

TWR Lighting, Inc. HARK[®]

Enlightened Technology[®]

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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 # E2/3DB2NM7W/IND

SERIAL # _____

PURCHASE DATE _____

PURCHASED FROM _____

TWR Lighting, Inc. **HARK**[®]

Enlightened Technology[®]

E2/3DB2NM7W/IND CONTROLLER

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WARRANTY & RETURN POLICY

RETURN MERCHANDISE AUTHORIZATION (RMA) FORM

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APPENDIX

CHASSIS COMPONENT LAYOUT.....	H40-368 (REV A)
SCHEMATIC LAYOUT	M01-368 (REV A)
HOUSING DETAIL.....	HD0-368
INSTALLATION GUIDELINE.....	INS-368
SIDELIGHT MOUNT ASSEMBLY	100489 (REV A)
TIMING/CONTROL PCB	H01-340
HIGH VOLTAGE RECTIFIER PCB.....	H02-258A (REV C)
TRIGGER VOLTAGE RECTIFIER PCB	H04-340
SIDELIGHT CURRENT SENSOR	100664 (REV F)
L-810 OL-1 SINGLE OBSTRUCTION LIGHT	FM10018 (REV D)
L-810 OL-1 SINGLE OBSTRUCTION LIGHT DETAIL.....	279-OL (REV C)
L-810 OL-1 SINGLE OBSTRUCTION WIRING DETAIL	274-S (REV A)
JUNCTION BOX DETAIL	100089 (REV A)
STDBEACON ASSEMBLY	100414 (REV C)

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E2/3DB2NM7W/IND CONTROLLER

1.0 INTRODUCTION

The TWR Lighting®, Inc. (TWR®) Model E2/3DB2NM7W/IND Type L-864/L-865 Controller has been designed and built to the Federal Aviation Advisory Circular 150/5345-43F, 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 E2/3DB2NM7W/IND Controller is for use on lighting structures or towers 351' to 700' AGL (above ground level) that are approved to be lighted with Dual White/Red Flashing Medium Intensity Strobes in accordance with the FAA Advisory Circular 70/7460-1K.

1.2 SPECIFICATIONS OF EQUIPMENT

Dimensions:

Controller (H x W x D)/Weight	41-1/4" x 29-1/4" x 14-1/2" / 642 lbs.
Mounting Dim (H x W)	31-9/16" x 27-9/16"
Beacon Height/Weight	28.0" /36 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	22 fpm +/- 2 fpm
White Nightmode (Back-up mode)	40 fpm +/- 2 fpm

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Wattage:		
Daymode		285 Watts
Red Nightmode		398 Watts
White Nightmode		105 Watts
Temperature:		+55°C / -55°C
Beacon Wind Load:		2.1 ft ²

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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-368, and HD0-368, for ease of install.

2.2 PHOTOCELL WIRING

(Refer to Drawing H40-368 REV A)

2.2.1 Connect the **BLACK** wire from the photocell to terminal block TB2-5.

2.2.2 Connect the **RED** wire from the photocell to terminal block TB2-6.

2.2.3 Connect the **WHITE** wire from the photocell to terminal block TB2-7.

NOTE: The enclosure provided is for Class I, Groups B, C, & D; Class II, Groups E & G, as well as Class III per NEC for hazardous locations (Article 500). Conduit seals are required within 18" from the enclosure on each conduit run (Article 501-1.5).

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2.3 POWER WIRING

(Refer to Drawing H40-368 REV A)

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

2.3.1 A 30 amp circuit breaker is recommended at service panel.

2.3.2 Connect the "HOT" side of the 120V AC line to TB2-8.

2.3.3 Connect the "NEUTRAL" side of the 120V AC line to TB2-9.

2.3.4 Connect the AC ground to the ground lug to the lower right of the terminal block TB2.

2.3.4 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 structure itself, using a suitable RF ground.

2.4 TOWER LIGHTING KIT

WARNING - DANGER!!!

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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!!

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2.4.1 Beacon Mounting and Wiring

(Refer to Drawings HD0-368, and INS-368)

2.4.1.1 Bolt the beacon to the mounting plate using four (4) 5/8" x 1-1/2" 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.

2.4.1.2 Level the beacon using the spirit level at the base of the lens. Shims may be used under beacon base or triple nutting each bolt with palnuts on all four (4) nuts.

2.4.1.3 Enter the electrical cable for the 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:

Connect cable wire color	to match	Lamp platform wire color	Terminal Block No.
10 Gauge Black		16 Gauge Black	5
10 Gauge Red		12 Gauge Red	3
10 Gauge Red/Black		12 Gauge Red/Black	2
14 Gauge White		16 Gauge White	6
14 Gauge White/Green		16 Gauge White/Green	7
14 Gauge Green		16 Gauge Green	4
16 Gauge Blue		18 Gauge Blue	8
16 Gauge Brown		18 Gauge Brown	9
16 Gauge Bare Wire		Beacon Base	

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2.4.2 LIGHTING KIT WIRING

Install wiring between the controller and the beacon utilizing strobe cable method. Refer to drawings HD0-368, T1551, T1552, T1553, and T1554, 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 29CFT 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 dual beacons and sidelights are contained on the tower kit drawings HD0-368. The connections for the dual beacons and sidelights in the controller are as follows:

- 2.4.2.1 Connect the 10 gauge **Red/Black** wire from Beacon #1 wiring to TB1-1.
- 2.4.2.2 Connect the 10 gauge **Red** wire from Beacon #1 wiring to TB1-2.
- 2.4.2.3 Connect the 10 gauge **Black** wire from Beacon #1 wiring to TB1-3.
- 2.4.2.4 Connect the 14 gauge **White** wire from Beacon #1 wiring to TB1-4.

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- 2.4.2.5 Connect the 14 gauge **White/Green** wire from Beacon #1 wiring to TB1-5.
- 2.4.2.6 Connect the 10 gauge **Red/Black** wire from Beacon #2 wiring to TB1-6.
- 2.4.2.7 Connect the 10 gauge **Red** wire from Beacon #2 wiring to TB1-7.
- 2.4.2.8 Connect the 10 gauge **Black** wire from Beacon #2 wiring to TB1-8.
- 2.4.2.9 Connect the 14 gauge **White** wire from Beacon #2 wiring to TB1-9.
- 2.4.2.10 Connect the 14 gauge **White/Green** wire from Beacon #2 wiring to TB1-10.
- 2.4.2.11 Connect the 10 gauge **Red/Black** wire from Beacon #3 wiring to TB1-11.
- 2.4.2.12 Connect the 10 gauge **Red** wire from Beacon #3 wiring to TB1-12.
- 2.4.2.13 Connect the 10 gauge **Black** wire from Beacon #3 wiring to TB1-13.
- 2.4.2.14 Connect the 14 gauge **White** wire from Beacon #3 wiring to TB1-14.
- 2.4.2.15 Connect the 14 gauge **White/Green** wire from Beacon #3 wiring to TB1-15.
- 2.4.2.16 Connect the 14 gauge **Green** wire and 16 gauge Bare Drain wire (if strobe cable install) from Beacon #1 to the ground lug located to the left of TB1.

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- 2.4.2.17 Connect the 14 gauge **Green** wire and 16 gauge Bare Drain wire (if strobe cable install) from Beacon #2 to the ground lug located to the left of TB1.
- 2.4.2.18 Connect the 14 gauge **Green** wire and 16 gauge Bare Drain wire (if strobe cable install) from Beacon #3 to the ground lug located to the right of TB1.
- 2.4.2.19 Connect the 16 gauge **Brown** wire from Beacon #1 to TB2-1.
- 2.4.2.20 Connect the 16 gauge **Blue** wire from Beacon #1 to TB2-2.
- 2.4.2.21 Connect the 16 gauge **Blue** wire from Beacon #2 to TB2-2.
- 2.4.2.22 Connect the 16 gauge **Brown** wire from Beacon #2 to TB2-3.
- 2.4.2.23 Connect the 16 gauge **Brown** wire from Beacon #3 to TB2-3.
- 2.4.2.24 Connect the 16 gauge **Blue** wire from Beacon #3 to TB2-4.
- 2.4.2.25 Connect the **Red** wire from the first level Sidelights to TB2-10 marked S1.
- 2.4.2.26 Connect the **Yellow** wire from the second level Sidelights to TB2-10 marked S1.
- 2.4.2.27 Connect the **White Neutral** wire from the first and second level Sidelights to TB2-9.
- 2.4.2.28 Connect the **Green** ground wire (if cable is used) from first and second level Sidelights to the ground lug located to the right of TB2.

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2.5 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 for models available and pricing. Alarm configurations are shown on drawings H40-368, and M01-368.

2.5.1 White Strobe #1 Failure (ST1)

Connect the customer's alarm common to terminal block TB-6, terminal #11. Connect the customer's alarm wire to terminal block TB-6, terminal #10, for normally open (or) terminal #12, for normally closed monitoring.

2.5.2 White Strobe #2 Failure (ST2)

Connect the customer's alarm common to terminal block TB-6, terminal #8. Connect the customer's alarm wire to terminal block TB-6, terminal #7, for normally open (or) terminal #9, for normally closed monitoring.

2.5.3 White Strobe #3 Failure (ST3)

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

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2.5.4 Red Strobe Failure (RF)

Connect the customer's alarm common to terminal block TB-6, terminal #2. Connect the customer's alarm wire to terminal block TB-6, terminal #1, for normally open (or) terminal #3, for normally closed monitoring.

NOTE: All three (3) red strobe alarms are grouped due to the fail-safe operation.

2.5.5 Power Failure (PF)

Connect the customer's alarm common to terminal block TB-8, terminal #5. Connect the customer's alarm wire to terminal block TB-8, terminal #6, for normally open (or) terminal #4, for normally closed monitoring.

2.5.6 Photocell (PC)

Connect the customer's alarm common to terminal block TB-8, terminal #2. Connect the customer's alarm wire to terminal block TB-8, terminal #1, for "off" operation (or) terminal #3, for "on" operation monitoring.

2.5.7 Sidelight Alarm (SA)

Connect the customer's alarm common to Module M1 (item #17), terminal #25. Connect the customer's alarm wire to Module M1, terminal #28, for normally open (or) terminal #26, for normally closed monitoring.

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2.6 ALARM TESTING

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

2.6.1 White Strobe Failure (ST1, ST2, and ST3)

White strobe failure testing can be performed in the daymode operation. Check for status of strobe beacons. Turn "off" switch S1 on PCB #1, and status should change after a nine (9) second delay. At this point, indicator PL2 will illuminate. After test, turn S1 to the normal operating position. The normal position of S1 is down.

2.6.2 Red Strobe Failure (RF)

Red strobe failure testing can be performed in the nightmode operation. Check for status of strobe beacons. Turn "off" switch SW2 on controller panel, and status should change after a ten (10) second delay. At this point, indicator PL3 will illuminate. This testing will cause the unit to go into the back-up white strobe operation. To clear this situation, turn on SW2, and reset the breaker.

2.6.3 Power Failure (PF)

While the controller is in normal operation, shut off power to the controller at the breaker panel. Alarm should be prompt and indicator PL1 will extinguish. Reset the breaker to resume normal operation.

2.6.4 Photocell (PC)

Controller should be in the daymode of operation when performing this test. Check status of operation. Turn SW1 on or cover the photocell and operation status should change state. After test, turn SW1 to normal operating position.

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2.6.5 Sidelight Alarm (SA)

Controller should be in the nightmode operation. Check status of operation. Pull fuse switch S1 open. Alarm should occur within five - ten (5-10) seconds. At this time, indicator PL4 will illuminate. After test, re-engage fuse switch S1.

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3.0 THEORY OF OPERATION

3.1 THE POWER SUPPLY

The AC line is sent to transformers T2A through fuses F2, MOVMOD, and relay K1. In order for K1 to energize and complete the circuit to T2A, the safety interlock switch CSS, BSS, must be closed. The BSS switch is located in the middle of the beacon. In order for the system to operate, the beacons and the power supply must be closed and secured.

Transformers T2A secondary output is around 1,000V AC. This output is 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 and +700V DC and -550V DC in nightmode. This high voltage is then used to charge the energy storage capacitors C102, C112, and C122 through current limiting resistors R31A, R31B, and R31C, and steering diodes D5, D6, and D8, for nightmode operation. Resistors R31A, R31B, and R31C are bypassed through K5A, K5B, and K5C for daymode operation.

Day energy storage capacitor banks C103-111, C113-121, and C123-131, are used for the daymode operation and are connected to the high voltage through the normally closed contacts of relays K5A, K5B, and K5C. When the light level drops below 3 foot candles, the photocell supplies 120V AC to relays K5A, K5B, and K5C, which removes day capacitors from the discharge path leaving capacitors C102, C112, and C122, in the circuit for nightmode operation. The energy storage capacitor banks are connected to the flashtube through the interconnecting tower wiring.

3.2 THE FLASHTUBE

The flashtubes FTW1, FTW2, and FTW3, (daymode) and FTR1, FTR2, and FTR3, (nightmode) 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, L11, L2, L22, L3, and L33. The electrode at the negative (-) end of the tube is called the cathode, and is connected to the negative side of the energy storage capacitor bank.

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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 is in its natural state, it 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, T6, T7, T8, and T9) 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 PCB #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 50Hz 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 T1 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.

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3.5 ALARM CIRCUITS

3.5.1 White Strobe Failure (ST1, ST2, and ST3)

White Strobe Failure alarm circuit monitors each flash of the daymode flashtube within the beacon. If the flashtube fails to flash (for any reason) the alarm circuit operates relays K7A, K7B, and K7C. At this point, indicator PL2 will illuminate. The customer can connect their alarm transmitting devices to the terminal block TB6.

3.5.2 Red Strobe Failure (RF)

Red Strobe Failure alarm circuit monitors each flash of the nightmode flashtube within each beacon. If any Red Strobe flashtube fails to flash (for any reason) the alarm circuit would operate relay K8. At this point, indicator PL3 will illuminate. The customer can connect their alarm transmitting devices to the terminal block TB-6.

3.5.3 Power Failure (PF)

The power failure alarm relay is energized during normal operation. Should the power be removed for any reason, then relay K1A would drop, and also indicator PL1 will extinguish. The customer can connect their alarm transmitting devices to terminal block TB-8.

3.5.4 Photocell (PC)

The photocell alarm relay K4 is energized whenever the photocell or SW1 is on. This relay will allow the customer to monitor the modes of operation to determine if switch from day to nightmode has occurred.

3.5.5 Sidelight Alarm (SA)

Module M1 monitors the current flowing to the sidelights. These modules can monitor from (1-8) 116W lamps. Factory setting is generally for six (6) lamps. When the current falls below five (5) amps (one [1] lamp less than the factory setting), then the onboard relay will engage, creating an alarm. At this time, indicator PL4 will illuminate.

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3.6 BLEEDER CIRCUIT

The bleeder circuit is the most important safety item in this system. It consists of resistors R32A, R32B, and R32C, connected to the high voltage storage capacitors through relay K2. When the AC line voltage is turned off, the relay will close, allowing the resistors to discharge the high voltage stored in the capacitors' 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 VOLTMETER 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 T1, and fuse F1, 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 F1 fuse, failed relay, etc.) LED4 would be extinguished.

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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 F41 (PCB #4) is sent to current limiting resistor R1, and LED6 (PCB #1, D11). 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. Whenever the photocell senses the darkness, or switch SW1 is on, relay K4 will energize, thereby sending 120V to relay K2 (PCB #1). Relay K2 will supply 12V DC to the timing circuit as well as LED7 (D7). LED7 will glow a constant red when in the nightmode.

3.7.5 Primary Timing

The primary timing pulses are received at LED8 (PCB #1, 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. The strobe unit in nightmode operation should produce 22 (+/- 2) pulses per minute.

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3.7.6 Timing Signal Verify

Timing pulses (either primary or secondary) are received at LED9 (PCB #1, 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, T3, T4, T5, and T6, on PCB #1. T1, T2, T3, T4, T5, and T6 will send a pulse to the gate of the SCR's Q6, Q8, Q10, Q13, Q14, and Q17, and turns it on. Capacitors C12, C13, C14, C15, C16, and C17, via Q6, Q8, Q10, Q13, Q13, Q14, and Q17, will send voltage to LED1 (D20), LED3 (D21), and LED5 (D22). After each confirmed flash, LED1 and LED3 will blink. Absence of a blinking LED signifies the strobe beacon has ceased to flash.

3.7.8 Strobe Fail Test

Switch S1, when turned up, cuts off timing signal to the trigger circuit and extinguishes LED8 (D12). At this time the strobe alarm should be received at terminal block TB-6. The normal position of S1 is down.

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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 troubleshoot 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 troubleshooting 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 left to right D16 – D14. (See drawings H40-368, H01-340, and H02-258A.)

E2/3DB2NM7W/IND CONTROLLER

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 - C111, C113 - C121, C123 - C131 day, C102, C112, and C122 night) for a short. If no capacitor is found to be shorted, check the resonant capacitor (C101) 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 F41 of PCB #4. If blown, replace with exact type of fuse. If the fuse blows again, check PCB #1, and #4. 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 fuses F2. Replace if bad.

4.3.3 Primary Timing LED - Out

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

4.3.4 False or Nonexistent Beacon Alarms (ST1, ST2, and ST3)

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, P1-4, P2-5, and P2-6, for 120V AC output. If voltage is okay, go to the next step.

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4.3.4.2 Check relays K7A, K7B, and K7C coils for an open condition. Normal resistance should be around 2K ohm. If one (1) or more coils are open, replace relay.

4.3.4.3 The time delay between an actual failure and the point where the relay trips is about nine (9) seconds, and is pre-set at the factory. This delay period can be tested by turning "on" (*upward*) switch S1 (on PCB #1). After testing, return switch S1 to its normal (*downward*) position.

4.3.5 False or Nonexistent Beacon Alarm (RF)

If alarm trips when the system appears to be working normally, or fails to show an alarm when there is an obvious failure, check relay K8 coil for an open condition. Normal resistance should be around 2K ohm. If coil is open, replace K8.

4.3.6 No Red Strobe Operation

4.3.6.1 Check if switch SW2 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 Turn switch SW1 to the "on" position. On the breaker at the service panel to the lights, turn off, then back on. If the beacons come on, then the unit fail-safes back to the white back-up mode of operation, then replace the failed red mode flashtube.

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 troubleshooting this system.

E2/3DB2NM7W/IND CONTROLLER

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 nightmode 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.
- 5.1.6 Open the internal hatch-plate latch, and let it recline open.
- 5.1.7 Disconnect the cable running through the tube from the ten (10) position terminal block located at the base of the fixture.
- 5.1.8 Loosen the three (3) socket screws with a #2 Phillips screwdriver.

E2/3DB2NM7W/IND CONTROLLER

- 5.1.9 To remove the flashtube, slide the lamp down to the cable.
- 5.1.10 To install a flashtube, slide the lamp over the connector on to the cable with the lamp in the base up position.
- 5.1.11 Insert the flashtube with the pins aligned with the socket.
- 5.1.12 Tighten the socket screws snug, then 1/4 turn more.
- 5.1.13 Reconnect cable connection. Make sure to follow the color codes on the cable to the terminal block.
- 5.1.14 Close the hatch and latch securely.
- 5.1.15 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 LAMP REPLACEMENT

- 5.2.1.1 Unclasp the two (2) latches and let the bail recline back.
- 5.2.1.2 Lift the lens up and over the lamp letting the lens hang from the safety cable.
- 5.2.1.3 Unscrew the lamp counter-clockwise and remove.
- 5.2.1.4 Install the new lamp by screwing the lamp clockwise.
- 5.2.1.5 Re-install the lens making sure it is seated properly on the base.
- 5.2.1.6 Re-clasp the two (2) latches.

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5.3 **POWER SUPPLY**

No scheduled maintenance is required. Perform on an as needed basis only.

5.4 **PHOTOCELL**

The photocell is a sealed unit. No maintenance is needed nor required, other than replacement as necessary.

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E2/3DB2NM7W/IND CONTROLLER

6.0 MAJOR COMPONENTS LIST

SCHEMATIC TAG #	PART NUMBER	DESCRIPTION
BSS1, BSS2, BSS3	STJ02003	BEACON SAFETY SWITCH
C101	STB99005	4uf 660V AC CAP
C102, C112, C122	STB99008CSI	3uf 660V AC/DC CAP
C103-111, C113-121, C123-131	STB99006	40uf 1KV CAP
CSS	STJ02001	CABINET SAFETY SWITCH
F1	KTK1	1 amp FUSE
F2	FNQ20	20 amp FUSE
F1	FUSE.5	½ amp FUSE (ON PCB #1)
F41	FUSE.125	1/8 amp FUSE
FTW1, FTW2, FTW3	STFLSHTB6	DAYMODE FLASHTUBE
FTR1, FTR2, FTR3	STFLSHTB7	NIGHTMODE FLASHTUBE
K2	PM17AY	HV BLEEDER RELAY 4PDT
K5A, K5B, K5C, K4, K6, K8, K10A, K10B, K10C	KRPA11AG120V	DPDT OCTAL RELAY
K7A, K7B, K7C, K1A, K11	KRPA5AG120V	SPDT OCTAL RELAY
K9	SPEC224	TIME DELAY RELAY
L1, L2, L3	INDCTRC3001	INDUCTOR, DAY
L11, L22, L33	100453	INDUCTOR, NIGHT
M1	RM4JA32MW	CURRENT SENSOR
K1	STJ10018	12 amp DPDT OCTAL RELAY
MOV2	MOV524V15	PHOTOCELL MOV

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E2/3DB2NM7W/IND CONTROLLER

6.0 MAJOR COMPONENTS LIST (continued)

SCHEMATIC TAG #	PART NUMBER	DESCRIPTION
MOVMOD	SPM120	SURGE SUPPRESSOR
MOV 9, 10, 11, 12, 13, 14	V275LA20A	TRIGGER CIRCUIT MOV
P1	STT60021	15 POSITION PLUG
P2	STT60019	12 POSITION PLUG
PCB #1	STH01340	E2/3DB2 PCB #1
PCB #2	STH02258A	HIGH VOLTAGE RECTIFIER PCB
PCB #4	STH04340	E2/3DB2 TRIGGER VOLTAGE RECTIFIER PCB
PHOTOCELL	86390HL-FAA2	120 - 240V AC EXPLOSION PROOF PHOTOCELL
R31A, R31B, R31C	STA22012	50 ohm 50W NIGHTMODE RESISTORS
R32A, R32B, R32C	STA08020	25K ohm 20W BLEEDER RESISTORS
R33A, R33B, R33C	ST08010	2.4 MEG 2W AUXILARY BLEEDER RESISTORS
S1	KTK10	10 amp FUSE
SW2	STJ01002	SPST 15 amp SWITCH
SW1	G052A3FN34	PHOTOCELL BYPASS SWITCH
T2A	STC30020	FERRORESONANT TRANSFORMER
PL1	G0B3-G23CN34LED	GREEN "POWER ON" INDICATOR
PL2, PL3, PL4	G0B3-R23CN34LED	RED "FAILURE" INDICATORS

TWR Lighting, Inc. **PARK**

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E2/3DB2NM7W/IND CONTROLLER

6.0 MAJOR COMPONENTS LIST (continued)

SCHEMATIC TAG #	PART NUMBER	DESCRIPTION
T1	100272	ISOLATION TRANSFORMER
T3A, T3B, T3C	100273	BURSTING CHOKE
T4, T5, T6, T7, T8, T9	STC05005	TRIGGER TRANSFORMER
TB1	TERMBLK-15	15 PART TERM BLK
TB2	TERMBLK-10	10 PARK TERM BLK
TB3	TERMBLK 141-12	12 PART TERM BLK
TLS	STJ10008	THERMAL LIMITING SWITCH/210
TB4	TERMBLK 141-4	4 PART TERM BLK
J2	STT60017	6 POSITION PLUG
J3	STT60015	18 POSITION PLUG
	100319	FLASHTUBE SOCKET
	STBEAGSKT	HINGE GASKET
	STBEAGSKT2	LENS GASKET
	STDBCLENS	CLEAR LENS
	STDBEACON	DB STROBE BEACON FIXTURE
	STROBCABLE-3	STROBE BEACON CABLE
	621RZ10	STDBEACON 10 PART TERMINAL BLOCK
	621RZ8	STDBEACON 8 PART TERMINAL BLOCK

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7.0 SUGGESTED SPARE PARTS LIST

QTY	PART NUMBER	DESCRIPTION
2	KTK1	1 amp FUSE
2	KTK10	10 amp FUSE
2	FNQ20	20 amp FUSE
2	FUSE.5	1/2 amp FUSE (ON PCB #1)
2	FUSE.125	1/8 amp FUSE
1	STH01340	E2/3DB2 PCB #1
1	86390HL-FAA2	120 - 240V AC EXPLOSION PROOF PHOTOCELL
1	KRPA11AG120V	DPDT OCTAL RELAY
1	KRPA5AG120V	SPDT OCTAL RELAY
1	STB99008CSI	3uf 660V AC/DC CAP
2	STB99006	40uf 1KV CAP
1	MOV524V15	PHOTOCELL MOV
1	V275LA20A	TRIGGER CIRCUIT MOV
1	STB99005	4uf 660V AC CAP
1	STJ10018	12 amp DPDT OCTAL RELAY

TWR Lighting, Inc. **MARK**[®]

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E2/3DB2NM7W/IND CONTROLLER

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 70% 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:

- x Improper Installation or Operation
- x Misuse
- x Abuse
- x Unauthorized or Improper Repair or Alteration
- x Accident or Negligence in Use, Storage, Transportation, or Handling
- x Any Acts of God or Nature
- x **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.

TWR Lighting, Inc. HARK®

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Warranty & Return Policy (continued)

Field Service – Repairs are warranted for 90 days from the date of service, except where TWR® has made recommendations that were not adhered to that may cause premature failure on previous repairs. Labor, Travel, and Tower Climb are not covered under warranty. Customer shall be obligated to pay for all incurred charges not related to warranty. All warranty repairs are performed by trained TWR® personnel, or dispatched through an extensive network of certified and insured Service Representatives.

Return 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:

- x The contact name and phone number of the tower owner
- x The contact name and phone number of the contractor
- x The site name and number
- x The part number(s)
- x The serial number(s) (if any)
- x A description of the problem
- x The billing information
- x 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., 4300 WINDFERN RD #100, HOUSTON TX 77041-8943, 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).

TWR Lighting, Inc. HARK[®]

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Warranty & Return Policy (continued)

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.

- x Product(s) that is deemed defective and/or unrepairable and covered under warranty - a credit will be issued to the customer's account.
- x Product(s) found to have no defect will be subject to a **\$60.00 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.
- x Product(s) under warranty, which the customer does not wish returned, the customer will be issued a credit against the replacement invoice.

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 **\$60.00 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.

Return to Stock – Any order that is returned to TWR[®] for part(s) ordered incorrectly by the customer, or unneeded upon receipt, the customer is required to pay a **20% restocking fee.** A credit will be issued once it is determined that the Return Terms are 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.

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.

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Warranty & Return Policy (continued)

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.

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E2/3DB2NM7W/IND CONTROLLER

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: 4300 WINDFERN RD #100 HOUSTON TX 77041-8943

TWR Lighting, Inc. HARK[®]

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E2/3DB2NM7W/IND CONTROLLER

RETURN MERCHANDISE AUTHORIZATION (RMA) FORM

RMA#: _____ **DATE:** _____

CUSTOMER: _____

CONTACT: _____ **PHONE NO.:** _____

ITEM DESCRIPTION (PART NO.): _____

MODEL NO.: _____ **SERIAL NO.:** _____

ORIGINAL TWR INVOICE NO.: _____ **DATED:** _____

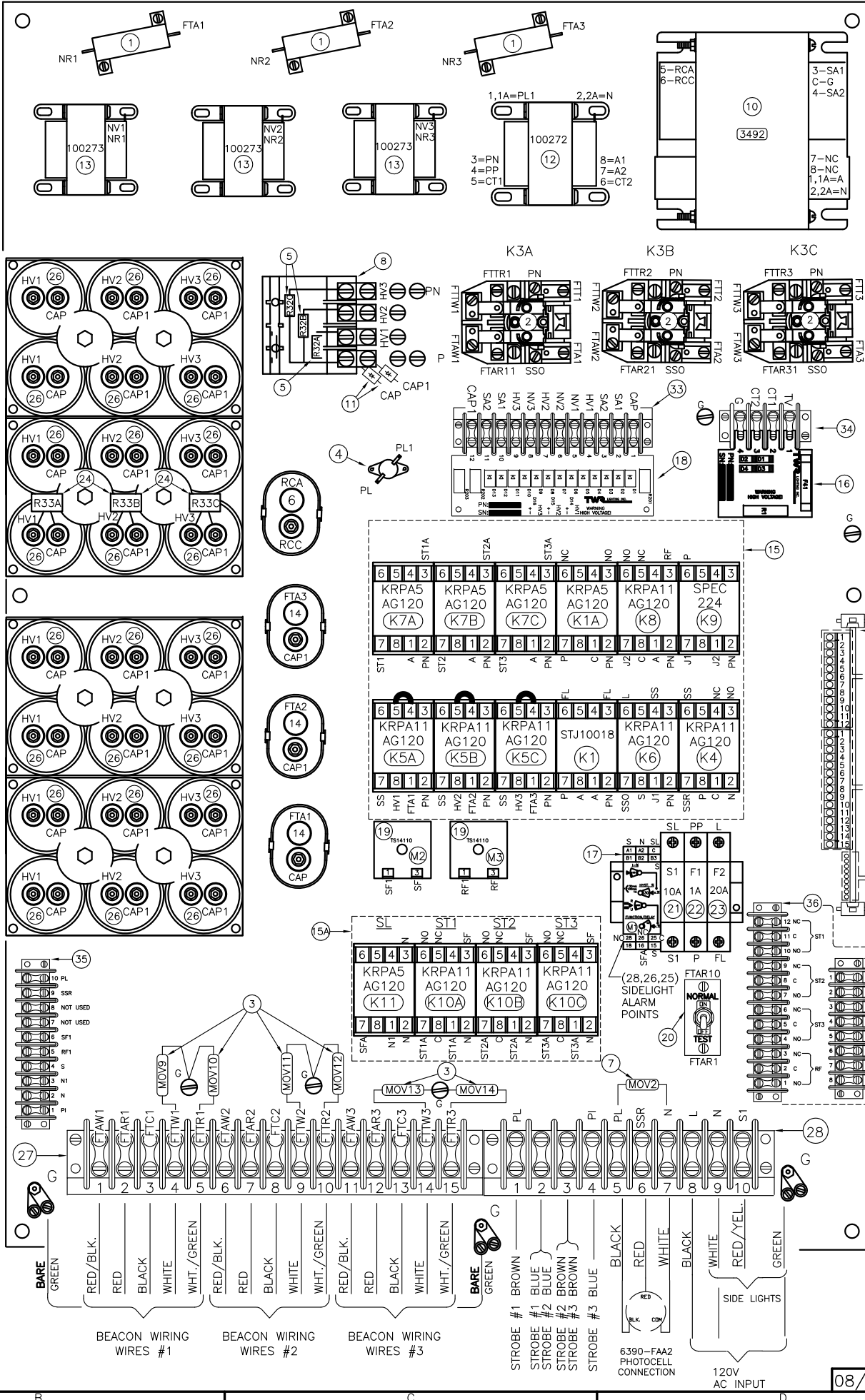
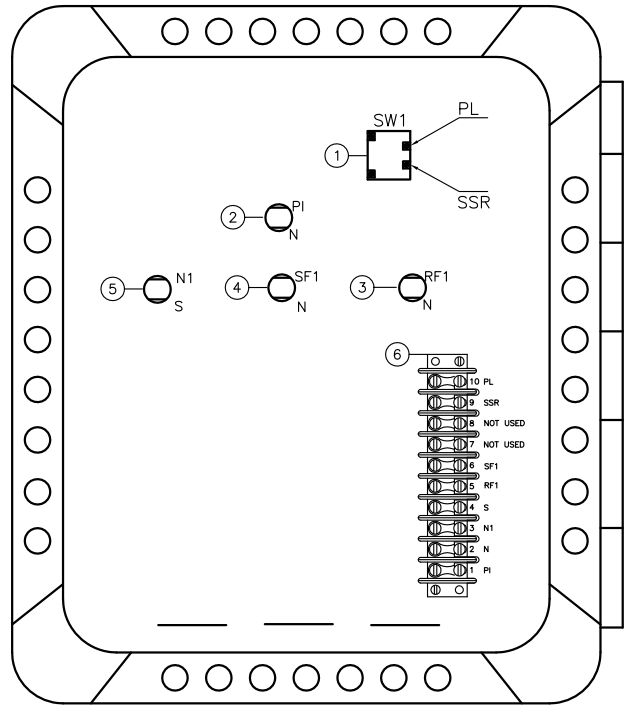
DESCRIPTION OF PROBLEM: _____

SIGNED: _____ **DATE NEEDED:** _____

RETURN ADDRESS: _____

PLEASE RETURN PRODUCT TO: 4300 WINDFERN RD #100 HOUSTON TX 77041-8943

ITEM NO.	SCHEMATIC TAG NO.	DESCRIPTION
1	SW1	PHOTOCELL BYPASS SWITCH
2	PL1	POWER ON INDICATOR
3	PL2	RED FAIL INDICATOR
4	PL3	STROBE FAIL INDICATOR
5	PL4	SIDLIGHT FAIL INDICATOR
6	TB7	10 POSITION TERMINAL BLOCK



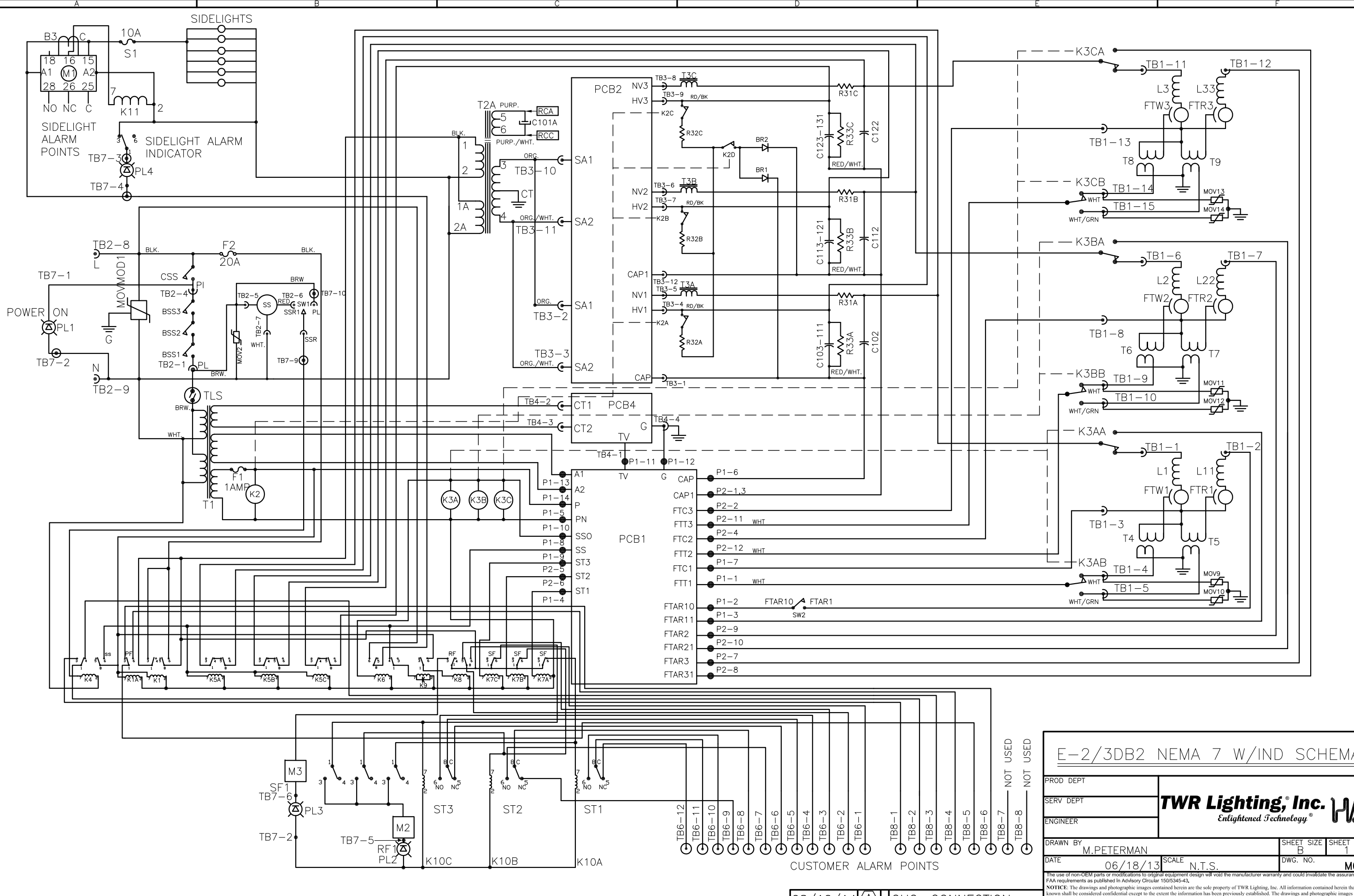
ITEM NO.	SCH. TAG NO.	DESCRIPTION
1	R31A,R31B,R31C	NIGHT RESISTORS 50 OHM (STA22012)
2	K3A,K3B,K3C	RED/WHITE RELAYS (STJ10006)
3	MOV 9,10,11,12,13,14	TRIGGER CIRCUIT MOVS (V275LA20A)
4	TLS	THERMAL SWITCH(OA-210) (STJ10008)
5	R32A,R32B,R32C	BLEEDER RESISTORS 25K 20W (STA08020)
6	C101A	RESONANT CAPACITOR 4UF (STB99005)
7	MOV2	PHOTOCELL MOV (MOV524V15)
8	K2	BLEEDER RELAY (PM17AY)
9	MOVMOD	SURGE ARRESTOR (SPM-120)
10	T2A	RESONANT TRANSFORMER (STC30020)
11	BR1,BR2	BLEEDER RECTIFIER (SCD2500V2A)
12	T1	ISOLATION TRANSFORMER (100272)
13	T3A,T3B,T3C	BURSTING CHOKES (100273)
14	C102,C112,C122	NIGHT MODE CAPACITOR (STB99008CSI)
15	RELAYS	
	K1	POWER RELAY (STJ10018)
	K1A	POWER ALARM RELAY (KRPA5AG120V)
	K4	PHOTOCELL RELAY (KRPA11AG120V)
	K5A, K5B, K5C	NIGHT/DAY INTENSITY RELAY (KRPA11AG120V)
	K6	SIDLIGHT POWER RELAY (KRPA11AG120V)
	K7A	STROBE 1 FAIL RELAY (KRPA5AG120V)
	K7B	STROBE 2 FAIL RELAY (KRPA5AG120V)
	K7C	STROBE 3 FAIL RELAY (KRPA5AG120V)
	K8	RED STROBE ALARM/FAIL (KRPA11AG120V)
	K9	DELAY TRANSFER RELAY (SPEC224)
15A	RELAYS	
	K10A	STROBE 1 FAIL RELAY IND. DRIVE (KRPA11AG120V)
	K10B	STROBE 2 FAIL RELAY IND. DRIVE (KRPA11AG120V)
	K10C	STROBE 3 FAIL RELAY IND. DRIVE (KRPA11AG120V)
	K11	SIDLIGHT RELAY DRIVE (KRPA5AG120V)
16	PCB4	TRIGGER VOLTAGE (STH04340)
17	M1	CURRENT SENSOR (RM4JA31MW)
18	PCB2	HV RECTIFIER (STH02258A)
19	M2, M3	10 SEC. TIME DELAY MODULES (TS14110M)
20	SW2	RED STROBE FAILURE (STJ01002)
21	S1	SIDLIGHT FUSE 10A (KTK10)
22	F1	CONTROL CIRCUIT FUSE 1A (KTK1)
23	F2	HV SUPPLY FUSE 20A (FNQ20)
24	R33A,R33B,R33C	AUXILIARY BLEEDER RES. 2.4M (STA08010)
25	PCB1	CONTROL PCB (STH01340)
26	C103-C111 C113-C121 C123-C131	DAY CAPACITORS 40UF (STB99006)
27	TB1	TERMINAL BLOCK 1 (TERMBLK15)
28	TB2	TERMINAL BLOCK 2 (TERMBLK10)
29	P2	CONTROL PCB CONNECTOR (STT60019)
30	P1	CONTROL PCB CONNECTOR (STT60021)
31	LED	DIAGNOSTIC LEDs
32	CSS	CABINET SAFETY SWITCH
33	TB3	HV PCB TERMINAL BLOCK (TERMBLK141-12)
34	TB4	TV PCB TERMINAL BLOCK (TERMBLK141-4)
35	TB5	10 POSITION TERMINAL BLOCK (TERMBLK141-10)
36	TB6	CUSTOMER ALARM POINTS (TERMBLK141-12)
37	TB8	CUSTOMER ALARM POINTS (TERMBLK141-8)

- NOTES:
- WIRES ARE CONNECTED LETTER TO LETTER. (EXAMPLE: N TO N TO N)
 - THIS DRAWING IS PROVIDED AS A GENERAL REFERENCE.
 - TWR LIGHTING, INC. DOCUMENTATION SUPERCEDES THIS DRAWING AND SHOULD BE REVIEWED PRIOR TO INSTALLATION OF THIS SYSTEM.

E2/3DB2 NEMA 7 W/IND CONTROLLER
CHASSIS LAYOUT

PROD DEPT			
SERV DEPT			
ENGINEER			
DRAWN BY	M.PETERMAN	SHEET SIZE	SHEET QTY.
DATE	06/18/13	B	1 OF 1
SCALE	N.T.S.	DWG. NO.	H40-368

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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E-2/3DB2 NEMA 7 W/IND SCHEMATIC

PROD DEPT	TWR Lighting, Inc. <i>Enlightened Technology</i> WORK	SHEET SIZE	SHEET QTY.
SERV DEPT		B	1 OF 1
ENGINEER			
DRAWN BY	M. PETERMAN	SCALE	N.T.S.
DATE	06/18/13	DWG. NO.	M01-368

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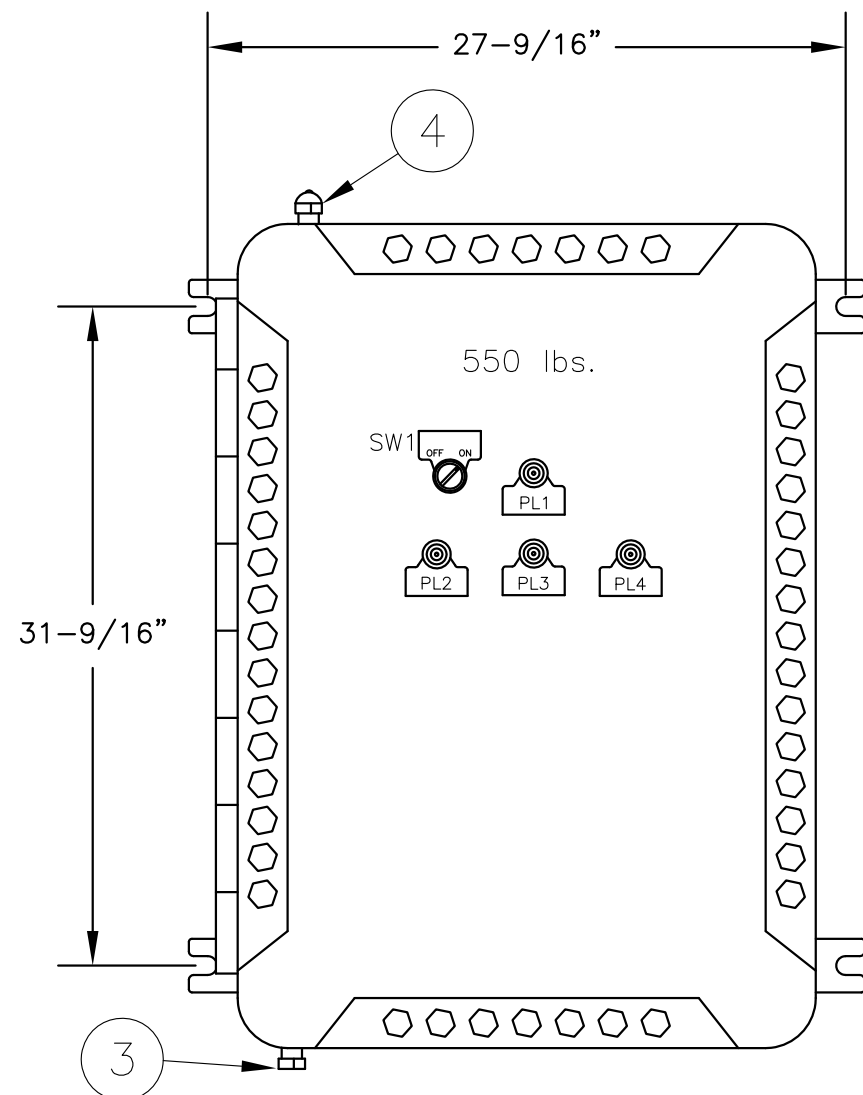
08/12/14 (A) CHG. CONNECTION

ITEM # DESCRIPTION

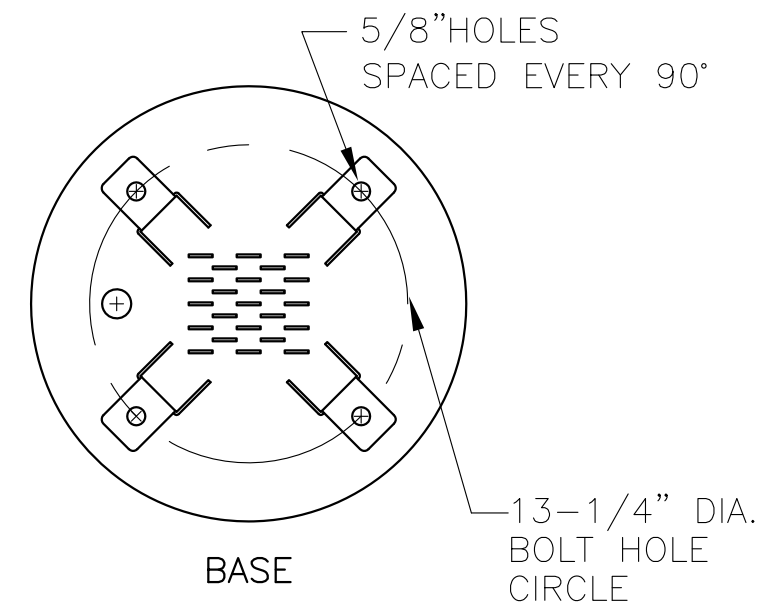
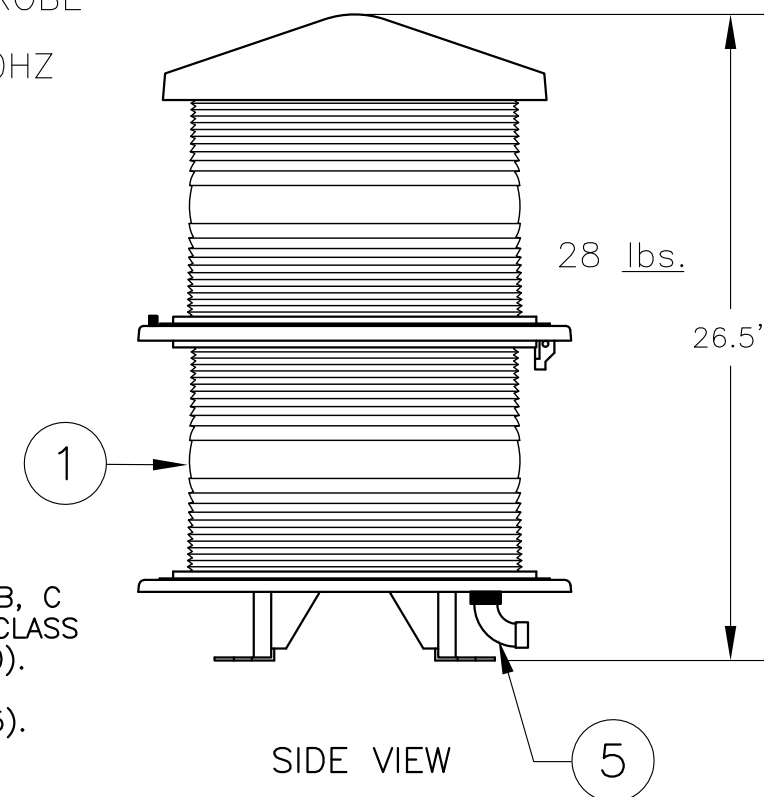
- 1 BEACON L-864/865 DUAL RED/WHITE STROBE
- 2 POWER SUPPLY E2/3DB2 NEMA7 120V 60HZ HAZARDOUS LOCATIONS.
- 3 NEMA 7 DRAIN
- 4 NEMA 7 BREATHER
- 5 WATER TIGHT CABLE CONNECTOR WITH SEALING GLAND.

***IMPORTANT NOTE:**

THE ENCLOSURE PROVIDED IS FOR CLASS I, GROUPS B, C AND D; CLASS II, GROUPS E, F AND G; AS WELL AS CLASS III PER NEC FOR HAZARDOUS LOCATIONS (ARTICLE 500). CONDUIT SEALS ARE REQUIRED WITHIN 18" FROM THE ENCLOSURE ON EACH CONDUIT RUN (ARTICLE 501-1.5).



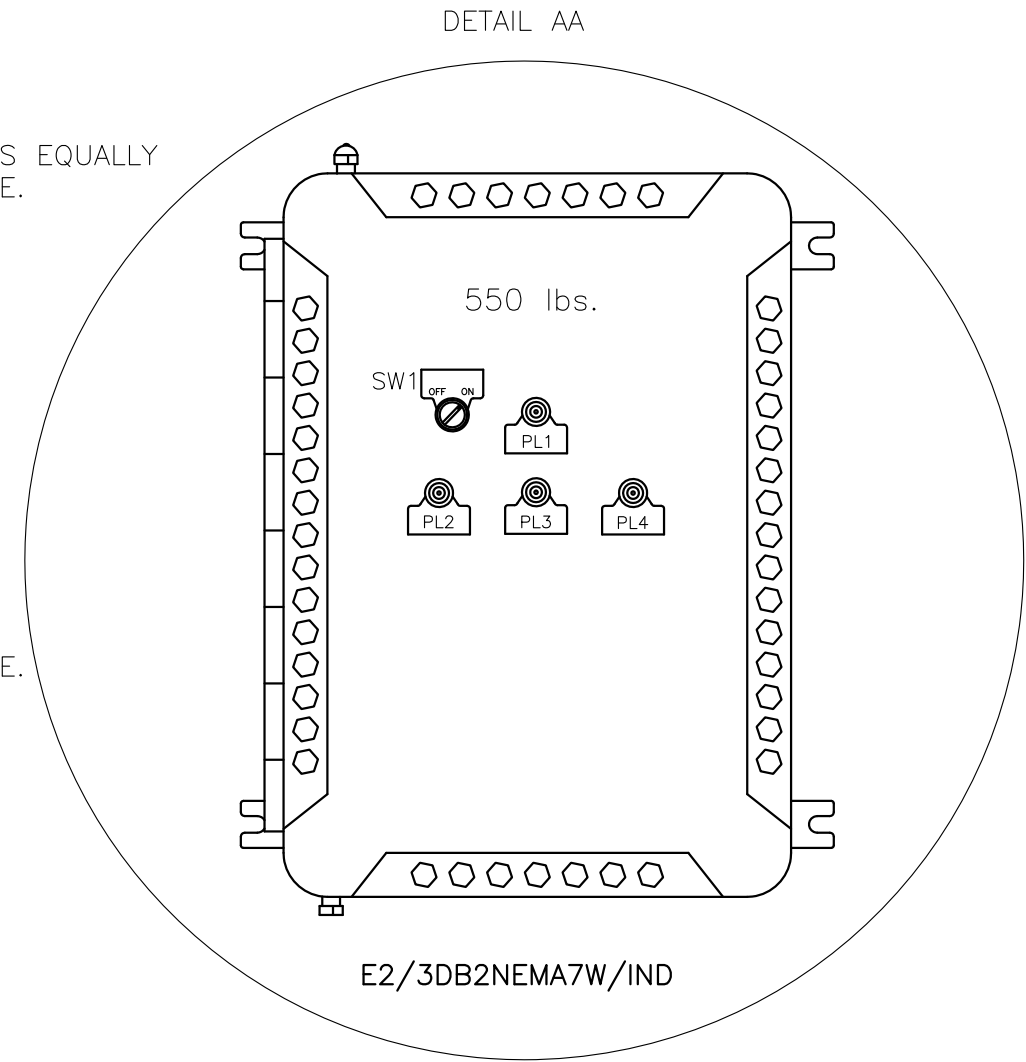
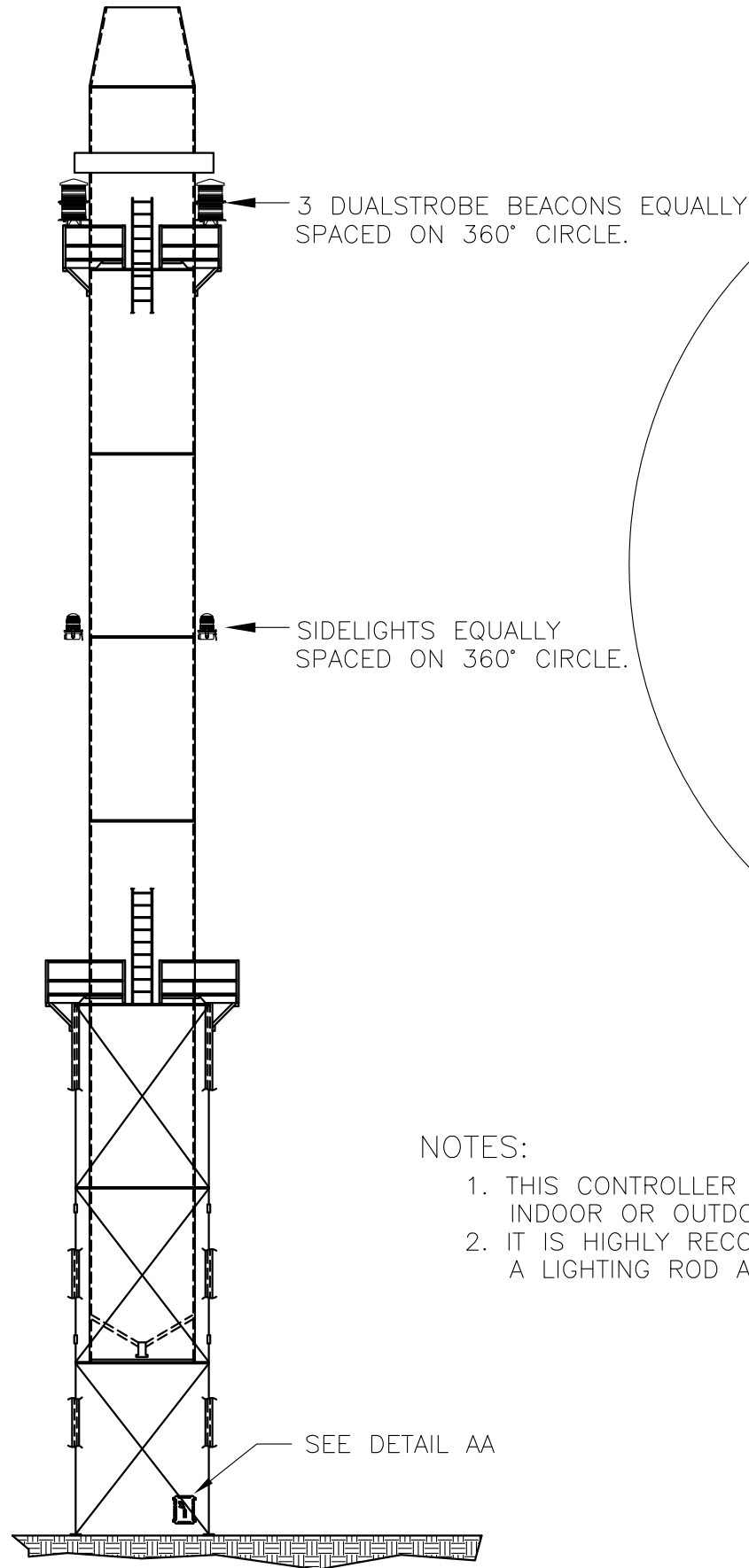
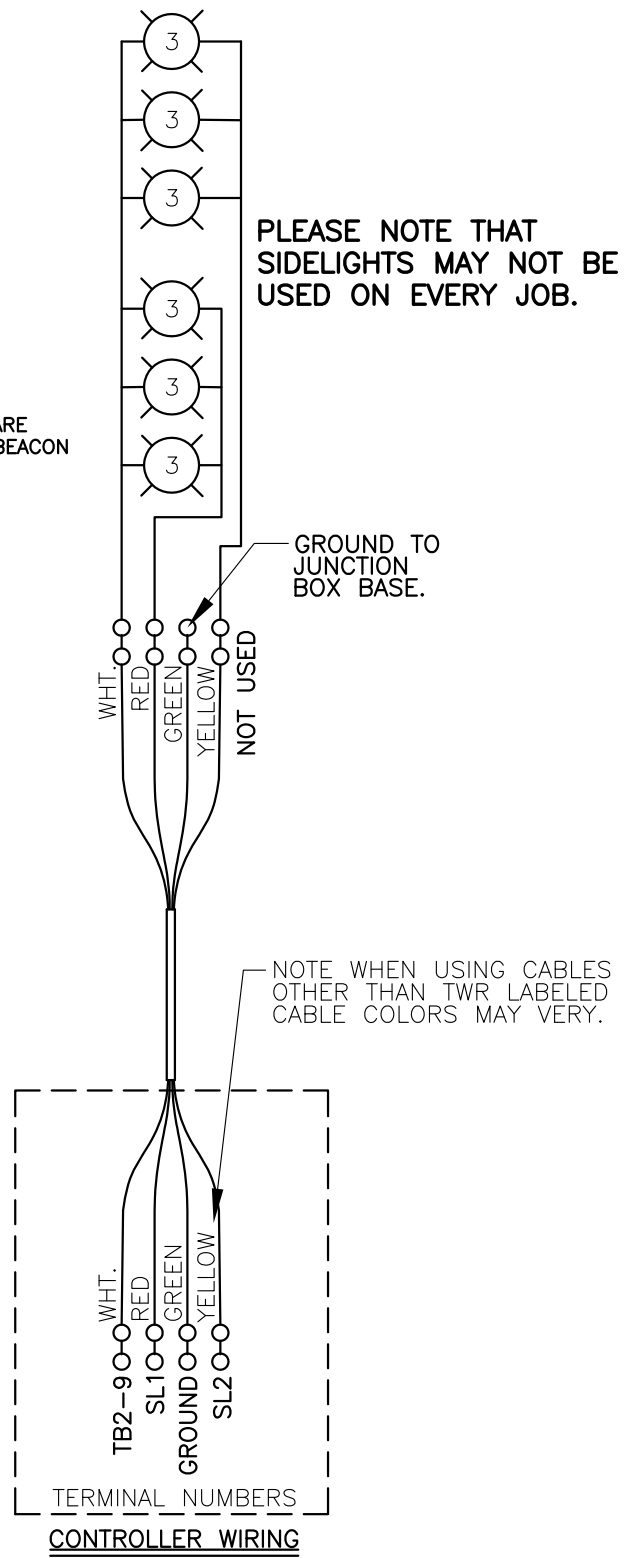
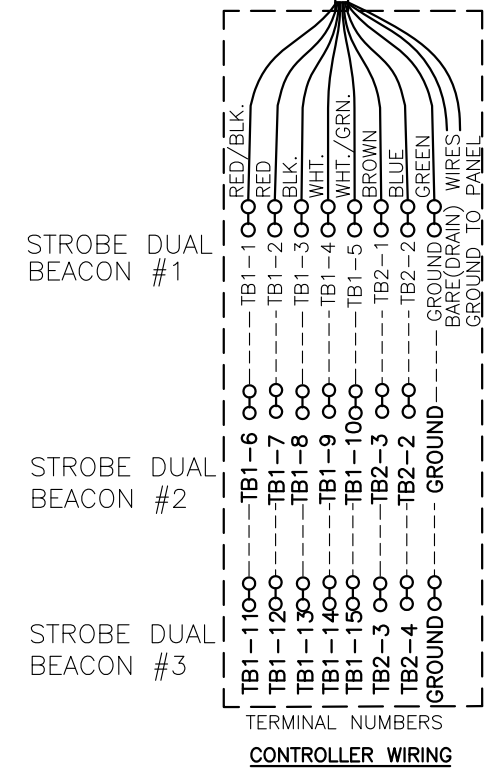
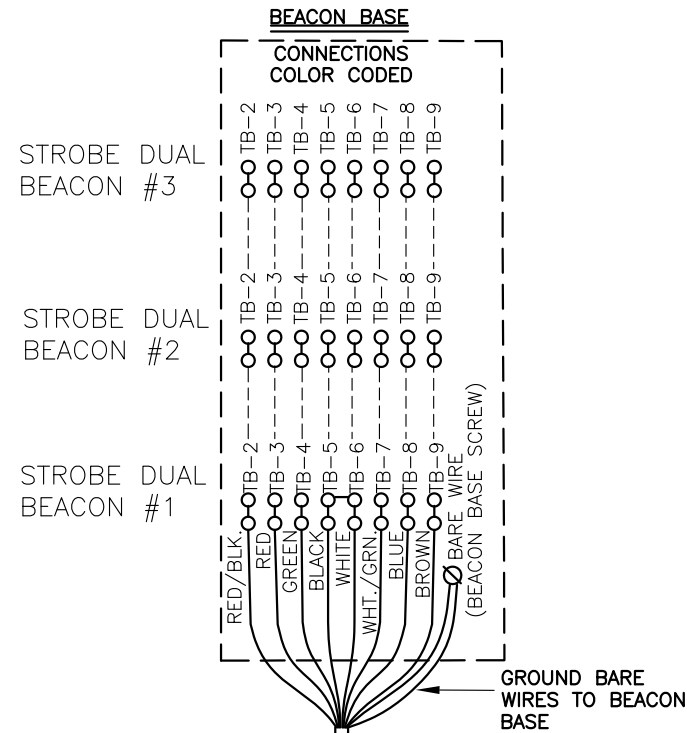
*ENTRANCE HOLES ARE MACHINED PER JOB REQUIREMENTS.



NOTES:

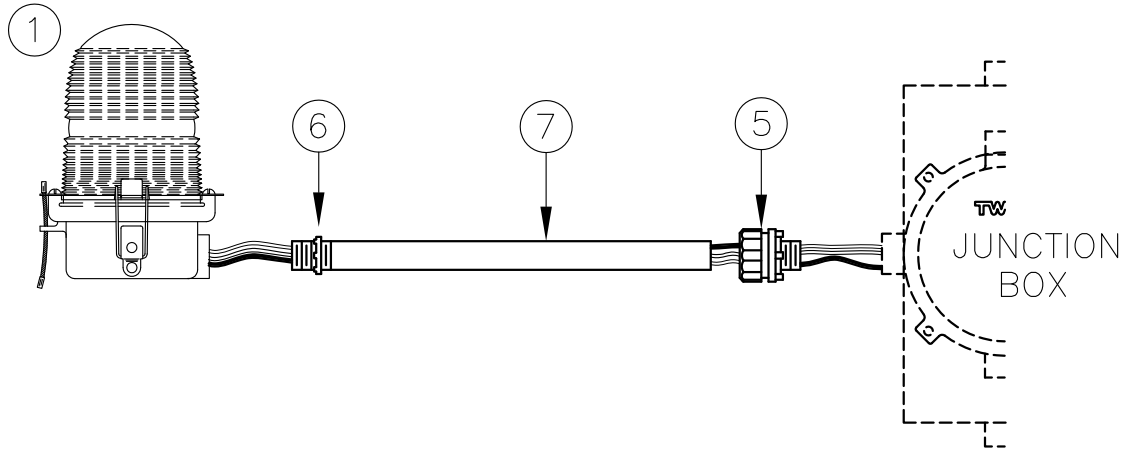
- A POWER SUPPLY IS NORMALLY MOUNTED AT GROUND LEVEL ON TOWER. RECOMMENDED MOUNTING HEIGHT IS 48" TO BOTTOM OF THE ENCLOSURE FOR EASE OF MAINTENANCE.
- B MOUNT BEACON HINGES SO LENS WILL OPEN UNOBSTRUCTED BY STRUCTURE.

HOUSING DETAILS E2/3DB2NM7W/IND			
L-864/865 DUAL RED/WHITE STROBE			
PROD DEPT	TWR Lighting, Inc. <i>Enlightened Technology</i> WORK		
SERV DEPT			
ENGINEER			
DRAWN BY M. PETERMAN	SHEET SIZE B	SHEET QTY. 1 OF 1	
DATE 06/27/2013	SCALE N.T.S.	DWG. NO. HDO-368	
<small>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. NOTICE: The drawings and photographic images contained herein are the sole property of TWR Lighting, Inc. All information contained herein that is not generally known shall be considered confidential except to the extent the information has been previously established. The drawings and photographic images contained herein may not be reproduced, copied or used as the basis for manufacture or sale or promotion or any other purpose without the expressed written permission of TWR Lighting, Inc.</small>			

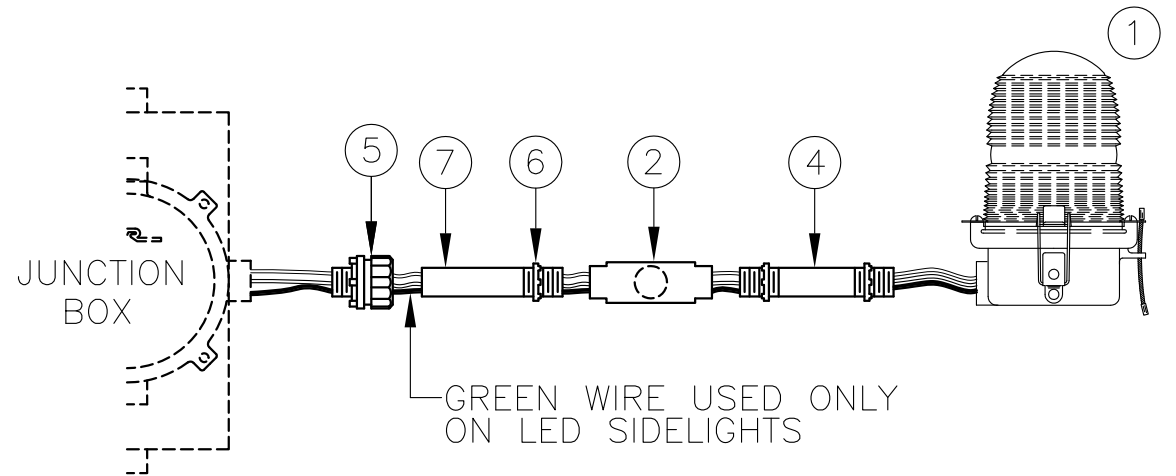


- NOTES:
1. THIS CONTROLLER CAN BE MOUNTED INDOOR OR OUTDOOR.
 2. IT IS HIGHLY RECOMMENDED TO MOUNT A LIGHTING ROD AT THE TOP LEVEL.

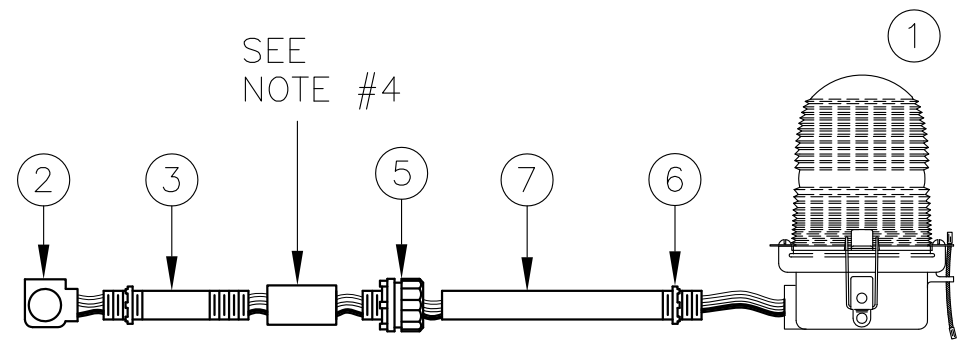
E2/3DB2NEMA7W/IND INSTALLATION GUIDELINE TYPICAL STACK LAYOUT			
PROD DEPT		TWR Lighting, Inc. <i>Enlightened Technology</i> MARK	
SERV DEPT			
ENGINEER			
DRAWN BY M. PETERMAN		SHEET SIZE B	SHEET QTY. 1 OF 1
DATE 06/27/2013	SCALE N.T.S.	DWG. NO.	INS-368
<small>The use of non-TWR parts or modifications 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. NOTICE: The drawings and photographic images contained herein are the sole property of TWR Lighting, Inc. All information contained herein that is not generally known shall be considered confidential except to the extent the information has been previously established. The drawings and photographic images contained herein may not be reproduced, copied or used as the basis for manufacture or sale or promotion or any other purpose without the expressed written permission of TWR Lighting, Inc.</small>			



VIEW A



VIEW B



VIEW C

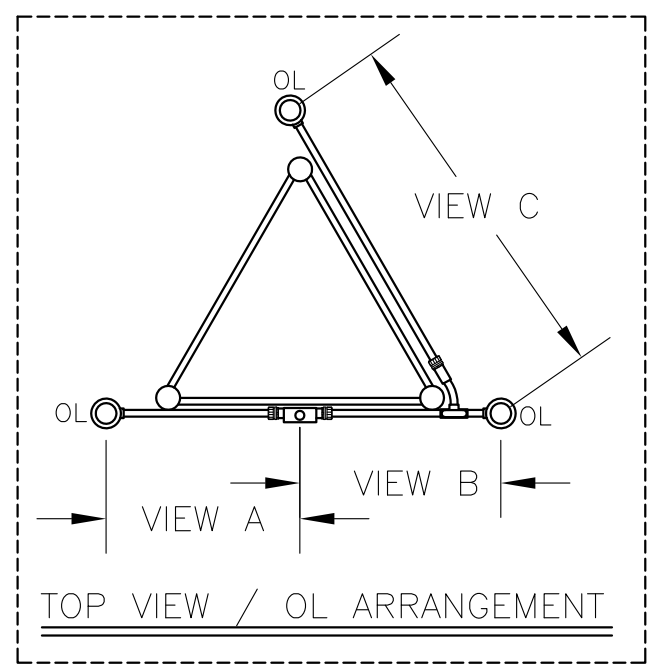
BILL OF MATERIALS

ITEM NO.	QTY.	TWR PART NO.	DESCRIPTION
1	3	OL1/LED	3/4" OBSTRUCTION LIGHT
2	1	T27CG	3/4" CONDULET W/COVER AND GASKET
3	1	EL3430	3/4" 30° ELBOW
4	1	N34T3	3/4" x 3" NIPPLE
5	3	HC402	3/4" NO THREAD CONNECTOR
6	5	A314	3/4" CONDUIT LOCKNUTS
7	30'	CONDUIT34	3/4" CONDUIT

* = ITEMS NOT SHOWN

NOTES:

1. THIS DRAWING IS A TYPICAL INSTALLATION DETAIL FOR 3 OL-1 PER LEVEL SYSTEM.
2. IN VIEW C ITEM NUMBER 3 MAY BE OMITTED WHEN ARRANGING FOUR LEG TOWERS.
3. ITEMS #7 CUT TO LENGTH FOR PROPER EXTENSION OF OL1 FROM STRUCTURE (6"-12"). ATTACH ITEM #5 TO UNTHREADED CONDUIT TO COMPLETE ASSEMBLY.
4. USE COUPLING THAT IS PROVIDED BY ITEM #7.
5. GREEN WIRE USED ONLY ON LED SIDELIGHTS



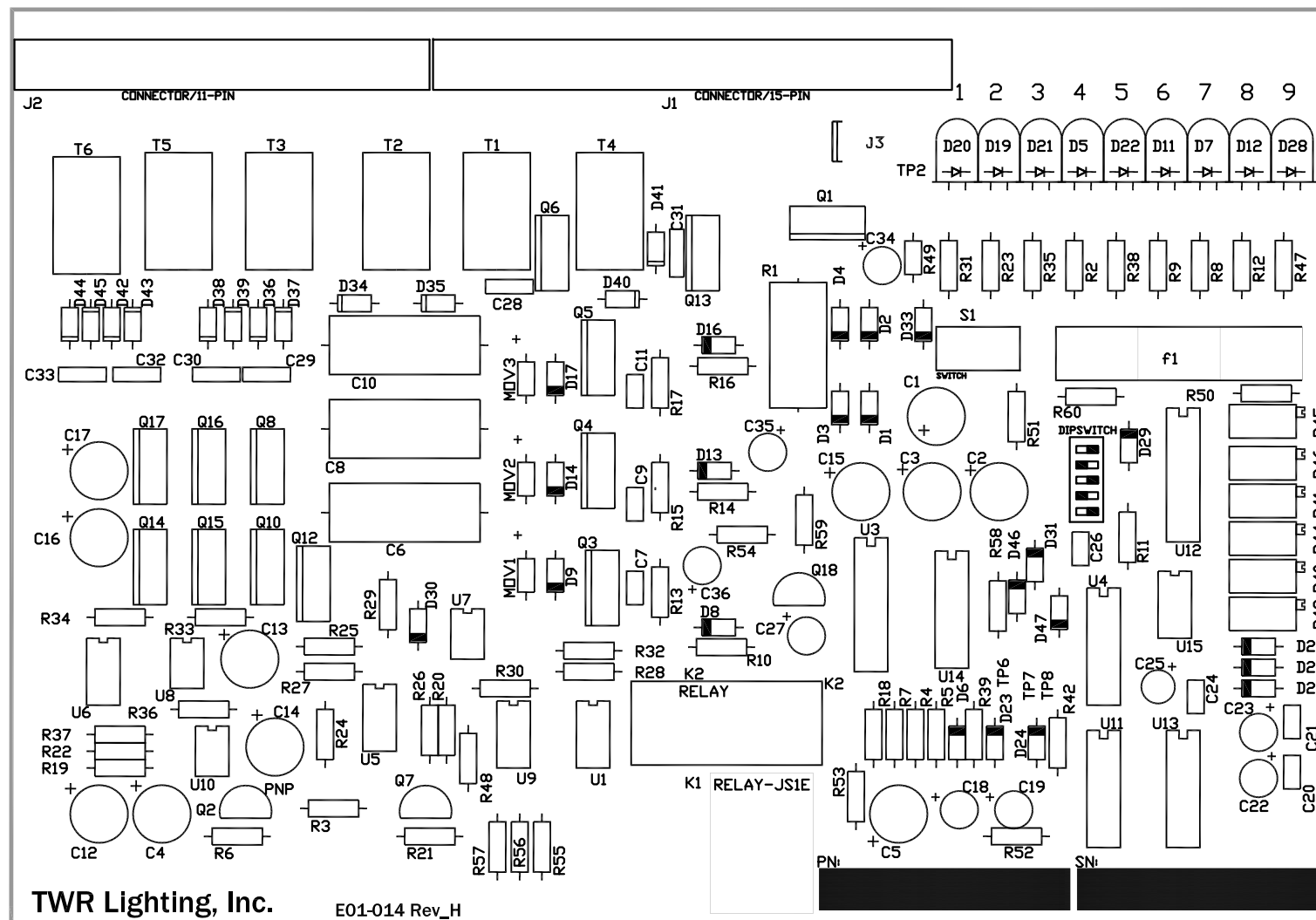
SLASSM

SIDELIGHT MOUNT ASSEMBLY
(10' FACE WIDTH MAX W/30' CONDUIT LISTED)

PROD DEPT	TWR Lighting, Inc. Enlightened Technology®	SHEET SIZE	SHEET QTY.
SERV DEPT		B	1 OF 1
ENGINEER			
DRAWN BY	F.DELACRUZ	SCALE	N.T.S.
DATE	05/23/00	DWG. NO.	100489

04/05/07	(A)	UPDATED TO LED
DATE:	LTR.	REVISION

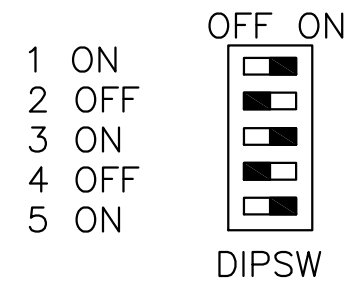
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TWR Lighting, Inc. E01-014 Rev_H

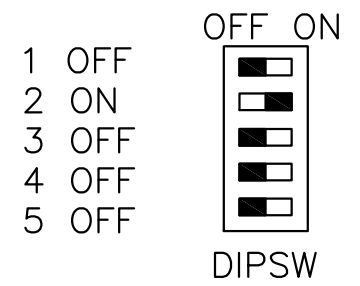
FACTORY SETUP:

MASTER & STAND ALONE



OPTIONAL SETUP:

SLAVE



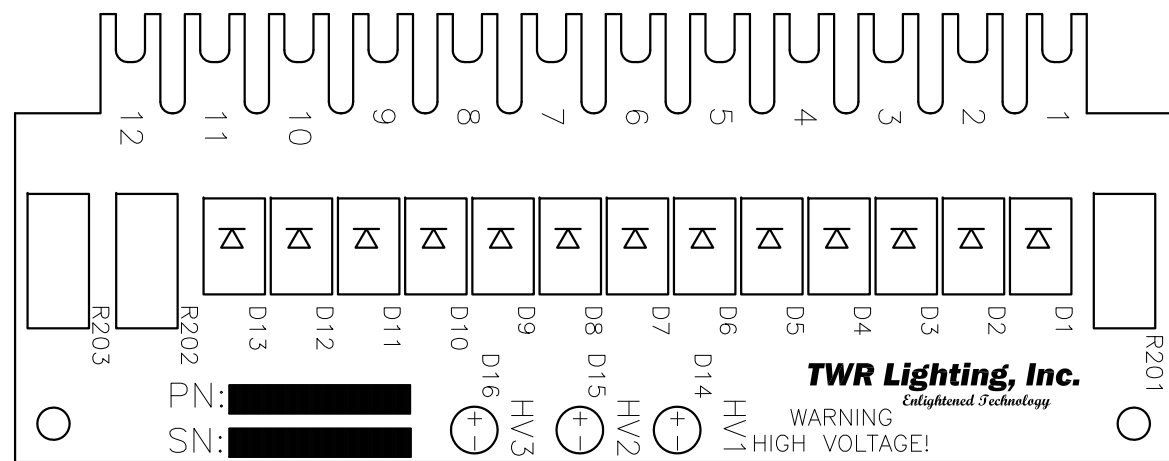
E2/3DB2 CONTROLLER PCB

PROD DEPT
SERV DEPT
ENGINEER

TWR Lighting, Inc.
Enlightened Technology

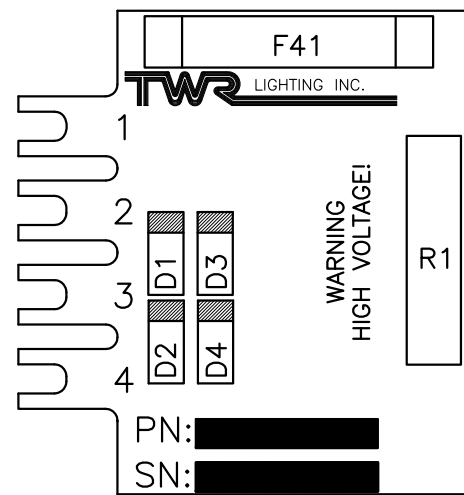
DRAWN BY R.MORENO	SHEET SIZE B	SHEET QTY. 1 OF 1
DATE 02/18/2009	SCALE N.T.S.	DWG. NO. H01-340

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D-2/3LV/E-2/3DB(SL) SERIES HV RECTIFIER			
PCB2 L-865 MEDIUM INTENSITY STROBE			
PROD DEPT	TWR Lighting, Inc. <i>Enlightened Technology®</i>		
SERV DEPT			
ENGINEER			
DRAWN BY E.A.SALAZAR	SHEET SIZE B	SHEET QTY. 1 OF 1	
DATE 07/27/04	SCALE FULL	DWG. NO. H02-258A	
<small>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.</small>			
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07/27/04	(C)	ADD	E2/3DBSL
DATE:	LTR.	REVISION	



<u>E2/3DB2 TRIGGER VOLTAGE</u> RECTIFIER PCB (PCB4)			
PROD DEPT	TWR Lighting, Inc. <i>Enlightened Technology®</i>		
SERV DEPT			
ENGINEER			
DRAWN BY R.MORENO	SHEET SIZE B	SHEET QTY. 1 OF	1
DATE 02/20/2009	SCALE N.T.S.	DWG. NO.	H04-340
<small>The use of non-TWR 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. NOTICE: The drawings and photographic images contained herein are the sole property of TWR Lighting, Inc. All information contained herein that is not generally known shall be considered confidential except to the extent the information has been previously established. The drawings and photographic images contained herein may not be reproduced, copied or used as the basis for manufacture or sale or promotion or any other purpose without the expressed written permission of TWR Lighting, Inc.</small>			

CURRENT MEASUREMENT RELAY

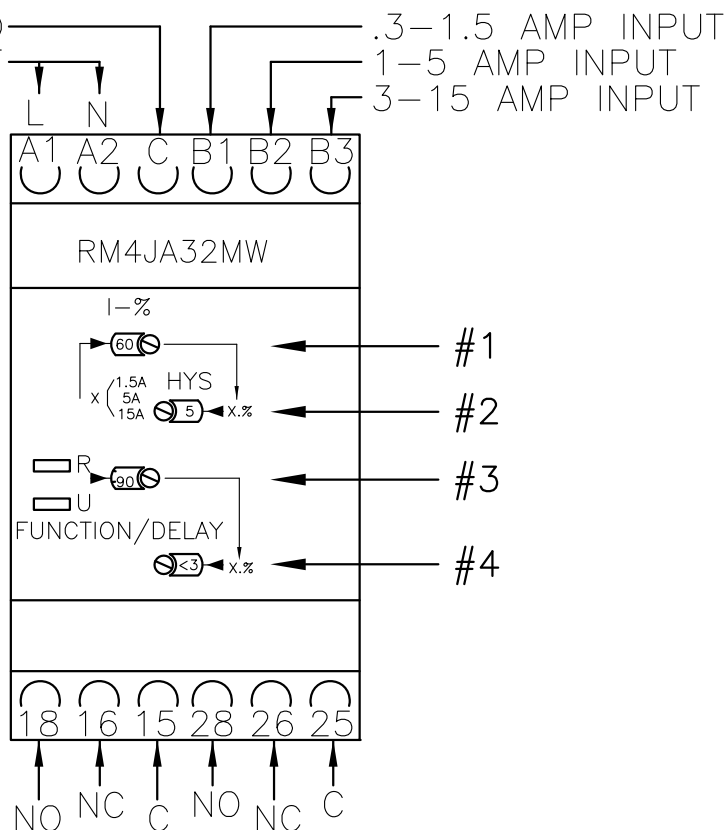
OUTPUT TO LOAD
CONTROL VOLTAGE INPUT

120VAC PRODUCT SPECIFIC SETTINGS

QTY.	PART NO.	INPUT	#1	#2	#3	#4	PRD.
6	860-1R01-001	B2	40	5	100	<30	DIALIGHT
1	LED BEACON	B1	33	15	100	<30	DIALIGHT
2	LED BEACON	B2	30	5	100	<30	DIALIGHT
2	STLDBEACON	B2	30	5	100	<30	DIALIGHT
2	STLDBEACON2	B1	30	15	100	<30	ORGA
2	LED BEACON2	B1	30	15	100	<30	ORGA
3	LED BEACON2	B1	55	15	100	<30	ORGA
1	116A21TS	B1	50	15	100	<30	TWR
2	116A21TS	B2	35	5	100	<30	TWR
3	116A21TS	B2	50	5	100	<30	TWR
4	116A21TS	B3	70	5	100	<30	TWR
6	116A21TS	B3	36	15	100	<30	TWR

24VDC PRODUCT SPECIFIC SETTINGS

QTY.	PART NO.	INPUT	#1	#2	#3	#4	PRD.
1	LED BEACON3	B2	30	10	100	<30	TWR
2	OL1VLED3						



FUNCTIONS

- Adjustment of current threshold as % of setting range max. $\pm 5\%$
 - Hysteresis adjustment from 5 to 30 % ▲.
 - Fine adjustment of time delay as % of setting range max. value.
 - 10-position switch combining
 - selection of the timing range: 1 s, 3 s, 10 s, 30 s, no time delay.
 - selection of overcurrent (>) or undercurrent (<) detection. See table below.
- R Yellow LED: indicates relay state (Off for de-energized relay, On for energized).
- U Green LED: indicates that supply to the RM4 is present.

Overcurrent Control

Yes

Overcurrentor

Yes

Measuring Range

0.3 A-15 A

Detailed Positions for Switch 4

Switch Position	Function	Time Delay (t)
< 0	Undercurrent detection	No time delay
< 1	Undercurrent detection	0.05 to 1 s
< 3	Undercurrent detection	0.15 to 3 s
< 10	Undercurrent detection	0.5 to 10 s
< 30	Undercurrent detection	1.5 to 30 s
> 0	Overcurrent detection	No time delay
> 1	Overcurrent detection	0.05 to 1 s
> 3	Overcurrent detection	0.15 to 3 s
> 10	Overcurrent detection	0.5 to 10 s
> 30	Overcurrent detection	1.5 to 30 s

■ = Selection by switch on front face

▲ = Value of current between energization and de-energization of the output relay (% of the current threshold to be measured).

*Due to current draw tolerances slight adjustments to setting #1 may be needed for proper alarming.

Sign: _____

TWR Lighting, Inc.

FAA Approved L-810

Single Obstruction Light Side Hub

OL1

FM10018_RD.DWG

For use as an obstruction light on towers, building, bridges, cooling towers. Meets or exceeds all FAA specs as found in AC 150/5345-43 Type L-810.

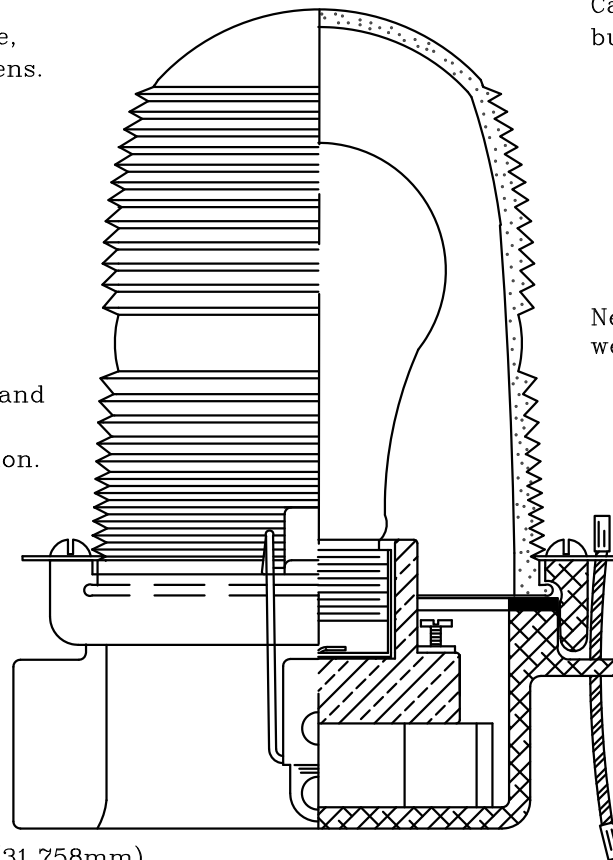
Our most popular light. The side hub allows for a straight run of conduit from the junction box for hook up.

High temperature, ultra pure
FAA approved Aviation red, blue,
yellow, or clear glass fresnel lens.

Can be used steady
burning or flashing.

Copper free aluminum casting and
all stainless steel latches and
hardware for corrosion protection.

Neoprene gasket for
weatherproofing.



High quality porcelain
receptacle.

Stainless steel
safety cable.

Specify conduit size
3/4", 1", 1-1/4" NPT
(19.055mm), (25.407mm), (31.758mm)

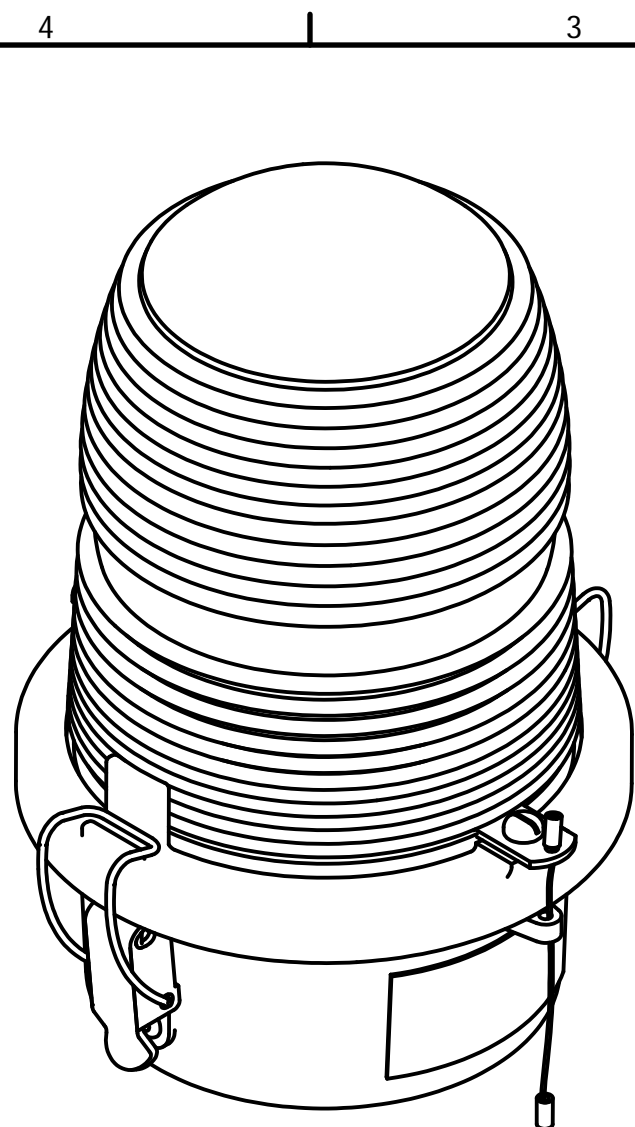
General Specifications

Height 7.5 inches (19.055 cm)
Weight 3 lbs (13605.442g)
Power 120, 230, or 240 volts AC
Uses 116W, 120V or 240V bulbs
Bulbs sold separately

No special tools required for maintenance.

TWR Lighting, Inc.
4300 Windfern Rd. #100
Houston, Tx., 77041-8943
Phone: (713)973-6905
Fax: (713)973-9352

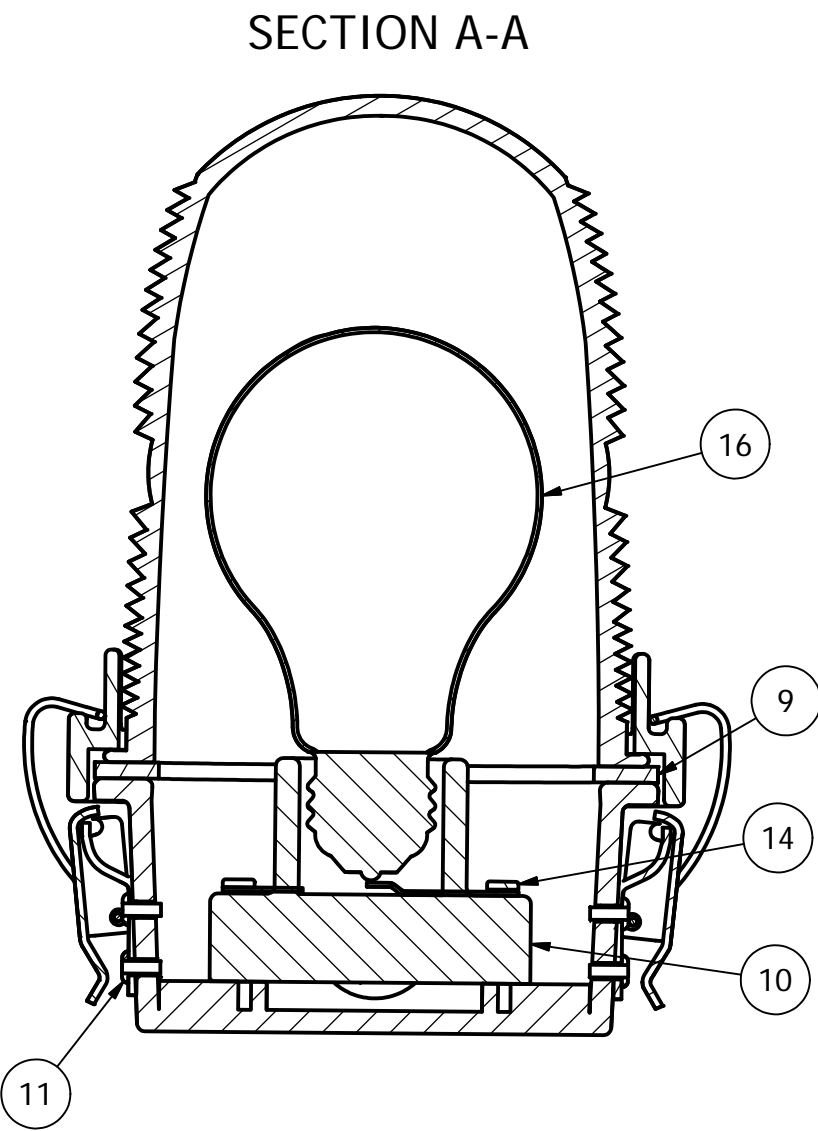
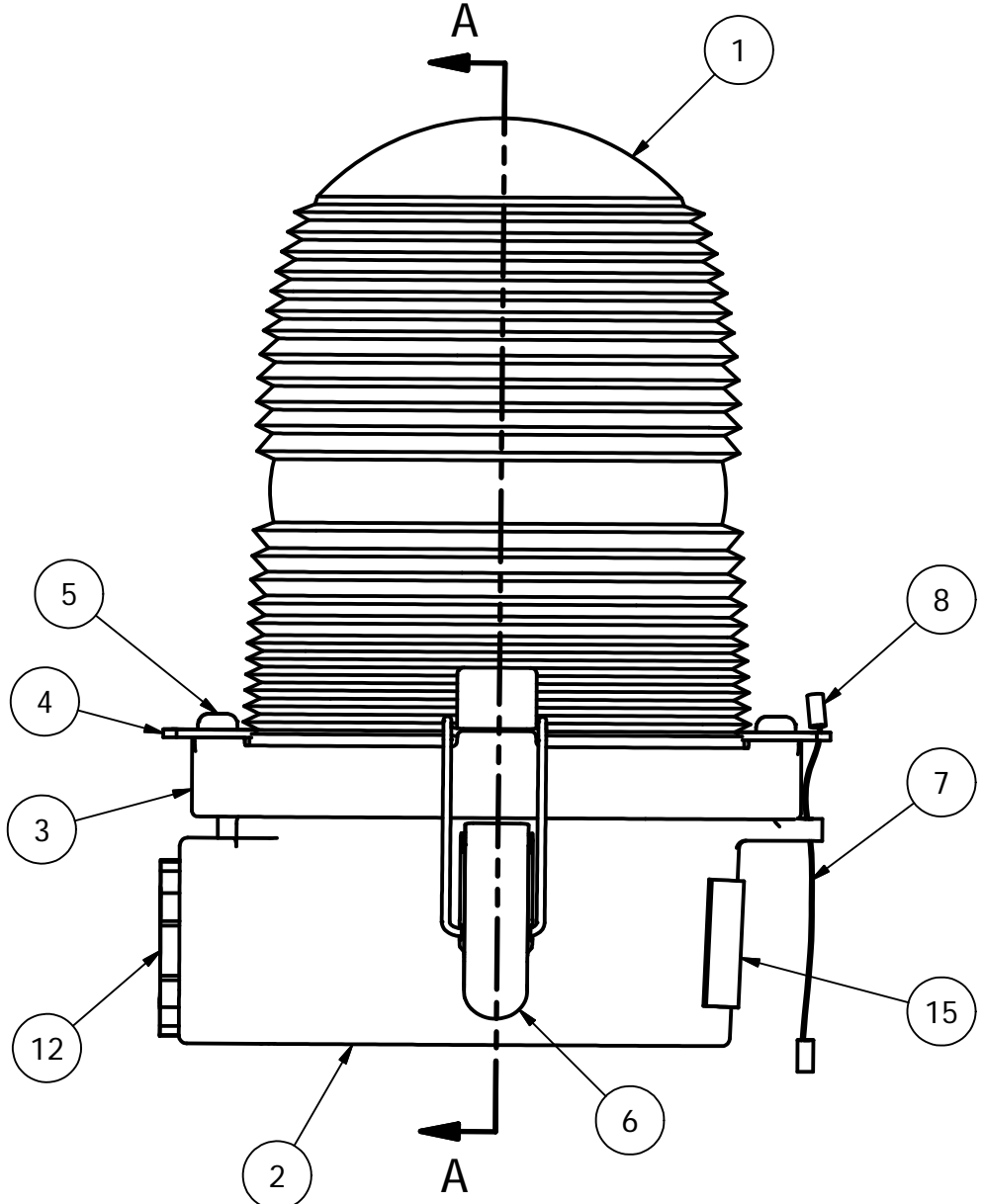
WEB SITE: <http://www.twrlighting.com>
©2003 TWR Lighting, Inc.



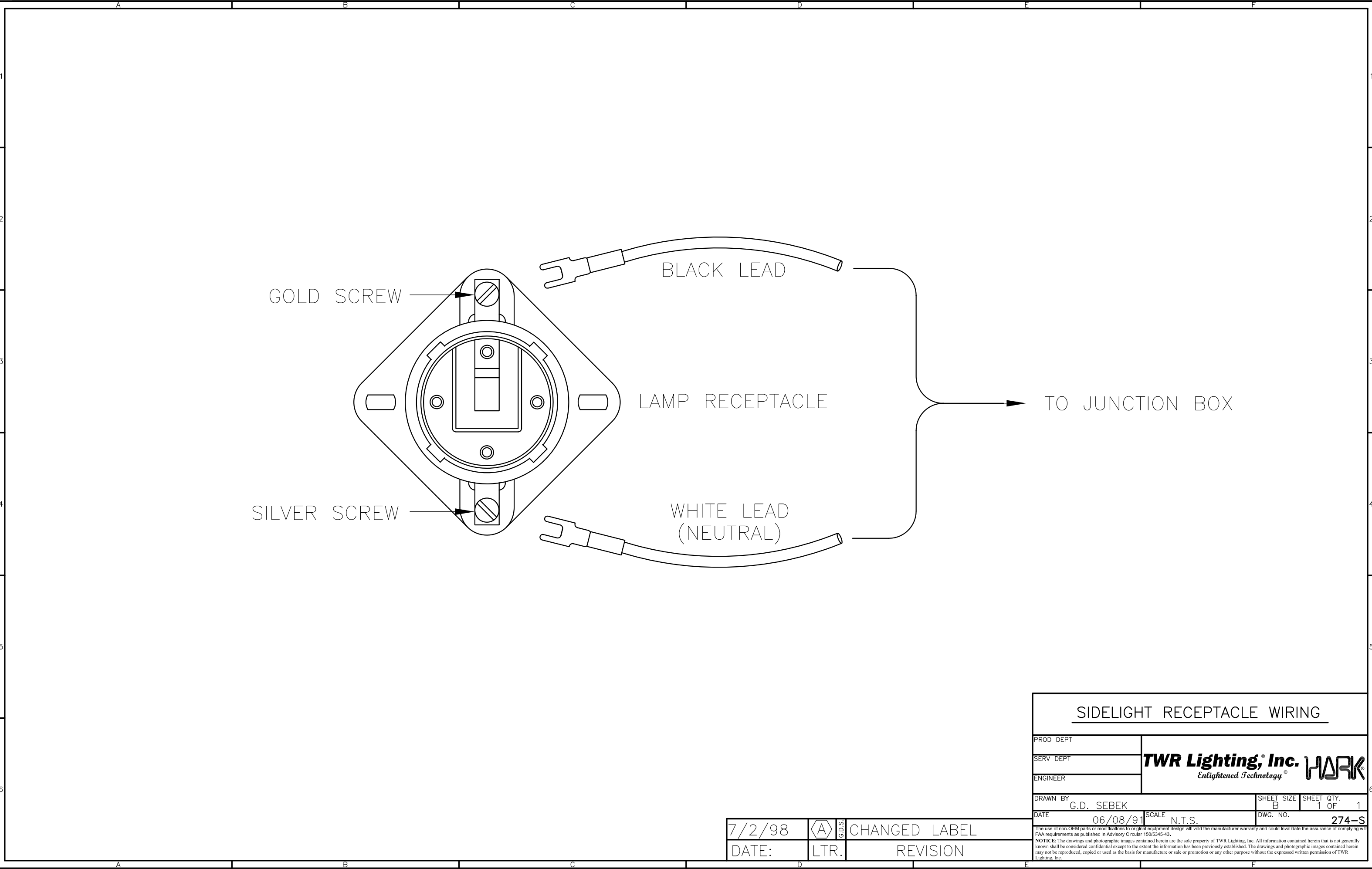
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	AP35222	RED SIDELIGHT GLASS
2	1	105C	SINGLE SIDELIGHT BODY
3	1	106C	LENS HOLDER RING
4	2	12V245	OL LENS CLIP
5	2	832X14PH	8-32 X 1/4" PH SS SLOT SCREW
6	2	HC255SS	SIDELIGHT LATCH
7	1	7X7SS	1/16 HOL 7X7 S.S. WIRE
8	2	A1A	STAKON CRIMP
9	1	OLG	OL GASKET
10	1	TWR19062	SIDELIGHT RECEPTACLE
11	4	18PRSS	1/8 X .40 SS POP RIVET
12	1	A314	3/4" CONDUIT LOCKNUT GALV.
*	2	104G	WHITE TEFLON WASHER
14	2	832X34PH	8-32 X 3/4" S.S. RH SLOT
15	1	100327	OL1 SERIAL NUMBER LABEL
~	1	116A21TS	116W-120V LAMP (TYP.)

* = PART NOT SHOWN
 ~ = PART SOLD SEPARATELY

NOTE:
 1. FAA APPROVED LIGHT USES THE 116A21TS LAMP.
 OTHER LAMPS ARE AVAILABLE TO MEET YOUR APPLICATION.

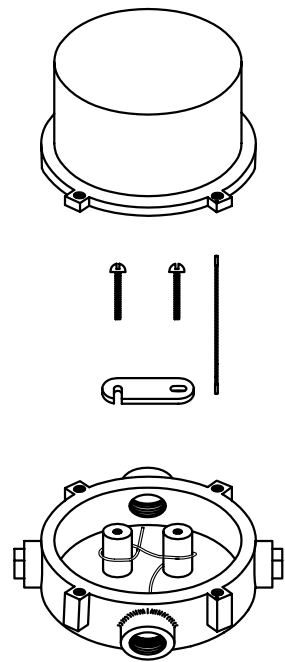
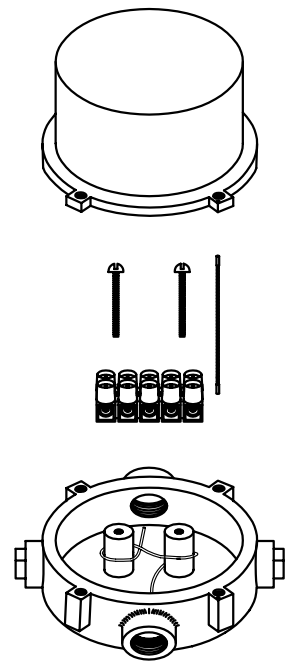


DRAWN vhernandez CHECKED		2/13/2012			
QA					
MFG					
APPROVED					
		TITLE		3/4" OL1 SIDE HUB ASSEMBLY DETAIL (PART#OL1)	
SIZE B		DWG NO 279-OL		REV C	
SCALE 2/3				SHEET 1 OF 1	

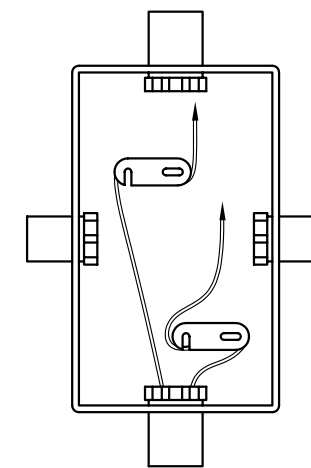
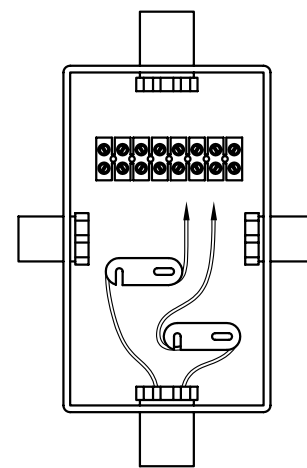


SIDELIGHT RECEPTACLE WIRING			
PROD DEPT	TWR Lighting, Inc. <i>Enlightened Technology</i> WORK		
SERV DEPT			
ENGINEER			
DRAWN BY	G.D. SEBEK	SHEET SIZE	SHEET QTY.
DATE	06/08/91	B	1 OF 1
		SCALE	DWG. NO.
		N.T.S.	274-S
<small>The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.</small>			
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7/2/98	(A)	CHANGED LABEL
DATE:	LTR.	REVISION



JB-5 AND JB-0
3/4" JUNCTION BOX



JB-8 AND JB-8SR
1" JUNCTION BOX

NOTES:

- 1) DRAWING ILLUSTRATES METHOD OF STRAIN RELIEVING WIRE. USE THIS METHOD ON ALL JUNCTION BOXES.
- 2) THE NATIONAL ELECTRICAL CODE-ARTICLE 300-19-B3 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.

AWG WIRE SIZE	MAX. NUMBER WIRES IN 3/4" CONDUIT	MAX. NUMBER WIRES IN 1" CONDUIT	WIRE AREA SQ. INCHES	WEIGHT PER 100 FEET
12 THHN	16	26	0.0117	2.50
10 THHN	10	17	0.0184	4.10
8 THHN	6	9	0.0373	6.70
6 THHN	4	7	0.0519	10.30
4 THHN	2	4	0.0845	16.20

JUNCTION AND STRAIN RELIEF BOXES

TWR Lighting, Inc.

APP'D	ENGINEER	CHK'D BY
DRAWN BY	G.D.SEBEK	SHEET SIZE B SHEET QTY. 1 OF 1
DATE	7/26/93	SCALE N.T.S. DRAWING NO. 100089

9/29/00	(A)	UPDATED NOTES
DATE:	LTR.	REVISION

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Parts List

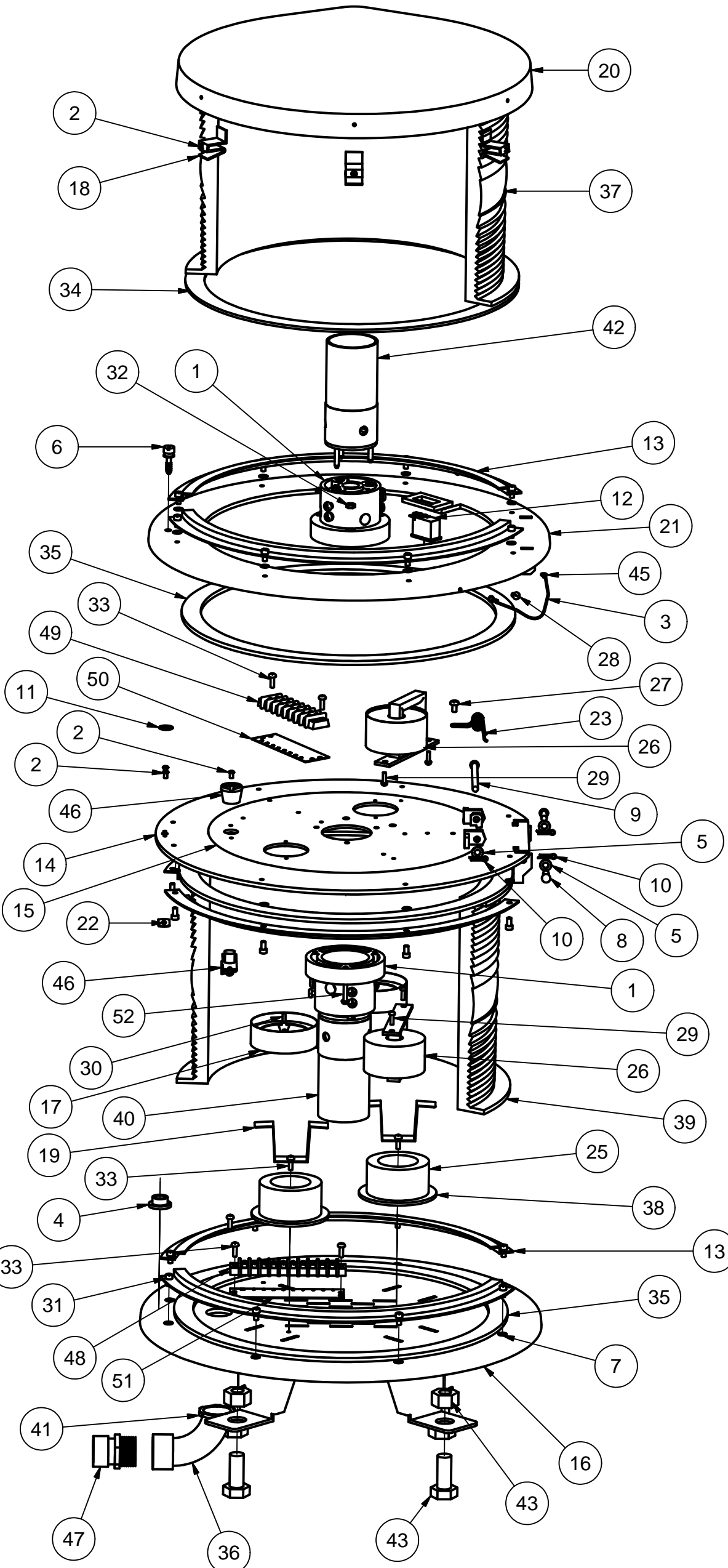
ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	100319	DUAL BEACON FLASHTUBE SOCKET
2	10	18PRSS-2	1/8 X .40 SS POP RIVET
3	2	7X7SS	1/16 HOL 7 X 7 SS WIRE
4	1	2-10000	CIRCULAR SPIRIT LEVEL
5	3	14FWDB	1/4 FLAT WASHER CH16L
6	1	121340712	DB QUICK OPEN CAPTIVE SCREW
7	24	8NFW	#8 NYLON FLAT WASHER
8	2	14X34CLVP	1/4 X 3/4 SHORT SS CLEVIS PIN
9	1	14X358CLVP	1/4 X 3-5/8 LONG SS CLEVIS PIN
10	3	12SSCP	1/2" SS COTTER PIN
11	1	1261	SS RETAINER FOR QUICK OPEN
12	1	STJ02003	CHERRY SWITCH
13	6	100337	DUAL BEACON LENS RETAINER RING
14	1	100343	DUAL BEACON LOWER HINGE ASSEMBLY
15	1	100345	DUAL BEACON HATCH PLATE
16	1	100360	DUAL BEACON BASE ASSEMBLY
17	2	100367	DUAL BEACON VENT CAP
18	6	100368	DUAL BEACON CAP BRACKET
19	2	100396	INDUCTOR BRACKET
20	1	100344	CAP DUAL BEACON
21	1	100342	DUAL BEACON UPPER HINGE ASSEMBLY
22	1	121102013	DB QUICK OPEN SCREW FLAT RECEPTACLE
23	1	070-4500	DB HATCH SPRING SS DWG100558
24	1	INSUTUBE	DUAL BEACON CERAMIC INSULATOR
25	1	INDTRC3001	INDUCTOR .47MH TRANSFORMER
26	2	STC05005	TRIGGER TRANSFORMER
27	1	1032X38PHH	10-32 X 3/8 PHILLIPS PAN HEAD SCREW
28	2	832X14PHH	8-32 X 1/4 PH SS SLOT SCREW
29	4	632X38PHH	6-32 X 3/8 PHILLIPS PAN HEAD SCREW
30	4	632X12PHH	6-32 X 1/2 PHILLIPS PAN HEAD SS SCREW
31	24	1032X38PHW	10-32 X 3/8 SS PHILIP HD CAPTIVE SCREW
32	3	832NUT	8-32 NUT
33	7	832X12PHH	8-32 X 1/2 PHILLIPS PAN HEAD
34	1	STBEAGSKT	GASKET NEOPRENE 13 1/4 X 15
35	3	STBEAGSK2	GASKET NEOPRENE 3/16 X 15 1/4
36	1	EL190S	1" 90 DEGREE SHORT ELBOW GALVANIZED
37	1	STDBRENS	RED DB LENS
38	2	100394-02	INDUCTOR BOTOM PAD GASKET
39	1	STDBCLENS	CLEAR DB LENS
40	1	STFLSHTB6	DAY MODE TUBE G01-109
41	1	A315	1" CONDUIT LOCKNUT GALVANIZED
42	1	STFLSHTB7	NIGHT MODE TUBE G01-112
43	4	58X112	A325 5/8 X 1-1/2 BOLT W/ANCO L/NUT
44	1	100453	INDUCTOR 135uh
45	4	CSL062X100	1/16 COPPER SLEEVE
46	1	57-10-401-10	SOUTHCO SPRING LATCH W/BLACK KNOB
47	1	CC-MPT-1-G	1" CORD CONNECTOR .700 TO .984
48	1	TERMBLK141-10	10 PART TERMINAL BLOCK
49	1	TERMBLK141-8	8 PART TERMINAL BLOCK
50	1	TERMARKSTRIP-8B	MS8-141 CINCH TERMINAL MARKER
51	1	TERMARKSTRIP	MS10-141 CINCH TERMINAL MARKER
52	3	832X1PHH	8-32 X 1 PHILLIPS PAN HEAD SS SCREW

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DRAWN	Gavin Sebek	3/3/2004
CHECKED		
QA		
MFG		
APPROVED		

TWR Lighting, Inc.

L865/864 DUAL BEACON ASSEMBLY

SIZE	DWG NO	REV
B	100414_RC	
SCALE	SHEET 1 OF 1	

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