IMPORTANT!!!

PLEASE TAKE THE TIME TO FILL OUT THIS FORM COMPLETELY. FILE IT IN A SAFE PLACE. IN THE EVENT YOU EXPERIENCE PROBLEMS WITH OR HAVE QUESTIONS CONCERNING YOUR CONTROLLER, THE FOLLOWING INFORMATION IS NECESSARY TO OBTAIN PROPER SERVICE AND PARTS.

MODEL # ___________________ E-2/3DBSL ________________

SERIAL # ____________________________________________________________________________

PURCHASE DATE _______________________________________________________________________

PURCHASED FROM ______________________________________________________________________
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1.0 INTRODUCTION

The TWR Lighting®, Inc. (TWR®) Model E-2/3DBSL Type L-864/L-865 Controller has been designed and built to the Federal Aviation Advisory Circular 150/5345-43G with safety and reliability in mind. TWR® is committed to providing our customers with some of the best products and services available. TWR® welcomes you to our family of fine products and we look forward to servicing your needs now and in the future. NOTE: Structures exceeding 500’ will require to be painted, in addition to this lighting, for added visual hazard marking.

1.1 APPLICATION

The E-2/3DBSL Controller is for use on lighting structures or towers 351’ to 700’ AGL (above ground level) that are approved to be lighted with Medium Intensity Dual White Strobe/Red LED in accordance with the FAA Advisory Circular 70/7460-1K.

1.2 SPECIFICATIONS OF EQUIPMENT

Dimensions:
- Controller (H x W x D)/Weight: 29.52” x 19.68” x 11.81”/115.0 lbs.
- Mounting Dim (H x W): 31.10” x 18.11”
- Beacon Height/Weight: 26.25” /75 lbs.
- Cable Diameter/Weight per 100 ft.: 625” +/- 10% 24 lbs.

Electrical Voltage:
- 120V AC +/- 10% 60 Hz (Standard)
- 240V AC +/- 10% 60 Hz (Available)

Intensity:
- White Daymode: 20,000 +/- 25% Effective Candelas
- Red Nightmode: 2,000 +/- 25% Effective Candelas
- White Nightmode (Back-up mode): 2,000 +/- 25% Effective Candelas

Beam Spread:
- Horizontal: 360°
- Vertical: 3° Minimum

Flash Rate:
- White Daymode: 40 fpm +/- 2 fpm
- Red Nightmode: 30 fpm +/- 10 fpm
- White Nightmode (Back-up mode): 40 fpm +/- 2 fpm

Wattage:
- Daymode: 285 Watts
- Red Nightmode: 135 Watts
- White Nightmode: 105 Watts

Temperature:
- +55°C / -55°C

Beacon Wind Load: 2.1 ft²
2.0 INSTALLATION

WARNING - DANGER!!

THIS SYSTEM OPERATES AT HIGH VOLTAGE LEVELS THAT COULD BE LETHAL TO SERVICE PERSONNEL. ALL INSTALLATION AND MAINTENANCE WORK SHOULD BE DONE BY QUALIFIED SERVICE PERSONNEL ONLY. WHEN PERSONNEL IS INSTALLING SYSTEM OR PERFORMING MAINTENANCE ON THIS SYSTEM, MAKE SURE THE POWER IS TURNED OFF AT THE SERVICE BREAKER PANEL!!

READ AND UNDERSTAND THE THEORY OF OPERATION AND ITS SAFETY MESSAGES BEFORE ATTEMPTING INSTALLATION/MAINTENANCE OF THIS SYSTEM. DO NOT ATTEMPT TO DEFEAT THE INTERNAL SAFETY SWITCHES IN THE CONTROLLER AND BEACONS!!

2.1 POWER SUPPLY CONTROL CABINET MOUNTING

The power supply control cabinet can be located at the base of the structure or in an equipment building. Mounting Dimensions can be found in Section 1.2, on page 1. Pay particular attention when choosing your controller mounting location to ensure proper door opening and room for service personnel. Refer to installation drawings INS-301, and HDO-301, for ease of install.

2.2 PHOTOCELL HOUSING

The standard photocell housing is supplied with a 20’ pigtail of 16 AWG TYPE TFFN wire. On occasion, in mounting of the photocell, an additional amount of wire may be required. Refer to drawing 100239, for proper assistance on determining gauge of wire for your specific needs.
2.3 PHOTOCELL WIRING
(Refer to Drawings HDO-301, and H40-301)

If the control cabinet is mounted inside an equipment building, the photocell should be mounted vertically on ½” conduit outside the building above the eaves facing north. Wiring from the photocell housing socket to the control cabinet should consist of one (1) each; red, black, and white wires. The white wire is connected to the socket terminal marked "N," the black wire is connected to the socket terminal marked "Li," and the red wire is connected to the socket terminal marked "Lo." The photocell should be positioned so that it does not "see" ambient light, which would prevent it from switching to the nightmode.

If the control cabinet is mounted outside an equipment building, the photocell should be mounted vertically on ½" conduit so the photocell is above the control cabinet. Care must be taken to assure that the photocell does not "see" any ambient light that would prevent it from switching into the nightmode. The photocell housing socket wiring is the same as above.

2.3.1 Connect the **BLACK** wire from the photocell to terminal block TB3-PL.

2.3.2 Connect the **RED** wire from the photocell to terminal block TB3-SSR.

2.3.3 Connect the **WHITE** wire from the photocell to terminal block TB3-N.

2.3.4 Install the photocell into the receptacle and twist to the right while depressing to lock into place.

2.4 POWER WIRING
(Refer to Drawing H40-301)

Power wiring to the control cabinet should be in accordance with local methods and National Electric Codes (NEC).

2.4.1 A 30 amp circuit breaker is recommended at service panel

2.4.2 Connect the "HOT" side of the 120V AC line to TB1-14.

2.4.3 Connect the "NEUTRAL" side of the 120V AC line to TB1-15.
2.4.4 Connect the AC ground to the ground lug to the lower right of the terminal block TB1.

2.4.5 Controller panel should be connected to the tower and/or building grounding system with the exception of installations on AM RF.

Applications where controller grounding to earth ground is prohibited. Ground the controller only to the tower itself using a suitable RF ground.

2.5 **TOWER LIGHTING KIT**

When installing this system, the customer will need to use strobe cable method to wire the LED dual beacons. Refer to Lighting Kit Drawing 603, for cable installations.

**WARNING DANGER!!!**

THIS SYSTEM OPERATES AT HIGH VOLTAGE LEVELS THAT COULD BE LETHAL TO SERVICE PERSONNEL. ALL INSTALLATION AND MAINTENANCE WORK SHOULD BE DONE BY QUALIFIED SERVICE PERSONNEL ONLY. WHEN PERSONNEL IS INSTALLING SYSTEM OR PERFORMING MAINTENANCE ON THIS SYSTEM, MAKE SURE THE POWER IS TURNED OFF AT THE SERVICE BREAKER PANEL!!

READ AND UNDERSTAND THE THEORY OF OPERATION AND ITS SAFETY MESSAGES BEFORE ATTEMPTING INSTALLATION/MAINTENANCE OF THIS SYSTEM. DO NOT ATTEMPT TO DEFEAT THE INTERNAL SAFETY SWITCHES IN THE CONTROLLER AND BEACONS!!

2.5.1 Beacon Mounting and Wiring

(Refer to Drawings HDO-301, and INS-301)

2.5.1.1 Bolt the beacon to the mounting plate using four 5/8” x 1-1/4” galvanized bolts that are supplied. Installer should make sure to check for full thread engagement on Anco locknut. Allow 16” clearance in back of the hinge (25” from the center of the base) to tilt lens back without hitting an obstruction.
2.5.1.2 Level the beacon using the spirit level at the base of the lens. Shims may be used under the LED dual beacon base or triple nutting each bolt with palnuts on all four (4) nuts.

2.5.1.3 Slip the electrical cable for the LED dual beacon through the watertight connector (cable gland bushing) and tighten the gland nut to make a watertight seal. Attach the wires to the terminal strip as follows:

<table>
<thead>
<tr>
<th>Wire color</th>
<th>to match</th>
<th>Lamp platform wire color</th>
<th>Terminal Block No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Gauge Red</td>
<td>16 Gauge Red/White</td>
<td>16 Gauge Red/White</td>
<td>1</td>
</tr>
<tr>
<td>14 Gauge White/Green</td>
<td>16 Gauge White/Green</td>
<td>16 Gauge White/Green</td>
<td>2</td>
</tr>
<tr>
<td>16 Gauge Brown</td>
<td>18 Gauge Brown</td>
<td>18 Gauge Brown</td>
<td>3</td>
</tr>
<tr>
<td>16 Gauge Blue</td>
<td>18 Gauge Blue</td>
<td>18 Gauge Blue</td>
<td>4</td>
</tr>
<tr>
<td>10 Gauge Black</td>
<td>16 Gauge Black</td>
<td>16 Gauge Black</td>
<td>5</td>
</tr>
<tr>
<td>14 Gauge White</td>
<td>16 Gauge White</td>
<td>16 Gauge White</td>
<td>6</td>
</tr>
<tr>
<td>14 Gauge Green</td>
<td>16 Gauge Green</td>
<td>16 Gauge Green</td>
<td>7</td>
</tr>
<tr>
<td>10 Gauge Red/Black</td>
<td>16 Gauge Red/Black</td>
<td>16 Gauge Red/Black</td>
<td>8</td>
</tr>
<tr>
<td>16 Gauge Bare Wire</td>
<td>Beacon Base</td>
<td>Beacon Base</td>
<td></td>
</tr>
</tbody>
</table>

2.5.2 Tower Kit Wiring

Install wiring between the controller and the LED dual beacon utilizing strobe cable method. Refer to drawings HDO-301, and 603, for installation of light kits. Following these minimum guidelines as well as any local or end user addition requirements, installing light kits will require lifting of the cable by the supplied cable grip or conduit to affix to the tower. Always work safely and adhere to all OSHA Safety Guidelines when lifting wiring or working on the structure or tower itself. It is the installer’s responsibility to install the lighting kit in a safe manner. Installers can request from OSHA their requirements 29CFR 1926.21, and 29CFR 1926.105, to ensure compliance to regulations.

NOTE: On occasion, a set of custom lighting kit drawings may be specifically requested by a customer and installed in this manual. In cases such as this, the drawings will precede the manual if a conflict occurs.
All the necessary information for wiring the LED dual beacons and LED sidelights is contained on the tower kit drawing 603. The connections for the LED dual beacons and LED sidelights in the controller are as follows:

2.5.2.1 Connect the 10 gauge **Red/Black** wire from LED dual beacon #1 wiring to TB1-1.

2.5.2.2 Connect the 10 gauge **Red** wire from LED dual beacon #1 wiring to fuse block marked B1.

2.5.2.3 Connect the 10 gauge **Black** wire from LED dual beacon #1 wiring to TB1-2.

2.5.2.4 Connect the 14 gauge **White** wire from LED dual beacon #1 wiring to TB1-3.

2.5.2.5 Connect the 10 gauge **Red/Black** wire from LED dual beacon #2 wiring to TB1-4.

2.5.2.6 Connect the 10 gauge **Red** wire from LED dual beacon #2 wiring to fuse block marked B2.

2.5.2.7 Connect the 10 gauge **Black** wire from LED dual beacon #2 wiring to TB1-5.

2.5.2.8 Connect the 14 gauge **White** wire from LED dual beacon #2 wiring to TB1-6.

2.5.2.9 Connect the 10 gauge **Red/Black** wire from LED dual beacon #3 wiring to TB1-7.

2.5.2.10 Connect the 10 gauge **Red** wire from LED dual beacon #3 wiring to fuse block marked B2.

2.5.2.10 Connect the 10 gauge **Black** wire from LED dual beacon #3 wiring to TB1-8.
2.5.2.11 Connect the 14 gauge **White** wire from LED dual beacon #3 wiring to TB1-9.

2.5.2.12 Connect the 14 gauge **White/Green** wire from LED dual beacons #1, 2, and 3 wiring to TB3-N.

2.5.2.13 Connect the 14 gauge **Green** wire from LED dual beacon #1 to the ground lug located to the lower left of TB1.

2.5.2.14 Connect the 14 gauge **Green** wires from LED dual beacons #2 and #3 to the ground lug located to the lower left of TB1.

2.5.2.15 Connect the 16 gauge Bare Drain wire (if strobe cable install) from LED dual beacon #1 to the ground lug located to the left of TB1.

2.5.2.16 Connect the 16 gauge Bare Drain wire (if strobe cable install) from LED dual beacon #2 to the ground lug located to the left of TB1.

2.5.2.17 Connect the 16 gauge Bare Drain wire (if strobe cable install) from LED dual beacon #3 to the ground lug located to the lower left of TB1.

2.5.2.18 Connect the 16 gauge **Brown** wire from LED dual beacon #1 wiring to TB1-10.

2.5.2.19 Connect the 16 gauge **Blue** wire from LED dual beacon #1 to TB1-11.

2.5.2.20 Connect the 16 gauge **Blue** wire from LED dual beacon #2 to TB1-11.

2.5.2.21 Connect the 16 gauge **Brown** wire from LED dual beacon #2 to TB1-12.

2.5.2.22 Connect the 16 gauge **Brown** wire from LED dual beacon #3 to TB1-12.
2.5.2.23 Connect the 16 gauge Blue wire from LED dual beacon #3 to TB1-13.

2.5.2.24 Connect the Red wire from the LED Sidelight #1 to fuse block marked S.

2.5.2.25 Connect the Yellow wire from the LED Sidelight #2 to fuse block marked S.

2.5.2.26 Connect the White Neutral wire from LED Sidelights #1 and #2 to TB3-N.

2.5.2.27 Connect the Green ground wire (if cable is used) from the LED Sidelights #1 and #2, wiring the ground lug located to the left of TB1.

2.6 ALARM WIRING

Alarm contacts (Form C) are provided for strobe failures, power failure and photocell on. It is left up to the customer or installer on how they choose to utilize these contacts with their monitoring equipment. External monitoring equipment is available. Please inquire within the sales staff at the factory for models available and pricing. Alarm configurations are shown on drawings H40-301, and M01-301.

2.6.1 White Strobe Failure (SF)

Connect the customer's alarm common to plug J3, terminal #5. Connect the customer's alarm wire to plug J3, terminal #6, for normally open (or) terminal #4, for normally closed monitoring.

2.6.2 Red LED Beacon Failure (BB)

Connect the customer's alarm common to plug J3, terminal #14. Connect the customer's alarm wire to plug J3, terminal #13, for normally open (or) terminal #15, for normally closed monitoring.

NOTE: All three (3) red light alarms are grouped due to the fail-safe operation.
2.6.3 Power Failure (PF)

Connect the customer's alarm common to plug J3, to terminal #11. Connect the customer's alarm wire to plug J3, terminal #12, for normally open (or) terminal #10, for normally closed monitoring.

2.6.4 Photocell (PC)

Connect the customer's alarm common to plug J3, terminal #17. Connect the customer's alarm wire to plug J3, terminal #16, for "off" operation (or) terminal #18, for "on" operation monitoring.

2.6.5 Sidelight Alarm (SL)

Connect the customer's alarm common to plug J3, terminal #2. Connect the customer's alarm wire to plug J3, terminal #3, for normally open (or) terminal #1, for normally closed monitoring.

2.6.6 Lights On (LO)

Connect the customer's alarm common to plug J3, terminal #8. Connect the customer's alarm wire to plug J3, terminal #9, for normally open (or) terminal #7, for normally closed monitoring.

2.7 ALARM TESTING

To test alarms, follow these procedures using an "ohm" meter between alarm common and alarm points.

2.7.1 White Strobe Failure (SF)

White strobe failure testing can be performed in the daymode operation. Check for status of the LED dual beacon. Turn "off" switch S1, on PCB #1, and status should change after a four (4) second delay. After test, turn S1 to the normal operating position.
2.7.2 LED Dual Beacon Failure (BB)

LED Dual Beacon failure testing can be performed in the nightmode operation. Check for status of the LED dual beacon. Turn "on" switch SW3 (up position) on controller panel and status should change to red nightmode. Pull the B1 open. (Alarm should be prompt after 10 seconds.) This testing will cause the unit to go into the back-up white strobe operation. To clear this situation, turn off SW3 (down position), re-engage B1, and reset the breaker.

2.7.3 Power Failure (PF)

While the controller is in normal operation, shut off power to the controller at the breaker panel. Alarm should be prompt. Reset the breaker to resume normal operation.

2.7.4 Photocell (PC)

Controller should be in daymode operation when performing this test. Check status of operation. Turn SW3 on (up position) (or) cover the photocell and operation status should change state. After test, turn SW3 to normal operating position (down position), or uncover photocell.

2.7.5 LED Sidelight Alarm (SL)

Controller should be in nightmode operation. Check status of operation. Pull fuse switch marked S. Alarm should occur within five (5) seconds. After test, re-engage fuse switch S.
2.8 CONTROLLER CONFIGURATION
(Refer to Drawing H01-301)

This unit is factory setup to be a master controller. If this unit is to be used in conjunction with an additional unit, change dip switch settings as drawing indicates. The following connections will need to be interfaced between systems.

2.8.1 Connect at least an 18/20 gauge wire from PCB #1, connector P1-15, from unit set-up to be the master unit to PCB #1, connector P1-15, of unit set-up to be the slave unit.

2.8.2 Connect at least an 18/20 gauge wire from TB3-SSR of master unit to slave unit TB3-SSR.

2.8.3 Connect at least an 18/20 gauge wire (ground) from one (1) chassis to the other chassis.

2.8.4 Use a single breaker for supply power to all controllers.

2.8.5 Follow standard instructions provided in the manuals supplied with the controllers.
3.0 THEORY OF OPERATION

3.1 THE POWER SUPPLY

The AC line is sent to transformers T1, and T3, through fuses F1, F4, MOVMOD, and relay K1. In order for K1 to energize and complete the circuit to T1, and T3, the safety interlock switch (CSS & BSS) must be closed. The BSS switch is located in the base of the beacon. In order for the system to operate, the beacons and the power supply must be closed and secured. The CSS is located in the enclosure door of the control cabinet. This switch is a three (3) position switch that can be pulled-out or depressed by closing the door to complete the circuit.

Transformers T1, and T3, secondary outputs are around 1,000V AC. These outputs are sent to the high voltage rectifier PCB (PCB #2) and converts the 1,000V AC of each transformer to around +550V DC and -550V DC in daymode operation. This High voltage is then used to charge energy storage capacitors bank C103-C109, C111-C117, and C119-C125. Resistors R31, R33, and R35, are bypassed through K5A, K5B, and K5C during daymode operation.

When the light level drops below 3 foot candles, photocell 6390-FAA2 supplies 120V AC to relay K3, and energizes it. The power is switched from the T1 & T3 to the red beacon control circuit. That consists of a flasher (M3) and a timing module (M4), which flash the beacon, and current sensing modules (M2 & M2A), which detect failures.

In the event of an LED Beacon failure or Flasher Failure, the K9 relay (failsafe relay) will remove power from the K3, de-energizing it. The power is then switched back to the strobe control circuit (T1 & T3). The photocell continues to supply 120V AC to the controller. This voltage is supplied to K5A, K5B, and K5C, which removes C103-C109, C111-C117, and C119-C125 from the discharge path, leaving capacitors C102, C110, and C118, in the circuit for failsafe mode operation. Transformers T1 & T3 secondary outputs are converted from 1,000V AC at the PCB #2 to around +700V DC and -550V DC for failsafe mode operation. This high voltage is then used to charge the energy storage capacitors C102, C110, and C118, through current limiting resistors R31, R33, and R35, and steering diodes D5, D6, and D8. The energy storage capacitor banks are connected to the flashtube through the interconnecting tower wiring.
3.2 THE FLASHTUBE

The flashtubes FT1, FT2, and FT3 (daymode) are quartz tubes containing two (2) electrodes each. The electrode at the positive (+) end is called the anode and is connected to the positive side of the storage capacitors through inductors L1, L2, and L3. The electrode at the negative (-) end of the tube is called the Cathode and is connected to the negative side of the energy storage capacitors banks.

The flashtube contains a gas called Xenon. When the high voltage energy in the storage capacitors is connected to the flashtube, nothing will happen since Xenon in its natural state is not a conductor of electricity. However, when a very short duration high voltage pulse is impressed on the trigger element of the tube (via the power supply and trigger transformers T4, T5, and T6) the Xenon gas is ionized and thereby becomes a good conductor of electricity. This allows the electrical energy in the storage capacitors to discharge rapidly through the flashtube, which converts this energy to light energy and heat energy. When the voltage stored in the capacitors discharges to a low level, the Xenon gas can no longer sustain conduction and since the short trigger pulse is gone by this time, it de-ionizes returning to its non-conducting state until another trigger pulse arrives to repeat the process. Meanwhile, the storage capacitor is being re-charged by the transformer and the high voltage rectifiers.

3.3 TIMING CIRCUIT

The timing circuit is contained entirely on printed circuit board #1. The timing circuit has its own power supply. This circuit converts the AC voltage to approximately 12V DC, which is used to supply all of the components in this circuit. It uses this low voltage DC to generate pulses that control the flash rate of the flashtube. It actually generates two (2) groups of pulses. The first is a pulse approximately once every 1.5 seconds to operate the flashtube during daylight hours. The second is a burst at 100Hz to elongate the apparent flash during the night time hours at reduced flash energy.
3.4 TRIGGER CIRCUIT

The trigger circuit is supplied by transformer T3 secondary windings. The 250V AC is converted to DC, which is stored in a storage capacitor much like the action of the high voltage circuit. The main difference is that the storage capacitor is much smaller. The trigger circuit receives the pulses generated by the timing circuit. It releases its stored energy with each pulse and delivers it to the flashtube's trigger element to initiate each flash.

3.5 ALARM CIRCUITS

3.5.1 Red Light On (LO)

Red Light On alarm circuit monitors Red LED Beacons on or off. If LED beacons are on, relay K7 (on PCB #3) will be engaged.

3.5.2 White Strobe Failure (SF)

White Strobe Failure alarm circuit monitors each flash of the day mode flashtube within the beacon. If the flashtube fails to flash (for any reason) the alarm circuit operates relay K11 (on PCB #3) that the customer can connect to their alarm transmitting devices. The alarm point can be accessed on J3 of PCB #3.

3.5.3 LED Dual Beacon (BB)

LED Dual Beacon failure alarm circuit monitors all three (3) LED beacons. If any LED Dual Beacon fails to flash (for any reason) the alarm circuit would operate relay K10 (on PCB #3) that the customer can connect to their alarm transmitting devices. The alarm point can be accessed on J3 of PCB #3.

3.5.4 Power Failure (PF)

The power failure alarm relay is energized during normal operation. Should the power be removed for any reason, then relay K6 would drop, creating an alarm for the customer's alarm transmitting device.
3.5.5 Photocell (PC)

The photocell alarm relay K4 is energized whenever the photocell or SW3 is on. This relay will allow the customer to monitor the modes of operation to determine if switch from daymode to nightmode has occurred.

3.5.6 Sidelight Alarm (SL)

Module M1 monitors the current flowing to the sidelights. This module can monitor from 3 mA to 1,000 mA. Factory setting is generally for six (6) lamps. When the current falls below to (5) lamps (one [1] lamp less than the factory setting), then the onboard relay will engage, creating an alarm.

3.6 BLEEDER CIRCUIT

The bleeder circuit is the most important safety item in this system. It consists of resistors R32, R34, and R36, connected to the high voltage storage capacitor through relays K2, and K2A. When the AC line voltage is turned off, the relay will close allowing the resistors to discharge the high voltage stored in the capacitor banks below 50V in 30 seconds.

**CAUTION**

NEVER RELY ON THIS CIRCUIT TO RENDER THIS SYSTEM HARMLESS. ANY DEFECT IN THIS CIRCUIT COULD ALLOW A HAZARDOUS HIGH VOLTAGE CHARGE TO REMAIN ON THE STORAGE CAPACITORS. ALWAYS WAIT AT LEAST 30 SECONDS AFTER POWER HAS BEEN TURNED OFF BEFORE STARTING ANY WORK ON THIS SYSTEM. ALWAYS MEASURE THE VOLTAGE ON THE STORAGE CAPACITORS WITH A VOLTOMETER BEFORE STARTING ANY OTHER WORK ON THIS SYSTEM. NEVER ATTEMPT TO DEFEAT THE SAFETY INTERLOCKS.
3.7 STROBE DIAGNOSTIC CIRCUITS

The diagnostic circuit is provided as a means of making system checks and maintenance more convenient. This circuit is entirely contained on the printed circuit boards PCB #1, and PCB #2. The circuits that are contained on PCB #1, and PCB #2, are as follows:

3.7.1 Control Power On

Line from the 120V AC input is sent through safety switches CSS, BSS, isolation transformer T2, and fuse F3, on PCB #1. Once this low voltage is at PCB #1, it is rectified, and then sent to LED4 (D5). If for any reason power is interrupted, (beacons opened, controller door open, blown F3 fuse, failed relay, etc.) LED4 would be extinguished.

3.7.2 High Voltage

The Cathode side of the high voltage HV1, HV2, and HV3, are routed through current limiting resistors (R201, R202, and R203). When the unit is in daymode, D14, D15, and D16 will be at full brightness when the capacitors are at full charge but, dims with the discharging of the storage capacitors. A constant intensity indicates that high voltage is present but capacitors are not discharging (check other indicators for fault). When the red LEDs fail to glow, then the high voltage is no longer present.

3.7.3 Trigger Voltage

The trigger voltage from fuse F2 is sent to current limiting resistor R29, and LED6 (D20). Under normal circumstances, the red LED should be at full intensity, indicating voltage to be normal. An absence of this indication means that the voltage is no longer present.
3.7.4 Nightmode

Output voltage from the photocell (SSR) is connected to the coil of relay K4 on PCB #3. Whenever the photocell senses the darkness, or switch SW3 is on, relay K4 will energize, thereby sending 120V to relay 1 on PCB #1 and the K3 relay. On the PCB #1, Relay 1 will supply 12V DC to LED7 (D7). LED7 will glow a constant red when in the nightmode. Relay K3 will energize, switching the power from T1 and T3 to the red light beacon control circuit.

3.7.5 Primary Timing

The primary timing pulses are received at LED8 (D12). LED8 will flash according to the pulses received from the timing circuit. If LED8 fails to flash, then the primary timing circuit has failed. Check LED9 (D28) for secondary timing operation. The strobe unit should produce 40 (+/- 2) pulses per minute in daymode or nightmode back-up operation.

3.7.6 Timing Signal Verify

Timing pulses (either primary or secondary) are received at LED9 (D28). The LED will flash according to the pulses received from the timing circuit. In the unlikely event that this LED is out, then total timing failure has occurred.

3.7.7 Flash Verified

Current from the Cathode side of the flashtube (FTC1, FTC2, and FTC3) are sent through the current sensing transformers T1, T2, and T3, on PCB #1. T1, T2, and T3 will send a pulse to the gate of the SCRs Q5, Q4, and Q7, and turn it on. Capacitors C12, C13, C11, C15, C16, and C17, via Q5, Q4, and Q7, will send voltage to LED1 (D9), LED3 (D10), and LED5 (D8). After each confirmed flash, LED1, LED 2, and LED3 will blink. Absence of a blinking LED signifies that the strobe beacon has ceased to flash.
3.7.8 Strobe Fail Test

Switch S1, when turned on, cuts off timing signal to the trigger circuit and extinguishes LED8 (D3). At this time the strobe alarm should be received at J3. The normal position of S1 is off (switch upward).

3.8 LED DUAL BEACON

It is a 120V AC 50/60 Hz LED Beacon energized by flasher PF-250, and works with current sensors M2, and M2A. While the LED red beacon fails, the current sensor will send 120V AC out to energize K8, to switch the system into white strobe nightmode (failsafe mode).
4.0 TROUBLESHOOTING

Much of the troubleshooting of this system will consist of correcting a "beacon out" situation. There may also be a failure mode where flashtube is still flashing, but at the wrong rate or the wrong intensity.

You must study and understand the safety messages and the theory of operation before attempting any service on this system. Servicing this system must be done by qualified personnel only.

4.1 TOOL REQUIREMENTS

In order to be prepared to trouble shoot or repair this system, a minimum amount of tools and equipment will be required. A recommendation list includes:

1) 5/16 Flat Electrician's Screwdriver
1) #2 Phillips Screwdriver
1) Nut Driver or Socket Set
1) Multi meter - Analog or Digital 600V AC / 600V DC Minimum

4.2 DIAGNOSTIC EVALUATION

The first step in trouble shooting of this system or performing annual maintenance will require the technician to open the controller door. With the power off to the controller, the technician should look over the controller circuit and repair or replace any apparent problems such as loose wire connections or corroded terminations. After the initial visual checks have been completed, restore power to the controller and pull out on the plunger of the cabinet safety switch (CSS) located at the lower right edge of the enclosure. Observe at this time the LEDs located on PCB #1 and PCB #2. Determine, by observation of these LED indicators, if the controller is performing to normal operation.

LEDs on PCB #1 are numbered from top to bottom, 1-9. LEDs on PCB #2 are numbered from top to bottom D14 - D16. (See Drawings H40-301, and H01-301.)
4.3  TROUBLESHOOTING ASSISTANCE

4.3.1  Flash Verify LED - Out

4.3.1.1  Observe high voltage LED (D14, D15, and D16) on the same beacon circuit to determine if it is available. If the LED is dim, or out completely, then check the high voltage capacitor bank (C103 - C109, C111 – C117, and C119 – C125, day, C102, C118, and C110 night) for a short. If no capacitor is found to be shorted, check the resonant capacitor (C101, and C126) for a short. If the resonant capacitor is okay, replace PCB #2. If the LED is at full illumination, go to the next step.

4.3.1.2  Check the status of trigger LED6. If LED is dim or off, check fuse F2. If blown, replace with exact type of fuse. If the fuse blows again, check transformer T1. Replace as necessary. If LED is okay, go to the next step.

4.3.1.3  If steps 4.3.1.1, and 4.3.1.2 check out okay, re-lamp the beacon.

4.3.2  Control Power on LED - Out

Check interlock circuits for an open circuit. If open, make the necessary repairs. If okay, check fuse F3. Replace if bad.

4.3.3  Primary Timing LED - Out

Observe the status of the timing LED8. If the LED is dim or out completely, check LED9, if dim or out, replace PCB #1. If one or both are lit, you should have timing.

4.3.4  False or Nonexistent LED Beacon Alarms (SF)

4.3.4.1  If alarm trips when the system appears to be working normally or fails to show an alarm when there is an obvious failure, check PCB #1, P2-ST for 120V AC output. If voltage is okay, go to the next step.
4.3.4.2 Check relay K11 coils for an open condition. Normal resistance should be around 2K ohm. If coil is open, replace relay.

4.3.4.3 The time delay between an actual failure and the point where the relay trips is pre-set at the factory or about eight (8) seconds. This delay period can be tested by throwing "on" (upward) switch number S1 (on PCB #1). After testing return switch S1 to its normal (downward) position.

4.3.5 LED Beacon Flasher Failure (BB)

In case a failure occurs in the red beacon portion, either the LED beacon or the flasher fails. The system will operate in mode, and have beacon fail alarm at the P12 plug. Pin #8 is failsafe common, Pin #7 is closed, and Pin #9 is open.

To troubleshoot the red beacon portion:

1. Turn power off at circuit breaker to reset light system.
2. Pull Relay K8 out of socket, and set SW3 to nightmode upward position.
3. Then turn power on at circuit breaker. Observe the LED beacon.
   - **IF**: Beacon steady burns (LED on Module will indicate flasher operation only) – replace M3 (Flasher)
   - **IF**: No light – check B1. If B1 is good, replace the LED red beacon.

4.3.6 No LED Beacon Operation

4.3.6.1 Check if switch SW3 is on. If switch is off, turn switch to the on position (upward). Reset the circuit breaker at the service panel. If okay, go to the next step.

4.3.6.2 Check M3 – LDB for 120V AC. If 120V AC doesn’t show up, check Relay K3; it should be energized. If okay, go to the next step.
4.3.6.3 Check M3 – BA for 120V AC. If 120V AC is not present, replace M3. If okay, check fuses F5 and F6.

**Note:** Once the unit fail-safes, you will need to reset the breaker at the panel in order to release the latched relay in this circuit anytime a failure has been detected. This is an important fact to remember when trouble shooting this system.
5.0 MAINTENANCE GUIDE

**WARNING - HIGH - VOLTAGE**

THIS SYSTEM OPERATES AT HIGH VOLTAGE LEVELS THAT COULD BE LETHAL TO SERVICE PERSONNEL. ALL INSTALLATION AND MAINTENANCE WORK SHOULD BE DONE BY QUALIFIED SERVICE PERSONNEL. READ AND UNDERSTAND THE THEORY OF OPERATION AND ITS SAFETY MESSAGES BEFORE ATTEMPTING INSTALLATION OF THIS SYSTEM. DO NOT ATTEMPT TO DEFEAT THE INTERNAL SAFETY DEVICES.

Tools Required:  
#2 Phillips Screwdriver  
3/16 Flat Blade Screwdriver

5.1 FLASHTUBE REPLACEMENT

The only required maintenance needed to be performed is the replacement of the flashtubes every four (4) years. By following these instructions, maximum safety and performance can be achieved.

5.1.1 Loosen the single quick open bolt located on upper hinge assembly.

5.1.2 Open the lens and tilt it back.

ALWAYS WAIT AT LEAST 30 SECONDS AFTER OPENING THE BEACON BEFORE STARTING ANY WORK ON THE BEACON.

5.1.3 Loosen the three (3) socket screws with a #2 Phillips screwdriver to remove lamp.

5.1.4 Install the new daymode flashtube making sure that the pins are aligned with the socket. Make sure tube is flush on the socket.

5.1.5 Tighten the socket screws snug, then 1/4 turn more.

5.1.5 Close the upper hinge assembly and latch securely.
5.2 RED OBSTRUCTION LIGHTING

The only required maintenance needed to be performed is replacement of the lamps in the L-810 fixture. Lamps should be replaced after being operated for not more than 75% of the rated life, or immediately upon failure, as per FAA Advisory Circular 70/7460-1K. By following these instructions, maximum safety and performance can be achieved.

Tools Required: None

5.2.1 LED LAMP REPLACEMENT (Sidelights)

NO MAINTENANCE IS NEEDED OR REQUIRED OTHER THAN REPLACEMENT AS NECESSARY.

5.3 PHOTOCELL

The photocell is a sealed unit. No maintenance is needed nor required other than replacement as necessary.
### DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

#### 6.0 MAJOR COMPONENTS LIST

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<tr>
<th>SCHEMATIC TAG #</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
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<td>BSS1, BSS2, BSS3</td>
<td>BEACON SAFETY SWITCH</td>
<td>STJ02003</td>
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<tr>
<td>C126</td>
<td>4 uf 660V AC CAP</td>
<td>STB99005</td>
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<td>C101, C102, C110, C118</td>
<td>3 uf 660 KV CAP CSI</td>
<td>STB99008CSI</td>
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<td>C103 - C109</td>
<td>40 uf 1KV CAP</td>
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<td>C111 – C117</td>
<td>CABINET SAFETY SWITCH</td>
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<td>C119 – C125</td>
<td>F1 10 amp FUSE</td>
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<td>CSS</td>
<td>F2 1/8 amp FUSE</td>
<td>FLQ18</td>
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<td>F3, F7</td>
<td>F4 1 amp FUSE</td>
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<td>F6</td>
<td>F4 20 amp FUSE</td>
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<td>HV BLEEDER RELAY 4PDT</td>
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<td>MID LED BEACONS CURRENT SENSOR</td>
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<td>MOV2</td>
<td>METAL OXIDE VARISTOR</td>
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<td>SURGE SUPPRESSOR</td>
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<td>P1, J1</td>
<td>15 POSITION PLUG</td>
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<td>J3</td>
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<td>PCB #2</td>
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<td>R31, R33, R35</td>
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<td>R38</td>
<td>AUXILIARY LOAD RESISTOR</td>
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<td>LED SIDELIGHT AND TOP LED BEACON CURRENT SENSORS</td>
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<td>TB3</td>
<td>SINGLE POLE TERMINAL</td>
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<td>M4</td>
<td>TIMER</td>
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<td>LED SIDELIGHT 120 – 240V AC Retrofit Kit Assembly</td>
<td>LED120-2RK</td>
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# DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

## 7.0 SUGGESTED SPARE PARTS LIST

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<td>10 amp FUSE</td>
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<td>(This replaces the P2455L Photocell)</td>
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<td>3 amp FUSE</td>
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<td>2</td>
<td>2 amp FUSE</td>
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Warranty & Return Policy

TWR Lighting®, Inc. ("TWR") warrants its products (other than “LED Product”) against defects in design, material (excluding incandescent bulbs) and workmanship for a period ending on the earlier of two (2) years from the date of shipment or one (1) year from the date of installation.

TWR Lighting®, Inc. ("TWR") warrants its “LED Product” against defects in design, material and workmanship for a period of five (5) years from the date of shipment. TWR®, at its sole option, will, itself, or through others, repair, replace or refund the purchase price paid for “LED Product” that TWR® verifies as being inoperable due to original design, material, or workmanship. All warranty replacement “LED Product” is warranted only for the remainder of the original warranty of the “LED Product” replaced. Replacement “LED Product” will be equivalent in function, but not necessarily identical, to the replaced “LED Product.”

TWR Lighting®, Inc. ("TWR") warrants its “LED Product” against light degradation for a period of five (5) years from the date of installation. TWR®, at its sole option, will, itself, or through others, repair, replace, or refund the purchase price paid for “LED Product” that TWR® verifies as failing to meet 75% of the minimum intensity requirements as defined in the FAA Advisory Circular 150/5345-43G dated 09/26/12. All warranty replacement “LED Product” is warranted only for the remainder of the original warranty of the “LED Product” replaced. Replacement “LED Product” will be equivalent in function, but not necessarily identical, to the replaced “LED Product.”

Replacement parts (other than “LED Product”) are warranted for 90 days from the date of shipment.

Conditions not covered by this Warranty, or which might void this Warranty are as follows:

- Improper Installation or Operation
- Misuse
- Abuse
- Unauthorized or Improper Repair or Alteration
- Accident or Negligence in Use, Storage, Transportation, or Handling
- Any Acts of God or Nature
- Non-OEM Parts
  The use of Non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.
Field Service – Labor, Travel, and Tower Climb are not covered under warranty. Customer shall be obligated to pay for all incurred charges. An extensive network of certified and insured Service Representatives is available if requested.

Repair, Replacement or Product Return RMA Terms – You must first contact our Customer Service Department at 713-973-6905 to acquire a Return Merchandise Authorization (RMA) number in order to return the product(s). Please have the following information available when requesting an RMA number:

- The contact name and phone number of the tower owner or
- The contact name and phone number of the contractor
- The site name and number
- The part number(s)
- The serial number(s) (if any)
- A description of the problem
- The billing information
- The Ship To address

This RMA number must be clearly visible on the outside of the box. If the RMA number is not clearly labeled on the outside of the box, your shipment will be refused. Please ensure the material you are returning is packaged carefully. The warranty is null and void if the product(s) are damaged in the return shipment.

All RMAs must be received by TWR LIGHTING®, INC., 10810 W. LITTLE YORK RD. #130, HOUSTON, TX 77041-4051, within 30 days of issuance.

Upon full compliance with the Return Terms, TWR® will replace, repair and return, or credit product(s) returned by the customer. It is TWR®’s sole discretion to determine the disposition of the returned item(s).
RMA Replacements – Replacement part(s) will be shipped and billed to the customer for product(s) considered as Warranty, pending return of defective product(s). When available, a certified reconditioned part is shipped as warranty replacement with a Return Merchandise Authorization (RMA) number attached. Upon receipt of returned product(s), inspection, testing, and evaluation will be performed to determine the cause of defect. The customer is then notified of the determination of the testing.

- Product(s) that is deemed defective and/or unrepairable and covered under warranty - a credit will be issued to the customer’s account.
- Product(s) found to have no defect will be subject to a $75.00 per hour testing charge (1 hour minimum), which will be invoiced to the customer. At this time the customer may decide to have the tested part(s) returned and is responsible for the return charges.
- Product(s) under warranty, which the customer does not wish returned, the customer will be issued a credit against the replacement invoice.

RMA Repair & Return – A Return Merchandise Authorization (RMA) will be issued for all part(s) returned to TWR® for repair. Upon receipt of returned product(s), inspection, testing, and evaluation will be performed to determine the cause of defect. The customer is then notified of the determination of the testing. If the returned part(s) is deemed unrepairable, or the returned part(s) is found to have no defect, the customer will be subject to a $75.00 per hour testing charge (1 hour minimum), which will be invoiced to the customer. Should the returned parts be determined to be repairable, a written estimated cost of repair will be sent to the customer for their written approval prior to any work being performed. In order to have the tested part(s) repaired and/or returned, the customer must issue a purchase order and is responsible for the return shipping charges.

RMA Return to Stock – Any product order that is returned to TWR® for part(s) ordered incorrectly or found to be unneeded upon receipt by the customer, the customer may be required to pay a minimum 20% restocking fee. Product returned for credit must be returned within 60-days of original purchase, be in new and resalable condition, and in original packaging. Once the product is received by TWR it’s condition will be evaluated and a credit will be issued only once it is determined that the RMA Return Terms have been met.

Credits – Credits are issued once it is determined that all of the Warranty and Return Terms are met. All credits are processed on Fridays. In the event a Friday falls on a Holiday, the credit will be issued on the following Friday.
Warranty & Return Policy
(continued)

Freight – All warranty replacement part(s) will be shipped via ground delivery and paid for by TWR®. Delivery other than ground is the responsibility of the customer.

REMEDIES UNDER THIS WARRANTY ARE LIMITED TO PROVISIONS OF REPLACEMENT PARTS AND REPAIRS AS SPECIFICALLY PROVIDED. IN NO EVENT SHALL TWR® BE LIABLE FOR ANY OTHER LOSSES, DAMAGES, COSTS, OR EXPENSES INCURRED BY THE CUSTOMER, INCLUDING, BUT NOT LIMITED TO, LOSS FROM FAILURE OF THE PRODUCT(S) TO OPERATE FOR ANY TIME, AND ALL OTHER DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING ALL PERSONAL INJURY OR PROPERTY DAMAGE DUE TO ALLEGED NEGLIGENCE, OR ANY OTHER LEGAL THEORY WHATSOEVER. THIS WARRANTY IS MADE BY TWR® EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED. WITHOUT LIMITING THE GENERALITY OF THE FORGOING, TWR® MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS OF THE PRODUCT(S) FOR ANY PARTICULAR PURPOSE. TWR® EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES.
RETURN MERCHANDISE AUTHORIZATION (RMA) FORM

RMA#: ____________________ DATE: ____________________

CUSTOMER: ____________________________________________

CONTACT: __________________ PHONE NO.: ________________

ITEM DESCRIPTION (PART NO.): ___________________________

MODEL NO.: __________________ SERIAL NO.: ______________

ORIGINAL TWR INVOICE NO.: __________ DATED: ____________

DESCRIPTION OF PROBLEM: __________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

__________________________________________________________

SIGNED: ________________________ DATE NEEDED: ____________

RETURN ADDRESS: __________________________________________


PLEASE RETURN PRODUCT TO: 10810 W. LITTLE YORK RD., #130 HOUSTON, TX 77041-4051
RETURN MERCHANDISE AUTHORIZATION (RMA) FORM

RMA#: ______________________ DATE: ______________________

CUSTOMER: ________________________________________________

__________________________________________________________

CONTACT: _______________ PHONE NO.: _______________________

ITEM DESCRIPTION (PART NO.): ______________________________

_________________________________________________________________

MODEL NO.: _____________ SERIAL NO.: _______________________

ORIGINAL TWR INVOICE NO.: _______________ DATED: __________

DESCRIPTION OF PROBLEM: __________________________________

_________________________________________________________________

_________________________________________________________________

SIGNED: ______________________ DATE NEEDED: _______________

RETURN ADDRESS: __________________________________________

PLEASE RETURN PRODUCT TO: 10810 W. LITTLE YORK RD., #130 HOUSTON, TX 77041-4051
POWER SUPPLY
29.52" x 19.68" x 11.81"
MOUNTING HOLES 7/16"

ITEM # DESCRIPTION
1 BEACON L-864/L865 DUAL RED LED / WHITE STROBE.
2 POWER SUPPLY E2/3DBSL
3 WATER TIGHT CABLE CONNECTOR WITH SEALING GLAND.
4 ENTRANCE HUB 3/4"
5 ENTRANCE HUB 1"
6 RIGID GALVANIZED CONDUIT OR STROBE CABLE.
7 #6390-FAA2 PHOTOCELL

NOTES:

A. POWER SUPPLY IS NORMALLY MOUNTED AT GROUND LEVEL ON TOWER. IT CAN ALSO BE MOUNTED INDOORS. RECOMMENDED MOUNTING HEIGHT IS 48" TO BOTTOM OF THE ENCLOSURE FOR EASE OF MAINTENANCE.

B. MOUNT BEACON HINGES SO LENS WILL OPEN UNOBSTRUCTED BY STRUCTURE.
NOTES:

1. THIS CONTROLLER CAN BE MOUNTED INDOOR OR OUTDOOR.
2. IT IS HIGHLY RECOMMENDED TO MOUNT A LIGHTING ROD AT THE TOP LEVEL.
3. FOR MORE DETAILS REFER TO DRAWINGS HD0-301 (CONTROLLER INSTALLATION), 603 (LIGHT KIT CABLE RUN).

PHOTOCELL
MOUNT PHOTOCELL OUTSIDE AWAY FROM EFFECTS OF EXTERIOR LIGHT WITH WINDOW FACING NORTH.

E2/3DBSL INSTALLATION GUIDELINE

DATE: LTR REVISON
NOTES:
1. ITEM #7 CAN BE USED TO REDUCE 3/4" CONDUIT TO 1/2" CONDUIT AT THE HOUSING OR AT THE CONTROLLER ITSELF.
2. IF ADDITIONAL WIRE IS REQUIRED OVER THE FACTORY 20', USE THE FOLLOWING CHART. 
   21' TO 300' - 16 AWG TFFN 
   301' TO 500' - 14 AWG TFFN
The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.

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Enlightened Technology
TWR Lighting, Inc.

NOTES:
1. THIS DRAWING IS A TYPICAL INSTALLATION DETAIL FOR 3 OL-1 PER LEVEL SYSTEM.
2. PART # EL3430 MAY BE OMITTED WHEN ARRANGING FOUR LEG TOWERS.
3. PART # CONDUIT34 CUT TO LENGTH FOR PROPER EXTENSION OF OL1 FROM STRUCTURE (6"-12"). ATTACH PART # HC402 TO UNTHEADED CONDUIT TO COMPLETE ASSEMBLY.
4. USE COUPLING THAT IS PROVIDED BY PART # CONDUIT34.
5. GREEN WIRE USED ONLY ON LED SIDELIGHTS
Parts List

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
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<tr>
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<td>OL1VLED2</td>
<td>L810 OBSTRUCTION LIGHT</td>
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<td>1</td>
<td>100591</td>
<td>OL 6 LED STAR DISK</td>
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<td>1</td>
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<td>1</td>
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<td>6</td>
<td>STD05008</td>
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<td>OLG</td>
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<td>1.7</td>
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<td>1</td>
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<td>LENS HOLDER RING</td>
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<td>1</td>
<td>A314</td>
<td>3/4&quot; CONDUIT LOCKNUT GALV.</td>
</tr>
</tbody>
</table>

* = ITEMS NOT SHOWN

* GROUND WIRE MUST BE CONNECTED TO PROPERLY PROTECT POWER SUPPLY. FAILURE TO GROUND WILL VOID ALL WARRANTIES.
**120VAC PRODUCT SPECIFIC SETTINGS**

<table>
<thead>
<tr>
<th>QTY.</th>
<th>PART NO.</th>
<th>INPUT</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
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<tr>
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<td>20</td>
<td>30</td>
<td>OFF</td>
<td>DIALIGHT</td>
</tr>
<tr>
<td>1</td>
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<td>DIALIGHT</td>
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<tr>
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<td>E3</td>
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<td>20</td>
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<td>35</td>
<td>20</td>
<td>30</td>
<td>OFF</td>
<td>ORGA</td>
</tr>
</tbody>
</table>

*NO MEMORY

**FUNCTIONS**

1) Configuration: Selection of operation mode (<1 / >1 / >1<) with or without memory.
2) Adjustment of current threshold as % of setting range.
3) Hysteresis adjustment from 5% to 50%.
4) Time Delay adjustment from 0.1 to 30sec.
5) Diagnostic button.
6) Relay outputs status (Yellow) LED.
   - Steady yellow LED indicates relay energized
   - Blinking yellow LED indicates current below threshold and the time delay has started
   - Yellow LED "OUT" indicates relay de-energized
7) Dial Pointer (Green) LED
   - Steady green LED indicates that supply to the RM22 is present

Due to current draw tolerances slight adjustments to setting #2 may be needed for proper alarming.
## Notes:

1. **Drawing Illustrates Method of Strain Relieving Wire. Use This Method on All Junction Boxes.**
2. **The National Electrical Code—Article 300-19-83 Requires Conductors in a Vertical Conduit Be Supported to Relieve Strain on Terminal Block Connections.**
3. **Sketch Illustrates Method of Strain Relieving a Single Conductor. Several Conductors May Be Grouped Together.**
4. **Conductors May Be Mixed but Should Not Take Up More Than 40% of Conduit’s Inside Area.**

### Using This Junction Box Method Spacing is 100 Feet Maximum.

<table>
<thead>
<tr>
<th>AWG</th>
<th>Max. Number Wires in 3/4” Conduit</th>
<th>Max. Number Wires in 1” Conduit</th>
<th>Wire Area</th>
<th>Weight per 100 Feet</th>
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</thead>
<tbody>
<tr>
<td>12 THHN</td>
<td>16</td>
<td>26</td>
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<td>4 THHN</td>
<td>2</td>
<td>4</td>
<td>0.0845</td>
<td>16.00</td>
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</tbody>
</table>
1) MOUNT BEACON HINGE SO LENS WILL OPEN UNRESTRICTED BY STRUCTURE.

2) ON AM RF TOWER APPLICATIONS, KEEP GROUND LUG FROM BEING CONNECTED TO EARTH GROUND, GROUND TO THE TOWER ONLY.

3) THIS DRAWING IS PROVIDED AS A GENERAL REFERENCE. TWILIGHT, INC. DOCUMENTATION SUPERSEDES THIS DRAWING. IT SHOULD BE REVIEWED PRIOR TO INSTALLATION OF THIS SYSTEM.

4) POWER SUPPLY IS NORMALLY MOUNTED AT EYE LEVEL ON TOWER. IT CAN ALSO BE MOUNTED INSIDE. RECOMMENDED MOUNTING HEIGHT IS 42° TO BOTTOM OF THE ENCLOSURE FOR EASE OF MAINTENANCE.

5) STROBE CABLE IS TO BE FASTENED TO TOWER STRUCTURE WITH PART NUMBER STR3081 (ATTACH EVERY 5')
**WRAPLOCK FASTENING DETAIL**

**WrapLock**

CUT OFF BAND TO PROPER LENGTH.
(SEE TABLE ON COVER OF BOX)

1. PASS ONE END THROUGH YOKE AND BEND BACK ABOUT 1 1/2" AND FLATTEN DOWN.
2. PASS BAND AROUND WORK AND THROUGH YOKE.
3. REPEAT AND PASS END THROUGH A SECOND TIME, DRAW UP FREE END SNUGLY WITH PLIERS.
4. INSERT FREE END IN SLOT OF RATCHET.
5. TURN DOWN UNTIL CLAMP IS TIGHT.
6. BACK OFF SLIGHTLY TO REMOVE RATCHET, CLAMP IS NOW SECURELY LOCKED.

TO REMOVE WrapLock
UNCOIL END WITH RATCHET, PRESS DOWN AT POINT WHERE BAND METAL HAS BEEN FORCED THROUGH CURVED PART OF YOKE.