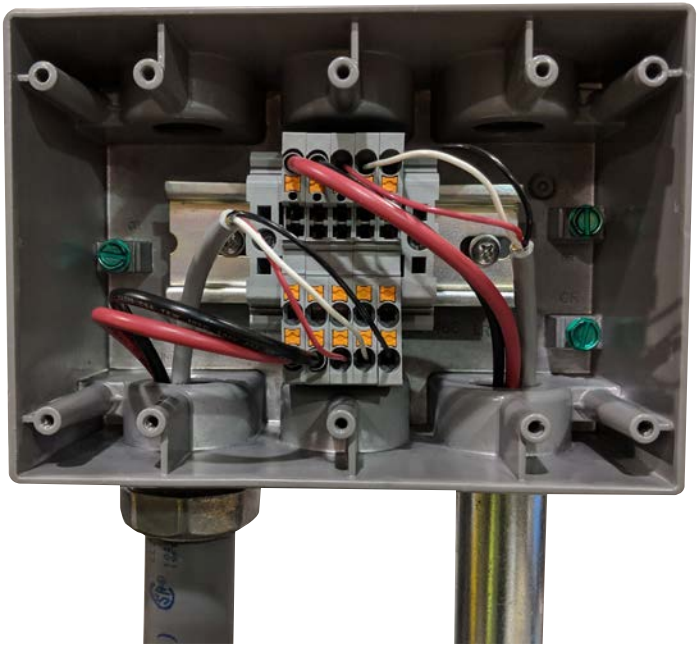
controller to the “down” position. The tilt switch circuit can now disable the PAPI if one or more LHAs deviate from the correct angle.

NOTE: The “closed” range of the tilt switch is within the angular range of +0.5 degrees and -0.25 degrees. A small deviation within this range will not affect functionality.

14.11 Connecting Power Cables

Flexible conduit (included) should be used to protect the wires exiting the LHA from environmental interference; a receptacle for conduit has been incorporated into the bottom of the LHA for ease of use and access.

The PCU includes two sets of 6 ft. wire pigtails: one for power, and one for control. When viewing the PCU from the front, the input is on the left, and the output is on the right. Junction boxes, carring power and signal lines from the PCU to the LHA, should be mounted securely to concrete pad.



LHA to PCU Connection

14.12 Connecting to AC

Follow these steps to connect to AC:

1. Use exactly the same gauge and color coding for the output wires as the input wire bundle.
2. White, black and green 12g wires to connect to AC.
3. Route through flexible conduit to customer provided junction box or base can.
4. Make connection per graph below.

Wire #	Signal	Color	Size	Function
1	Line 1	Black	12 AWG [3.3 mm^2]	AC Conductor
2	Line 2 or Neutral	White	12 AWG [3.3 mm^2]	AC Conductor
3	Ground	Green	12 AWG [3.3 mm^2]	Protective Earth Ground

AC Connection Wires From PCU

14.13 DC PCU Power Input

Follow these steps to connect cables from a power supply to the PCU:

1. Connect the positive 24 VDC prime power from a regulated 24 volt power source to the 10 gauge red wire at the PCU input.
2. Connect the negative of the 24 volt prime power source to the 10 gauge black wire of the PCU input.

Setting up solar power supply is covered in *Section 14.16, Option: When Connecting to Solar Power.*

NOTE: The power connections are distinguished by the larger diameter of the wire, and the fact that they are individual wires and not part of a cable bundle.

3. Connect the input remote signal to the signal input of the PCU.
   The signal input is a single cable with three (3) individual wires contained within it.
   These are all 22 gauge wires and they are color coded.

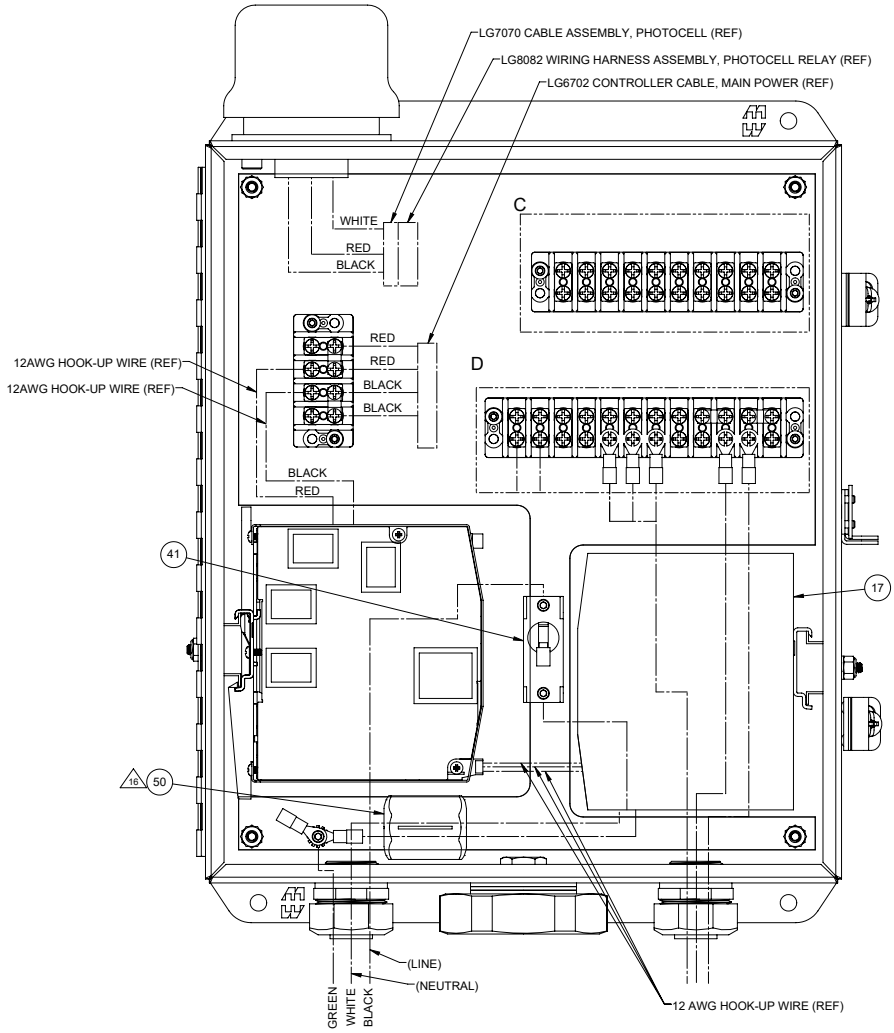
Wire #	Signal	Color	Size	Function
1	24 VDC PWR	Red	12 AWG [3.3 mm^2]	Main DC Power Input
2	0 VDC PWR	Black	12 AWG [3.3 mm^2]	Main DC Power Ground Return
3	CAN_H	Red	22 AWG [0.3 mm^2]	High of the CAN Bus Signal Pair
4	CAN_L	White	22 AWG [0.3 mm^2]	Low of the CAN Bus Signal Pair
5	CAN_GND	Black	22 AWG [0.3 mm^2]	Ground Reference for the CAN Bus – Isolated From the Main DC Power Ground

14.14 PCU Radio Connections

To allow for remote control of the PAPI, the PCU may be controlled by an existing Pilot Activated Lighting Controller (PALC) L-849.

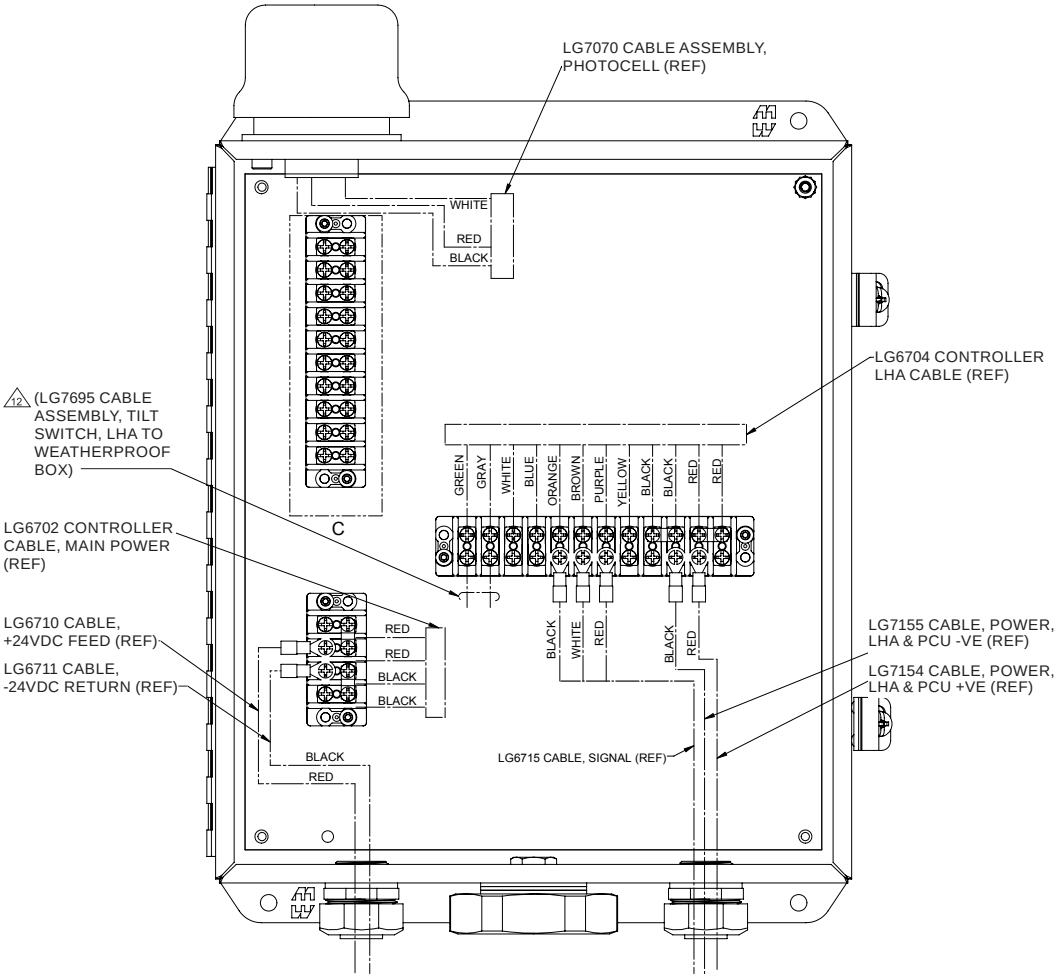
The connections should be made on terminal block.

Wire #	Signal	Color	Size	Function
1	24 VDC PWR	Red	18 AWG [0.82 mm^2]	Main DC Power Input
2	0 VDC PWR	Black	18 AWG [0.82 mm^2]	Main DC Power Ground Return
3	Level 1	Brown	18 AWG [0.82 mm^2]	
4	Level 2	Orange	18 AWG [0.82 mm^2]	
5	Level 3	Yellow	18 AWG [0.82 mm^2]	
6	Level 4	Blue	18 AWG [0.82 mm^2]	
7	Level 5	Purple	18 AWG [0.82 mm^2]	
8	-	-	-	Not Connected
9	-	-	-	Not Connected



SOME COMPONENTS REMOVED FOR CLARITY

AC PCU Shown



SOME COMPONENTS REMOVED FOR CLARITY

DC PCU Shown

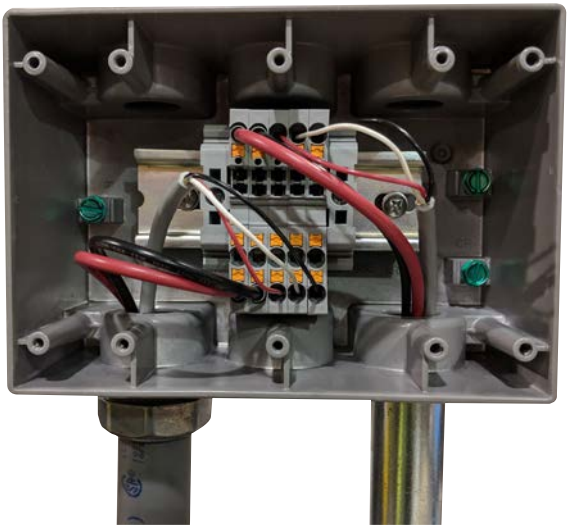
14.15 PCU Output to LHA

Follow these steps to connect cables from the PCU to the LHA:

1. Use exactly the same gauge and color coding for the output wires as the input wire bundle.
2. Use flexible conduit to enclose the output wire set and terminate it in the first junction box.

3. Mount the junction box on fixed conduit with the flex conduit terminated on one of the lower entrances to the junction box.

NOTE: Each junction box contains a terminal strip for connecting power and signal wires. Signal wires are connected starting on the left side, and the power wires are connected starting starting on the right side. Refer to table in *Section 14.7* for color scheme.



Fully Wired Junction Box

4. Feed the 6 ft. pigtail through the flexible conduit and terminate it at the junction box.
5. For all but the last LHA in the train, double-tap the input power and signal to the junction box to provide signal and power to the next LHA. These terminate on the lower part of the terminal strip.
6. Terminate the wires from the LHA using the same color and gauge coding from below on the upper part of the strip.

Example Of An Installed LHA

14.16 Option: When Connecting to Solar Power

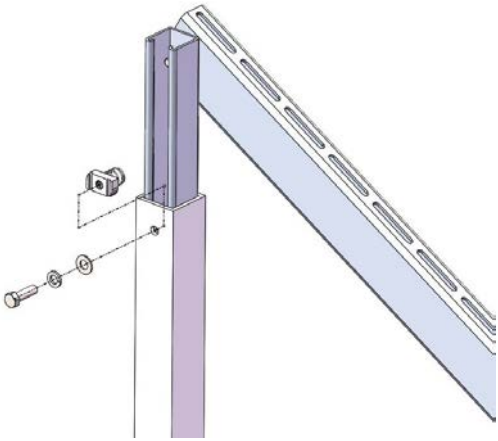
Orient the solar panels facing toward the equator.

Inclination	
Site Latitude	**Near Optimum Solar Module Inclination Angle**
0-9°	15°
10-20°	Latitude +5°
21-45°	Latitude +10°
45-55°	Latitude +15°

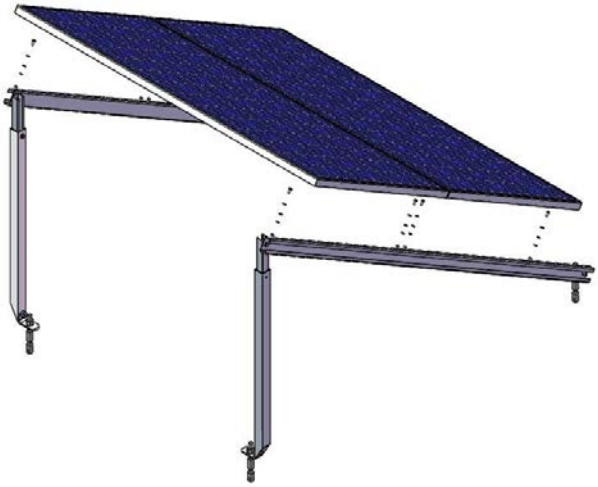
14.16.1 Assembling the Solar Panels

Apply anti-seize to all fastener threads before assembly.

1. Assemble solar panel brackets according to the photo above, using a 1/2 in. and 9/16 in. combination wrench and sockets.



2. Insert the spring nut into the channel and rotate to lock in place.
3. Install fastener into spring nut.



4. Insert the spring nut into the channel and rotate to lock in place.
5. Install fastener into spring nut and torque to 12 ft*lb.
6. Mount solar panels on brackets. Torque the fasteners to 7 ft*lb.
7. Secure the solar panels to the concrete pad using supplied frangible bolts.
8. Feed the pigtail of wires hanging from the solar battery box into a piece of flexible conduit and connect it to the bottom of the solar combiner.
9. Feed the wiring from the last junction box into flexible conduit and connect it to the back of the solar battery box.

PAPI Solar Battery Supply Comes Pre-Wired Wth 6 ft. Pigtail

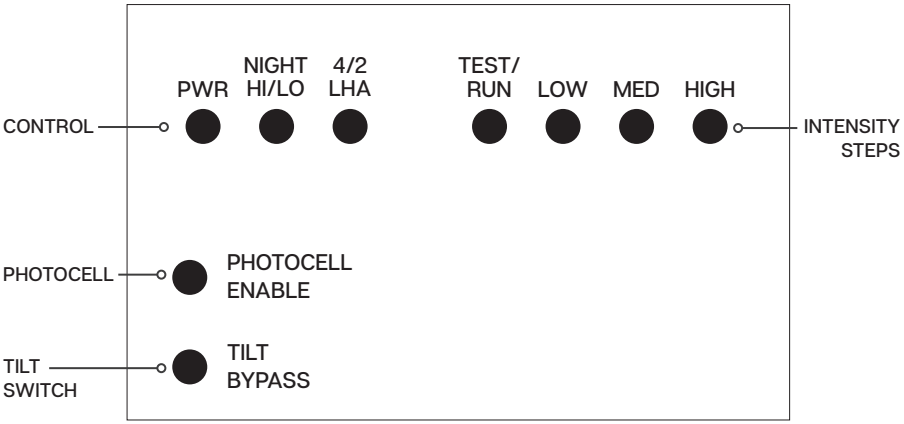
10. Flip the two battery breakers located in the right group first.
11. Flip the other four breakers (three to the left, and the remaining one to the right).

Completed Solar Power Installation for 2 or 4 LHAs

15 - Operation

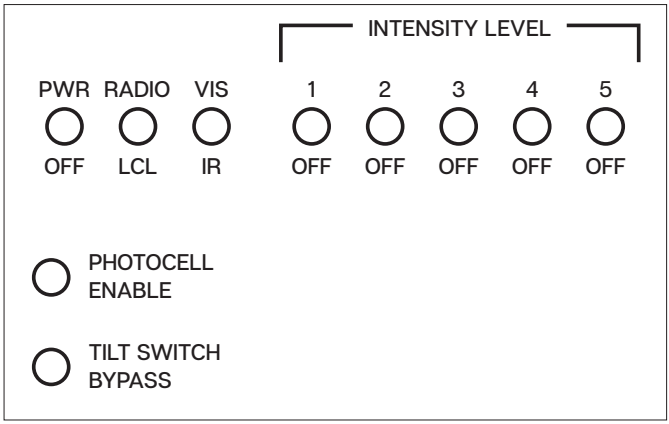
15.1 PCU Switches - FAA and ICAO Versions

The PCU control panel includes nine (9) toggle switches. The three switches on the top left are for control. The next four (4) toggle switches are used to select the intensity step. The toggle switch on the left side below the top row enables or disables autonomous photocell operation. The toggle switch on the bottom enables/disables the tilt switch. If an optional feature is not installed (e.g. IR or tilt switch) that opening in the control panel is plugged or does not appear.



Control Panel: FAA Version

Toggle Switches - FAA Control Panel	
PWR / Off	Turns the system On/Off. When toggled **off**, no power is supplied to the LHAs, and the PCU does not receive radio remote control signals.
NIGHT HI / LO	Selects the NIGHT mode intensity for photocell operation. Low is 5% High is 20%.
4 / 2 LHA	Selects whether the system is a 4 box or 2 box.
TEST / RUN	Switches the system to manual control for diagnostic purposes.
LOW	The LOW Intensity switch sets the LHA to 5% intensity in TEST mode.
MED	The MED Intensity switch sets the LHA to 20% intensity in TEST mode.
HIGH	The HIGH Intensity switch sets the LHA to 100% intensity in TEST mode.
PHOTOCELL ENABLE	If the PHOTOCELL ENABLE switch is toggled **up**, the LHA intensity is set by the ambient light. 100% intensity level for day and a lower intensity at night. Night time intensity is selected by the NIGHT HI/LO switch. When the photocell switch in the PCU is toggled down, the system will operate based off radio (PALC) input.
TILT BYPASS	When the TILT BYPASS switch is toggled down, the tilt switch is enabled. When the tilt switch is enabled, the PCU will turn off all power to both LHA if any LHA becomes misaligned at an incline angle greater than 0.5°.



Control Panel: ICAO Version

Toggle Switches - ICAO Control Panel	
PWR / Off	Turns the system On/Off. When toggled **off**, no power is supplied to the LHAs, and the PCU does not receive radio remote control signals.
RADIO / LCL	When in LCL, this allows the use of the 5 intensity level toggle switches
VIS / IR	Selects between visual and covert IR modes (if optioned)
INTENSITY LEVEL 1	Selects intensity level 1
INTENSITY LEVEL 2	Selects intensity level 2
INTENSITY LEVEL 3	Selects intensity level 3
INTENSITY LEVEL 4	Selects intensity level 4
INTENSITY LEVEL 5	Selects intensity level 5 (100%)
PHOTOCELL ENABLE	When Up, the photocell is enabled and will automatically switch between Step 5 during the day and Step 3 at night. When Down, the system will accept remote commands via PALC or AvMesh radio.
TILT SWITCH BYPASS	When the TILT BYPASS switch is toggled down, the tilt switch is enabled. When the tilt switch is enabled, the PCU will turn off all power to the system if any LHA becomes misaligned by an angle greater than 0.5°.

15.2 PCU Manual Operation - FAA and ICAO Versions

FAA Version

Toggle the Test/Run switch to the **Test** position to manually operate the PCU.

NOTE: If all of the intensity level switches are toggled to the **off** position, then no signal emanates from the LHA. If the Test/Run switch toggled to the Test position, the operating mode is selected from the optional radio remote control transmitter.

Operating the PCU

1. Before operating the PCU, verify that the power switch is toggled to the **off** position.
2. Toggle the Test/Run switch to the **Test** position.
3. Toggle all of the intensity step switches to **off** position.
4. Toggle the Power toggle switch to the **Power** position.
5. Toggle one of the intensity switches to the **up** position. If more than one of the intensity step toggle switches is in the **on** position, then the LHA will operate at the highest step that is switched to the **on** position.

L-854 Radio Control Equipment

Toggle the Test/Run switch to the **Test** position. The PCU is controlled by the commands from the radio source. Refer to *Section 14.14, PCU Radio Connections* for wiring instructions.

Avlite Radio Remote Control

Refer to the *AV-426-RF Radio-Controlled Solar Aviation Light Installation and Service Manual* to read about operating the radio controller used for the AV-PAPI system. The manual can be downloaded off the Avlite website here: https://www.avlite.com/product/av-426-radio-controlled-solar-aviation-light/.

NOTE: The Avlite RF Radio Control Group Number must be specified when ordering the AV-PAPI. If using a hard wired control system configuration, instructions for operation will depend on the existing control system.

ICAO Version

Toggle the Radio/Local switch to the **Local** position to manually operate the PCU.

NOTE: If all of the intensity level switches are toggled to the **off** position, then no signal emanates from the LHA. If the Radio/Local switch toggled to the Radio position, the operating mode is selected from the optional radio remote control transmitter.

Operating the PCU

1. Before operating the PCU, verify that the power switch is toggled to the **off** position.
2. Toggle the Radio/Local switch to the **Local** position.
3. Toggle all of the intensity step switches to **off** position.
4. Toggle the Power toggle switch to the **Power** position.
5. Toggle one of the intensity switches to the **up** position. If more than one of the intensity step toggle switches is in the **on** position, then the LHA will operate at the highest step that is switched to the **on** position.

L-854 Radio Control Equipment

Toggle the Radio/Local switch to the **Radio** position. The PCU is controlled by the commands from the radio source. Refer to *Section 14.14, PCU Radio Connections* for wiring instructions.

Avlite Radio Remote Control

Refer to the *AV-426-RF Radio-Controlled Solar Aviation Light Installation and Service Manual* to read about operating the radio controller used for the AV-PAPI system. The manual can be downloaded off the Avlite website here: https://www.avlite.com/product/av-426-radio-controlled-solar-aviation-light/.

NOTE: The Avlite RF Radio Control Group Number must be specified when ordering the AV-PAPI. If using a hard wired control system configuration, instructions for operation will depend on the existing control system.

16 - Functional System Tests

Follow these steps to perform a full functional system test on one LHA:

Prior to Installation

Follow these steps to verify that the system powers on as expected:

1. Move the LHA to a work area. If the LHAs are dirty, rinse them by spraying clean water and wiping off any debris with a cloth.
2. Set up the LHA and the PCU as explained in *Section 14.8, Aiming the Light Head Assemblies.*
3. Connect the PCU to power and verify the system powers on.

Manual Operation - FAA Version

Follow these steps to perform a functional system test:

1. On the PCU, toggle the Test/Run switch to the **Test** position.
2. Toggle the Tilt Bypass Switch to the **up** position.
3. Toggle the Intensity High switch to the **up** position to operate the system in full intensity mode.
4. Stand in front of an LHA and place a diffuse reflective surface in front of the weather cover to see the reflection of the beams. The surface can be a piece of paper, cardboard or clothing. Verify that white light is emitted from the top row and red light is emitted from the bottom row.
5. Observe the intensity of the light on the reflective surface. Toggle the High switch to the off position and the Medium switch to the on position.
6. Toggle the Medium switch to off and the Low switch to on.
7. Repeat these steps to check the operation of each LHA in the same manner.

Manual Operation - ICAO Version

Follow these steps to perform a functional system test:

1. On the PCU, toggle the Radio/Local switch to the **Local** position.
2. Toggle the Tilt Bypass Switch to the **up** position.
3. Toggle Intensity Level switch 5 to the **up** position to operate the system in full intensity mode.
4. Stand in front of an LHA and place a diffuse reflective surface in front of the weather cover to see the reflection of the beams. The surface can be a piece of paper, cardboard or clothing. Verify that white light is emitted from the top row and red light is emitted from the bottom row.
5. Observe the intensity of the light on the reflective surface. Toggle the Intensity Level switch 5 to the OFF position and the Intensity Level switch 4 to the **up** position. The intensity of the white and red beams should be at 20%.
6. Repeat these steps for each intensity level, confirming the remaining 4%, 0.8%, and 0.16% levels.
7. Repeat these steps to check the operation of each LHA in the same manner.

17 - Maintenance

Disconnect all power to equipment before servicing. All maintenance should be performed by qualified personnel familiar with Airfield Ground Lighting. Ideally, all maintenance tasks that require the Optical Housing or Electrical Enclosure to be opened should be performed in a clean, dry, dust free environment.

17.1 Cleaning the Lens

Dusty environments may require periodic cleaning of the LHA lens.

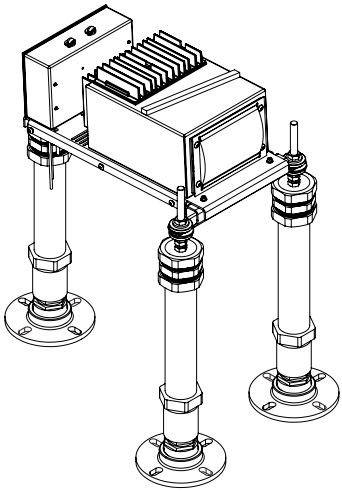
1. Access LHA lens through the front, under the weather cover.
2. Use a clean, soft, lint-free cloth or lens tissue to clean the outer surfaces. Reach in to clean the lens.
3. Wipe using a downward motion, lifting the cloth from the lens surface before repeating the wiping motion. This accumulates the dirt and debris at the bottom of the lens where it cannot affect the beam.
4. Apply only **light** pressure when cleaning as grit may scratch surfaces.
5. You can also spray clean water on the outer surfaces of the lens. Use a clean, soft, lint-free cloth or lens tissue to clean the outer surfaces of the lenses and wipe off of the lenses.
6. If the front surfaces of the lenses are very dirty, you can use lens cleaner fluid. Spray or pour a small amount of lens cleaning fluid on clean lens tissue or piece of soft cloth, then wipe the lenses in a downward motion, as previously explained.
7. Take another piece of clean, dry lens tissue or soft cloth and wipe the residual lens cleaner fluid off lenses with the same downward motion as previously discussed.

NOTE: It is important not to scratch the outer surface of the lenses or leave residue that attracts dust or dirt.

17.2 Removing the LHA Weather Cover

Many maintenance or repair tasks require the removal of the weather cover. Follow these steps to remove the LHA weather cover:

1. Use a #2 Phillips screwdriver to remove the four truss head machine screws along the bottom rear panel of the LHA weather cover.
2. Remove four truss head machine screws along the bottom of each side of the weather cover. Save these twelve (12) screws in a clean, safe place.
3. Slide the weather cover back slightly, then lift the weather cover straight up until it clears the optical assembly. Set the weather cover away from the remainder of the LHA.
4. Installation is the reverse of assembly.



The illustration above shows the isometric wireframe drawing of the PAPI LHA with the weather cover removed. The front of the PAPI is on the right. The optical enclosure is towards the front. The power circuit board is located in the enclosure at the rear of the LHA.

17.3 Re-Lamping Procedure

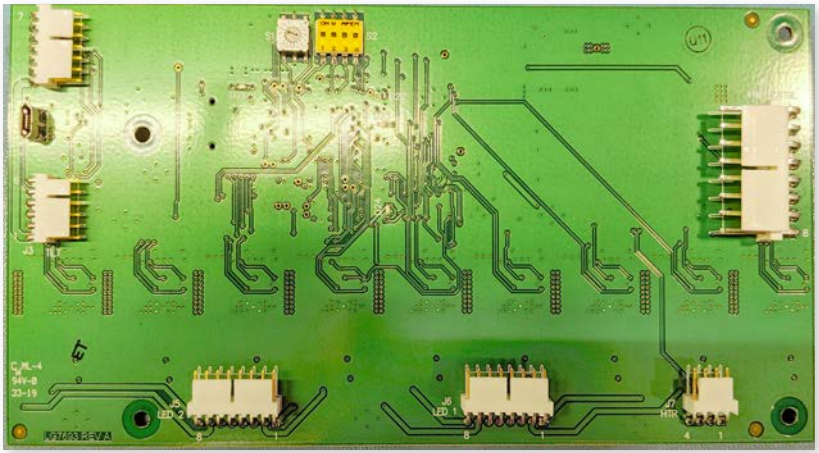
The re-lamping procedure is the same for both the red and white LED modules. The red LED module is located on the back of the optical housing, and the white is located on the top.

1. Turn off the system and disconnect from power.
2. Remove weather cover on the Light Head Assembly.
3. Remove the wire to board connectors by gently pulling on the wires.
4. Mark the position of the edges of the heat sink relative to the optical head so that the replacement module may be located in the same position.
5. Remove the six (6) screws securing the heat sink using a #1 Phillips screwdriver.
6. Install the wire to board connector, the connector is keyed to prevent incorrect orientation. During installation, gently apply pressure to the opposite side of the PCB header while inserting the connector from the back side of the heatsink. To ensure the connector is seated properly, apply gentle pressure to the connector housing using a small flat bladed screwdriver until you feel it bottom out after the detent.
7. If necessary, the gasket between the optical housing and heat sink may be replaced at this time.
8. Position the replacement LED module on the gasket.

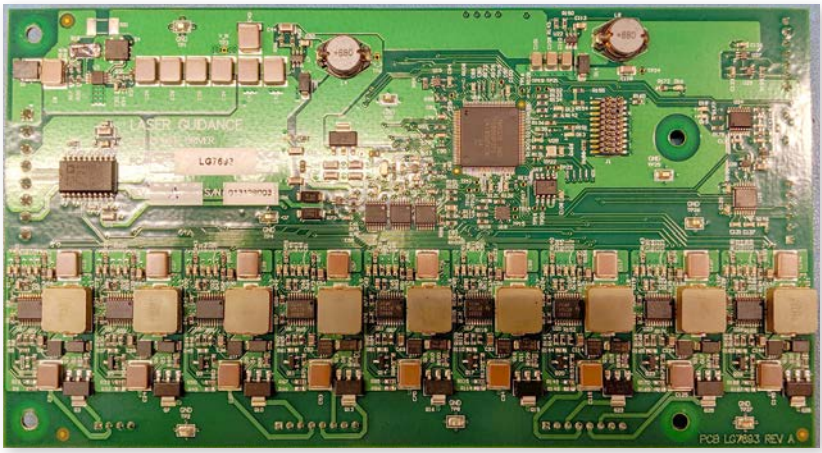
17.4 LHA Driver Board Replacement

The LED driver board is serviced as a complete assembly. When ordering a replacement, please provide the complete AV-PAPI system part number with options codes and serial number so that the correct firmware can be installed before dispatch.

1. Toggle the Power switch on the PCU control panel to the **off** position.
2. Disconnect the LHA cable at the PCU.
3. Remove the LHA weather cover.
4. Remove the 8 SHCS and flat washers from the perimeter of the top of the aluminum enclosure that is mounted in the rear left side of the LHA base plate. Remove the top cover of the box. Store these eight (8) socket head cap screws, eight (8) flat washers, and the cover in a clean, dry place.
5. With a ¼-inch wrench, remove the five (5) nylon insert locknuts that hold the PCB to the stand-offs.
6. Store the five (5) locknuts in a clean, dry place.
7. Mark the Molex connectors to indicate the location and orientation relative to the PCB.
8. Carefully lift the circuit board and remove the Molex connectors from the PCB.
9. Obtain a replacement LHA power control board from Avlite.
10. Insert the Molex connectors in the same location and orientation on the PCB.
11. Verify that the Molex connectors are fully engaged to the PCB.
12. Carefully install the PCB onto the stand-offs and secure the PCB to the standoffs with the six (6) nylon insert locknuts.
13. Install the cover of the box and secure with its SHCS and flat washers.
14. Re-install the weather cover.



LHA PCB Front View

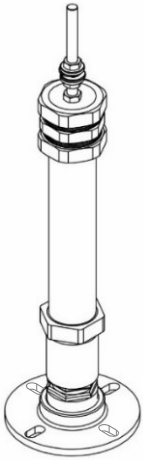


LHA PCB Back View

17.5 Support Strut Assembly Replacement

Toggle the Power switch on the PCU control panel to the **off** position.

1. Disconnect the LHA cable at the PCU.
2. Loosen and remove the upper jam nuts and spherical washers on each of the 3 legs.
3. Place the jam nuts and spherical washers in a clean, dry location.
4. Remove the LHA from the legs by lifting upwards.
5. Observe the distance from the bottom of the lower jam nut to the top of the support column adapter.
6. Remove the damaged leg assembly by rotating the frangible coupling counterclockwise out of the flange using an adjustable wrench on the flats of the frangible coupling near the bottom of the assembly.
7. Replace the damaged leg with a new Support Strut Assembly by screwing the Support Strut Assembly into the flange using the adjustable wrench on the flats of the frangible coupling.



Front Support Strut Assembly

8. Remove the upper jam nut and spherical washer from the new leg.
9. Set the bottom of the lower jam nut at the same distance from the top of the support column adapter as was measured before removing the damaged leg.
10. Install the LHA on the three legs.
11. Install the upper spherical washers and upper jam nuts on each of the legs.
12. Set the alignment of the LHA.

18 - Troubleshooting

Problem	Possible Cause	Solution
No light emitted from LHA	Local/Radio switch toggled to Radio position	Verify that the Local/Radio switch is toggled to the Local position.
	Infrared/Visible switch toggled to Infrared position.	Verify that the Infrared/Visible switch is toggled to the Visible position.
	Intensity switches toggled off when the Local/Radio switch is in the Local position.	Verify that at least one intensity switch is toggled to the up position.
	Break in cabling between the PCU and the LHA.	Check cables using a multi-meter to verify 24 VDC at the input to the PCU.
	Break in cabling between the LHA and the junction box.	Check cables using a multi-meter to verify 24 VDC at each junction box.
	 If there is still no light emitting from the LHAs, contact Avlite to speak to a technician.	
No light emitted using solar power option	Batteries not charged.	1. Determine if the battery bank is charged by connecting the charging cord to the battery box and a known working source of AC power. 2. If the PAPI operates then the batteries were discharged. 3. Allow sufficient time for batteries to charge.
	No Voltage	1. Disconnect the cable connecting the battery box to the PCU and use a multi-meter to check the voltage at the output connector for each battery box. It should be a nominal 24 VDC, which can be between 22 AND 28.8 VDC depending on the state of the charge. 2. If the voltage is zero, open the top of the battery box and check the circuit breaker. 3. Reset the circuit breaker and verify that the switch is toggled **on.**
		1. Disconnect the battery box to PCU cable at the PCU and check the voltage at the end of each cable. The voltage should be nominal 24 VDC. 2. If there is voltage at the BBA and not at the end of the cable, the wrong cable end was connected to the battery box, the connector was not fastened properly, or the cable is defective and must be replaced.

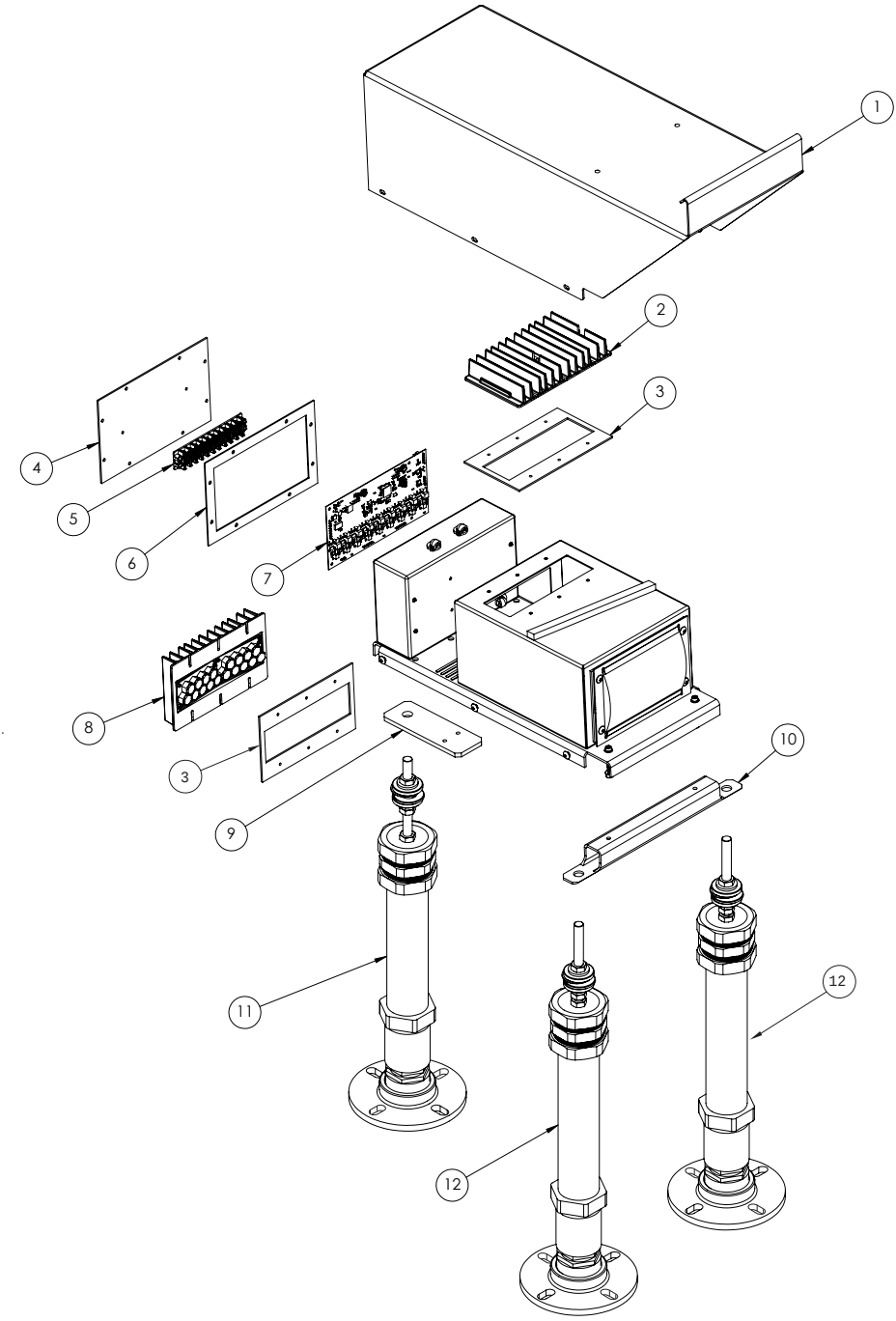
Problem	Possible Cause	Solution
		1. If cables work as expected, re-connect the battery box to PCU cable. 2. Operate the PCU in manual mode. Verify that the Radio/Local switch in the control panel is toggled to the Local position. 3. If none of the LHAs are functioning in any mode, disconnect the cable connecting the PCU to the LHA and check the voltage across pins A and B of the connector. 4. The voltage should be nominal 24 VDC. If there is no voltage from the PCU, verify that the cables are properly connected.
	Break in cabling between PCU and LHA.	1. Disconnect the PCU to LHA cables at the LHA. 2. Check the voltage across pins A and B. The voltage should be a nominal 24 VDC. If there is voltage at the PCU and not at the end of the cable, the wrong cable end was connected to the PCU or the cable is defective and must be replaced. 3. Reconnect the PCU to LHA cables.
One LHA does not emit light	Bad cables	1. Toggle the Power switch on the control panel to the **off** position. 2. Disconnect the LHA cable at the PCU. 3. Remove the weather cover. Check all of the connections to the receptacles on the PCB enclosure and verify that they are not loose and that all of the screws are tight. 4. Remove the 8 SHCS and flat washers from the top of the aluminum enclosure that is mounted in the rear of the LHA base plate. 5. Remove the top cover of the box. 6. Store the screws, washers, and cover in a clean, dry place. 7. Use a multi-meter to check all of the connections to the LHA power control board. 8. Replace any defective cables.
	Bad connectors	If all of the connections are good, use the multi-meter to check the cable continuity.
	Bad LHA power control board	If the cable continuity is good, the most likely cause is LHA PCB failure. Replace the PCB in the non-functioning LHA.

Problem	Possible Cause	Solution
Non-functioning LHA does not emit white light	Connector	1. Remove the weather cover. 2. Verify that the connector to the non-functioning White LED Array is properly connected.
	White LED Array PCB	If the connector is properly connected, and the issue still persists, replace the White LED Array PCB.
	LHA PCB	If the LHA still does not emit white light, replace any of the LHA PCB.
White LED Array (one side)	Connector	Check the connector to the non-functioning side and verify that it is properly connected.
	White LED Array PCB	If the cable is properly connected, and the problem still persists, replace the White LED Array PCB.
	LHA PCB	If the issue still persists after replacing the White LED Array PCB, replace the LHA PCB.
White LED modules do not change brightness when switching between the intensity levels, but still emit white light		Return PCU to Avlite for repair.
Red LED Array	Connector	1. Remove the weather cover. 2. Verify that the connector to the non-functioning red LED Array is properly connected.
	Red LED Array PCB	If the connector is properly connected, and the issue still persists, replace the red LED Array PCB.
	LHA PCB	If the issue still persists after replacing the red LED Array PCB, replace the LHA PCB.
Red LED Array (one side)	Connector	Check the connector to the non-functioning side and verify that it is properly connected.
	Red LED Array PCB	If the cable is properly connected and the problem still persists, replace the red LED Array PCB.
	LHA PCB	If the red LED Array PCB has been replaced and the issue still persists, replace the LHA PCB.
Red LED Modules do not change brightness when switching between the intensity levels, but still emit red light		Return PCU to Avlite for repair.

19 - Replacement Parts

Please call a local Avlite distributor if replacement parts are required. Perform parts replacement in a clean, dry environment whenever possible.

For greatest safety, it is recommended that all power to the PCU be disconnected along with the LHA cable. However, parts in an LHA can be replaced when the Power switch on the PCU control panel is toggled to the **off** position.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Parts List							
Find No.	**Part Name**	**Part Rating**	**Length (in.)**	**Width (in.)**	**Height (in.)**	**Manufacturer**	**Part No.**
1	Weather Cover Assembly, PAPI Series III	-35°C to 55°C	24.5	9	10	Avlite Systems	AV-SP-LG7179*
2	Heatsink Assembly, LED Array, White, PAPI Series III	-35°C to 55°C	7	4.15	1.13	Avlite Systems	AV-SP-LG7186
3	Gasket, Heatsink, PAPI Series III	-35°C to 55°C	7	4.15	0.093	Avlite Systems	AV-SP-LG7751
4	Cover, Control Box, Electrical Components, PAPI Series III	-35°C to 55°C	8.21	5.25	0.09	Avlite Systems	AV-SP-LG7183
5	Terminal Block, 10 Circuit	-35°C to 55°C 300V AC/DC, 20 A	5.13	1.13	0.53	Marathon Special Products	671 RZ 10
6	Gasket, Control Box, Electrical Components, PAPI Series III	-35°C to 55°C	8.21	5.25	0.06	Avlite Systems	AV-SP-LG7184
7	PCB Assembly, PAPI Series III Driver	-35°C to 55°C	7.5	4	0.7	Avlite Systems	AV-SP-LG7944
8	Heatsink Assembly, LED Array, Red, PAPI Series III	-35°C to 55°C	7	4.15	1.13	Avlite Systems	AV-SP-LG7185
9	Mounting Bar, Rear, PAPI Series III	-35°C to 55°C	5.81	2	0.25	Avlite Systems	AV-SP-LG7191
10	Mounting Bar, Front, PAPI Series III	-35°C to 55°C	12.75	1.25	1.25	Avlite Systems	AV-SP-LG7902
11	Rear Support Strut Assembly, PAPI, Fixed Mount	-35°C to 55°C	22.04	6.25	6.25	Avlite Systems	AV-SP-LG6777
12	Front Support Strut Assembly, PAPI, Fixed Mount	-35°C to 55°C	23.29	6.25	6.25	Avlite Systems	AV-SP-LG6776
-	Frangible Coupling 2" Thread For 2" EMT	-35°C to 55°C	5.37	3.05	2.71	Airport Lighting Company	#59-E

*Note: Specify color when ordering.

20 - Warranty

Refer to Avlite website: www.avlite.com

21 - Customer Feedback

Thank you for your purchase.
We welcome your feedback and recommendations.

Please send your comments to:
Sealite USA t/a Avlite Systems
61 Business Park Drive
Tilton, New Hampshire 03276
USA
Email: usa@avlite.com
Telephone: 603 737 1311

Notes

Avlite Solution Verticals available

Avlite®

We believe technology improves navigation™

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