



# HUGHEY & PHILLIPS, LLC

## Installation and Operation Guide

### *HORIZON™ MEDIUM INTENSITY*

### *DUAL LED LIGHTING SYSTEM*

## **MANUAL EPM-00000043-001**

Revision 'F'

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## REVISIONS

REV	DATE	ECO	COMMENT
-	12/11/11		Initial Release
A	2/13/13	127	Revised Spare Parts List
B	4/8/13	180	Corrected System Table Descriptions
C	1/3/14	265	Added Catenary Part Numbers and Section
D	3/25/14	293	Revised Item Descriptions
E	9/23/14	310	Added CBL0007color code
F	2/14/19	690	Update notices, tables

## WARRANTY POLICY

*FOR CURRENT WARRANTY POLICY  
PLEASE VISIT [WWW.HUGHEYANDPHILLIPS.COM](http://WWW.HUGHEYANDPHILLIPS.COM)*

## TABLE OF HORIZON™ STANDARD SYSTEMS

MODEL NUMBER	INPUT VOLTAGE	Hz.	DESCRIPTION
50-0002-001	100-265 VAC	50/60	L-864 LED, MI RED, 24 FPM
50-0002-001A	100-265 VAC	50/60	L-864 LED, MI RED, 24 FPM, GPS
50-0002-001B	100-265 VAC	50/60	L-864 LED, MI RED, 24 FPM, GPS/PHOTOCELL
50-0002-001C	100-265 VAC	50/60	L-864 LED, MI RED, 30 FPM
50-0002-001D	100-265 VAC	50/60	L-864 LED, MI RED, 30 FPM, GPS
50-0002-001E	100-265 VAC	50/60	L-864 LED, MI RED, 30 FPM, GPS/PHOTOCELL
50-0003-001	100-265 VAC	50/60	L-865 LED, MI WHITE, 40 FPM
50-0003-001A	100-265 VAC	50/60	L-865 LED, MI WHITE, 40FPM, GPS
50-0003-001B	100-265 VAC	50/60	L-865 LED, MI WHITE, 40 FPM, GPS/PHOTOCELL
50-0004-001	100-265 VAC	50/60	L-866 LED, MI WHITE, 60 FPM, MIDDLE
50-0004-002	100-265 VAC	50/60	L-866 LED, MI WHITE, 60 FPM, TOP
50-0004-003	100-265 VAC	50/60	L-866 LED, MI WHITE, 60 FPM, BOTTOM
50-0005-001	100-265 VAC	50/60	L-864/865 LED, MI DUAL, 24/40 FPM
50-0005-001A	100-265 VAC	50/60	L-864/865 LED, MI DUAL, 24/40 FPM, GPS
50-0005-001B	100-265 VAC	50/60	L-864/865 LED, MI DUAL, 24/40 FPM, GPS/PHOTOCELL
50-0005-001C	100-265 VAC	50/60	L-864/865 LED, MI DUAL, 30/40 FPM
50-0005-001D	100-265 VAC	50/60	L-864/865 LED, MI DUAL, 30/40 FPM, GPS
50-0005-001E	100-265 VAC	50/60	L-864/865 LED, MI DUAL, 30/40 FPM, GPS/PHOTOCELL
50-0006-001	100-265 VAC	50/60	L-864 LED, MI RED, 24 FPM, GPS
50-0007-001	100-265 VAC	50/60	L-865 LED, MI WHITE, 40 FPM, GPS
50-0008-001	100-265 VAC	50/60	L-866 LED, MI WHITE, 60 FPM, GPS
50-0009-001	100-265 VAC	50/60	L-864/865 LED, MI DUAL, 40 FPM, GPS
50-0011-001	100-265 VAC	50/60	L-864 LED, MI RED, STEADY ON
50-0012-001	100-265 VAC	50/60	L-866/885 LED, MI DUAL, 60 FPM, MIDDLE
50-0012-002	100-265 VAC	50/60	L-866/885 LED, MI DUAL, 60 FPM, TOP, GPS
50-0012-003	100-265 VAC	50/60	L-866/885 LED, MI DUAL, 60 FPM, BOTTOM

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## 1.0 SAFETY AND GENERAL INFORMATION

### 1.1 Equipment Description

The lighting system is a LED technology light system manufactured to comply with Federal Aviation Administration (FAA) Advisory Circular 150/5345-43G. Each system consists of an omni-directional flash unit, internal power supply with integrated controls, and an interconnecting cable. System components are shown in Figures 1, 2 and 3.

### 1.2 Flash Unit

The flash unit, Figure 1, consists of an acrylic lens, reflector, and cover assembly attached to the flash unit base. Included within the flash unit is the integrated power supply, LED modules, interlock switch, surge arrestor and the terminal block where the interconnecting cable terminates.

### 1.3 Integrated Power Supply

The power supply contains power control circuits for producing and regulating energy required by the flashing function. The logic board is a microprocessor-based timing and monitoring circuit which controls flashing and alarming functions.

### 1.4 Controller

A controller is used to provide power to the flash unit. A photocell is connected to set the appropriate night or day flash mode. When using multiple flash units, the controller can conduct a SYNC signal between units for synchronized flashing. Monitoring of each flash unit will also be provided by the controller via dry-contact alarm points.

## 2.0 GENERAL INFORMATION

**WARNING**

**HIGH VOLTAGE: INSTALLATION, WIRING AND SERVICING  
MUST BE PERFORMED BY QUALIFIED PERSONNEL**

### 2.1 Equipment Description

The lighting system is a LED technology light system manufactured to comply with Federal Aviation Administration (FAA) Advisory Circular 150/5345-43. Each system consists of an omni-directional flash unit, internal power supply with integrated controls, and an interconnecting cable. System components are shown in Figures 1, 2 and 3.

### 2.2 Flash Unit

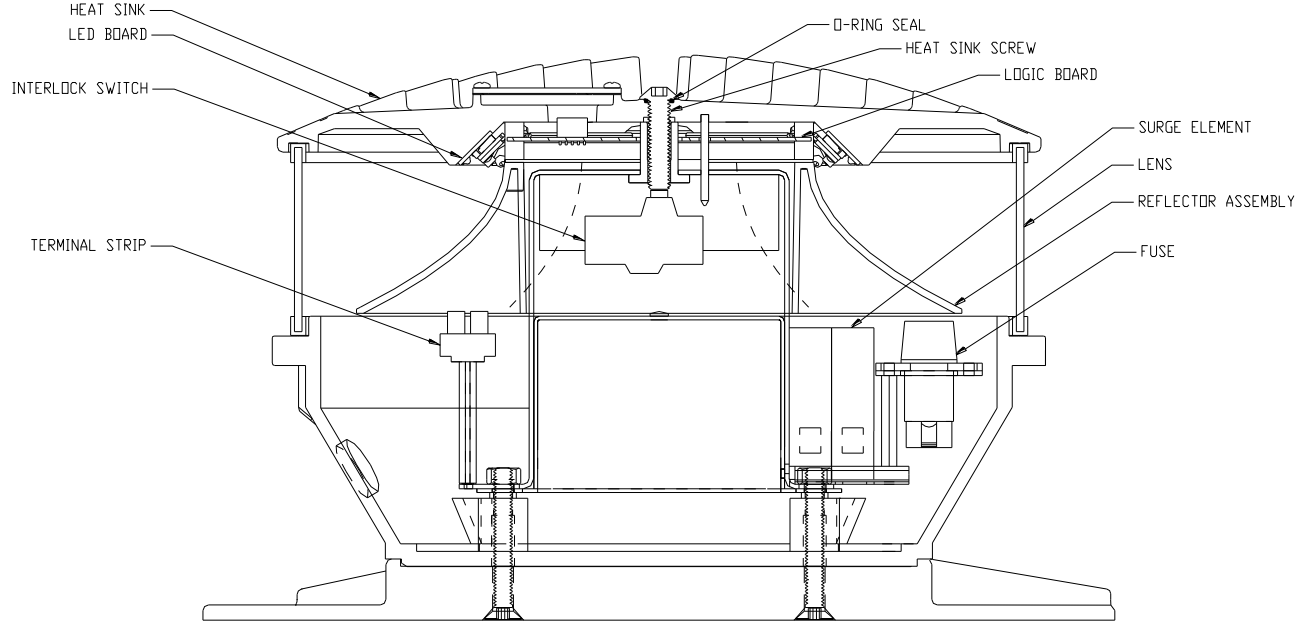
The flash unit, Figure 1, consists of an acrylic lens, reflector, and cover assembly attached to the flash unit base. Included within the flash unit is the integrated power supply, LED modules, interlock switch, surge arrestor and the terminal block where the interconnecting cable terminates.

### 2.3 Integrated Power Supply

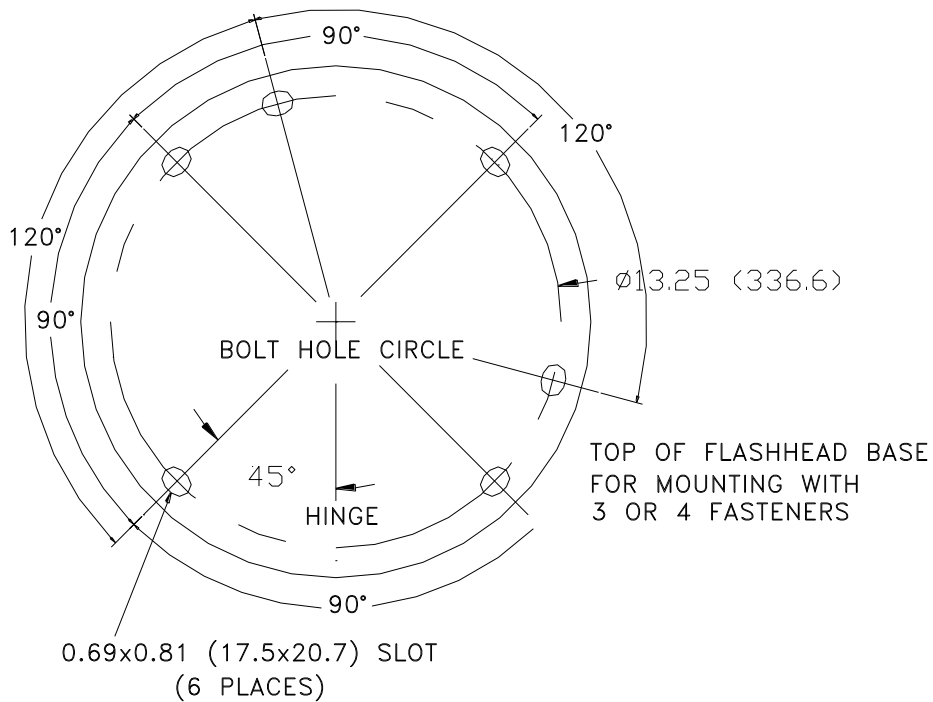
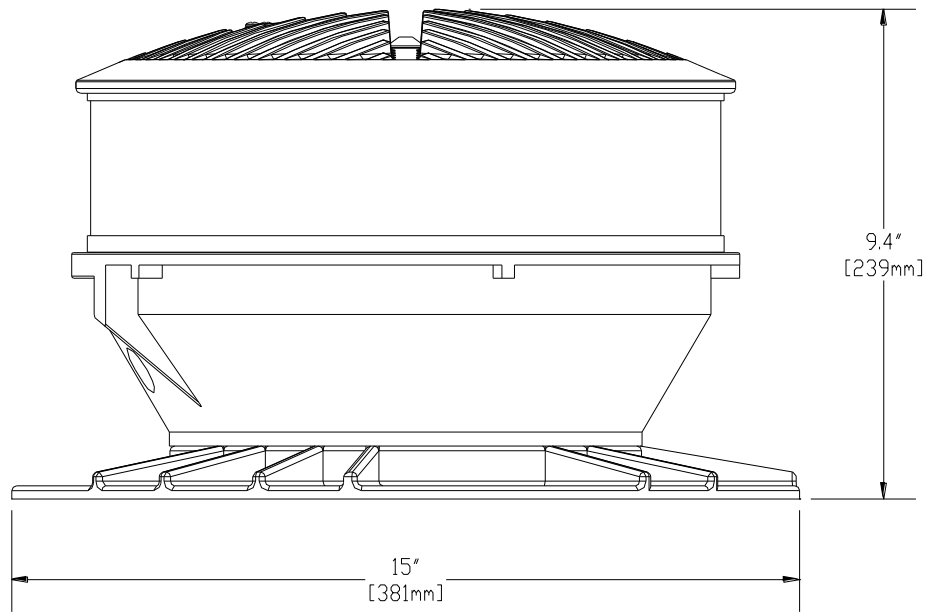
The power supply contains power control circuits for producing and regulating energy required by the flashing function. The logic board is a microprocessor-based timing and monitoring circuit which controls flashing and alarming functions.

### 2.4 Controller

A controller is used to provide power to the flash unit. A photocell is connected to set the appropriate night or day flash mode. When using multiple flash units, the controller can conduct a SYNC signal between units for synchronized flashing. Monitoring of each flash unit will also be provided by the controller via dry-contact alarm points.

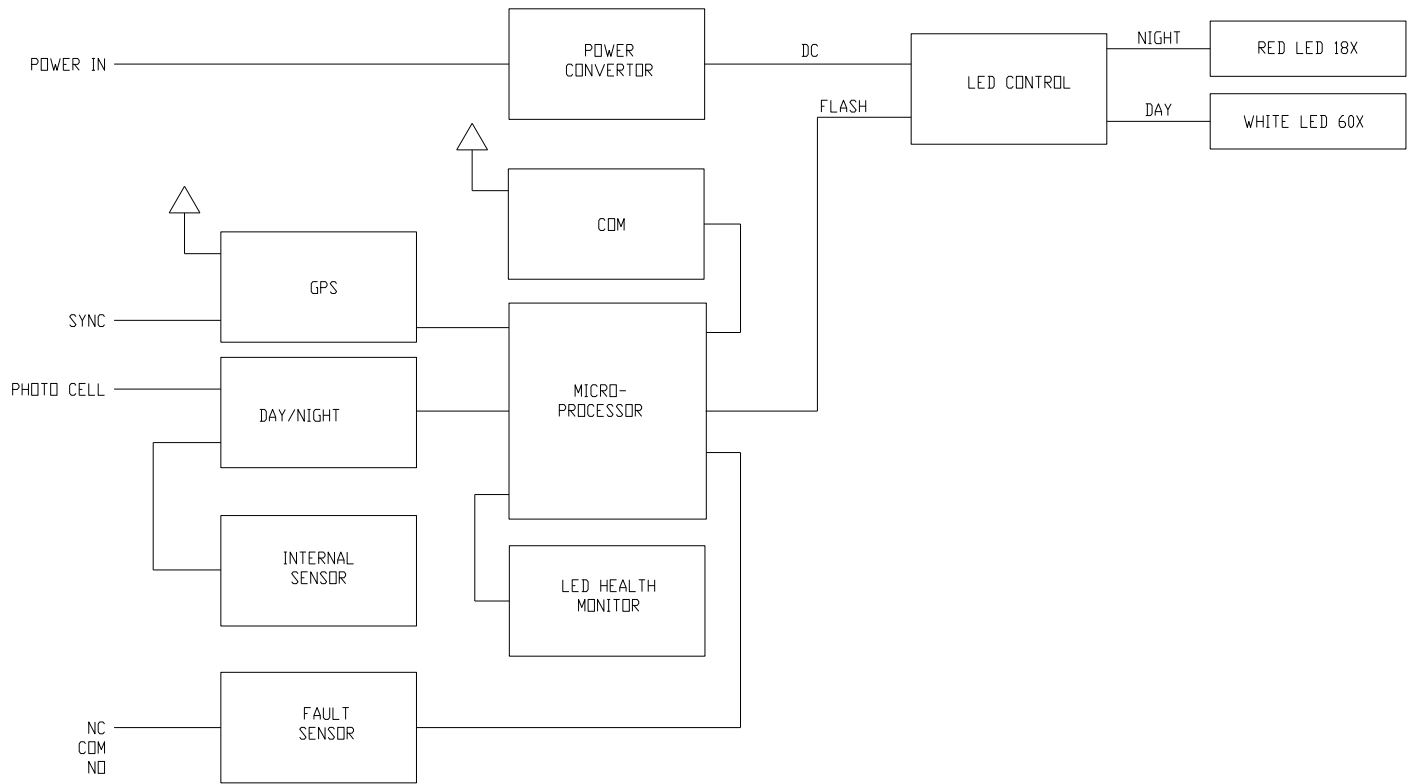


**Figure 1. Flash Unit Details**



**Figure 2. Flash Unit Dimensional & Mounting Details**





**Figure 3. Flash Unit Internal System Diagram**

## 3.0 SAFETY NOTICE

### 3.1.1 Voltages

The flashhead unit contains voltages of over 200VDC and may pose a personnel safety hazard. Personnel must observe safety regulations at all times.

### 3.1.2 Interlocks

The flashhead contains an interlock for your protection. To ensure safety, always remove power from the equipment prior to opening. Do not depend on the interlocks for personnel protection when working with the equipment. Do not short-circuit or tamper with any safety interlock switch. Ground capacitors with a grounding rod prior to touching any component. Short capacitors prior to touching any component.

#### Keep Away From Live Circuits

Operating and maintenance personnel must observe all safety regulations at all times. Do not change "Plug-In" components or make adjustments inside the equipment with the power control circuits in the ON position. Under certain conditions, dangerous voltage potentials may exist in circuits with the Power Controls in the OFF position due to the charges retained by the flash capacitors. To avoid casualties, always remove the power, wait one (1) minute, and then discharge all capacitors.

### 3.1.3 Precautionary Notice for Semiconductor and Integrated Circuits

This equipment contains semiconductor devices / integrated circuits. Take the necessary ESD precautions prior to attempting any service work.

### 3.2 Reference Data

Refer to Table 1 for a listing of the equipment specifications.

**Table 1. Equipment Specifications**

Item	Specification
<b>Light Output</b>	
<b>Day Intensity</b>	20,000 $\pm$ 25% effective candelas (White)
<b>Night Intensity</b>	2,000 $\pm$ 25% effective candelas (White)
<b>Night Intensity</b>	2,000 $\pm$ 25% effective candelas (Red)
<b>Beam Pattern</b>	360° horizontally; 3° min. vertically; Max. intensity of 3% of peak @ $-10^\circ$
<b>Flash Rate</b>	
Day	40 flashes per minute (FPM) White flash; 60 FPM White (L-866)
Night	24 or 30 FPM Red flash, depending upon model; 60 FPM Red (L-885); 60 FPM White (L-866)
<b>Electrical Input</b>	
<b>Power Supply</b>	100-265 VAC 50 or 60 Hz
<b>Mechanical Properties</b>	
<b>Flash Unit</b>	
Weight	18 pounds (8.1 kg)
Dimensions (inches)	15" wide x 9.3" high (381mm x 236mm)
Wind Load	105 pounds @ 150 mph
<b>Operating Environment</b>	
<b>Temperature</b>	$-55^\circ\text{C}$ to $+55^\circ\text{C}$
<b>Humidity</b>	95% relative

## 4.0 INSTALLATION

### 4.1 Unpacking

Carefully unpack each item. Examine each item for obvious physical damage. Report any claims to the carrier immediately. Pertinent data such as installation drawings, schematics, interconnection drawings, and operation manuals may be included in carton.

### 4.2 Mounting and Preparation

#### 4.2.1 General

This section contains detailed drawings for mounting the flash unit. See Figures 1 and 2.

#### 4.2.2 Lighting System Flash Unit

Normally the flash unit is mounted at the uppermost point on the structure. It must be mounted level to assure proper light output. See Figure 2 for the mounting dimensions of the flash unit mounting plate. A 20' pigtail, H&P cable CBL0002 or CBL0006 (#18-8C Tray Cable) is attached to provide a connection to existing wiring systems or use for new installations.

#### 4.2.3 Lighting System Controller

The system controller is connected to the flash unit via the cable provided by Hughey & Phillips or the installer. This cable will provide power, mode and sync signals to the flash unit. Double check all wiring prior to applying power to system. See controller wiring details.

#### 4.2.4 Ambient Light Sensor

The ambient light sensor, when supplied with the controller, should be mounted upright, away from artificial light (e.g., floodlights), and in a location that will enable its sensor window to have an unobstructed view of the polar sky (e.g., pointed north in the Northern Hemisphere). Typical installation is done by using ½" rigid conduit to remotely mount the photocell.

#### 4.2.5 Lightning Rod & Surge Protection

For added protection against lightning strikes, Hughey & Phillips recommends the installation of a lightning rod near the flash unit. The lightning rod should be installed so the tip of the rod is at least 3 feet above the height of the flash unit. For added protection to the System Controller, a LSPD-3000B should be installed near the base of the tower.

### 4.3 Installation Wiring

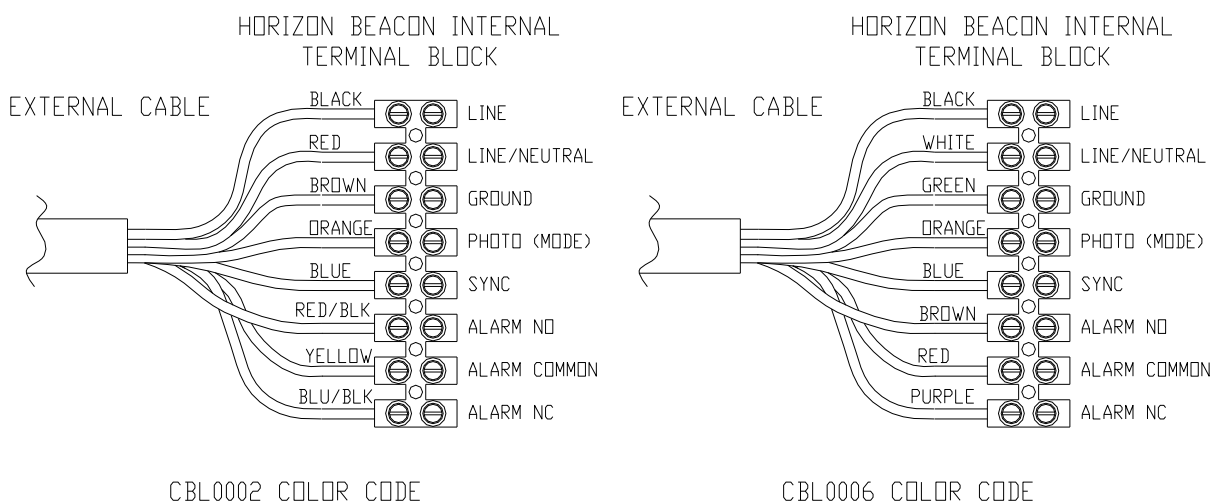
Perform one of the following procedures for installing interconnecting wiring:

a) Connect all wiring between a single flash unit and the controller using a #12AWG, 4 conductor cable, H&P part WC23012DL0T-xxx. The wires in this cable are color coded and connect to pigtail of the flash unit and terminal block inside the controller.

1. Black Wire of Cable to TB1-L, AC Line (hot)
2. White Wire of Cable to TB1-N, AC Neutral
3. Green Wire of Cable to TB1-G, Ground
4. Orange Wire of Cable to TB1-M, Photo Mode (0VAC Day, 120V Night)

b) Use cable CBL0006 or CBL0002 to connect flash unit pigtail and controller as shown:

1. Black Wire of Cable to TB1-L , AC Line (hot)
2. Red (CBL0002 only) or White wire of Cable to TB1-N, AC Neutral
3. Brown(CBL0002 only) or Green wire of Cable to TB1-G, Ground
4. Orange wire of Cable to TB1-M, Photo Mode (0VAC Day, 120V Night)
5. Blue wire of Cable to TB2-S, Sync (optional)\*\*
6. Red/Black or Brown (CBL0006 only) wire of Cable to User's Normally Open (NO) Alarm Circuit
7. Blue/Black or Red (CBL0006 only) wire of Cable to User's Normally Closed (NC) Alarm Circuit\*\*
8. Yellow wire of Cable to User's Common (COM) Alarm Circuit

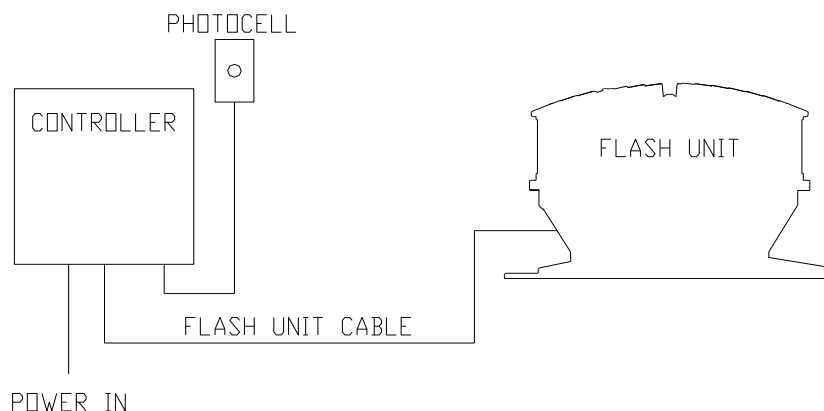


**\*\*Confirm correct colors before connecting power – never connect line voltage to blue Sync line or permanent damage will result\*\***

- c) Connect wiring between the sidelight level and the controller using #12-3C cable, H&P part number WC23012CL0T-xxx. The wires in this cable are connected from TB1, as follows:
1. Black wire from the sidelight cable to TB1-O1 (Line)
  2. Red wire from the sidelight cable to TB1-W (Neutral)
  3. Blue wire from sidelight cable to TB1-G (Ground)
- d) Connect wiring between the external photocell and the controller using #18 AWG wire. The wires in this cable are connected from TB1, as follows:
1. Black wire of the photocell to TB1-BLK
  2. Red wire of the photocell to TB1-RED

#### 4.4 Final Check

Before applying power to the equipment, check that all wires are properly secured within all terminal blocks by pulling lightly on each. Ensure all switch settings are correct within system controller as instructed within controller manual. System interlocks, relays and circuit boards should also be checked to ensure that they are properly seated. Check to ensure that any user-installed wiring does not interfere with relay operation when covers are closed.



**Figure 4. System Diagram Overview**

## 5.0 LIGHTNING PROTECTION

### 5.1 Built-in Lightning/Surge Protection

The flash unit has built in lightning and surge protection devices to protect against transient voltages. These devices are designed to withstand 6kV/3kA transients as required by the FAA Advisory Circular 150/5345-43.

The surge arrestors are replaceable. Please see the spare part listing for part number.

If problems arise, always check the appropriate circuit breaker or fuse.

## 6.0 CATENARY LIGHTING SYSTEMS

### 6.1 Sequenced Flashing Systems

Catenary support structure systems composed of L-866 or L-866/885 light units must have a sequenced flashing characteristic and operate 24 hours per day.

This system consists of three lighting levels on or near each supporting structure. A light level may consist of one or more L-866 and/or L-885 units to provide required horizontal light coverage for pilot safety. One light level is near the top, one at the bottom or lowest point of the catenary span, and one midway between the top and bottom. The middle unit must be at least 50 feet (15m) from the other two levels. The middle light may be omitted when the distance between the top and bottom levels is less than 100 feet (30m).

The flash sequence must be middle, top, and bottom. The interval between the beginning of the top and the beginning of the bottom flashes must be about twice the interval between the beginning of the middle and the beginning of the top flashes. The interval between the end of one sequence and the beginning of the next must be about 10 times the interval between middle and top flashes. The time for the completion of one cycle is about one second.



## 7.0 GPS LIGHTING SYSTEMS

### 7.1 GPS Systems

HORIZON™ units installed with the GPS Module, 51-0002-001, will receive a timing signal from the available satellites to synchronize with other HORIZON units, even if they are not wired together, such as across a river.

One GPS unit will automatically become the 'Master' for the set of installed fixtures which share a hardwired sync line.

Often multiple GPS units connected at the controller provide redundancy. In case one GPS unit fails to lock with the satellites, another unit will become the 'Master'.

## 8.0 MAINTENANCE

### 8.1 General

While great care has been taken in the design and component quality selection of the unit, should maintenance be needed the unit is repairable.

### 8.2 Flash Unit

The flash unit allows the user to replace the following LRUs (Lowest Replaceable Unit): Power Supply Assembly, Logic PCBA, surge arrestors, lens, switch and LED light engine modules.

The GPS Cover must be securely tightened to the top cover by use of the four (4) screws. The screws must be torqued to 9 in/lbs. to ensure proper sealing of the foam gasket.

The interlock screw must be securely seated to provide watertight connection to o-ring. The interlock screw should be torqued to 15-20 in/lbs.

## 9.0 PARTS LISTING

Description	Part Number	Ref. Designator
Power Supply Assembly	51-0026-003	PS1
Logic PCBA, Dual, programmed	51-0063-001	LB1
Logic PCBA, Red, programmed	51-0061-001	LB1
Logic PCBA, White, programmed	51-0062-001	LB1
Logic CCA, Red, Steady On	51-0071-001	LB1
Logic CCA, Catenary, L-866/885, Middle	51-0067-001	LB1
Logic CCA, Catenary, L-866/885, Top, GPS	51-0068-001	LB1
Logic CCA, Catenary, L-866/885, Bottom	51-0070-001	LB1
Surge Arrestor (x2)	2798844	S1, S2
Interlock Switch	SWI0000	SW1
Lens Gasket	51-0017-001	
Lens	51-0018-001	L1
GPS Cover (without GPS)	51-0030-001	
GPS Cover (with GPS)	51-0030-003	
GPS Module	51-0002-001	GPS
LED Module – Red	51-0054-001	LED1 – LED6
LED Module – White	51-0008-001	LED1 – LED6
LED Module – Dual (Red/White)	51-0060-001	LED1 – LED6