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-2/3DB

SERIAL # _____

PURCHASE DATE _____

PURCHASED FROM _____

E-2/3DB CONTROLLER

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E-2/3DB CONTROLLER

APPENDIX

E-2/3DB CONTROLLER

1.0 INTRODUCTION

TWR Lighting, Inc.'s Model E-2/3DB Type L-864/L-865 Controller has been designed and built to the Federal Aviation Advisory Circular 150/5345-43E 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-2/3DB 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 70/7460-1J.

1.2 SPECIFICATIONS OF EQUIPMENT

Dimensions:	
Controller (H x W x D)/Weight	33.00" x 36.75" x 9.0"/210.0 lbs.
Mounting Dim (H x W)	37.375" x 24.0"
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
Wattage:	
Daymode	285 Watts
Red Nightmode	930 Watts
White Nightmode	105 Watts
Temperature:	+55°C / -55°C
Beacon Wind Load:	2.1 ft^2

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 5. Pay particular attention when choosing your controller mounting location to ensure proper door opening and room for service personnel. Refer to installation Drawings INS-279 and HDO-279 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-269 and H40-279)

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 "COM," the black wire is connected to the socket terminal marked "B," and the red wire is

connected to the socket terminal marked "R." These socket connections are made by using .25" quick connect terminals which must be crimped to the wires. 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 TB2-5.

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

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

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 H40-279)

Power wiring to the control cabinet should be in accordance with local methods and the National Electric Code (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 TB1-16.

2.4.3 Connect the "NEUTRAL" side of the 120V AC line to TB1-17.

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 choose between using strobe cable or conventional conduit wiring methods to wire the strobe beacons. Refer to Lighting Kit Drawings 601-01 and 601-02 for conduit, and 601 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-279 and INS-279)

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 beacon base or triple nutting each bolt with palnuts on all four (4) nuts.

2.5.1.3 Slip 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:

Wire color	to match	Lamp platform wire color	Terminal Block No.
10 Gauge Black		12 Gauge Black	1
10 Gauge Red/Black		20 Gauge Red/Black	2
10 Gauge Red		20 Gauge Red/White	3
14 Gauge White		20 Gauge White	4
14 Gauge White/Green		20 Gauge White/Green	5
14 Gauge Green		20 Gauge Green	6
16 Gauge Blue		20 Gauge Blue	7
16 Gauge Brown		20 Gauge Brown	8
16 Gauge Bare Wire		Beacon Base	

2.5.2 LIGHTING KIT WIRING

Install wiring between the controller to the beacon utilizing either strobe cable or conduit method. Refer to Drawings HDO-279, 601, 601-01, and 601-02, 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 proceed the manual if a conflict occurs.

All the necessary information for wiring the dual beacon and sidelights is contained on the tower kit Drawings 601, 601-01, and 601-02. The connections for the dual beacon and sidelights in the controller are as follows:

2.5.2.1 Connect the 10 gauge Red/Black wire from Beacon #1 wiring to TB1-1.

2.5.2.2 Connect the 10 gauge Red wire from Beacon #1 wiring to TB1-2.

2.5.2.3 Connect the 10 gauge Black wire from Beacon #1 wiring to TB1-3.

2.5.2.4 Connect the 14 gauge White wire from Beacon #1 wiring to TB1-4.

2.5.2.5 Connect the 14 gauge White/Green wire from Beacon #1 wiring to TB1-5.

2.5.2.6 Connect the 10 gauge Red/Black wire from Beacon #2 wiring to TB1-6.

2.5.2.7 Connect the 10 gauge Red wire from Beacon #2 wiring to TB1-7.

2.5.2.8 Connect the 10 gauge Black wire from Beacon #2 wiring to TB1-8.

2.5.2.9 Connect the 14 gauge White wire from Beacon #2 wiring to TB1-9.

2.5.2.10 Connect the 14 gauge White/Green wire from Beacon #2 wiring to TB1-10.

2.5.2.11 Connect the 10 gauge Red/Black wire from Beacon #3 wiring to TB1-11.

2.5.2.12 Connect the 10 gauge Red wire from Beacon #3 wiring to TB1-12.

2.5.2.13 Connect the 10 gauge Black wire from Beacon #3 wiring to TB1-13.

2.5.2.14 Connect the 14 gauge White wire from Beacon #3 wiring to TB1-14.

2.5.2.15 Connect the 14 gauge White/Green wire from Beacon #3 wiring to TB1-15.

2.5.2.16 Connect the 14 gauge Green wire from Beacon #1 to the first ground lug located to the left of TB1.

2.5.2.17 Connect the 14 gauge Green wire from Beacon #2 to the first lug located to the left of TB1.

2.5.2.18 Connect the 14 gauge Green wire from Beacon #3 to the first lug located to the left of TB1.

2.5.2.19 Connect the 16 gauge Bare Drain wire (if strobe cable install) from Beacon #1 to second ground lug located to the left of TB1.

2.5.2.20 Connect the 16 gauge Bare Drain wire (if strobe cable install) from Beacon #2 to second ground lug located to the left of TB1.

2.5.2.21 Connect the 16 gauge Bare Drain wire (if strobe cable install) from Beacon #3 to second ground lug located to the left of TB1.

2.5.2.22 Connect the 16 gauge Brown wire from Beacon #1 wiring to TB2-1.

2.5.2.23 Connect the 16 gauge Blue wire from Beacon #1 to TB2-2.

2.5.2.24 Connect the 16 gauge Blue wire from Beacon #2 to TB2-2.

2.5.2.25 Connect the 16 gauge Brown wire from Beacon #2 to TB2-3.

2.5.2.26 Connect the 16 gauge Brown wire from Beacon #3 to TB2-3.

2.5.2.27 Connect the 16 gauge Blue wire from Beacon #3 to TB2-4.

2.5.2.28 Connect the Red wire from the Sidelight #1 to fuse block marked SL1.

2.5.2.29 Connect the Yellow wire from the Sidelight #2 to fuse block marked SL2.

2.5.2.30 Connect the White Neutral wire from Sidelights #1 and #2

to TB1-17.

2.5.2.31 Connect the Green ground wire (if cable is used) from Sidelights #1 and #2, wiring the ground lug to the lower right 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 H40-279 and M01-279.

2.6.1 White Strobe #1 Failure (ST1)

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.

2.6.2 White Strobe #2 Failure (ST2)

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.

2.6.3 White Strobe #3 Failure (ST3)

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.

2.6.4 Red Strobe Failure (RF)

Connect the customer's alarm common to plug J3, terminal #14. Connect the customer's alarm wire to plug J3, terminal #15, for normally open (or) terminal #13, for normally closed monitoring. **NOTE: All three (3) red strobe alarms are grouped due to the fail-safe operation.**

2.6.5 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.

2.6.6 Photocell (PC)

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

2.6.7 Sidelight #1 Alarm (SA1)

Connect the customer's alarm common to Module M1, terminal T4. Connect the customer's alarm wire to Module M1, terminal T5, for normally open (or) terminal T6, for normally closed monitoring.

2.6.8 Sidelight #2 Alarm (SA2)

Connect the customer's alarm common to Module M2, terminal T4. Connect the customer's alarm wire to Module M2, terminal T5, for normally open (or) terminal T6, 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 (ST1, ST2, and ST3)

White strobe failure testing can be performed in the day mode operation. Check for status of strobe beacons. 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 Red Strobe Failure (RF)

Red strobe failure testing can be performed in the night mode operation. Check for status of strobe beacons. Turn "on" switch SW2 on controller panel and status should change after an eight (8) second delay. This testing will cause the unit to go into the back-up white strobe operation. To clear this situation, turn off SW2 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 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.

2.7.5 Sidelight #1 Alarm (SA1)

Controller should be in the nightmode of operation. Check status of operation. Pull fuse switch SL1 open. Alarm should occur within five (5) seconds. After test, re-engage fuse switch SL1.

2.7.6 Sidelight #2 Alarm (SA2)

Controller should be in the nightmode of operation. Check status of operation. Pull fuse switch SL2 open. Alarm should occur within five (5) seconds. After test, re-engage fuse switch SL2.

2.8 CONTROLLER CONFIGURATION (Refer to Drawing H01-279)

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 TB1-9 of master unit to slave unit TB2-6.

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 T2, and T2A through fuses F2, F3, MOVMOD1, and relay K1. In order for K1 to energize and complete the circuit to T2 and T2A, 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.

Transformers T2, and T2A 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 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, K5, and K5C for daymode operation.

Energy storage capacitors bank C103-131 is 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 C103-131 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 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, 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 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 1.2 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 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.

3.5 ALARM CIRCUITS

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

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 relays K7A, K7B, and K7C (on PCB #3) that the customer can connect to their alarm transmitting devices. The alarm point can be accessed on J3 of PCB #3.

3.5.2 Red Strobe Failure (RF)

Red Strobe Failure alarm circuit monitors each flash of the night mode flashtube within each beacon. If any Red Strobe flashtube fails to flash (for any reason) the alarm circuit would operate relay K8 (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 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, creating an alarm for the customer alarm transmitting device.

3.5.4 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 day to night mode has occurred.

3.5.5 Sidelight Alarm (SA1, and SA2)

Modules M1, and M2 monitor the current flowing to the sidelights. These modules can monitor from (1-4) 116W lamps. Factory setting is generally for three (3) lamps. When the current falls below two (2) amps (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 R32A, R32B, and R32C 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 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 F11 on PCB #1. Once this low voltage is at PCB #1, it is rectified, 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.

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 (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 on PCB #3. Whenever the photocell senses the darkness, or switch SW1 is on, relay K4 will energize, thereby sending 120V to relay U2. Relay U2 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 (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.

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, 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 that 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 (D12). At this time the strobe alarm should be received at J3. The normal position of S1 is off (switch downward).

4.0 TROUBLE SHOOTING

Much of the trouble shooting 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 H40-279, and H01-279.)

4.3 TROUBLE SHOOTING 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 - C131 day, C102, C112, and C122 night) for a short. If no capacitor is found to be shorted, check the resonant capacitor (C101, and C101A) 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. 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 fuses F2, and 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 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, and P1-10 for 120V AC output. If voltage is okay, go to the next step.

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 pre-set at the factory or about eight (8) seconds. This delay period can be tested by throwing "on" *(upward)* switch number S1 (on the circuit board #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 *(upward)*. On the breaker at the service panel to the lights, turn off, then back on. If the beacons comes 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 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 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 quick release connector connected to the cable running through the tube.

5.1.8 Loosen the three (3) socket screws with a #2 Phillips screwdriver.

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.

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 70/7460-1J. 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.

5.3 POWER SUPPLY

The only required maintenance to be performed is periodic inspection/cleaning of the vent filter. Monthly inspections should be made at first to familiarize yourself with power supply's particular maintenance requirements. Maintenance intervals can vary due to location, seasonal weather conditions, and general housekeeping of site.

The filter is located on the inside of the enclosure on the lower right hand side.

Tools Required: None.

5.3.1 Turn off power at breaker panel.

5.3.2 Open the controller door.

5.3.3 Disconnect P1 and P2 connectors from PCB #1.

5.3.4 Remove PCB #1 from track.

5.3.5 Slide filter up and remove from bracket.

5.3.6 Wash filter with water and squeeze until all excess water is removed. If no water is available, then knock out dust from filter before reinstalling.

5.3.7 Reinstall filter into bracket.

5.3.8 Reinstall PCB #1.

5.3.9 Reconnect P1 and P2 connectors to PCB #1.

5.3.10 Close the controller door.

5.3.11 Turn on power at breaker panel.

5.4 PHOTOCELL

The photocell is a sealed unit. No maintenance is needed or required other than replacement as necessary.

6.0 MAJOR COMPONENTS LIST

SCHEMATIC TAG #	DESCRIPTION	PART NUMBER
BSS1, BSS2, BSS3	BEACON SAFETY SWITCH	STJ02003
C101	4UF 660V AC CAP	STB99005
C101A	5UF 660V AC CAP	STB99001
C102, C112, C122	4UF 2.5 KV CAP CSI	STB99010
C103 - C131	40 UF 1KV CAP	STB99006
CSS	CABINET SAFETY SWITCH	STJ02001
FAN	AXIAL FAN	EP123815HBT
F1	1 amp FUSE	KTK1
F2	10 amp FUSE	KTK10
F3	20 amp FUSE	KTK20
F11	1/2 amp FUSE	FUSE.5
F41	1/8 amp FUSE	FUSE.125
FTW1, FTW2, FTW3	DAYMODE FLASHTUBE	STFLSHTB6
FTR1, FTR2, FTR3	NIGHTMODE FLASHTUBE	STFLSHTB7
K1, K4, K6, K8	DPDT OCTAL RELAY	X99KE
K2	HV BLEEDER RELAY DPDT	STJ10006
K2A	HV BLEEDER RELAY 4PDT	PM17AY
K5A, K5B, K5C	DPDT OCTAL RELAY	KRPA11AG120
K7A, K7B, K7C	SPDT OCTAL RELAY	X9KE
K9	TIME DELAY RELAY	SPEC224
L1, L2, L3	INDUCTOR	INDCTR3001

SCHEMATIC TAG #	DESCRIPTION	PART NUMBER
L11, L22, L33	INDUCTOR	100453

6.0 MAJOR COMPONENTS LIST (continued)

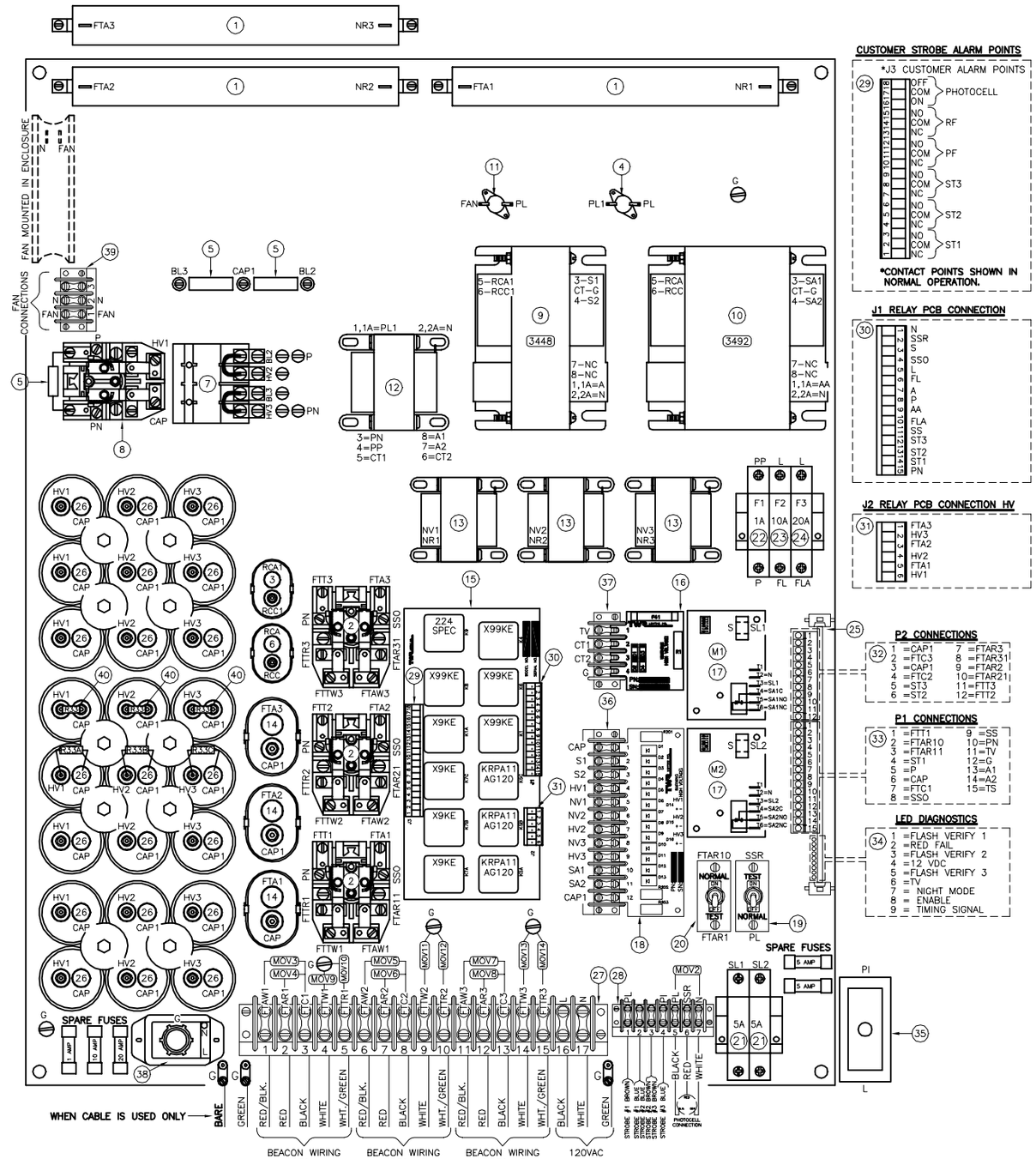
SCHEMATIC TAG #	DESCRIPTION	PART NUMBER
M1, M2	CURRENT SENSOR	SRCR430T
MOV2	METAL OXIDE VARISTOR	MOV524V15
MOVMOD1, 2, 3, 4	SURGE SUPPRESSOR	DTK-120HW
MOV 2, 3, 4, 5, 6, MOV 7	METAL OXIDE VARISTOR	V1000LA80A
P1, J1	15 POSITION PLUG	STT60009
P2	12 POSITION PLUG	STT60019
PCB #1	E-2/3DB CONTROL PCB	STH01279
PCB #2	HIGH VOLTAGE RECTIFIER PCB	STH02258A
PCB #3	RELAY PCB	STH03279
PCB #4	TRIGGER VOLTAGE RECTIFIER PCB	STH04269
PHOTOCELL	120V AC PHOTOCELL	P2455L
R31A, R31B, R31C	50 ohm 225W	STA22004
R32A, R32B, R32C	25K ohm 20W	STA08020
R33A, R33B, R33C	2.4 MEG 2W	ST08010
SL1, SL2	5 amp FUSE	KTK5
SW1, SW2	SPDT 10 amp SWITCH	STJ01002
T2	FERRORESONANT TRANSFORMER	STC30019
T2A	FERRORESONANT TRANSFORMER	STC30020
T1	ISOLATION TRANSFORMER	100272

6.0 MAJOR COMPONENTS LIST (continued)

SCHEMATIC TAG #	DESCRIPTION	PART NUMBER
T3A, T3B, T3C	BURSTING CHOKE	100273
T4, T5, T6, T7, T8, T9	TRIGGER TRANSFORMER	STC05005
TB1	17 PART TERM BLK	TERMBLK-17
TB2	7 PARK TERM BLK	TERMBLK141-7
TB3	12 PART TERM BLK	TERMBLK 141-12
TB5	3 PART TERM BLK	CURBLK
TLS1	THERMAL LIMITING SWITCH/210	STJ10008
TLS2	THERMAL LIMITING SWITCH/130	STJ10010
TB4	4 PART TERM BLK	TERMBLK141-4
J2	6 POSITION PLUG	STT60017
J3	18 POSITION PLUG	STT60015
	FLASHTUBE SOCKET	100319
	HINGE GASKET	STBEAGSKT
	LENS GASKET	STBEAGSKT2
	CLEAR LENS	STDBCLENS
	DB STROBE BEACON FIXTURE	STDBEACON
	STROBE BEACON CABLE	STROBCABLE-3
	SIDELIGHT CABLE	STCABLEOB
	FAN PLUG	CD045-36
	VENT FILTER	STFILTER

7.0 SUGGESTED SPARE PARTS LIST

QUANTITY	DESCRIPTION	PART NUMBER
2	1 amp FUSE	KTK1
2	10 amp FUSE	KTK10
2	20 amp FUSE	KTK20
2	1/2 amp FUSE	FUSE.5
2	1/8 amp FUSE	FUSE.125
1	E2/3DB PCB #1	STH01279
1	120V AC PHOTOCELL	P2455L



ITEM NO.	SCH. TAG NO.	DESCRIPTION
1	R31A,R31B,R31C	NIGHT MODE RESISTORS 50 OHM 225W
2	K3A,K3B,K3C	RED/WHITE RELAYS
3	C101	4uf 660VAC RESONANT CAPACITOR (T2)
4	TLS1	THERMAL LIMITING SWITCH 1 (OA-210)
5	R32A,R32B,R32C	BLEEDER RESISTORS
6	C101A	5uf RESONANT CAPACITOR (T2A)
7	K2A	BLEEDER RELAY 2
8	K2	BLEEDER RELAY 1
9	T2	FERRO TRANSFORMER 1
10	T2A	FERRO TRANSFORMER 2
11	TLS2	THERMAL LIMITING SWITCH 2 (CA-130)
12	T1	ISOLATION TRANSFORMER
13	T3A,T3B,T3C	BURSTING CHOKES
14	C102,C112,C122	NIGHT CAPACITORS 4uf @ 25KV
15	PCB3	RELAY PCB3
	K1	POWER RELAY
	K1A	POWER ALARM
	K4	PHOTOCELL RELAY
	K5A	NIGHT/DAY INTENSITY RELAY 1
	K5B	NIGHT/DAY INTENSITY RELAY 2
	K5C	NIGHT/DAY INTENSITY RELAY 3
	K6	SIDELIGHT POWER RELAY
	K7A	STROBE FAIL RELAY 1
	K7B	STROBE FAIL RELAY 2
	K7C	STROBE FAIL RELAY 3
	K8	RED STROBE ALARM/FAIL
	K9	TRANSFER RELAY
16	PCB4	TRIGGER VOLTAGE PCB4
17	M1,M2	SCR430T CURRENT SENSOR
18	PCB2	HV RECTIFIER PCB2
19	SW1	PHOTOCELL BYPASS SWITCH
20	SW2	RED STROBE FAILURE
21	SL1,SL2	SIDELIGHT FUSES
22	F1	.5 AMP FUSE
23	F2	10 AMP FUSE
24	F3	20 AMP FUSE
25	PCB1	CONTROL PCB
26	C103-C131	DAY CAPACITORS 40uf @ 1.1KV
27	TB1	TERMINAL BLOCK 1
28	TB2	TERMINAL BLOCK 2
29	J3	CUSTOMER ALARM POINTS
30	J1	RELAY PCB CONNECTION
31	J2	RELAY PCB CONNECTION HV
32	P2	CONTROL PCB CONNECTION 2
33	P1	CONTROL PCB CONNECTION 1
34	LED	DIAGNOSTIC LEDS
35	CSS	CABINET SAFETY SWITCH
36	TB3	HV PCB TERMINAL BLOCK
37	TB4	TV PCB TERMINAL BLOCK
38	MOVMOD	SURGE ARRESTOR
39	TB5	FAN CONNECTIONS
40	R33A,R33B,R33C	2.4 MEG 2W AUXILARY BLEEDER RES.

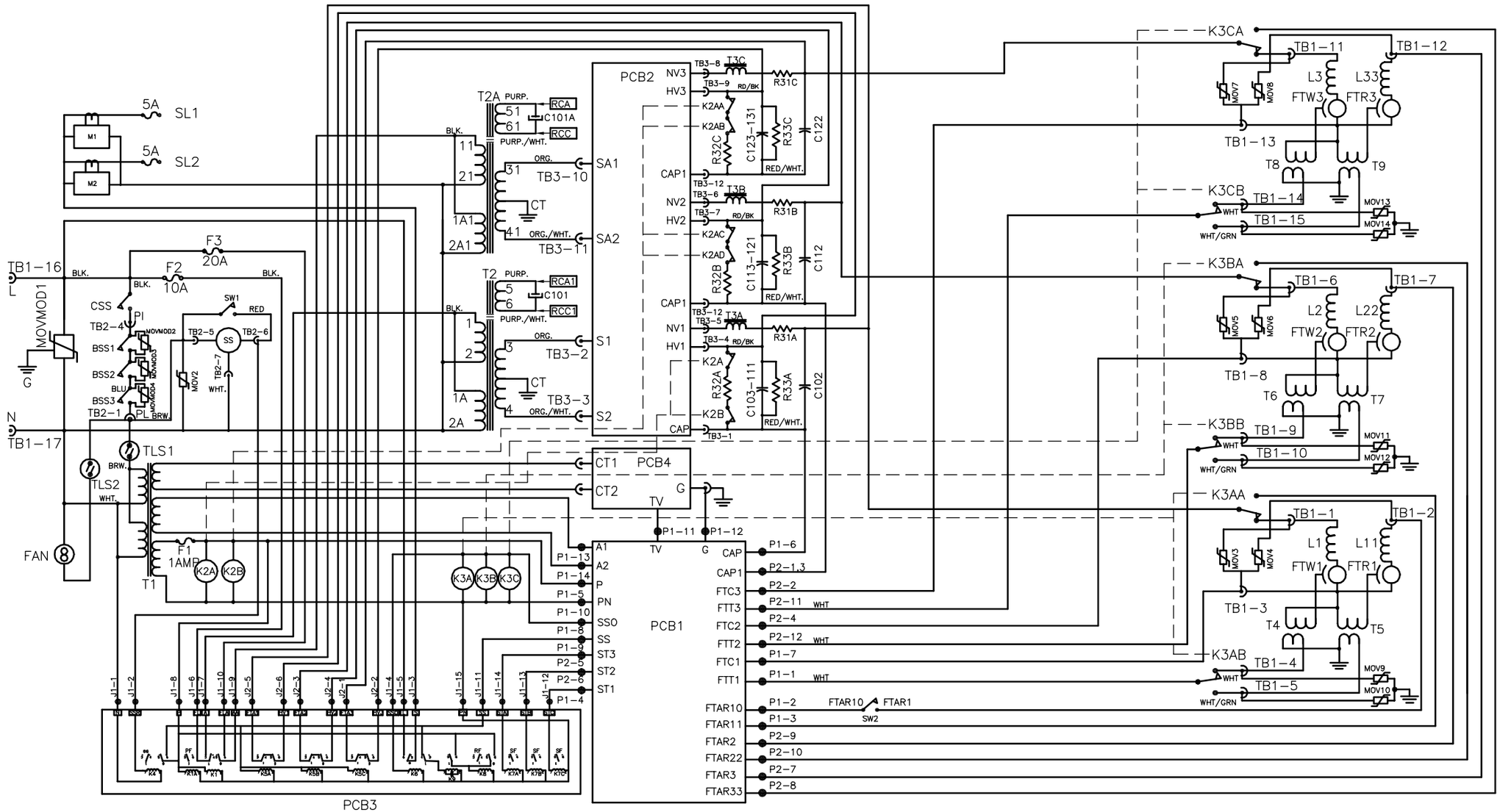
DATE:	LTR.	REVISION
01/12/00	D	CHG. CAPACITORS

E-2/3DB CONTROLLER CHASSIS LAYOUT

o2wireless Solutions
TWR lighting division

APP'D
CHK'D BY
ENGINEER

DRAWN BY E.A.SALAZAR
SHEET SIZE B
SHEET QTY. 1 OF 1
DATE 07/09/98
SCALE N.T.S.
DRAWING NO. H40-279



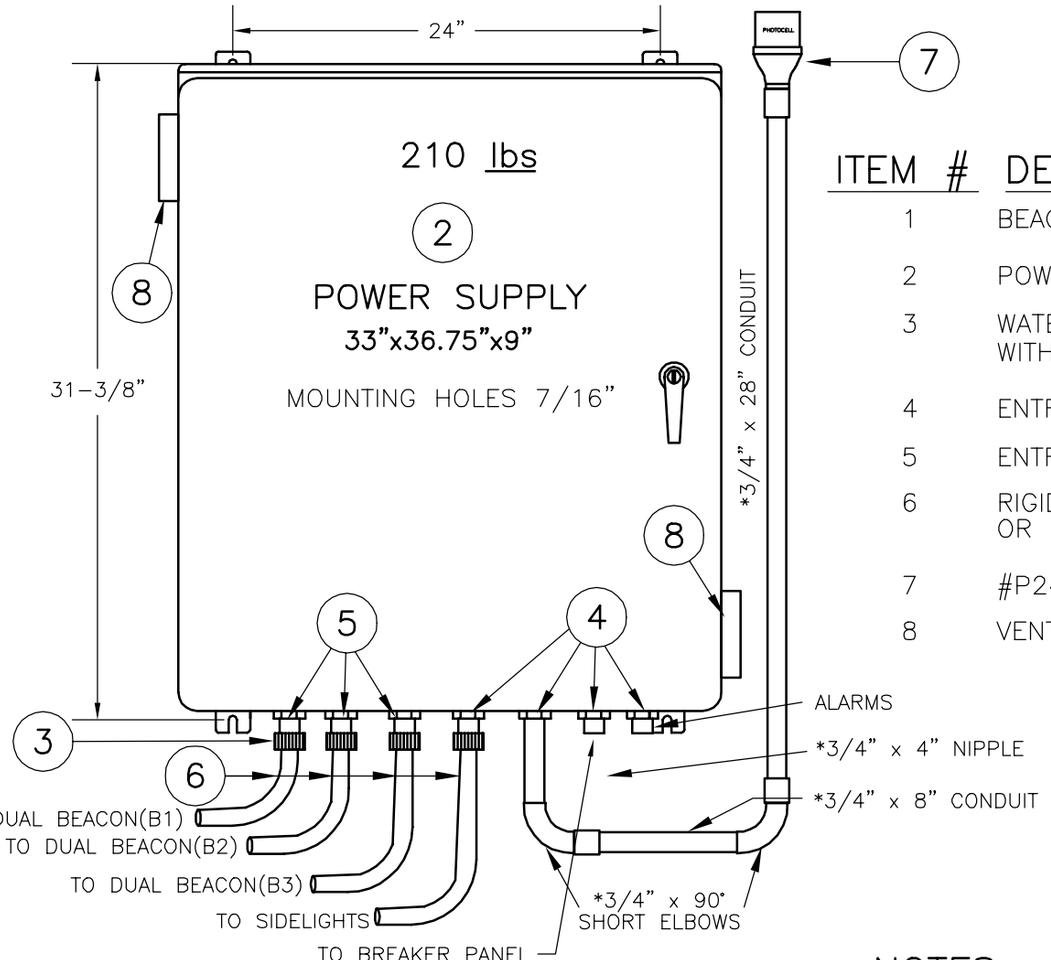
E-2/3DB SCHEMATIC

o2wireless Solutions
TWR lighting division

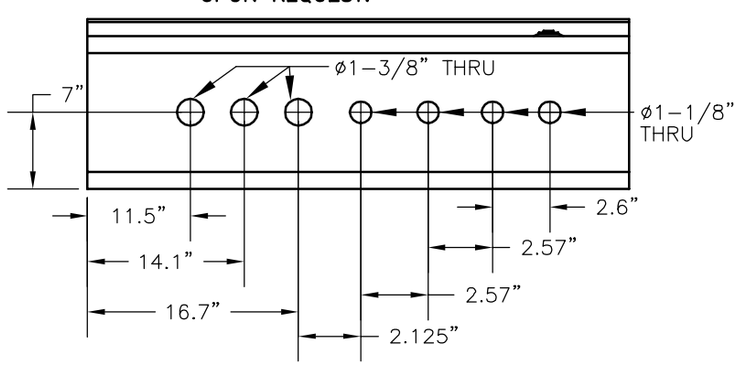
APP'D
CHK'D BY
ENGINEER

DRAWN BY E.A.SALAZAR
SHEET SIZE B
SHEET QTY. 1 OF 1
DATE 07/10/98
SCALE N.T.S.
DRAWING NO. M01-279

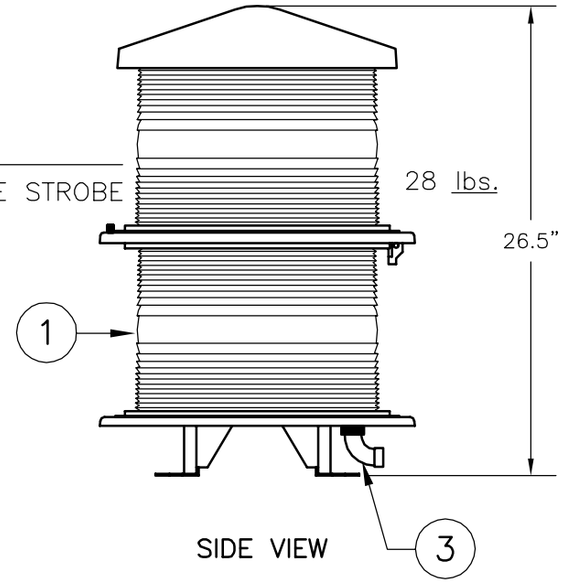
DATE:	LTR.	REVISION
02/26/01	C	ADDED MOVS

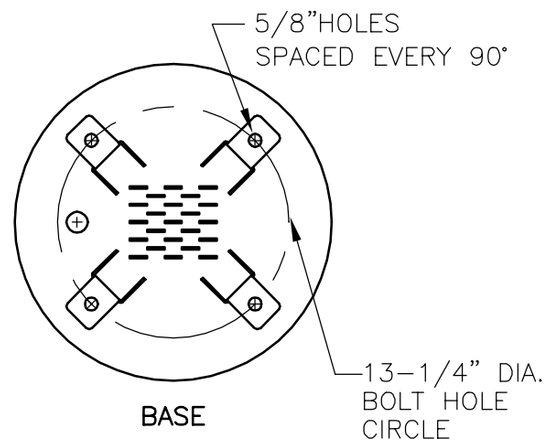


* = ITEMS NOT INCLUDED BUT ARE AVAILABLE UPON REQUEST.



ITEM #	DESCRIPTION
1	BEACON L-864/L865 DUAL RED/WHITE STROBE
2	POWER SUPPLY E-2/3DB
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	#P2455L PHOTOCELL
8	VENT & FILTER COVER





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.

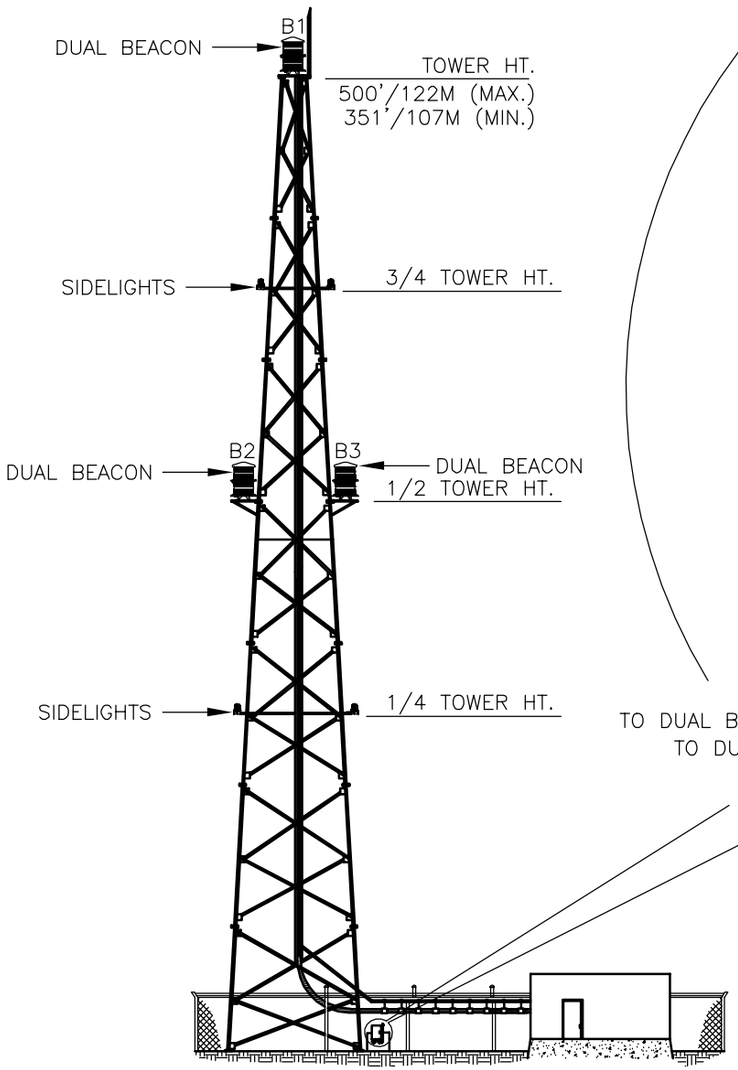
DATE:	LTR.	REVISION
08/11/00	A	MODIFIED DRAWING

HOUSING DETAILS E-2/3DB
L-864/L-865 RED/WHITE STROBE

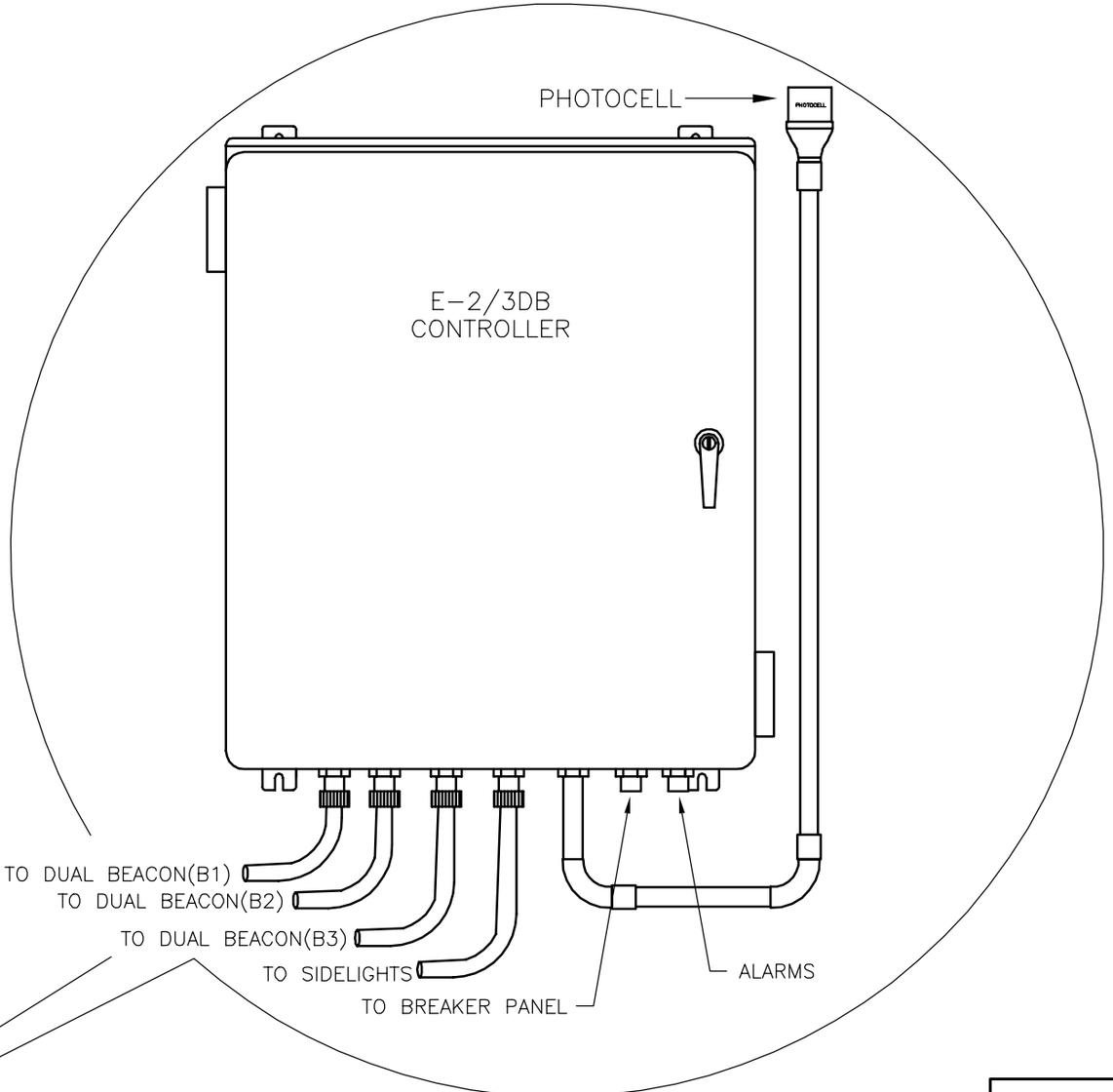
o2wireless Solutions
TWR lighting division

APP'D
CHK'D BY
ENGINEER

DRAWN BY	SHEET SIZE	SHEET QTY.
E.A.SALAZAR	B	1 OF 1
DATE: 10/08/98	SCALE: N.T.S.	DRAWING NO. HDO-279



TYPICAL SITE LAYOUT



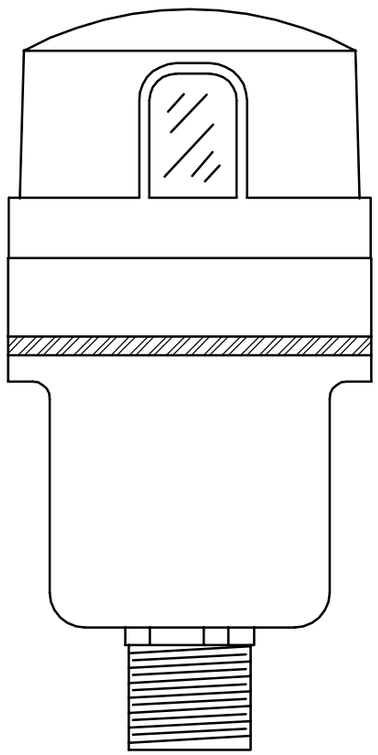
NOTES:

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 HD0-279 (CONTROLLER INSTALLATION), 601 (LIGHT KIT CABLE RUN), 601-01(LIGHT KIT CONDUIT & CABLE RUN) AND 601-02 (LIGHT KIT ONLY CONDUIT RUN).

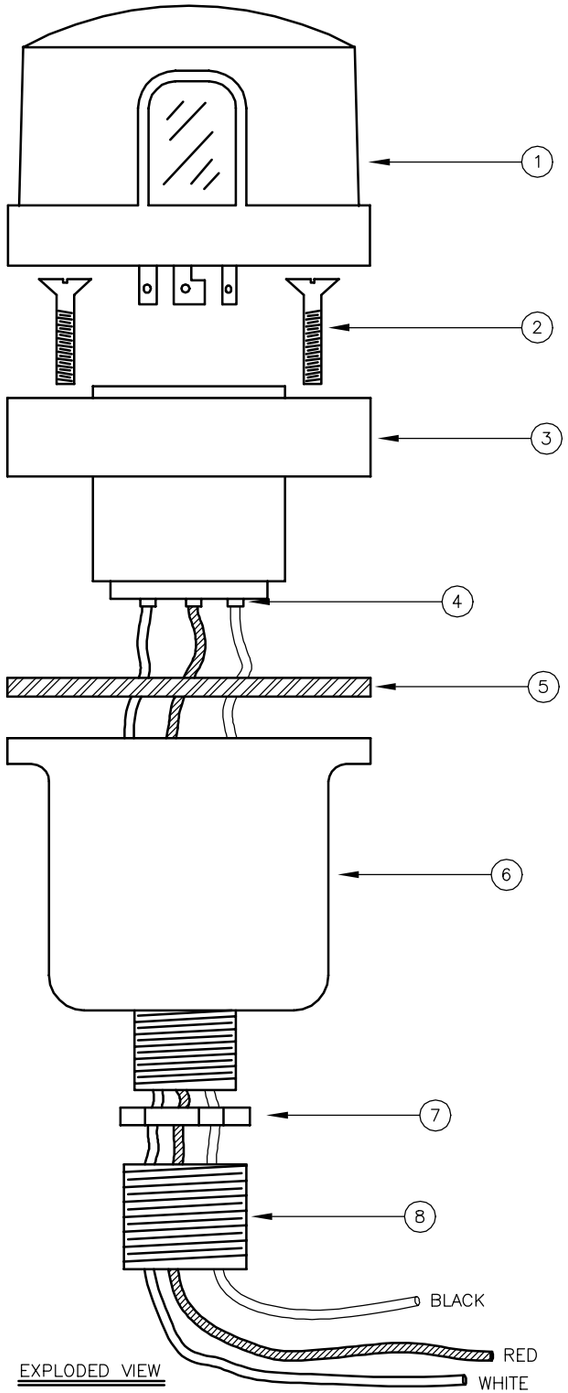
E-2/3DB INSTALLATION GUIDELINE

o2wireless Solutions
TWR lighting division

APP'D	
CHK'D BY	
ENGINEER	
DRAWN BY	E.A.SALAZAR
SHEET SIZE	B
SHEET QTY.	1 OF 1
DATE	10/08/98
SCALE	N.T.S.
DRAWING NO.	INS-279



ASSEMBLY



EXPLODED VIEW

ITEM	QTY.	DESCRIPTION
1	1	PHOTOCELL
2	2	6-32 x 7/8" SCREW
3	1	RECEPTACLE SOCKET
4	3	.250 SPADE CONNECTOR
5	1	RECEPTACLE GASKET
6	1	RECEPTACLE HOUSING
7	1	1/2" CONDUIT LOCKNUT
8	1	3/4" TO 1/2" REDUCER

NOTES:

1. ITEM #8 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.

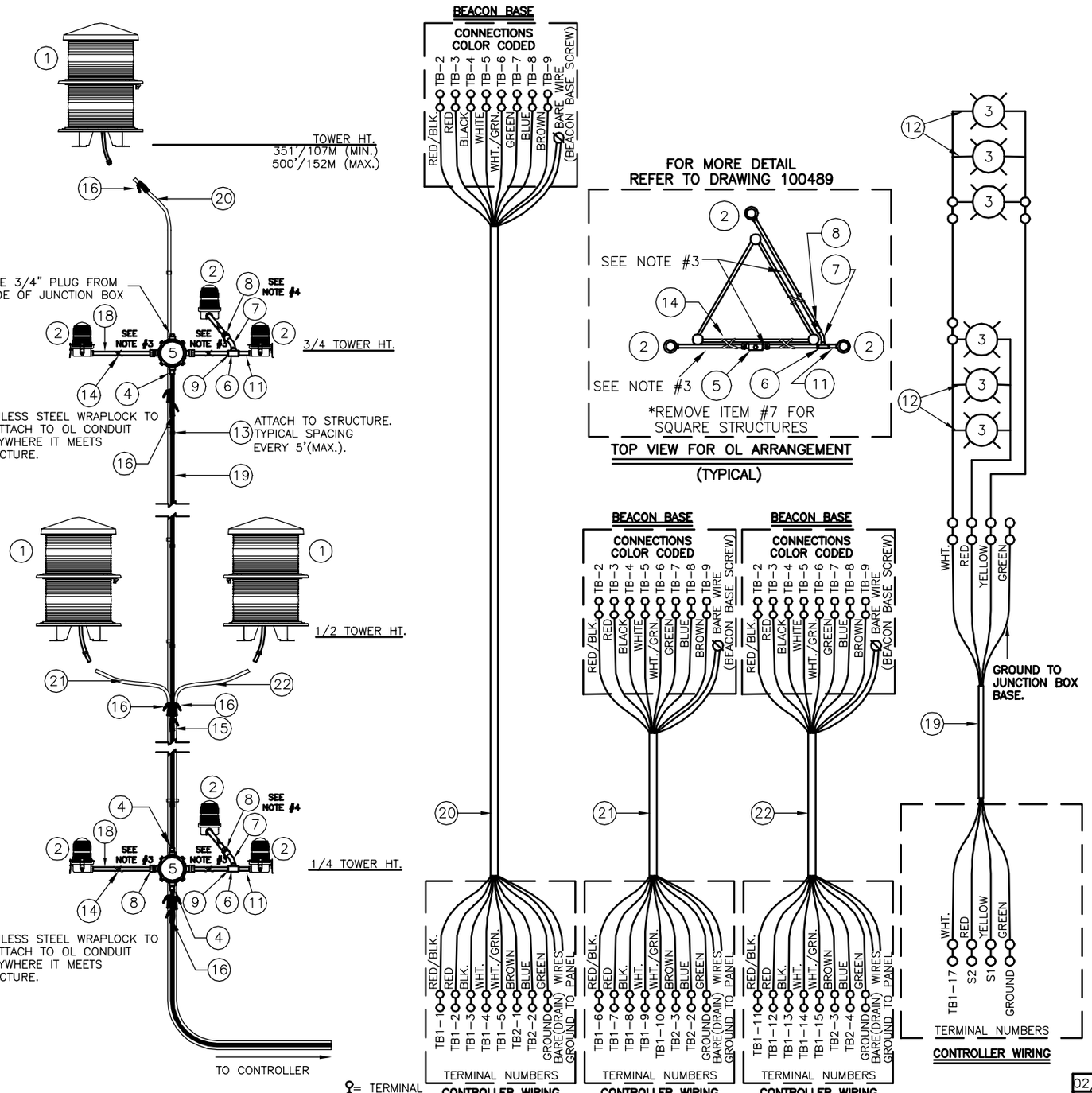
   21' TO 300' – 16 AWG TFFN
   301' TO 500' – 14 AWG TFFN

PHOTOCELL HOUSING DETAIL

o2wireless Solutions
TWR lighting division

APP'D
CHK'D BY
ENGINEER

DRAWN BY	SHEET SIZE	SHEET QTY.
E.A.SALAZAR	B	1 OF 1
DATE 10/18/95	SCALE N.T.S.	DRAWING NO. 100239



BILL OF MATERIALS

	ITEM NO.	QTY.	TWR PART NO.	DESCRIPTION
	1	3	STDBEACON	DUAL BEACON
	2	6	OL1	3/4" OBSTRUCTION LIGHT
	3	6	116A21TS	116 WATT 120 VOLT LAMP
	4	3	CGB295SA	3/4" CORD CONNECTOR 0.50 – 0.625
	5	2	JB5	3/4" JUNCTION BOX
	6	2	T27CG	3/4" CONDULET W/COVER AND GASKET
	7	2	EL3430	3/4" 30° ELBOW
	8	6	HC-402	3/4" NO THREAD CONNECTOR
	9	10	A314	3/4" CONDUIT LOCKNUTS
*	10	1	PIPDOP	4 oz. PIPE DOPE
	11	2	N34T3	3/4" x 3" NIPPLE
	12	6	SLPIGTAIL25	25' SIDELIGHT PIGTAIL
	13	–	STCABLTIE	STROBE CABLE TIES(TWR. HEIGHT ÷ 5 x 2.75)
	14	1	SS5012	STAINLESS STEEL WRAPLOCK 50' (FOR OLS)
	15	3	CABLEGRIP1	SINGLE EYE LACE MESH 0.5 – 0.62
	16	8	CABLEGRIP3	SINGLE EYE LACE MESH 0.63 – 0.74
*	17	1	STH40279	E2/3DB DUAL BEACON CONTROLLER
	18	60'	CONDUIT34	3/4" CONDUIT (FOR OLS)

ITEM NUMBERS #19–#22 ARE NOT INCLUDED IN THE KIT BUT ARE AVAILABLE UPON REQUEST, AND REQUIRED FOR INSTALLATION.

19	–	STCABLEOB	OBSTRUCTION LIGHT CABLE(3/4 TWR. HT.+30'/9M)
20	–	STROBCABLE-3	STROBE CABLE (TWR. HT. + 30'/9M)
21	–	STROBCABLE-3	STROBE CABLE (1/2 TWR. HT. + 30'/9M)
22	–	STROBCABLE-3	STROBE CABLE (1/2 TWR. HT. + 30'/9M)

* = ITEMS NOT SHOWN

NOTES:

1) MOUNT BEACON HINGE SO LENS WILL OPEN UNOBSTRUCTED BY STRUCTURE.
2) ON AM RF TOWER APPLICATIONS, KEEP GROUND LUG FROM BEING CONNECTED TO EARTH GROUND. GROUND TO THE TOWER ONLY.
3) ITEM #18 CUT TO LENGTH FOR PROPER EXTENTION OF OL1 (6"–12") FROM STRUCTURE. ATTACH ITEM #8 TO UNTHREADED CONDUIT TO COMPLETE ASSEMBLY.
4) USE COUPLING THAT IS PROVIDED WITH ITEM #18 TO COUPLE ITEM #7 TO ITEM #8
5) THIS DRAWING IS PROVIDED AS A GENERAL REFERENCE. TWR LIGHTING, DIV. DOCUMENTATION SUPERSEDES THIS DRAWING & SHOULD BE REVIEWED PRIOR TO INSTALLATION OF THIS SYSTEM.
6) POWER SUPPLY IS NORMALLY MOUNTED AT EYE LEVEL ON TOWER. IT CAN ALSO BE MOUNTED INDOORS. RECOMMENDED MOUNTING HEIGHT IS 42" TO BOTTOM OF THE ENCLOSURE FOR EASE OF MAINTENANCE.
7) STROBE CABLE IS TO BE FASTENED TO TOWER STRUCTURE WITH PART NUMBER STCABLTIE. (ATTACH EVERY 5')

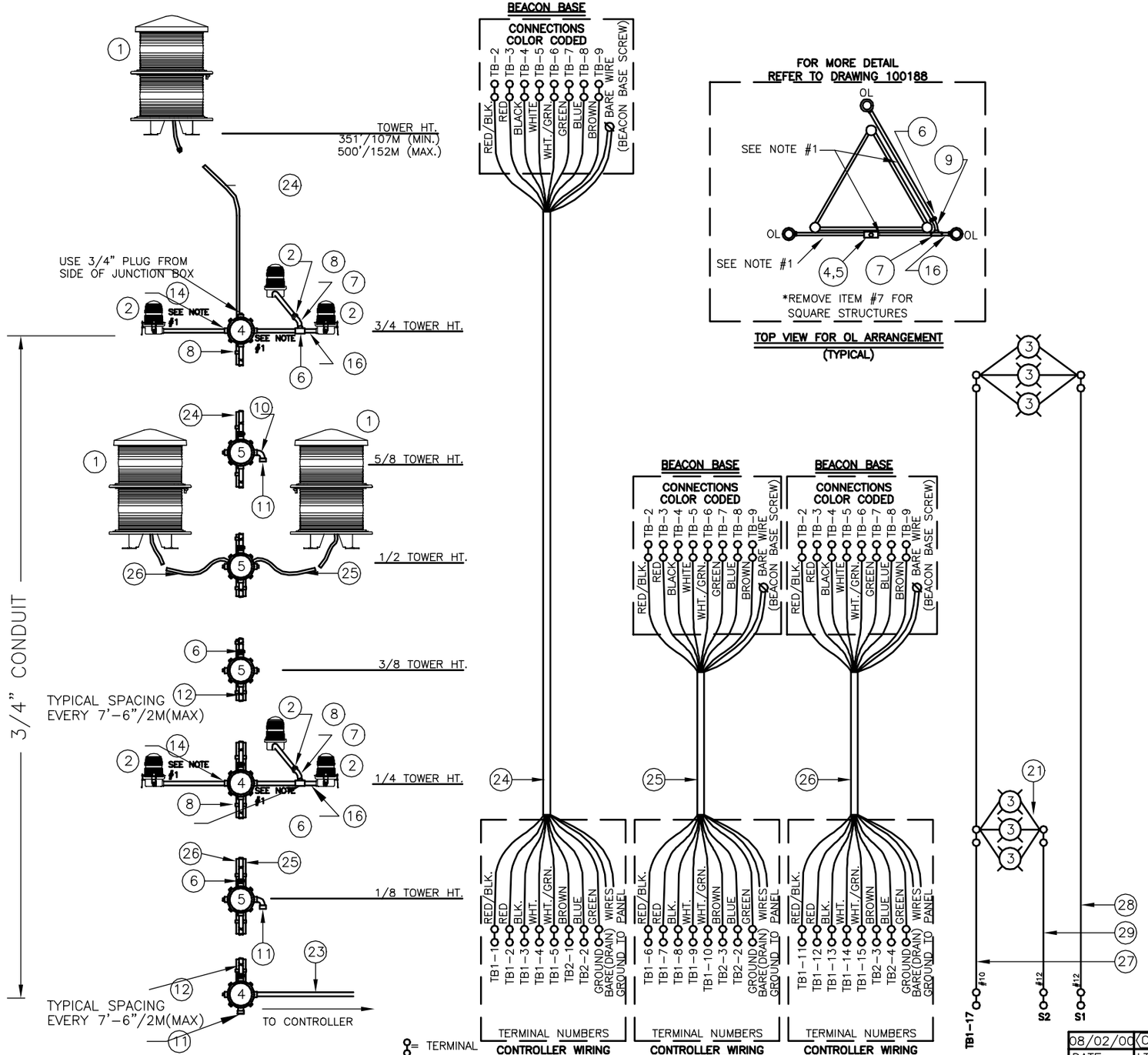
DATE:	LTR.	REVISION
02/23/01	(D)	REWORKED KIT PARTS

LK1E2/3DB TOWER LIGHTING KIT CABLE RUN
(TOWERS 351'/107M TO 500'/152M)

o2wireless Solutions
TWR lighting division

APP'D
CHK'D BY
ENGINEER

DRAWN BY E.A.SALAZAR
SHEET SIZE B
SHEET QTY. 1 OF 1
DATE 11/20/97
SCALE N.T.S.
DRAWING NO. 601



BILL OF MATERIALS

ITEM NO.	QTY.	TWR PART NO.	DESCRIPTION
1	3	STDBEACON	DUAL BEACON
2	6	OL1	3/4" OBSTRUCTION LIGHT
3	6	116A21TS	116 WATT 120 VOLT LAMP
4	3	JB5	3/4" JUNCTION BOX
5	4	JBO	3/4" STRAIN RELIEF BOX
6	9	UNY205	3/4" UNION
7	3	T27CG	3/4" CONDULET W/COVER AND GASKET
8	–	STCABLTIE	STROBE CABLE TIES (TOWER HEIGHT ÷ 5x2.75)
9	2	EL3430	3/4" 30° ELBOW
10	2	EL3490	3/4" 90° SHORT ELBOW
11	3	5012902	3/4" BREATHER
12	1	SS10012	WRAPLOCK
* 13	1	PIPDOP	4 oz. PIPE DOPE
14	22	A314	3/4" CONDUIT LOCKNUTS
* 15	16	CPLG34	3/4" GALVANIZED COUPLING
16	8	N34T3	3/4" x 3" NIPPLE
17	6	N34T6	3/4" x 6" NIPPLE
18	6	N34T12	3/4" x 12" NIPPLE
19	6	N34T24	3/4" x 24" NIPPLE
20	4	N34T36	3/4" x 36" NIPPLE
21	6	SLPIGTAIL25	25' SIDELIGHT PIGTAIL
* 22	1	STH40279	E2/3DB DUAL BEACON CONTROLLER

ITEM NUMBERS #23-#29 ARE NOT INCLUDED IN THE KIT BUT ARE AVAILABLE UPON REQUEST, AND REQUIRED FOR INSTALLATION.

23	–	CONDUIT34	3/4" CONDUIT (3/4 TOWER HT. + 30'/9M)
24	–	STROBCABLE-3	STROBE CABLE (TOWER HT. + 40'/12M)
25	–	STROBCABLE-3	STROBE CABLE (1/2 TOWER HT. + 40'/12M)
26	–	STROBCABLE-3	STROBE CABLE (1/2 TOWER HT. + 40'/12M)
27	–	10THHNWHT	#10 THHN WHITE WIRE (TWR HT.+40'/12M)
28	–	12THHNBLK	#12 THHN BLK. WIRE (1/2 TWR HT.+40'/12M)
29	–	12THHNRED	#12 THHN RED WIRE (1/2 TWR HT.+40'/12M)

* = ITEMS NOT SHOWN

NOTES:

1) ITEMS #15-#20 TO BE USED IN VARIOUS COMBINATIONS FOR OL1 RUN. EXTRA NIPPLES TO BE CUT TO FIT IF FACE WIDTH IS LARGER THAN 6'.
2) USE ITEM #15 TO COUPLE CONDUIT NIPPLES. APPROPRIATE OL1 EXTENSION FROM STRUCTURE IS 12".
3) MOUNT BEACON HINGE SO LENS WILL OPEN UNOBSTRUCTED BY STRUCTURE.
4) ON AM TOWER APPLICATIONS, KEEP GROUND LUG FROM BEING CONNECTED TO EARTH GROUND. GROUND TO THE TOWER ONLY.
5) THIS DRAWING IS PROVIDED AS A GENERAL REFERENCE. TWR LIGHTING, INC. DOCUMENTATION SUPERSEDES THIS DRAWING & SHOULD BE REVIEWED PRIOR TO INSTALLATION OF THIS SYSTEM.

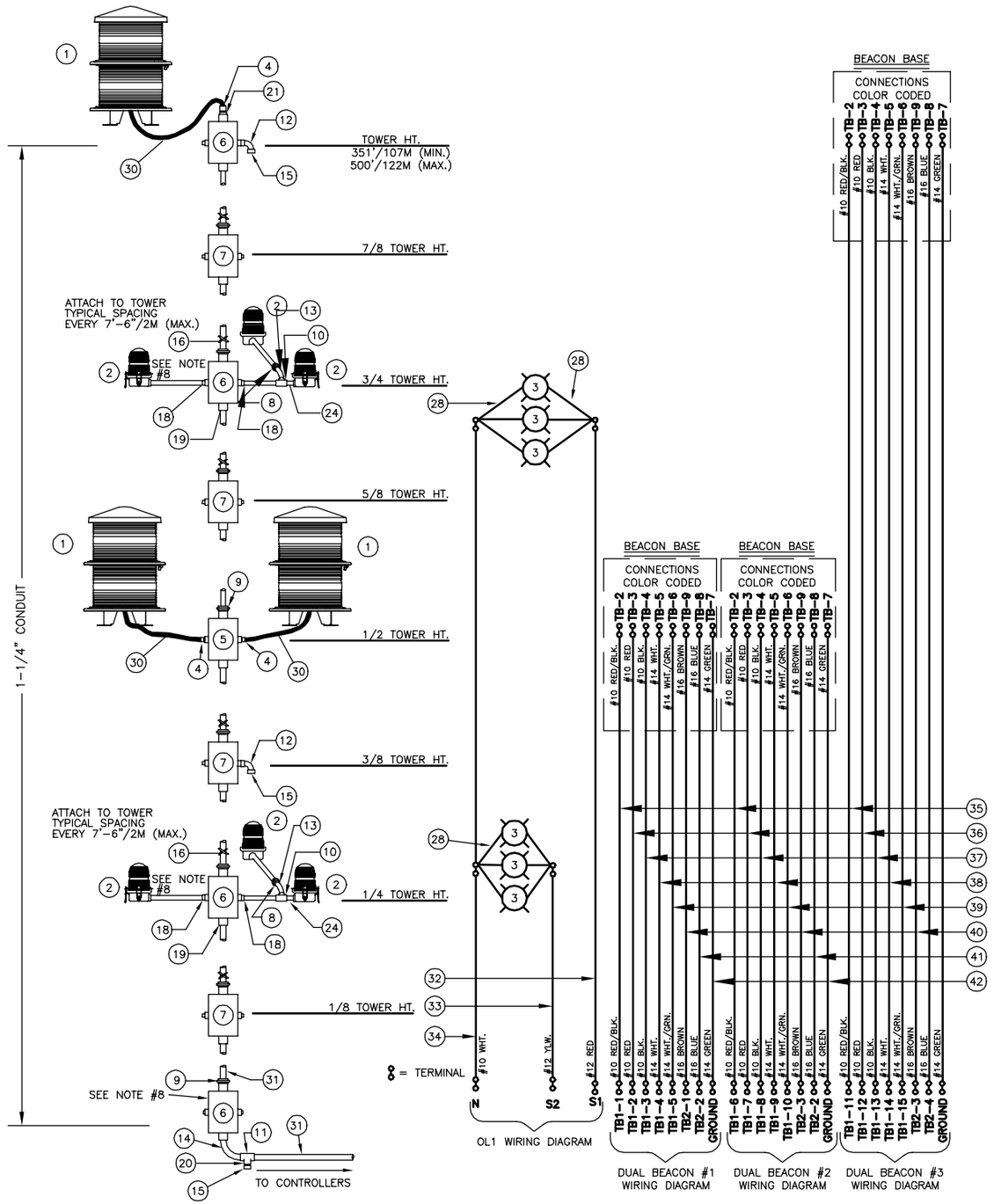
LK2E2/3DB TOWER LIGHTING KIT CABLE RUN
(TOWERS 351'/107M TO 500'/152M)

o2wireless Solutions
TWR Lighting division

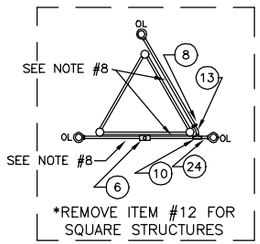
APP'D
CHK'D BY
ENGINEER

DRAWN BY E.A.SALAZAR
SHEET SIZE B
SHEET QTY. 1 OF 1
DATE 11/20/97
SCALE N.T.S.
DRAWING NO. 601-01

DATE:	LTR.	REVISION
08/02/00	C	CHANGED B.O.M.



FOR MORE DETAILS REFER
TO DRAWING 100188



*REMOVE ITEM #12 FOR
SQUARE STRUCTURES

TOP VIEW FOR OL ARRANGEMENT
(TYPICAL)

BILL OF MATERIALS

	ITEM NO.	QTY.	TWR PART NO.	DESCRIPTION
	1	3	STDBEACON	DUAL BEACON
	2	6	OL1	3/4" OBSTRUCTION LIGHT
	3	6	116A21TS	116 WATT 120 VOLT LAMP
	4	3	CGB396SA	1" CORD CONNECTOR 0.625-0.75
	5	1	J10TB5RL4-5TDB	1-1/4" JUNCTION BOX W/30 TERMINALS 1" LR
	6	4	J10TB5RL3-5TDB	1-1/4" JUNCTION BOX W/30 TERMINALS, 3/4" LR
	7	4	JB8SR114	1-1/4" STRAIN RELIEF BOX
	8	2	UNY205	3/4" UNION
	9	9	UNY405	1-1/4" UNION
	10	2	T27CG	3/4" CONDULET W/COVER AND GASKET
	11	2	T47CG	1-1/4" CONDULET W/COVER AND GASKET
	12	2	EL3490	3/4" 90° SHORT ELBOW
	13	2	EL3430	3/4" 30° ELBOW
	14	2	EL11490	1-1/4" 90° SWEEP ELBOW
	15	3	5012902	3/4" BREATHER
	16	2	SS10012	WRAPLOCK
*	17	2	PIPDOP	4 oz. PIPE DOPE
	18	10	A314	3/4" CONDUIT LOCKNUTS
	19	20	A316	1-1/4" CONDUIT LOCKNUTS
	20	2	RE42	1-1/4" TO 3/4" REDUCER
	21	1	RE43	1-1/4" TO 1" REDUCER
*	22	16	CPLG34	3/4" GALVANIZED COUPLING
	23	9	N34T3	3/4" x 3" NIPPLE
	24	6	N34T6	3/4" x 6" NIPPLE
	25	6	N34T12	3/4" x 12" NIPPLE
	26	6	N34T24	3/4" x 24" NIPPLE
	27	4	N34T36	3/4" x 36" NIPPLE
	28	6	SLPIGTAIL25	25' SIDELIGHT PIGTAIL
*	29	1	STH40279	E2/3DB DUAL BEACON CONTROLLER
	30	30'	STROBCABLE-3	STROBE CABLE

ITEM NUMBERS #30-#41 ARE NOT INCLUDED IN THE KIT BUT ARE AVAILABLE UPON REQUEST, AND REQUIRED FOR INSTALLATION.

31	–	CONDUIT114	1-1/4" CONDUIT (TWR. HT. + 30'/9M)
32	–	12UL1452RED	#12 UL1452 RED WIRE(3/4 TWR. HT.+40'/12M)(OL'S)
33	–	12UL1452YLW	#12 UL1452 YLW. WIRE(1/4 TWR. HT.+40'/12M)(OL'S)
34	–	10UL1452WHT	#10 UL1452 WHT. WIRE(3/4 TWR. HT.+40'/12M)(OL'S)
35	–	10UL1452REDBLK	#10 UL1452 RED/BLK. WIRE (TWR. HT x 2+ 120'/36M)
36	–	10UL1452RED	#10 UL1452 RED WIRE (TWR. HT. x 2 + 120'/36M)
37	–	10UL1452BLK	#10 UL1452 BLK. WIRE (TWR. HT. x 2 + 120'/36M)
38	–	14UL1452WHT	#14 UL1452 WHT. WIRE (TWR. HT. x 2 + 120'/36M)
39	–	14UL1452WHTGRN	#14 UL1452 WHT./GRN. WIRE(TWR. HT x 2 + 120'/36M)
40	–	16UL1452BRN	#16 UL1452 BRN. WIRE (TWR. HT. x 2 + 120'/36M)
41	–	16UL1452BLUE	#16 UL1452 BLUE WIRE (TWR. HT. x 2 + 120'/36M)
42	–	14UL1452GRN	#14 UL1452 GRN. WIRE (TWR. HT. x 2 + 120'/36M)

NOTES:

1. POWER SUPPLY IS NORMALLY MOUNTED AT EYE LEVEL ON TOWER. IT CAN ALSO BE MOUNTED INDOORS. RECOMMENDED MOUNTING HEIGHT IS 42" TO BOTTOM FOR MAINTENANCE.
2. MOUNT BEACON HINGE SO LENS WILL OPEN UNOBSTRUCTED BY STRUCTURE.
3. CONDUIT SIZE BASE ON USING TYPE UL1452 WIRE.
4. USE RIGID GALVANIZED STEEL CONDUIT.
5. BREATHERS ALLOW FOR CIRCULATION OF AIR TO PREVENT CONDENSATION.
6. MIDDLE LEVEL BEACON CANNOT BE MOUNTED AT LESS THAN 200'.
7. JUNCTION BOXES SHOULD BE MOUNTED SO SAFETY CHAIN IS LOCATED ON THE BOTTOM OF THE BOX.
8. ITEMS #22-#27 TO BE USED IN VARIOUS COMBINATIONS FOR OL1 RUN. EXTRA NIPPLES TO BE CUT TO FIT IF FACE WIDTH IS LARGER THAN 6'.
9. USE ITEM #22 TO COUPLE NIPPLES. APPROPRIATE OL1 EXTENSION IS 12".
10. THIS DRAWING IS PROVIDED AS A GENERAL REFERENCE. TWR LIGHTING, INC. DOCUMENTATION SUPERSEDES THIS DRAWING & SHOULD BE REVIEW PRIOR TO INSTALLATION OF THIS SYSTEM.

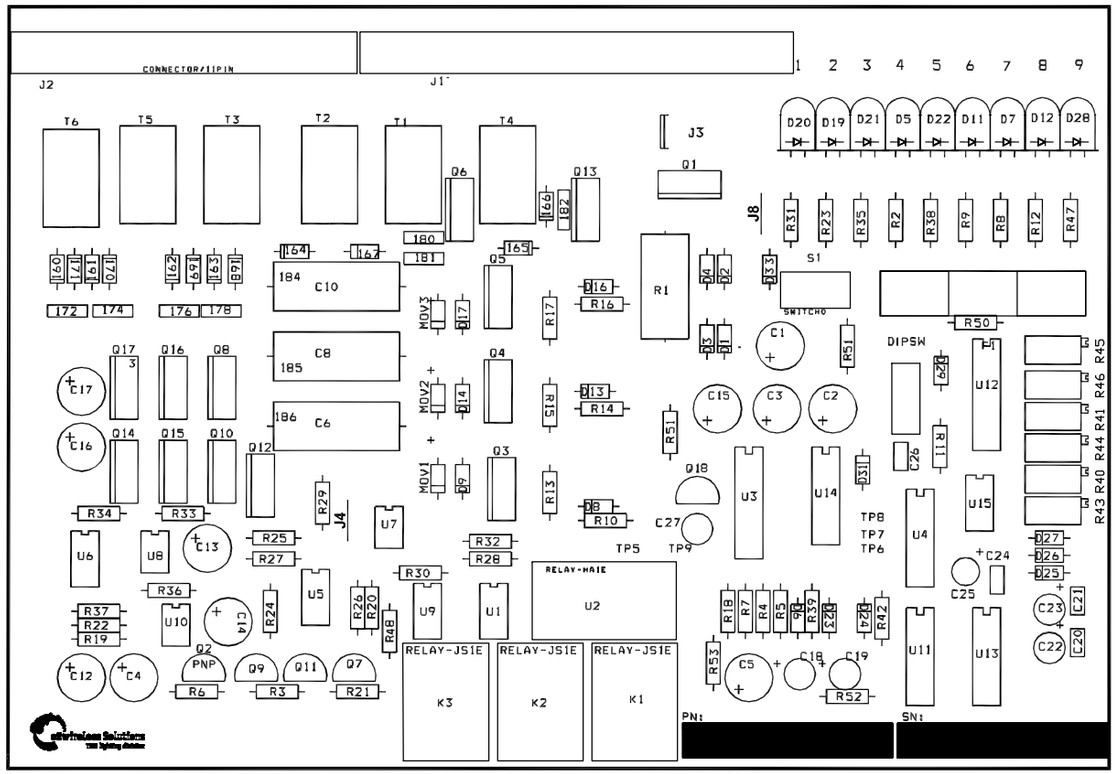
LK3E2/3DB TOWER LIGHTING KIT
(TOWERS 351'/107M TO 500'/152M)

o2wireless Solutions
TWR lighting division

APP'D
CHK'D BY
ENGINEER

DRAWN BY E.A.SALAZAR
SHEET SIZE B
SHEET QTY. 1 OF 1
DATE 03/01/98
SCALE N.T.S.
DRAWING NO. 601-02

DATE:	LTR.	REVISION
08/02/00	(E)	CHANGED B.O.M.
3/22/00	(D)	ADDED MATERIALS



FACTORY SETUP:

MASTER & STAND ALONE

OFF ON

1 ON
2 OFF
3 ON
4 OFF
5 ON

DIPSW

OPTIONAL SETUP:

SLAVE

OFF ON

1 OFF
2 ON
3 OFF
4 OFF
5 OFF

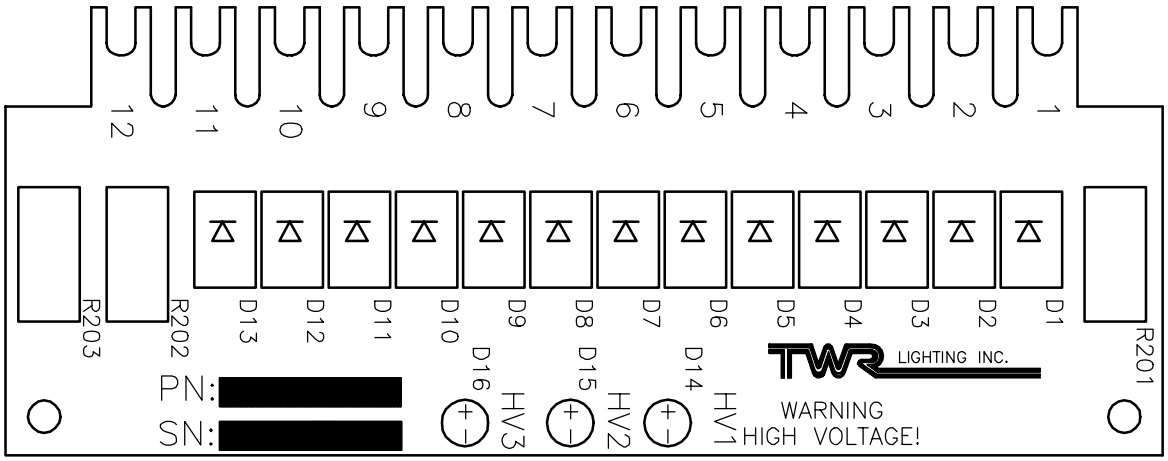
DIPSW

DATE:	LTR.	REVISION
01/29/01	A	MODIFIED PCB

E-2/3DB CONTROL PCB

o2wireless Solutions
TWR lighting division

APP'D	
CHK'D BY	
ENGINEER	
DRAWN BY	E.A.SALAZAR
SHEET SIZE	B
SHEET QTY.	1 OF 1
DATE	10/08/98
SCALE	FULL
DRAWING NO.	H01-279

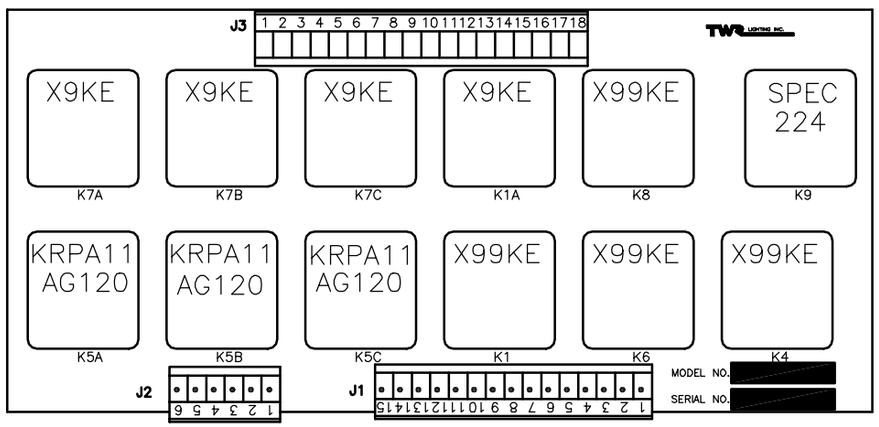


D-2/3LV/E-2/3LV HV RECTIFIER PCB2
L-865 MEDIUM INTENSITY STROBE

o2wireless Solutions
TWR lighting division

APP'D	
CHK'D BY	
ENGINEER	
DRAWN BY	E.A.SALAZAR
SHEET SIZE	B
SHEET QTY.	1 OF 1
DATE	6/15/95
SCALE	FULL
DRAWING NO.	H02-258

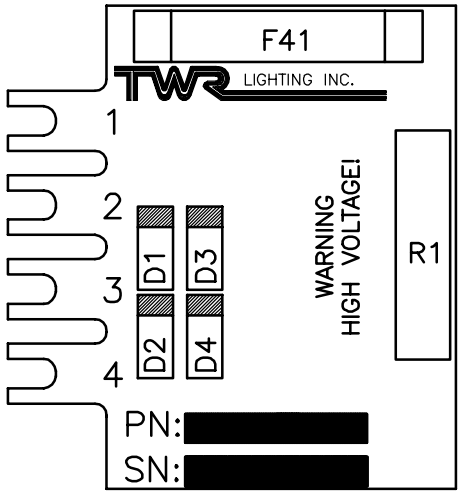
DATE:	LTR.		REVISION
07/24/97	A	E.A.S.	UPDATED PCB



E2/3DB RELAY PCB3

o2wireless Solutions
TWR lighting division

APP'D	
CHK'D BY	
ENGINEER	
DRAWN BY: E.A.SALAZAR	SHEET SIZE: B; SHEET QTY.: 1 OF 1
DATE: 10/06/98	SCALE: N.T.S.
	DRAWING NO.: H03-279



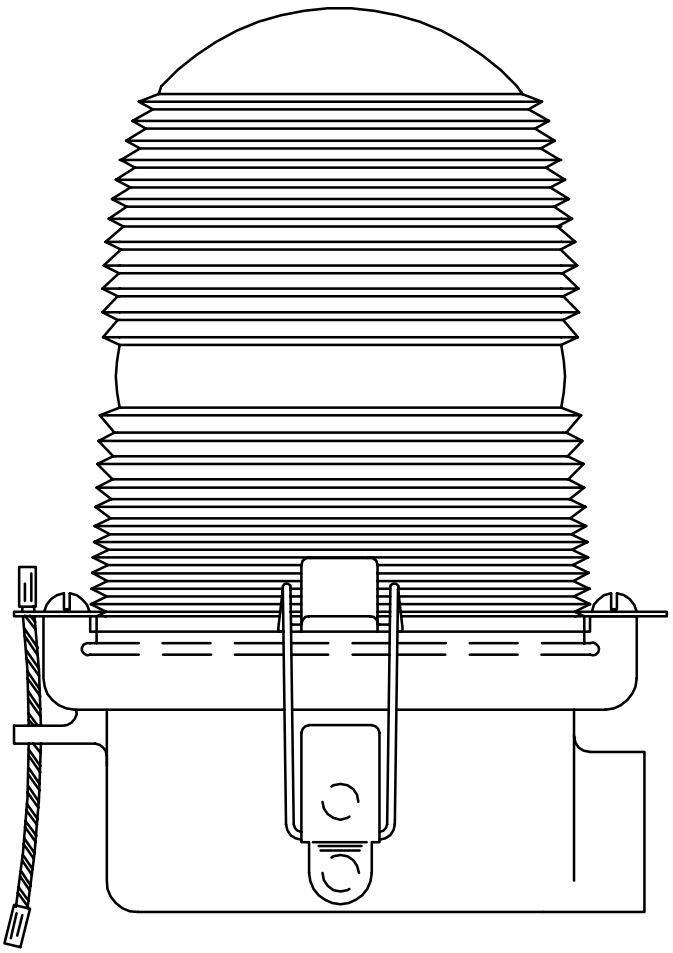
E-1DB/E-2/3DB TRIGGER VOLTAGE
RECTIFIER PCB (PCB4)

o2wireless Solutions
TWR lighting division

APP'D	
CHK'D BY	
ENGINEER	
DRAWN BY: E.A.SALAZAR	SHEET SIZE: B / SHEET QTY.: 1 OF 1
DATE: 06/13/97 / SCALE: FULL	DRAWING NO.: H04-269

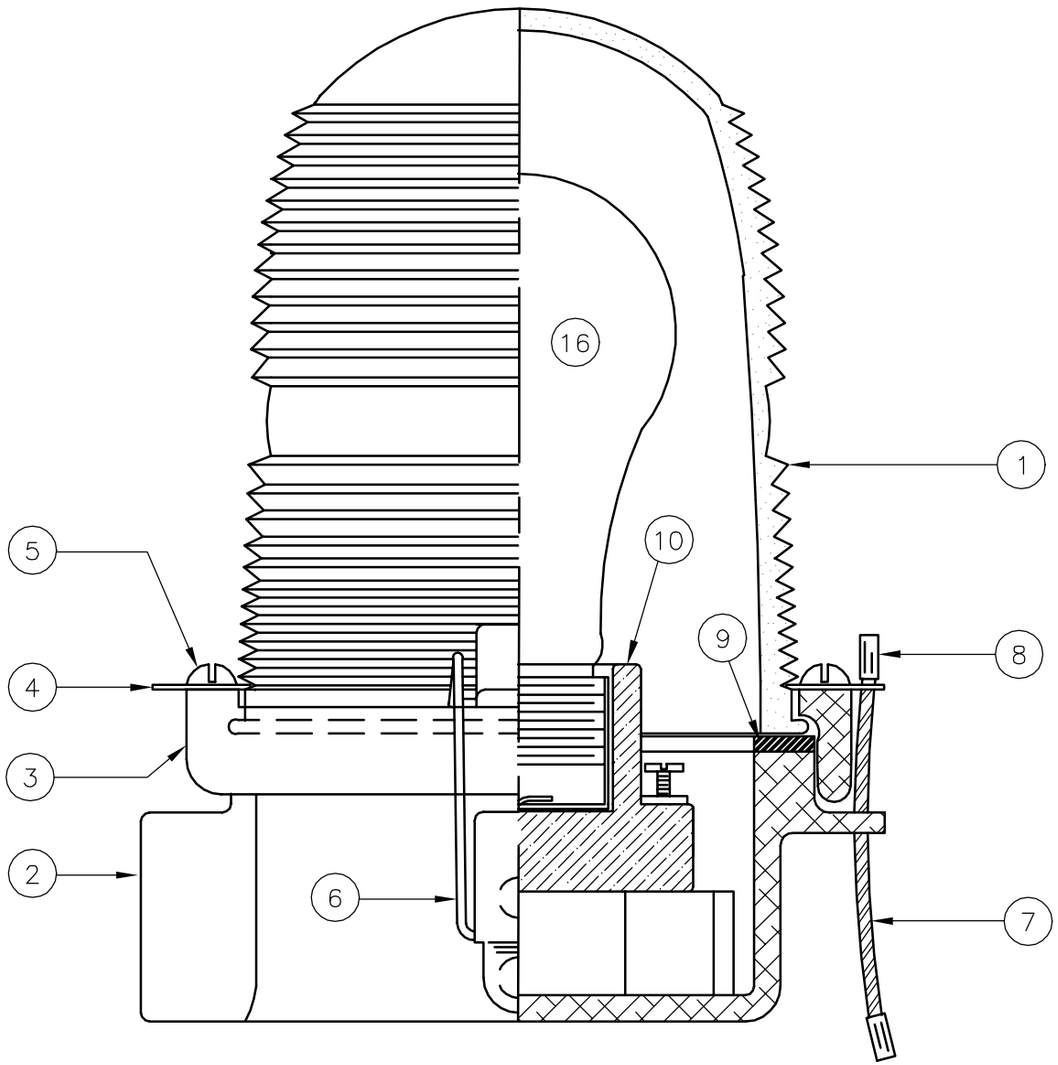
o2wireless Solutions
TWR lighting division
1603 ELMVIEW DRIVE
HOUSTON,TEXAS 77080-7223
FAX: (713) 973-6652
PHN: (713) 973-6905

FAA SPEC. L-810 RED TYPE OL-1 SINGLE OBSTRUCTION LIGHT



- 7" HIGH
- 4-1/2" DIAMETER
- WEIGHT 4 LBS.
- 3/4" HORIZONTAL CONDUIT ENTRANCE ON SIDE. BOTTOM HUB ALSO AVAILABLE.
- USE ONE LAMP 116 A21/TS 120/230 VOLT 8000 HOUR LIFE.
- LAMP HOLDER IS PORCELAIN WITH BRASS SCREW SHELL.

[100031]



	ITEM NO	QTY.	TWR PART NUMBER	DESCRIPTION
	1	1	AP35222	RED SIDELIGHT GLASS
	2	1	105R	OL-1 BOTTOM HUB
	3	1	106C	LENS HOLDER RING
	4	2	12V245	OL LENS CLIP
	5	2	832X14PH	8-32 X 1/4" PH S.S. SLOT
	6	2	HC255SS	SIDELIGHT LATCHES
	7	1	7X7SS	1/16 7 X 7 S.S. WIRE
	8	2	A1A	STAKON CRIMP
	9	1	OLG	OL GASKET
	10	1	19062	SIDELIGHT RECEPTACLE
*	11	4	18PRSS	1/8 POP RIVETS
*	12	1	A314	3/4" CONDUIT LOCKNUT
*	13	2	104G	WHITE TEFLON WASHER
*	14	2	832X34PH	8-32 X 3/4" S.S. RH SLOT
*	15	1	100327	OL-1 SERIAL NUMBER LABEL
~	16	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.

OL1

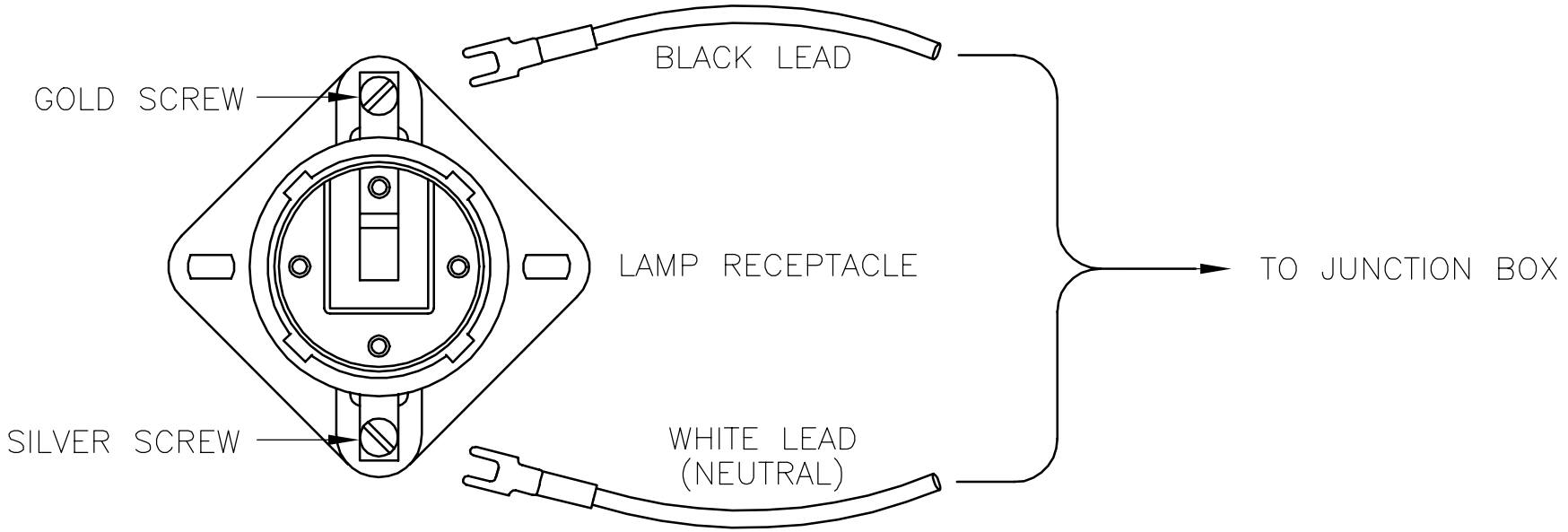
3/4" OL-1 SIDE HUB ASSEMBLY DETAIL (PART #OL1)

o2wireless Solutions
TWR lighting division

APP'D
CHK'D BY
ENGINEER

DRAWN BY E.A.SALAZAR
SHEET SIZE B
SHEET QTY. 1 OF 1
DATE 1/7/92
SCALE FULL
DRAWING NO. 279-OL

DATE:	LTR.	REVISION
06/23/97	A	UPDATED B.O.M.

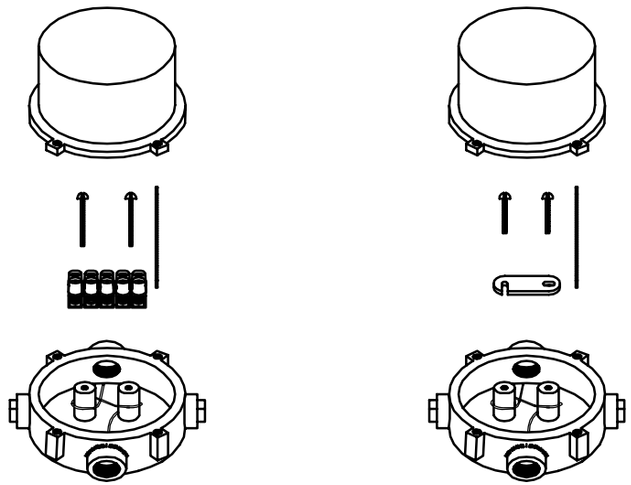


SIDELIGHT RECEPTACLE WIRING

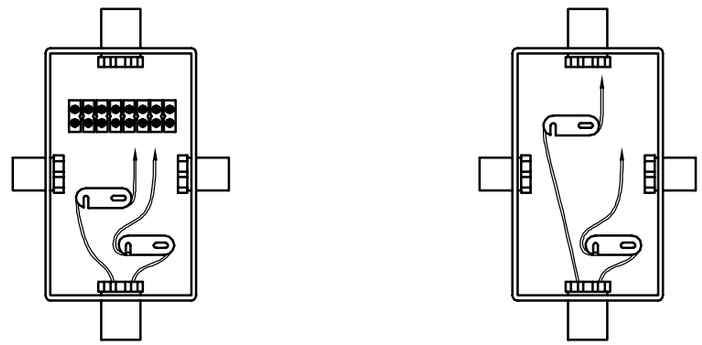
o2wireless Solutions
TWR lighting division

APP'D	
CHK'D BY	
ENGINEER	
DRAWN BY	G.D.SEBEK
SHEET SIZE	B
SHEET QTY.	1 OF 1
DATE	6/8/91
SCALE	1"=1"
DRAWING NO.	274 S

DATE:	LTR.		REVISION
7/2/98	A	G.D.S.	CHANGED LABEL



JB–5 AND JB–0
3/4" JUNCTION BOX



JB–8 AND JB–8SR
1" JUNCTION BOX

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

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.

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

JUNCTION AND STRAIN RELIEF BOXES

o2wireless Solutions
TWR lighting division

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