AirportLightingCompany

OWNER'S MANUAL

L-849(L)
RUNWAY END INDENTIFICATION LIGHT
SAL-1030-V Voltage Driven

L-849(L)
Runway End Identification Light
Voltage Driven

Owner's Manual

ETL Certified to:
FAA AC 150/5345-51 and EB 67

Compliant to:
ICAO: Annex 14, Volume 1 (Current Edition)
T/C: Transport Canada TP 312

Manufactured by:
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AirportLightingCompany

An ISO 9001:2015 Certified Company

108 Fairgrounds Drive
Manlius, New York 13104

GUARANTEE

Products manufactured by Airport Lighting Company (ALC) which use LEDs as a light source are warranted against mechanical and physical defects in design or manufacture for a period of 2 years from date of installation per the applicable FAA Advisory Circular and against electrical defects in design or manufacture of the LED or LED specific circuitry for a period of 4 years per FAA EB67D. ALC will correct such defects by repair or replacement, at its option, provided the products have been properly handled and stored prior to installation, properly installed and operated after installation, and provided further that the Buyer has notified ALC in writing within the warranty period and within a reasonable time after notice of such defects. Refer to handling, storage, installation and operational instructions for proper procedural guidance that must be followed to maintain warranty provisions.

This warranty is in effect for the specified term as long as the equipment, in ALC's judgment, has not been altered in such a way as to affect the equipment adversely, subject to accident, negligence, improper storage, and has been operated and maintained in accordance with accepted FAA guidelines as described in AC 150/5340-26 and ALC's published operational guidelines.

ALC reserves the right to examine products about which a claim has been made. Equipment must be presented in the same condition as when the defect was discovered. ALC also reserves the right to require the return of equipment to establish any claim.

STATEMENT OF WARRANTY

https://www.airportlightingcompany.com/terms-conditions/

General Information

The SAL 1030-V REIL is a voltage-powered system consisting of two Optical Flashhead (OFH) assemblies with integrated DC power supplies and a Master Control Unit (MCU). System can operate as a FAA Style A (unidirectional, one brightness step) or Style E (unidirectional, three brightness steps). The OFHs are used to the threshold (approach end) of a visual or instrument non-precision runway and provide guidance to pilots during approach for landing.

The OFHs receive flashing and other operating commands from the MCU and send monitored status information in return. Selected operating parameters are shown visually on the Control Module inside the MCU.

Operation is typically automatic, but flash intensity functions can be set to Maintenance mode for testing purposes. The OFHs flash simultaneously upon a single command from the MCU. The flash rate is 120 flashes per minute (FPM). There are no programming requirements that must be set in the field.

The light beam is slightly greater than 10° vertically by 30° horizontally. This beam coverage is formed by the composite effect of an array of high-performance, white LEDs.

Style	**Effective Candela (cd) Brightness Step**		
	High	Medium	Low
A	15,000	---	---
E	15,000	1,500	300

The LED array is monitored in such a way that a failure of a complete row or column, or a combination that exceeds a certain number of LEDs at random locations, will turn on an alarm signal light and cause an alarm relay to operate. The alarm relay is for external remote distribution.

Error Codes are generated because of failure within the lighting system. These are displayed intermittently on the four-segment numerical display. A dry contact alarm point is provided for remote monitoring.

Theory of Operation

The SAL 1030-V REIL is a microcontroller-based system. Each Optical Head consists of an array of 60, optically enhanced, high performance, LEDs arranged geometrically to form a vertical beam coverage of at least 10° and a horizontal coverage of at least 30°.

The MCU has a single microcontroller card (LSM) for all input and output functions. An RS-485 data bus provides communications between the MCU and the two OFHs. An LSM in each head communicates with the LED array, collecting status information to send back to the MCU LSM card. Each head is identified by an address code for data tagging at the MCU.

A low-capacitance data transmission line, suitable for RS-485 drivers and receivers, can support satisfactory communications at the baud rate of this system for up to 4000 feet.

While the heads communicate only with the MCU, the MCU has connections outside of the system such as primary power, remote switching, and optionally, a remote alarm activating circuit. These external lines may be subjected to voltage surges or other electrical disturbances. The externally connected lines are provided with over-voltage protection within the MCU. Similar surge protection guards the RS-485 data bus to the Optical Heads.

The MCU is powered by a 24 VDC power supply that accepts an input voltage ranging from 120 to 240VAC, 50 or 60 Hz.

Each Optical Head is powered by a 48VDC power supply located in the Junction Box (part of each head emplacement). These power supplies also accept an input from 120 to 240 VAC, 50 or 60 Hz.

The Head Controller cyclically scans the LED array collecting temperature, voltage, and flash information. An alarm signal is generated if either head develops an operating condition that falls below a prescribed safe level per FAA EB67D. Examples are (a) more than 25% failed LEDs per EB67 in a single head, (b) incomplete column of LEDs, or (c) incomplete row of LEDs. A fail-safe Alarm Relay (contacts close on fail) that can be used for remote alarm signaling is also activated.

Installation

The L-849(L) system will be mounted at the end of the runway. One OFH will be placed at each side of the runway edge. Each device (OFH and MCU) will require a dedicated emplacement that includes a concrete foundation with 2” NPS/NPT female threaded receiver. Detailed drawings, provided by others, will indicate exact placement and installation of each OFH and MCU.

Unpacking

Light units should be stored and transported in original ALC shipping containers. Unpacking of lights should be done at the runway location where light will be installed.

Inspect and verify the light nameplate to ensure it corresponds to the site location for installation. Visually inspect the light for any damage. If any damage is noted, immediately contact ALC for possible warranty claim. Claims should also be filed with the freight/shipping company.

Tools Required

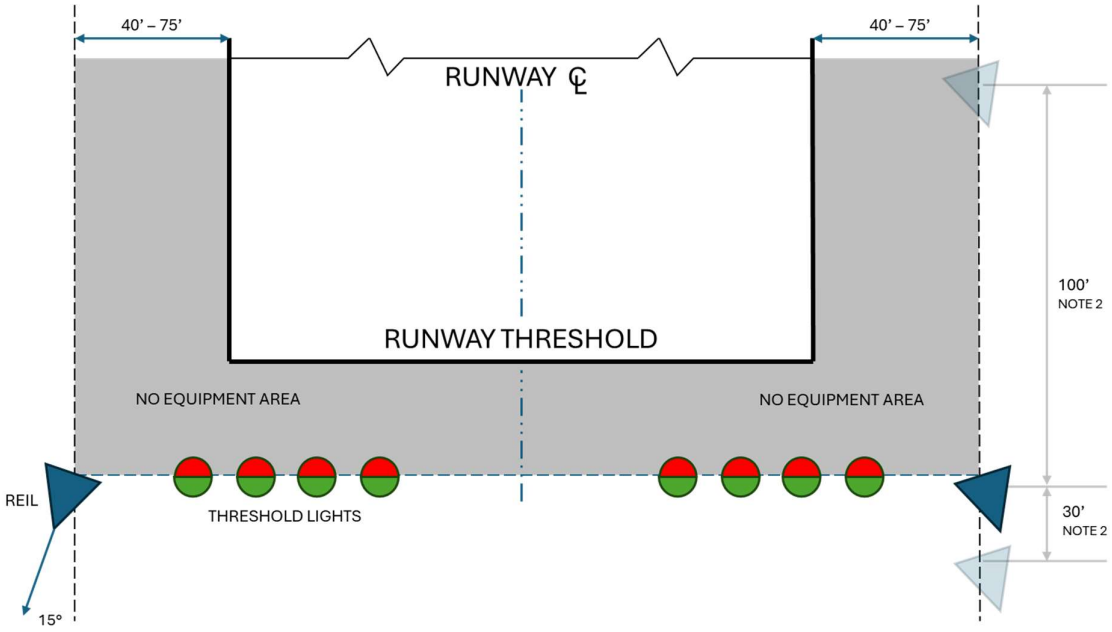
No special tools are required for installation of the system.

The following are the recommended tools for proper installation:

- #2 Phillips screwdriver with 10” shank
- Flat blade screwdriver with 10” shank
- Micro flat blade screwdriver
- 3/16 Allen Wrench
- 3” Slip-joint pliers
- Wire Strippers
- Digital Multi-Meter (DMM)

Typical Layout

The Runway End Identification Lights (REIL) are used for early identification of the runway and runway end. REILs are beneficial in areas having a large concentration of lights and areas of featureless terrain. The REILs must be installed where there is a circling approach or a circling and non-precision straight in approach. Detail below based off FAA AC 150/5340-30 Figure A-79.



Layout Notes:

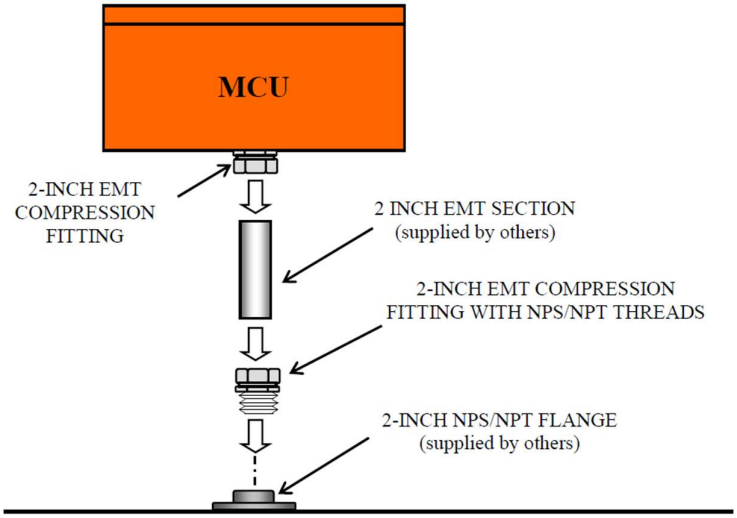
1. The optimum location for each light in is line with the runway threshold lights and extended between 40 feet (12.1m) to 75 feet (22.7m) from the runway edge.
2. Location of the lights can have an upwind and downwind longitudinal tolerance of 100 feet (30.4m) and 30 feet (9.1m), respectively, from the runway threshold lights.
3. Lights should be spaced equally from the runway centerline. When adjustments are required, the difference in the distance of the units must not exceed 10 feet (3m).
4. Typical optical beam placement of the light will be 15°outward from the runway centerline and inclined at 10° above the horizontal. If adjustments are required, the light should include a baffle and be set at 10° horizontally and 20° vertically.
5. Lights should be placed at a minimum of 40 feet (12.1m) from other runways and taxiways.
6. If REILs are used with a VASI (Visual Approach Slope Indicator), install the lights 75' (22.7m) from the runway edge. When installed with other glide slope indicators, lights will be installed 40' (12.1m) from the runway edge. See FAA Order JO 6850.2 for additional information on jet blasts and wind vortices.
7. Both lights must be at the same elevation and within 3 feet (0.9m) of the horizontal plane through the runway centerline.

Master Control Unit Installation

The Master Control Unit (MCU) is provided with a factory installed compression fitting for 2” EMT at the bottom surface of the enclosure. A length of 2” EMT and a compatible compression fitting threaded at one end are required. The EMT and fitting are supplied by others based on the site requirements and conditions.

When the MCU is mounted on an in-ground base can, the EMT support is generally open to the can to allow wire passage. The MCU is shipped with a slotted foam plug to allow wire passage. The foam plug is essential to prevent moisture from the base can entering the MCU.

NOTE: Failure to install the foam plug or provide other means of preventing free air passage will allow condensation to collect within the enclosure. Failure to install plug will void equipment warranty.

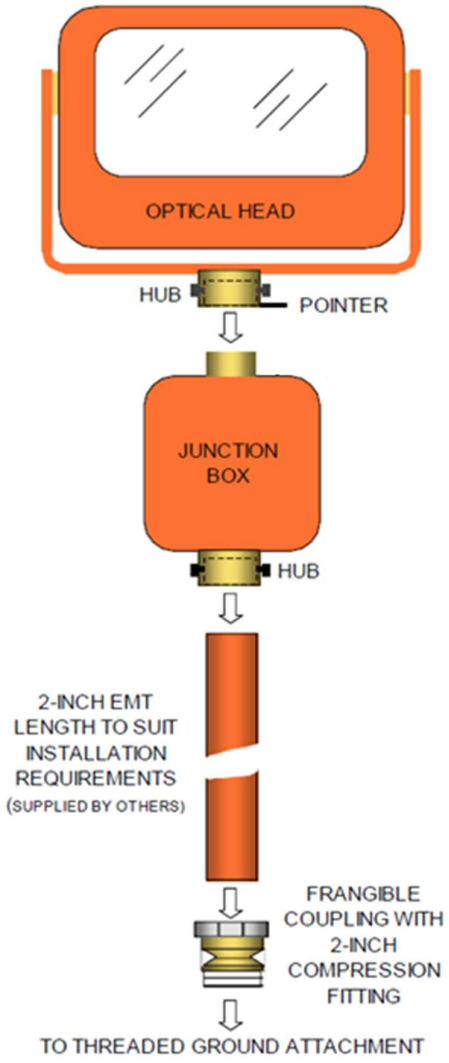


Optical Flashhead Installation

The Optical Flashhead (OFH) is comprised of an optical head and junction box. These are shipped as a complete unit. The junction box includes an installed 2” EMT hub. A length of 2” EMT and a compatible compression fitting threaded at one end are required. The EMT and fitting are supplied by others based on the site requirements and conditions.

Each OFH is supported by a 2” EMT and various couplings as shown. The length of EMT will differ for each site location, therefore, will be supplied by others as required. The MCU and one OFH may be co-located at the same emplacement with two threaded receivers separated by 8” (203mm) center to center.

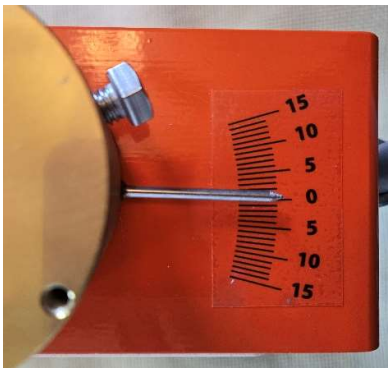
The OFH includes vertical adjustment and horizontal adjustment scales from proper aiming of the light unit. The scales will be ±15°.



Optical Flashhead Aiming

Using the horizontal scale located on the junction box (JB), the flashhead will be aligned with the runway centerline. The scale range is ±15° with 1° increments. A metal pointer is affixed to the flashhead hub and indicates the aiming direction. The JB must be properly aligned or zeroed so it is parallel to the runway.

Zero the OFH by aligning the JB cover parallel to the runway end. This can be accomplished by installing an aiming target 200 feet down range from the emplacement. Use the edge of the JB as a sightline and rotate the JB until it aligns with the target. Tighten the three JB hex bolts on the EMT mounting hub to lock in the alignment.



To set the OFH offset, the optical head must be rotated to match the site requirements. Slightly loosen the two hex bolts and setscrew on the optical head hub which contains the metal pointer. Rotate the head slowly until the pointer matches the defined angle for the emplacement. Firmly tighten the two hex bolts and setscrew.

Using the vertical scale on the flashhead, the unit will be adjusted to match the emplacement angle. The adjustment will be accomplished with the turnbuckle located on the backside of the flashhead. Typical alignment will have the OFH pointing upwards.

The OFH vertical scale should be zeroed. Rotate the turnbuckle until the spirit level bubble lies symmetrically between the reference lines. Slightly loosen the vertical pointer screw to allow the pointer rest on 0°. Tighten the pointer screw. Slowly adjust the turnbuckle to set the vertical angle required for the emplacement.

Specifications

Property	Item	Specification
Environmental	Operating Temperature	-40°F - +130°F (-40°C - +55°C)
	Storage Temperature	-55°F - +130°F (-55°C - +55°C)
	Ingress Protection	IP68
	Salt Fog	Per FAA AC AC 150/5345-51
	Temperature Shock	Per FAA AC AC 150/5345-51
Electrical	Input Voltage	120-240 VAC, 50/60Hz
	Power Consumption	50 Watts
	Lamp Type	LED
	Lamp Life	> 50,000 Hours
Photometric	Light Color	White
	Main Beam Angle	Vertical: 10°, Horizontal 30°
	Intensity	High: 15,000cd Medium: 1500cd Low: 300cd
Mechanical	MCU Dimensions *(h-w-d)*	6.5” x 13.5” x 12” (165 x 343 x 305)
	MCU Weight	10.2 lb. (4.6kg)
	OFH Dimensions	15” x 15” x 4.8” (381 x 381 x 122)
	OFH Weight	24.6 lb. (11.2kg)
	JB Dimensions	7.9” x 9” x 4.5” (201 x 229 x 114)
	JB Weight	8.8 lb. (4.0kg)

System Wiring

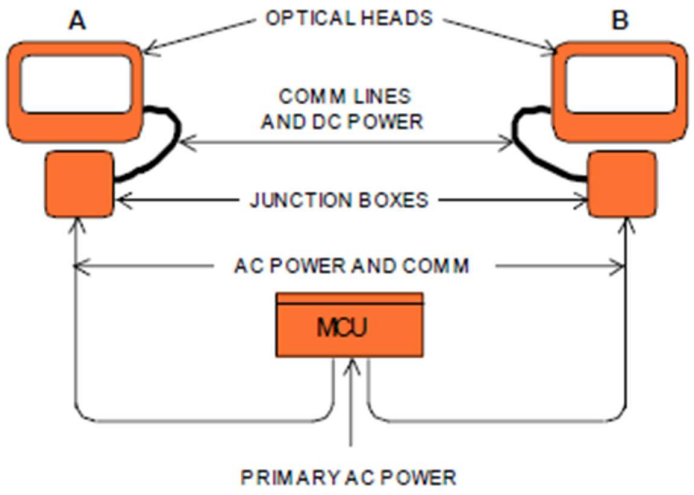
Wiring during installation consists of bringing primary power to the Master Control Unit (MCU), and power and communications from the MCU to the two OFHs. All connections are made at terminal blocks that accept bare-wire insertions under screw clamps. No special wire termination tools are required.

Power wiring consists of three conductors. Two are required for 120 or 240 Vac; the third is for equipment ground.

Communication wiring must satisfy the requirements for an EIA RS- 485 data bus. It must have three conductors: Two are for balanced-line data transmission (designated as Comm A and Comm B). The third is an isolated ground conductor; designated as CGi at the terminal blocks.

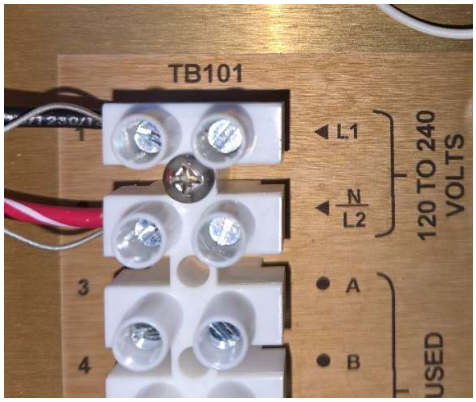
Do not connect the COMM ground to chassis ground.

System alarm termination is provided for remote monitoring of the system. The dry contact alarm provides 'Close on Fail' or 'Open on Fail' contacts. Consult end user for proper wiring connections.



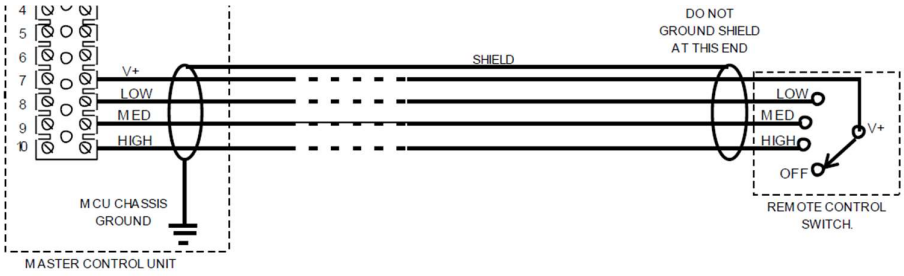
MCU Input Wiring

TB101 is the input terminal block for Primary AC Power and Remote Control (points 1 & 2). The MCU will accept any voltage between 120-240VAC 50/60Hz. Two chassis ground lugs are located in the center of the main panel.



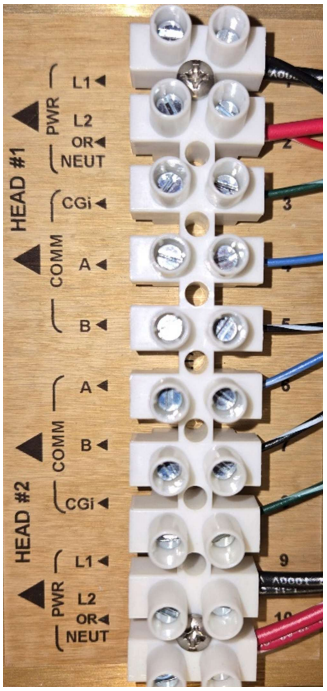
MCU Remote Control Wiring

Remote Control is compatible with L-854 Radio Receiver/Decoder or any switch that satisfies the function shown below. It consists of a four-wire circuit in which one of the conductors provides the switching voltage (V+, 24 VDC). The other three are activated through a switch for Low, Medium, or High intensity. For satisfactory operation up to 1000 feet, the lines from the MCU to the Remote Switch should be shielded, and the shield should be grounded at the MCU chassis only.



MCU Output Wiring to OFH

TB102 is the output terminal block for connection to the two OFHs for Power and Communications. Separate cables are highly recommended for these connections. A total of four cables will be required, two Power Cables and two Communication cables.



Power cable should contain three conductors of #14-AWG or larger. Recommended colors will be Black (L1), Red (L2 or Neutral) and Green (chassis Ground). For applications where the OFH is mounted 1000 feet or greater, conductor size should be #12-AWG.

RS-485 Communication cable should contain two #22-AWG conductors and a bare shield. Applicable cables will be Belden 3106A or 3107A. The data transmission is phase sensitive; therefore, COMM A in the MCU must connect to COMM A in the OFH. Bare shield will connect to CGi.

Do not connect the COMM ground to chassis ground.

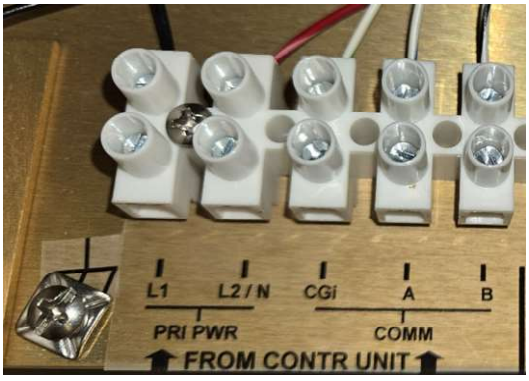
OFH Input Wiring

The Optical Flashheads are identified as #1 and #2 by the serial number. Serial numbers starting with '62' will be OFH #1 and '63' will be OFH #2. Note location of the units for alarming and data logging. Wiring will be identical for each OFH.

Power wiring (PRI PWR) will connect at L1, L2/N and ground lug.

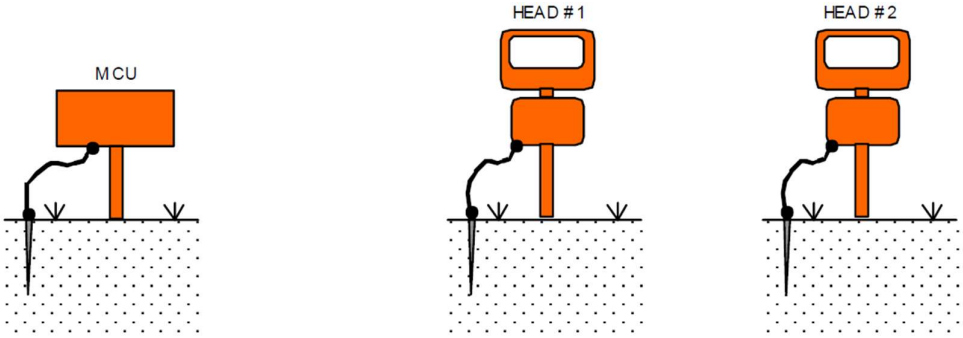
Communication cable (COMM) will match color code of MCU at CGi, A and B.

Flashhead is pre-wired at the factory through the metallic watertight flexible conduit.



Lightning Protection

A local ground is required at each device for protection against lightning damage. An external ground lug is provided on the MCU and each JB. Recommended ground wire is a #2-AWG copper wire. Do not ground equipment to a counterpoise. **Failure to properly ground each device will void the warranty.**



Foam Plug Installation

Use the FOAM PLUG when the supporting conduit opens directly to an IN-GROUND base can. Place any electrical conductors and/or cables into the provided slit as shown in Figure 1. Re-insert the foam plug into the conduit opening to make an environmental seal, Figure 2. Failure to use the conduit foam plug could lead to excessive formation of condensation during certain atmospheric conditions.

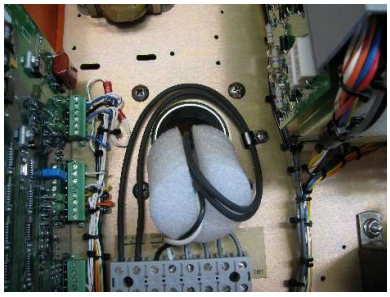


Figure 1

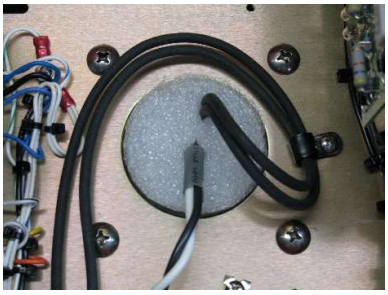
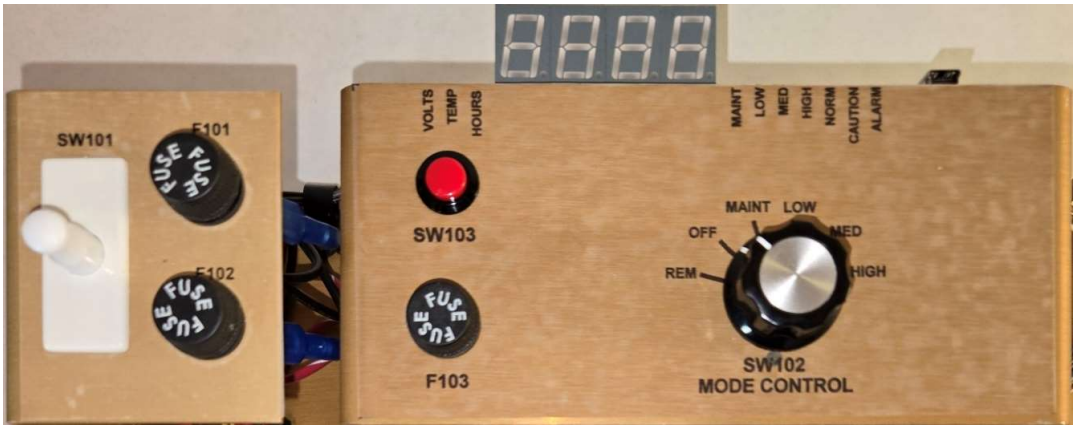


Figure 2

Warranty may be void if Foam Plug is not properly installed.

System Operation

The MCU provides operational control of the lighting system. Three switches are provided for safety (SW101), Mode Control (SW102), and System Information (SWS103). Three fuses (F1-F2-F3) are provided to protect the system circuitry.



SW101 is provided in each device to disable the unit when the cover is removed. The plunger can be pulled up in a locked position to energize the system.

SW102 is used to provide local, remote or maintenance mode of the system.

REM Remote Control via L-854 Radio Receiver/Decoder or other switching method

OFF Inhibits flashing of the system

MAINT Operates OFH in low level, steady mode for troubleshooting

LOW Sets OFHs to flash in Low Intensity mode

MED Sets OFHs to flash in Medium Intensity mode

HIGH Sets OFHs to flash in High Intensity mode

SW103 is used for system information which is displayed on the four-character array. Press button to toggle between the three display settings.

VOLTS Displays combined average voltage across each group of OFH LED arrays

TEMP Displays combined average operating temperature OFH LED arrays

HOURS Displays the total no-fault operation during High Intensity mode

Fuse 1 provides protection of the main Input Voltage (L1), Fuse 2 for Input Voltage (N/L2).

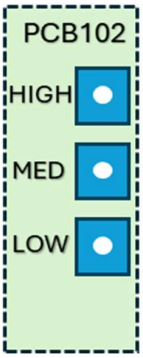
Fuse 3 provides protection of 24VDC from internal Power Supply (PS101) to LSM Card.

System status is provided by the row of LEDs mounted above SW102. Operational status is shown via the MAINT/LOW/MED/HIGH LEDs. Alarm status is shown via the NORM/CAUTION/ALARM LEDs. See troubleshooting section for additional information on CAUTION & ALARM conditions.

NORM	System is operating without any alarms
CAUTION	System is operation in an abnormal condition
ALARM	System is disabled due to major failure

Current Sense Option Setup

The REIL derives its flash level (low, medium, high) based upon the current level on the circuit. The REIL must be field calibrated based upon the supply currents from the CCR. This adjustment will be accomplished using the three potentiometers (POTs) located on PCB102 located on the right side of the MCU.



Set up will be based upon:

a. REIL Intensity Levels (Single (H) or Three Level (L/M/H))
b. Style of CCR (3-step or 5-step).

Three Intensity with 3 Step CCR

1. Open MCU cover and set interlock switch (SW101) to service position (pulled out).
2. Turn all three POTs on PCB102 fully counterclockwise.
3. Set Mode Switch (SW102) to REM.
4. Set the CCR to Step 1.
5. Slowly adjust the LOW POT clockwise until the adjacent LED turn ON. The status LED labeled LOW on the main MCU panel should start flashing.
6. Set the CCR to Step 2.
7. Slowly adjust the MED POT clockwise until the adjacent LED turn ON. Only the status LED labeled MEDIUM on the main MCU panel should start flashing. The LOW LED on PCB102 will remain lit.
8. Set the CCR to Step 3.
9. Slowly adjust the HIGH POT clockwise until the adjacent LED turn ON. Only the status LED labeled HIGH on the main MCU panel should start flashing. The LOW and MED LEDs on PCB102 will remain lit.

Operate the CCR in different steps and verify REIL operates in proper intensity. Adjust POTs as required to match intensity to step.

Single Intensity with 3 Step CCR

1. Open MCU cover and set interlock switch (SW101) to service position (pulled out).
2. Turn LOW and MED POTs fully counterclockwise, turn HIGH POT fully clockwise.
3. Set Mode Switch (SW102) to REM.
4. Set the CCR to Step 3.
5. Slowly adjust the LOW POT clockwise until the adjacent LED and HIGH LED turn ON. The MED LED will be OFF. The status LED labeled HIGH on the main MCU panel should flash.
6. Set the CCR to Step 2.
7. All LEDs on PCB102 should be OFF. Status LEDs on main MCU panel should be OFF.

Re-adjust the LOW POT for the proper turn-off condition, if required.

Three Intensities with Five Step CCR

1. Open MCU cover and set interlock switch (SW101) to service position (pulled out).
2. Turn all three POTs on PCB102 fully counterclockwise.
3. Set Mode Switch (SW102) to REM.
4. Set the CCR to Step 1.
5. Slowly adjust the LOW POT clockwise until the adjacent LED turn ON. The status LED labeled LOW on the main MCU panel should start flashing.
6. Set the CCR to Step 2.
7. DO NOT make any POT adjustments. LOW status LED should remain flashing.
8. Set the CCR to Step 3.
9. Slowly adjust the MED POT clockwise until the adjacent LED turns ON. The LOW LED should remain lit and the MEDIUM status LED on main MCU panel should start flashing.
10. Set the CCR to Step 4.
11. Slowly adjust the HIGH POT clockwise until the adjacent LED turns ON. The LOW and MED LEDs should remain lit and HIGH status LED on main MCU panel should start flashing.
12. Set the CCR to Step 5.
13. DO NOT make any POT adjustments. HIGH status LED should remain flashing.
14. Operate the CCR on different Step levels and observe the main intensity status LEDs match CCR step levels. Re-adjust intensity POT as required.

Single Intensity with Five Step CCR

1. Open MCU cover and set interlock switch (SW101) to service position (pulled out).
2. Turn LOW and MED POTs fully counterclockwise, turn HIGH POT fully clockwise.
3. Set Mode Switch (SW102) to REM.
4. Set the CCR to Step 5.
5. Slowly adjust the LOW POT clockwise until the adjacent LED turns ON and status LED labeled HIGH on main MCU panel starts flashing.
6. Set the CCR to Step 4.
7. All LEDs on PCB102 should be OFF. Status LEDs on main MCU panel should be OFF.

Re-adjust the LOW POT for the proper turn-off condition, if required.

Troubleshooting

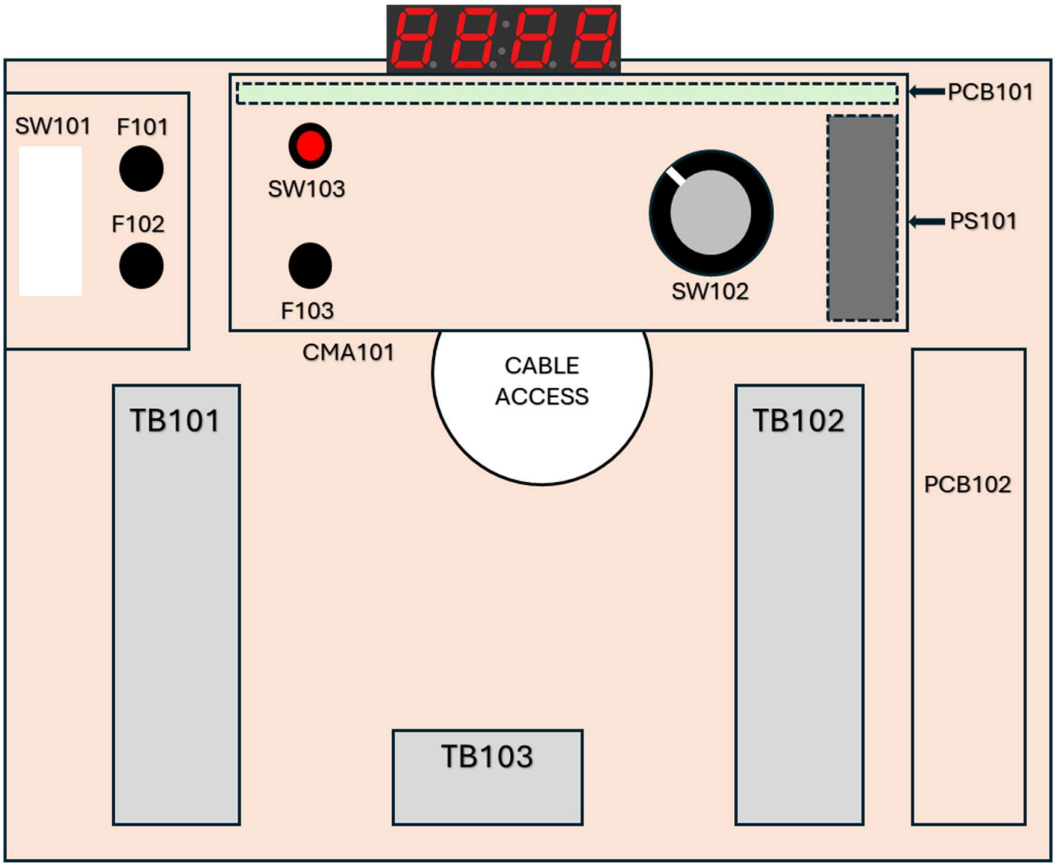
This section provides general troubleshooting information on the SAL-1030-V REIL system. Most common issues are shown in the chart. If the issue is not listed below, please contact Airport Lighting Co. technical support for additional assistance.

Problem	Possible Cause	Solution
No Flash at either OFH	No Input Power	Verify proper input voltage of 120-240VAC 50/60Hz. Correct main input voltage source.
	Blown Fuse	Test continuity of each fuse (F1/F2/F3). Replace as needed.
	Shorted Input MOV	Verify MOV across TB101 L1/L2 is not shorted. Replace as needed.
	Open/Bad Interlock Switch	Energize interlock by pulling up to lock into place. Verify voltage at TB102 FH#1 L1/L2 and FH#2 L1/L2. Replace Interlock Switch.
	Bad Comm Cable	Verify COMM A & COMM B match between MCU and OFHs Verify ~4.5VDC between COMM A & COMM B in OFH
One OFH not Flashing	Open/Bad Interlock Switch	Verify Cover is closed. Verify Voltage at both pins of interlock switch when engaged. Replace Interlock Switch.
	OFH Power Supply failed.	Verify +48VDC on terminal block between BU+ and WH-. Replace Power Supply.
	Code C005 Reported in MCU	Place MCU into MAINT mode and verify all OFH LEDs are lit. Replace faulty LED Module with shown bad LED(s). Replace faulty Control Board if LED array is out.
	Code C006 Reported in MCU	OFH not communicating with MCU. Verify data comm connections. Verify ~4.5VDC between COMM A – COMM B in OFH. Correct Communication issue.
Brief Flash in One OFH (2-3 Flashes)	Bad Comm Cable	Verify proper communication cable connects.
Intermittent Flash Pattern	Bad OFH Control Board	Place MCU into MAINT mode and verify all OFH LEDs are lit. Replace faulty Control Board.
	Bad LED Module	Replace faulty LED Module with shown bad LED(s).

Problem	Possible Cause	Solution
Remote Control Issues	Selector Switch	Verify SW102 is set to REM (Remote)
	Wiring Issue	Verify proper wiring between TB101 (7-8-9-10) and Remote Control device
	Shorted Input MOV	Verify MOV across TB101 L1/L2 is not shorted. Replace as needed.
	Open/Bad Interlock Switch	Energize interlock by pulling up to lock into place. Verify voltage at TB102 FH#1 L1/L2 and FH#2 L1/L2. Replace Interlock Switch.
	Bad Comm Cable	Verify COMM A & COMM B match between MCU and OFHs Verify ~4.5VDC between COMM A & COMM B in OFH

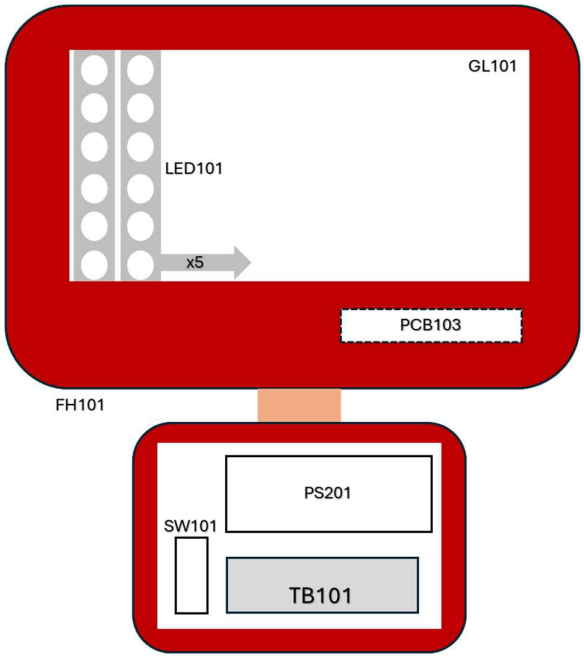
Replacement Parts

Master Control Unit



Item	Part Number	Description
F101, F102, F103	55-00267	Fuse, 250V, 1.5A
SW101	44-00107	Interlock Switch
TB101, TB102	55-00147	Terminal Block, 10 Position
TB103	44-00162	Terminal Block, 4 Position
CMA101	344-50515	Control Module Assembly
PS101	44-00104	24VDC Power Supply, 15W
PCB101	344-30105-V	Micro-Controller Board, LSM, Voltage
PCB102	255-20086	Current Sense Board
MV101	55-00203	Metal Oxide Varistor, 250V
FP101	88-02010	Foam Plug, 1-1/2”

Optical Flashhead Unit



Item	Part Number	Description
SW101	55-00201	Interlock Switch
TB101	55-00147	Terminal Block, 10 Position
PS201	44-00146	48VDC Power Supply
PCB103	344-30131	LED Control Board
LED101	344-30145	LED Module, 2 Boards/12 LEDs
GL101	44-00118	Flashhead Glass
LEDMOD	344-00010	Replacement Kit, LED Control Board & 10 LED Modules
FH101	344-40520	Replacement SAL-1030 Flashhead

AirportLightingCompany

Catalog Ordering Code

SAL 1030-□-□-□ –

Type
V = 100-250VAC 50/60Hz
I = 2.8A - 6.6A
S = Solar

Style
A = Uni-directional, high intensity, one brightness step
C = Uni-directional, low intensity, one brightness step
E = Uni-directional, three brightness steps

Options
1 = Elapsed Time Meter
2 = Current sense module (voltage units only)
4 = Flash Monitoring
6 = Separate Mount Flash Head (specify quantity)*

**All units have co-mounted flash heads unless specified with Option 6*