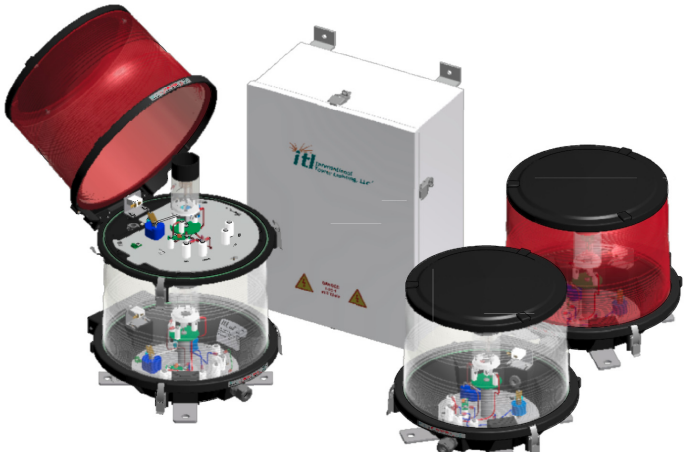
Installation Instruction Manual

ILS-1400
ILS-2400
ILS-3400
ILS-3800

ILS Strobe
Lighting Systems



PULSAR
(XENON Series)

Toll Free: +1 (866) 624-8309 ● www.itl-llc.com

itl International Tower Lighting, LLC™

Front Matter

Copyright & Trademarks

Limited Warranty and Disclaimer

ITL, LLC guarantees that every ILS-1400/2400/3400/3800 series strobe lighting system is free from physical defects of design, materials and workmanship under normal use for one (1) year from the date of installation or two (2) years from the date of shipment. If the product proves defective during this warranty period it will be corrected by repair or replacement f.o.b. factory. Please contact ITL, LLC in order to obtain a Return Authorization Number, RMA.

In no event shall ITL, LLC's liability exceed the price paid for the product from direct, indirect, special, incidental, or consequential damages resulting from the use of the product, its accompanying software, or its documentation. ITL, LLC makes no warranty or representation, expressed, implied, or statutory, with respect to its products or the contents or use of this documentation and all accompanying software, and specifically disclaims its quality, performance, merchantability, or fitness for any particular purpose unless otherwise stated.

The technical documentation is being delivered to you AS-IS. ITL, LLC makes no warranty as to its accuracy or use. Any use of the technical documentation or the information contained therein is at the risk of the user. Documentation may include technical or other inaccuracies or typographical errors. ITL, LLC reserves the right to revise or update its products, software, or documentation without obligation to notify any individual or entity.

Please send any comments regarding the manual to support_doc@itl-llc.com.

Safety Warning

This equipment uses lethal voltages which can cause serious injury and/or death. Do not attempt to service this equipment with line power applied.

The strobe lamp used in this equipment produces brilliant flashes of light, which contain ultraviolet radiation. Temporary or permanent eye damage may result if looking directly at the strobe lamp while it is operating.

Do not rely on interlock switches or the bleeder circuit to remove lethal voltages from the system. Always discharge all capacitors individually before servicing. Measure for voltages using a voltmeter to ensure that power is off and has been completely removed.

Do not wear any jewelry. Gold and silver are excellent conductors of electricity.

Battery Warning and Disposal

There is danger of explosion if the included sealed lead-acid battery is replaced incorrectly. Only replace the battery with the same or equivalent type recommended by the battery manufacturer. Dispose of used batteries according to the battery manufacturer's instructions.

Do not incinerate, disassemble, or puncture the battery.

For questions or details please contact The Battery *Council International at (312) 664-6610*, or your local waste agency.

Table of Contents

The fastest way to find a specific topic is to use the detailed index in the back of the manual.

List of Illustrations and Tables

Introduction

Congratulations, and thank you for choosing an ITL PULSAR XENON Series lighting system.

We trust that ITL's reputation for technical excellence, experience in product development, commitment to our customers and testing will ensure your complete satisfaction.

You have chosen one of the most technologically innovative strobe lighting systems available on the market today. This product is the result of many years of engineering with extensive input from field service personnel.

This manual covers the

- ILS-1400 FAA type L-864 red strobe lighting system with side lights FAA Type L-810
- ILS-2400 FAA type L-865 white strobe lighting system
- ILS-3400 FAA type L-864/5 dual strobe lighting system with side lights FAA type L-810
- ILS-3800 FAA type L-864(L)/L-865 white strobe / red LED system with side lights FAA type L-810 or L-810(L), see Appendix A

Please take the time to read and familiarize yourself with this manual. It contains the information necessary to install, test and troubleshoot the ILS strobe lighting systems.

Product Description

The ILS-1400 FAA type L-864, ILS-2400 FAA type L-865 and ILS-3400 FAA type L-864/L-865) are medium intensity strobe lighting systems as defined by the FAA's advisory circular, AC150-5345-43F. Both lighting systems meet or exceed the specifications as defined in the advisory circular. For more information on those specifications please refer directly to the FAA website www.faa.gov/airports_airtraffic/airports.

Each system consists of a power conversion unit, the IPS-3400, a strobe cable, and a single red (IFH-1400) or white (IFH-2400) or dual white/red (IFH-3400) flash head.

The ILS-1400 is a red only system which produces a low intensity red "burst" of rapid flashes every 3 seconds (20 FPM) in Night Mode. See major component block diagram below.

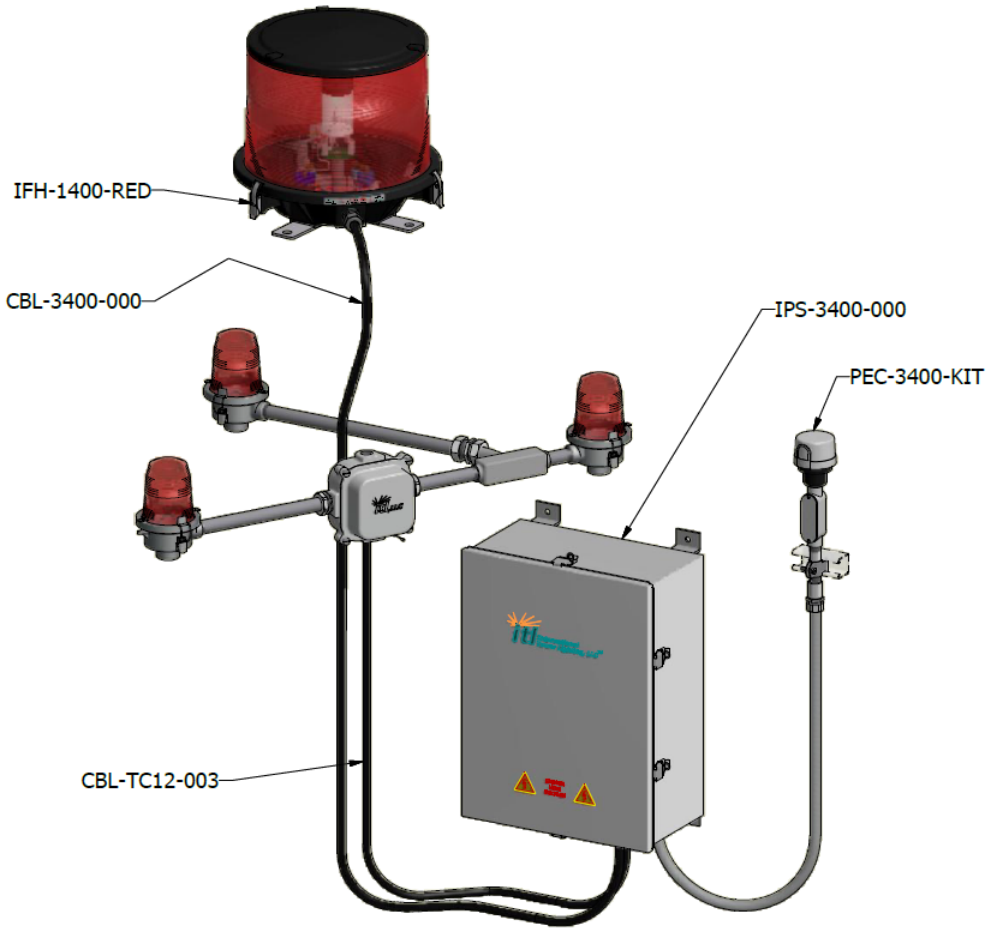


Figure 1: ILS-1400 Red Strobe System

The ILS-2400 is a white only system which produces 1 medium intensity white flash every 1.5 seconds equating to 40 flashes per minute (FPM) in Day Mode and a low intensity white “burst” of rapid flashes every 1.5 seconds (40 FPM) in Night Mode. See major component block diagram below.

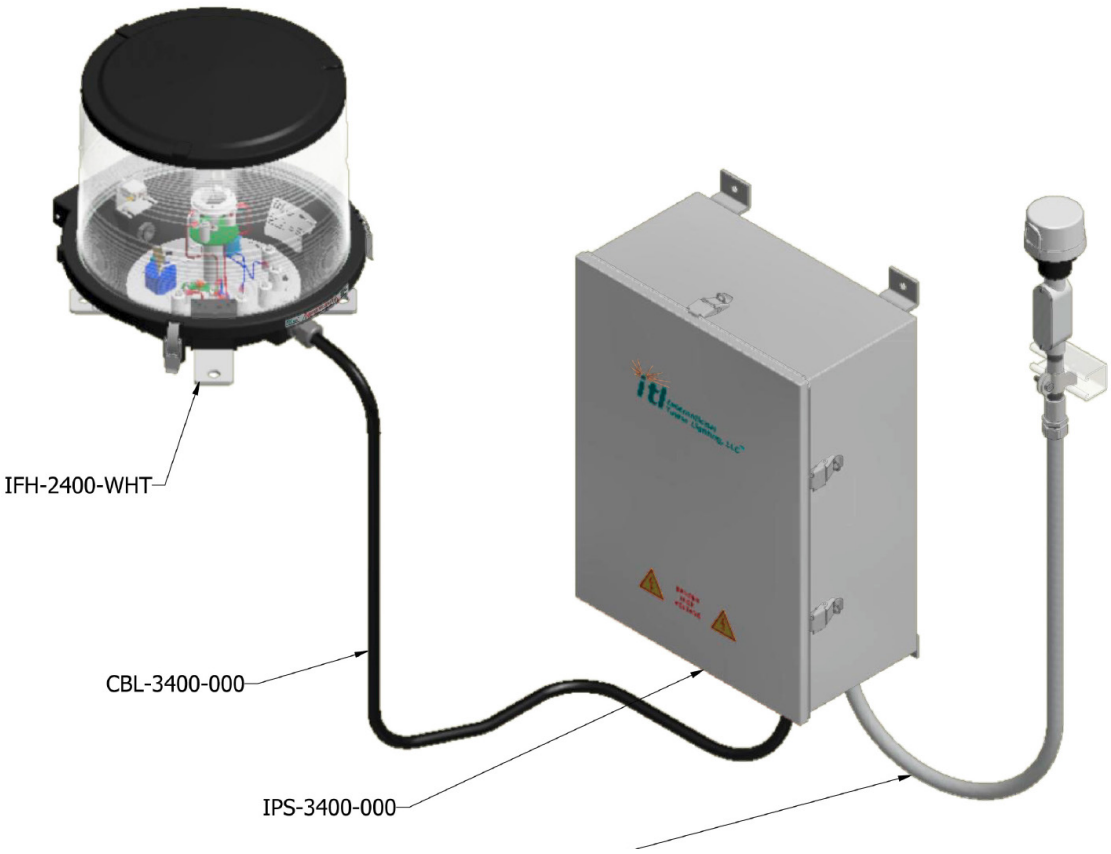


Figure 2: ILS-2400 White Strobe System

By contrast, the ILS-3400 is a dual white/red system which produces 1 medium intensity white flash every 1.5 seconds (40 FPM) in Day Mode to the lower of the two tubes and a low intensity red “burst” of rapid flashes every 3 seconds (20 FPM) in Night Mode to the upper of the two tubes. See major component block diagram below.

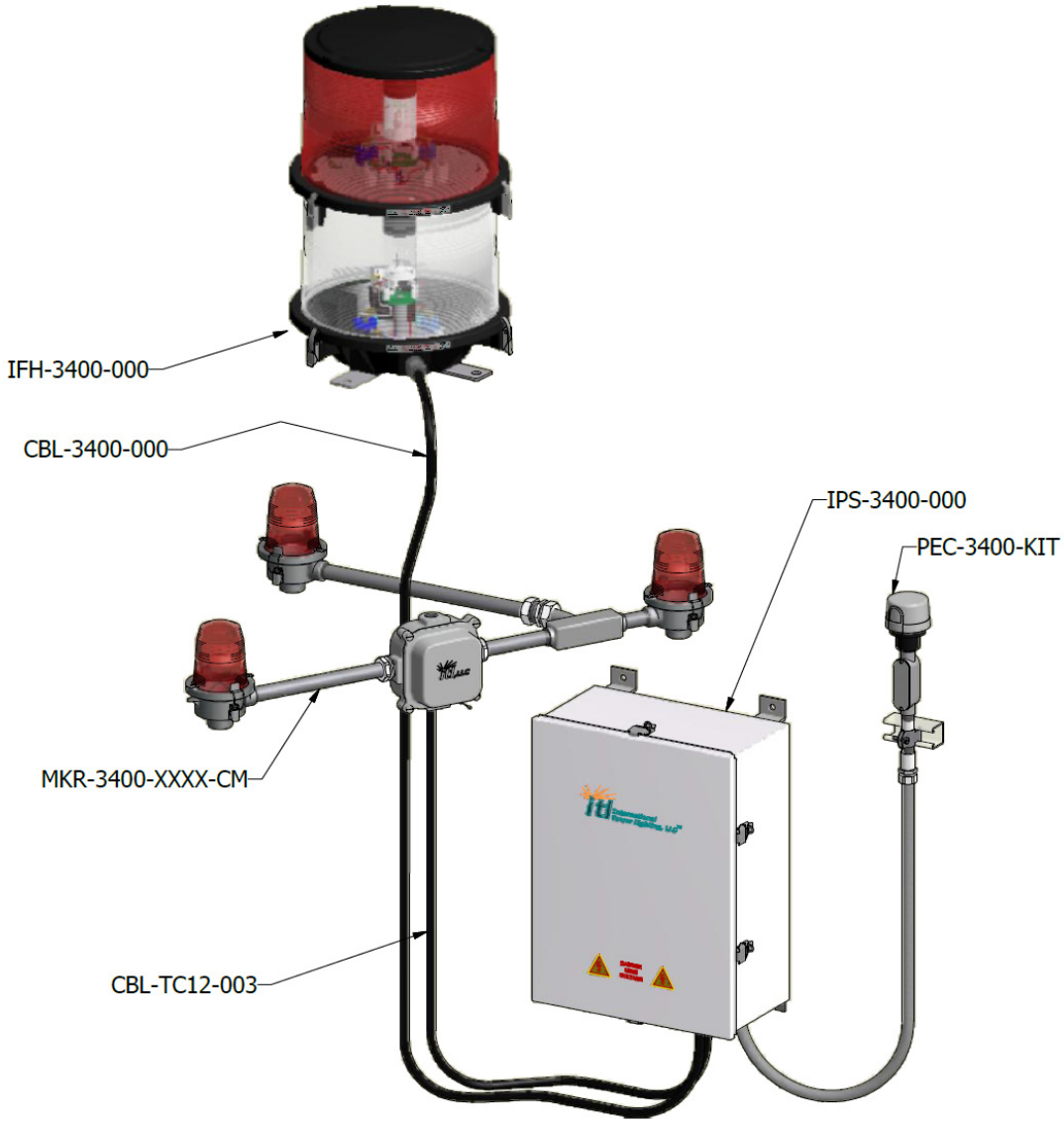


Figure 3: ILS-3400 Dual Strobe System

The intensity for all lighting systems is 20,000cd for a day flash and 2,000cd for a burst of night flashes.

Power Conversion, IPS-3400

Both systems utilize the same power conversion unit, the IPS-3400 power supply. This power supply stores high voltage energy in capacitors which are discharged into the flash head's Xenon gas discharge tube(s) (flash tube) in order to produce short brilliant flashes. The power supply contains a step-up transformer and voltage rectifier board (ITL-3410-0HV) which converts the incoming 115/230VAC and stores it in the unit's capacitors. In particular the unit has a bank of capacitors which are used to store the energy for a day flash and a single capacitor which stores the energy used for the night burst.

A microprocessor controlled circuit board, the ITL-3400, is the brain of the power supply. It times the exact triggering of the flash tube(s), controls the intensity of the flashes and handles any alarming in case of component failure. This circuit board takes input from an electric photocell (PEC) in order to switch the unit from Day to Night flashing based on the ambient light. Subsequently the circuit board controls off-board relays in order to change the intensity (energy) applied to the flash tube(s). For daytime operation the circuit board will generate a trigger to the day flash tube every 1.5s. For nighttime operation the circuit board will generate a trigger to the flash tube every 1.5s for white night operation or every 3s for red night operation.

After each flash the ITL-3400 then examines the intensity of the flash and either confirms the successful flashing or generates an alarm otherwise.

Several smaller circuit boards are connected to the ITL-3400 main board. The ITL-3420-SEN senses the strobe and sidelight energy while the ITL-3401-RLY contains several dry-contact Form-C alarm relays. For further details about any of these boards please refer to sections below or consult the table of contents or index.

The main board also conveniently connects to one of several ITL communication boards. These boards however are separate products and are not part of any standard IPS-3400 configuration. In particular, the ITL-3430-PCS provides CDMA or GPRS wireless communication, the ITL-3431-SAT communicates via satellite, while the ITL-3432-POT provides a traditional dial-up connection.

Flash head, IFH-1400/2400/3400

There are three omni-directional flash head configurations available to connect to the IPS-3400. The IFH-1400 (L-864) is a single acrylic red lens flash head with one flash tube. Its configuration provides for red-only operation. The IFH-2400 (L-865) is a single acrylic clear lens flash head with one flash tube. Its configuration provides for white-only operation, i.e. white strobe at daytime and white strobe at nighttime.

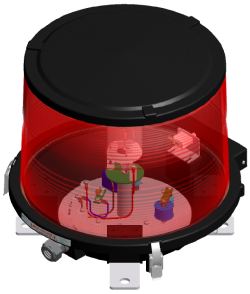


Figure 4: IFH-1400-RED Red Flash Head

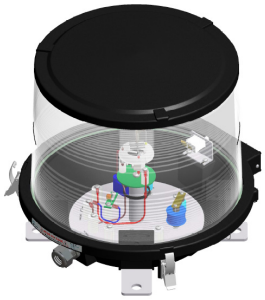


Figure 5: IFH-2400 White Flash Head

The IFH-3400 by contrast contains two acrylic lenses and two flash tubes and in essence stacks two flash heads on top of each other. The upper red lens is used for nighttime red strobe operation while the lower clear lens is used for daytime white strobe operation, and white backup operating, in case of red failure.

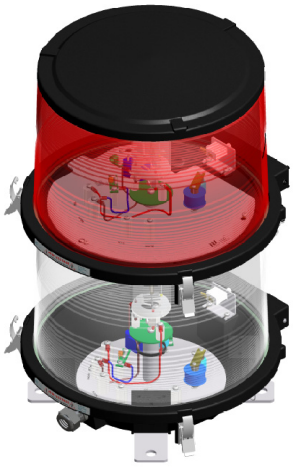


Figure 6: IFH-3400-000 Dual Red/White Flash Head

Besides the flash tube, each flash head contains terminals to connect the flash head cable from the power supply, a coupling transformer, a trigger transformer, a R/C network, and an interlock switch. The transformers shape the amplitude of the trigger pulse applied to the flash tube. The interlock switch is provided for safety and disconnects the high voltage from the flash tube and also stops triggering the tube.

The flash tubes are three terminal Xenon-filled glass discharge tubes. High voltage is applied across two of the terminals of the flash tube, the positive electrode or anode and the negative electrode or cathode. A third terminal, the trigger, is used to temporarily energize the tube and produce a short brilliant white flash.

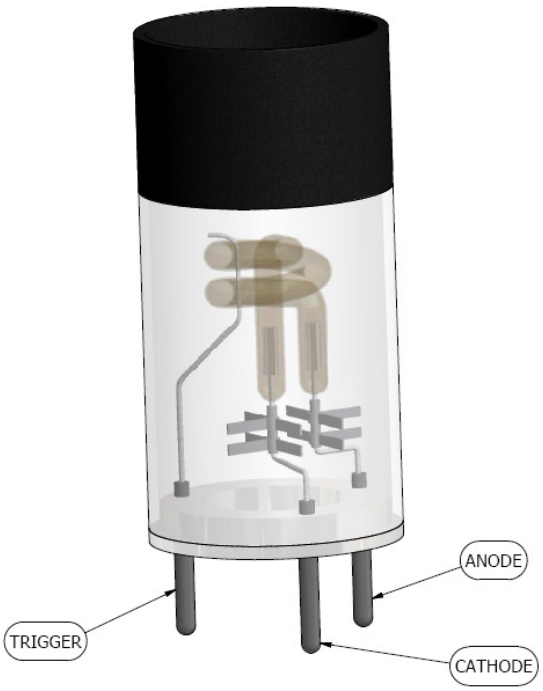


Figure 7: FH0-3400-000 Flash Tube Detail

Specifications

Complies with AC150/5345-43G

Environment

Temperature	-40°C to +55°C
Humidity	less than 95% relative humidity (non-condensing)

Light Output

Day Intensity	20,000 +/-25% effective candelas
Night Intensity	2,000 +/-25% effective candelas
Beam Pattern	360º horizontal, ≥3º vertical
Day Flash Rate	40 FPM
White Night Flash Rate	40 FPM
Red Night Flash Rate	20 FPM
Side Lights	0 to 4 L-810 type incandescent. Or L-810(L) LED (steady burning or flashing)

Mechanical

IFH-1400/2400

Dimension	Height:	15”	(38.1cm)
	Diameter:	16.5”	(42cm)
Weight	13 lbs (6Kg) max		

IFH-1700 (LED) (ILS-3800 only)

Dimension	Height:	11”	(27.7cm)
	Diameter:	16.5”	(42cm)
Weight	28 lbs (13Kg) max		

IFH-3400 Flash Head

Dimension	Height:	25”	(63.5cm)
	Diameter:	16.5”	(42cm)
Weight	24 lbs (11Kg) max		

IPS-3400/3800 Power Supply

Dimension	Height:	23.63”	(60.02cm)
	Width:	16.57”	(42cm)
	Depth:	9.76”	(24.8cm)
Weight	65 lbs	(30Kg) max	

Electrical

IPS-3400

Input Power	120/240VAC at 60Hz
Power Consumption	Day: 180W
	Red Night: 140W
	White Night: 65W

IPS-3800 (ILS-3800 only)

Input Power	120/240VAC at 60Hz
Power Consumption	Day: 180W
	Red Night: 48W
	White Night: 65W

Installation

The following section describes how to install the strobe lighting system. Based on the type of system you are going to install please refer to the appropriate wiring diagram in section *ILS-1400 / ILS-2400 / ILS-3400/ ILS-3800 Installation Wiring Diagram.*

Unpacking your Strobe Lighting System

Please examine the shipping containers and their content thoroughly upon receipt and report any potential shipping damage to the carrier.

Tools for Installation

The following tools are suggested for mounting of the ITL power supply and flash head.

- Digital multi-meter capable of reading 600VAC/DC (Fluke 177 or 179)
- Nut Drivers and Sockets
- #2 Phillips Screwdriver
- 5/16 Flat Head screwdriver
- Crimp Tool
- Needle Nose Pliers

Quick Installation Guide

The quick start guide shows how to install the ILS strobe lighting systems. The guide provides only basic instructions for more details, refer to this document.

- Remove packaging material from inside power supply and flash head
- Mount the power supply cabinet.
- Ground the power supply cabinet to the site grounding system using an AWG6 copper conductor.
- Using the mounting holes provided in the bottom of the cabinet ground the power supply cabinet to the site grounding system using an AWG 6 copper conductor and a two-hole (5/8” centers) compression lug.
- Mount the flash head using the hardware supplied.
- Install sidelights (ILS-1400, ILS-3400 & ILS-3800 only)
- Connect strobe cable to both, power supply and flash head
- Connect PEC
- Install strobe tube(s) into flash head
- Attach primary power cable
- Apply power to unit (pull interlock switch)
- Observe red alarm LEDs off
- Observe yellow confirm LED blinks every 1.5s in day mode and every 1.5s in night mode for the ILS-2400 or every 3s in night mode for the ILS-3400 system

- Cover PEC and observe Day to Night switching
- Toggle manual mode switch from Day to Night and observe that unit's operation follows switch (PEC Alarm LED will be lit when switch is not in auto mode)
- Move manual toggle switch back to 'Auto' position
- Generate strobe and sidelight failure and observe subsequent alarming
- All fixtures, enclosures and junction boxes must be mounted in the upright position.

Flash Head

Flash heads need to be mounted such that all four mounting feet are in direct contact with an unpainted surface in order to allow for proper grounding of the electrical components. It also needs to be mounted such that it will not obstruct access to the internal components for the purpose of installing and maintaining the equipment. The following diagrams detail the mounting dimensions and clearance for proper access.

Leveling

Flash heads need to be leveled properly for correct vertical beam spread. The following diagrams detail how to use a compact "torpedo" level on two axes to ensure that the flash head is mounted level. If the flash head mounting surface is not level already use shims to correct. Do not compromise grounding of the four flash head mounting feet.

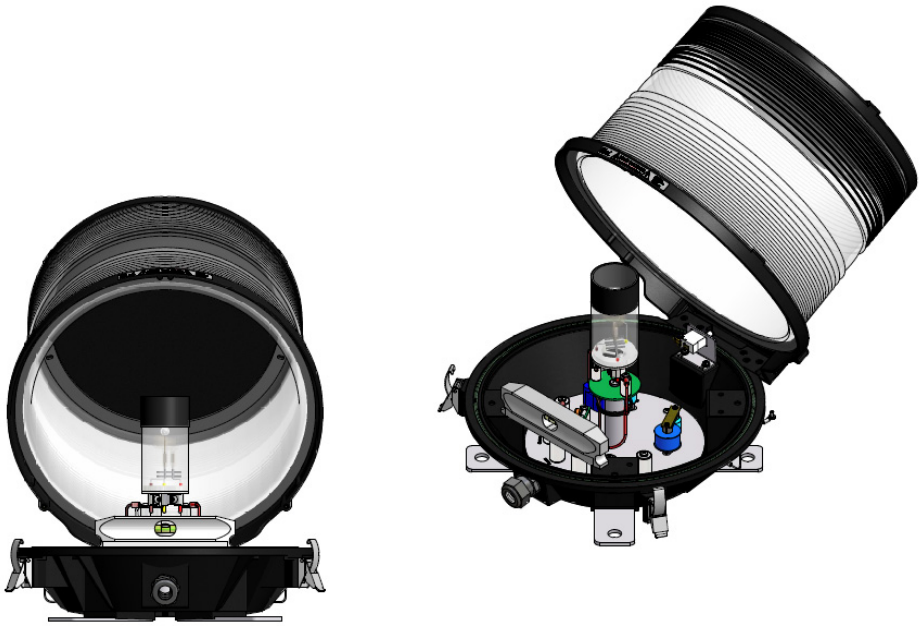


Figure 8: Flash Head Leveling - Axis 1

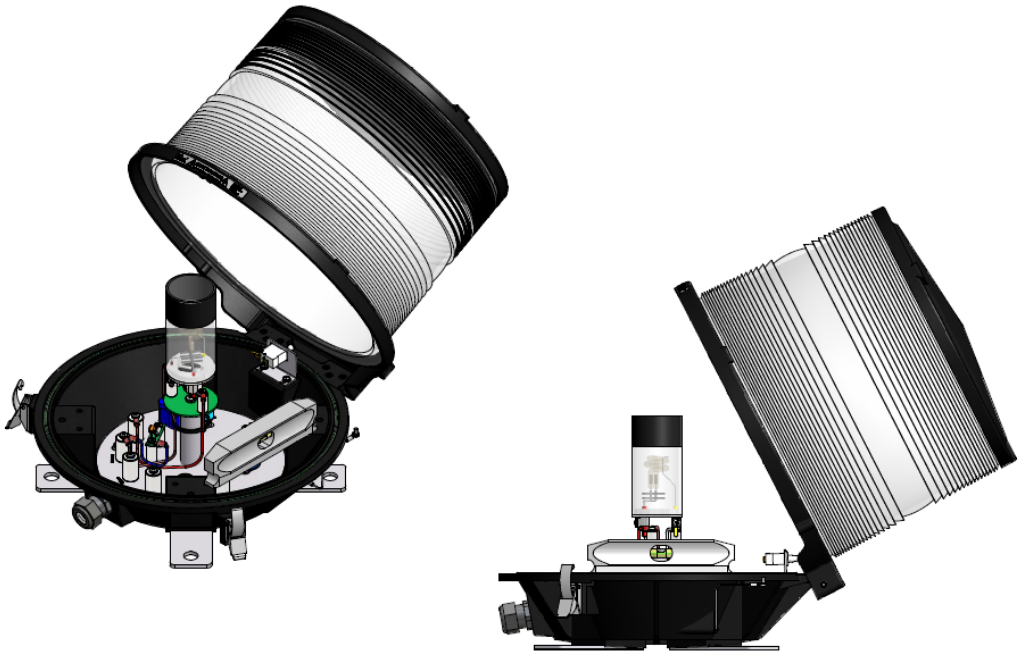


Figure 9: Flash Head Leveling - Axis 2

IFH-1400/2400 Flash Head Mounting

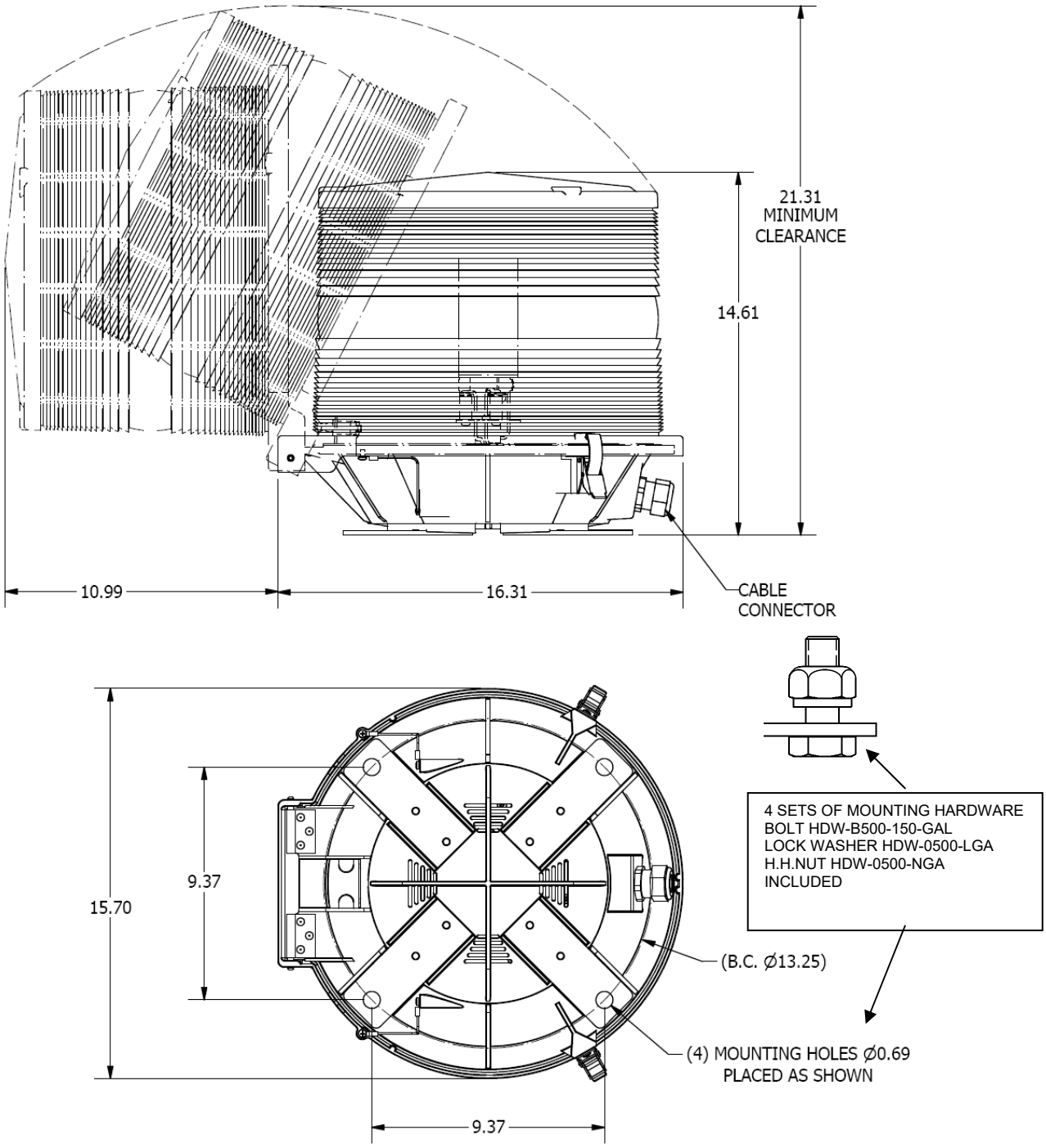


Figure 10: IFH-1400 / IFH-2400 Flash Head Dimensions and Mounting Detail

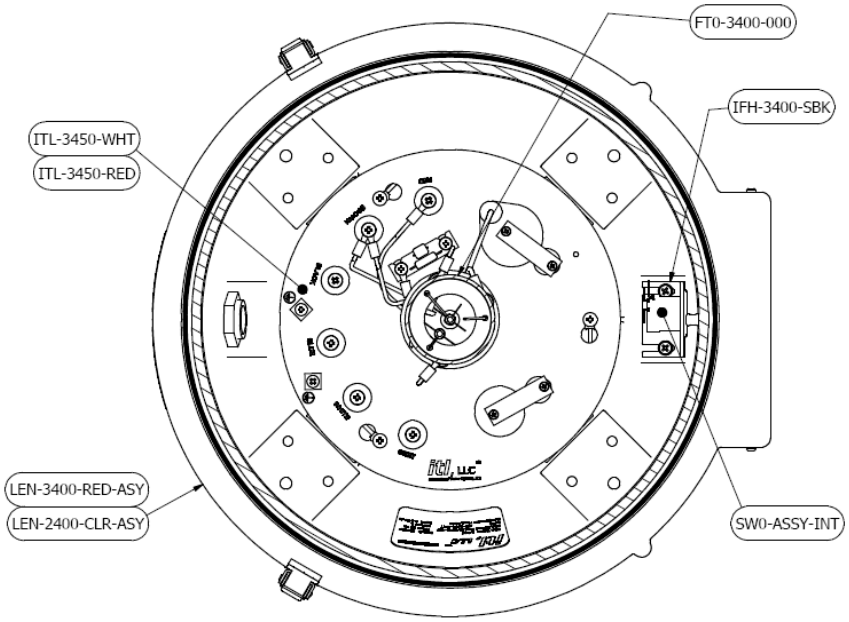


Figure 11: IFH-1400 / IFH-2400 Flash Head Component Layout, Top View

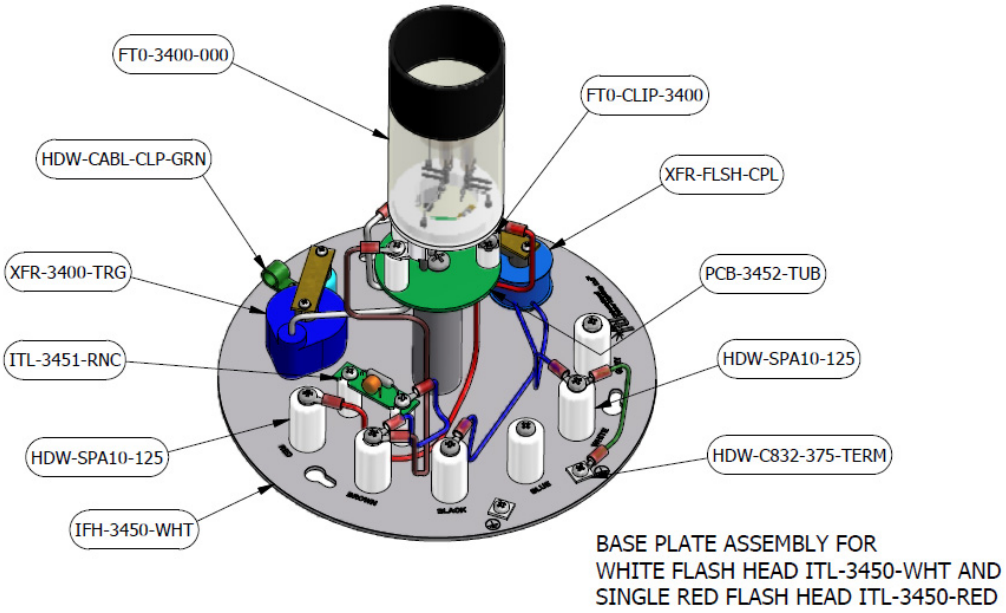


Figure 12: IFH-1400 / IFH-2400 Flash Head Component Layout, Isometric View

QTY	PART NUMBER	DESCRIPTION
1	FT0-3400-000	FLASHTUBE
3	FT0-CLIP-3400	FLASHTUBE MOUNTING CLIP
6	HDW-SPA10-125	SPACER , CERAMIC, 10-32 x 1.25
5	HDW-SPA8-100	SPACER , CERAMIC, 8-32 X 1
1	ITL-3450-WHT	BASEPLATE ASSEMBLY WHITE FOR IFH-2400/IFH-3400
1	ITL-3450-RED	BASEPLATE ASSEMBLY RED FOR IFH-1400
1	ITL-3451-RNC	RC BOARD ASSEMBLY FOR IFH-3400
1	LEN-2400-CLR-ASY	CLEAR LENS ASSEMBLY WITH MOUNTING RING AND COVER FOR IFH-2400
1	LEN-3400-RED-ASY	RED LENS ASSEMBLY WITH MOUNTING RING AND COVER FOR IFH-1400
1	SW0-ASSY-INT	INTERLOCK SWITCH
1	XFR-FLSH-CPL	COUPLING TRANSFORMER
1	XFR-3400-TRG	TRIGGER TRANSFORMER

Figure 13: IFH-1400 / IFH-2400 Flash Head Parts List Table

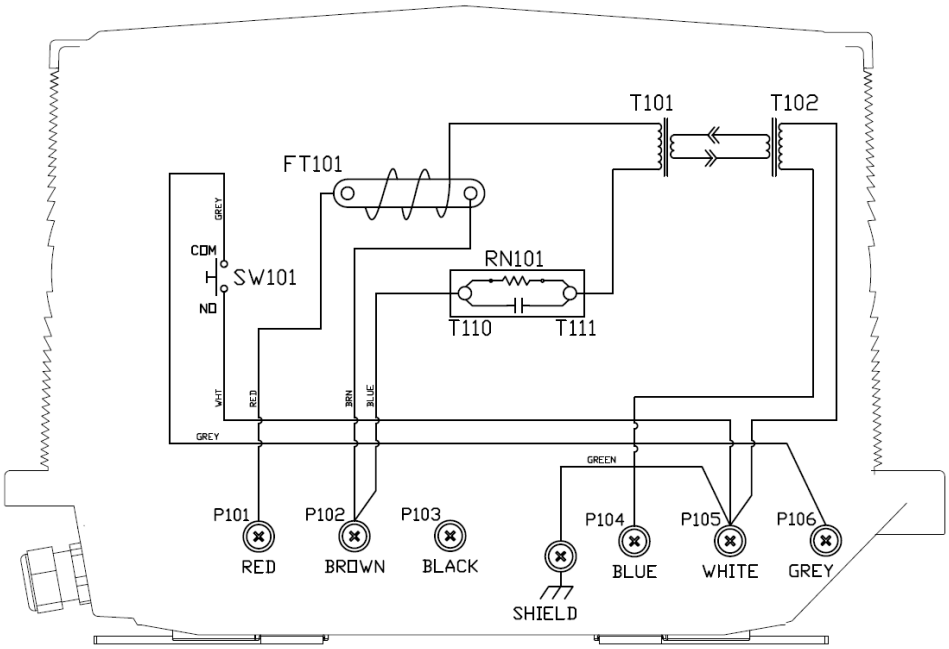


Figure 14: IFH-1400 Red Flash Head Wiring Diagram

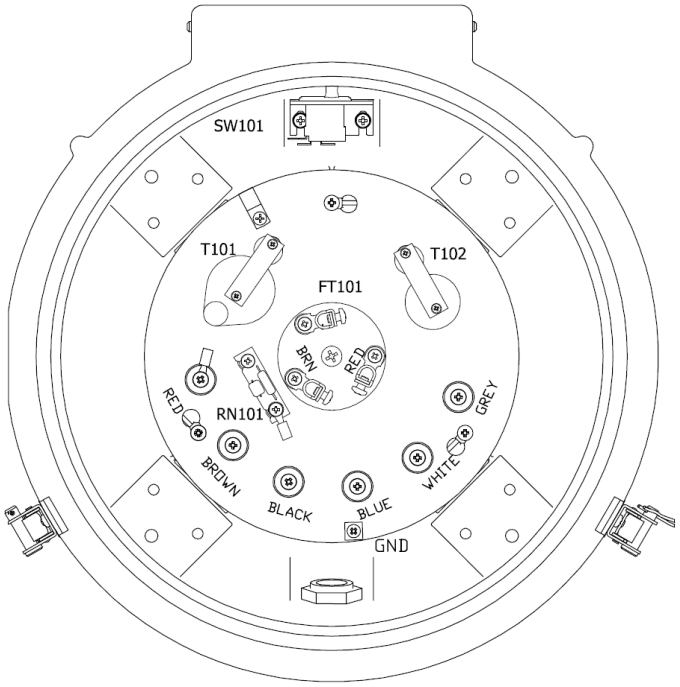


Figure 15: Red Flash Head Component Locator Diagram

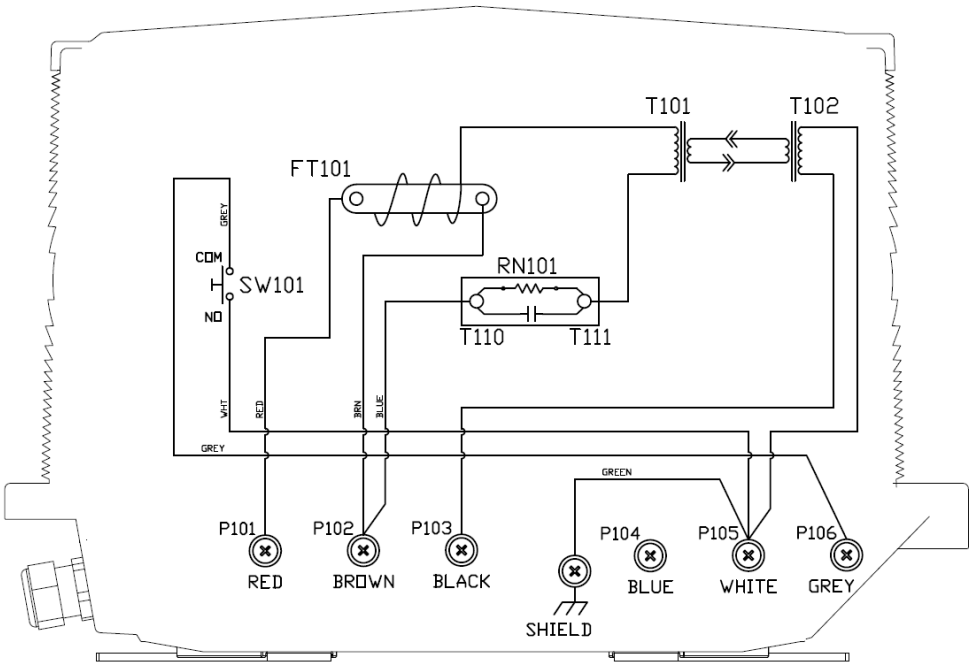


Figure 16: IFH-2400 White Flash Head Wiring Diagram

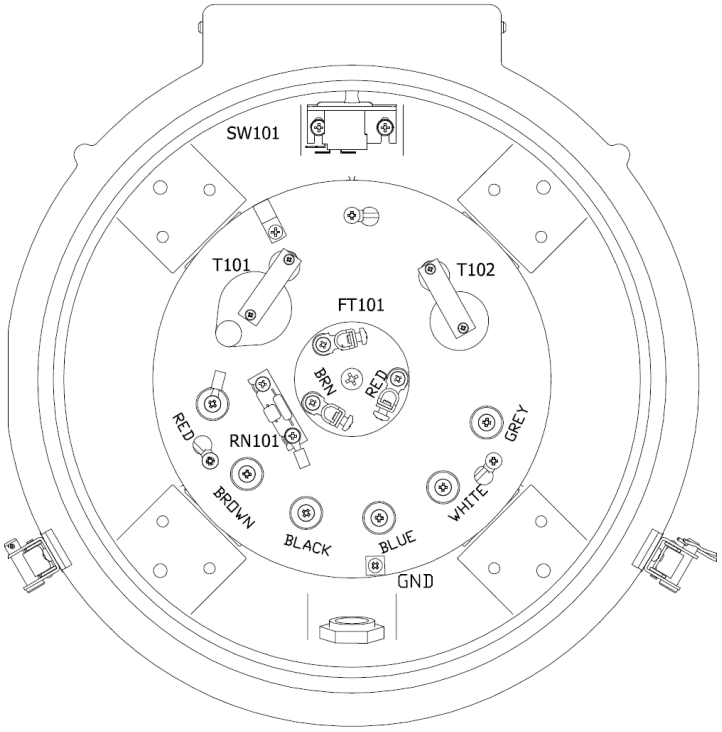


Figure 17: White Flash Head Component Locator Diagram

IFH-3400 Flash Head Mounting

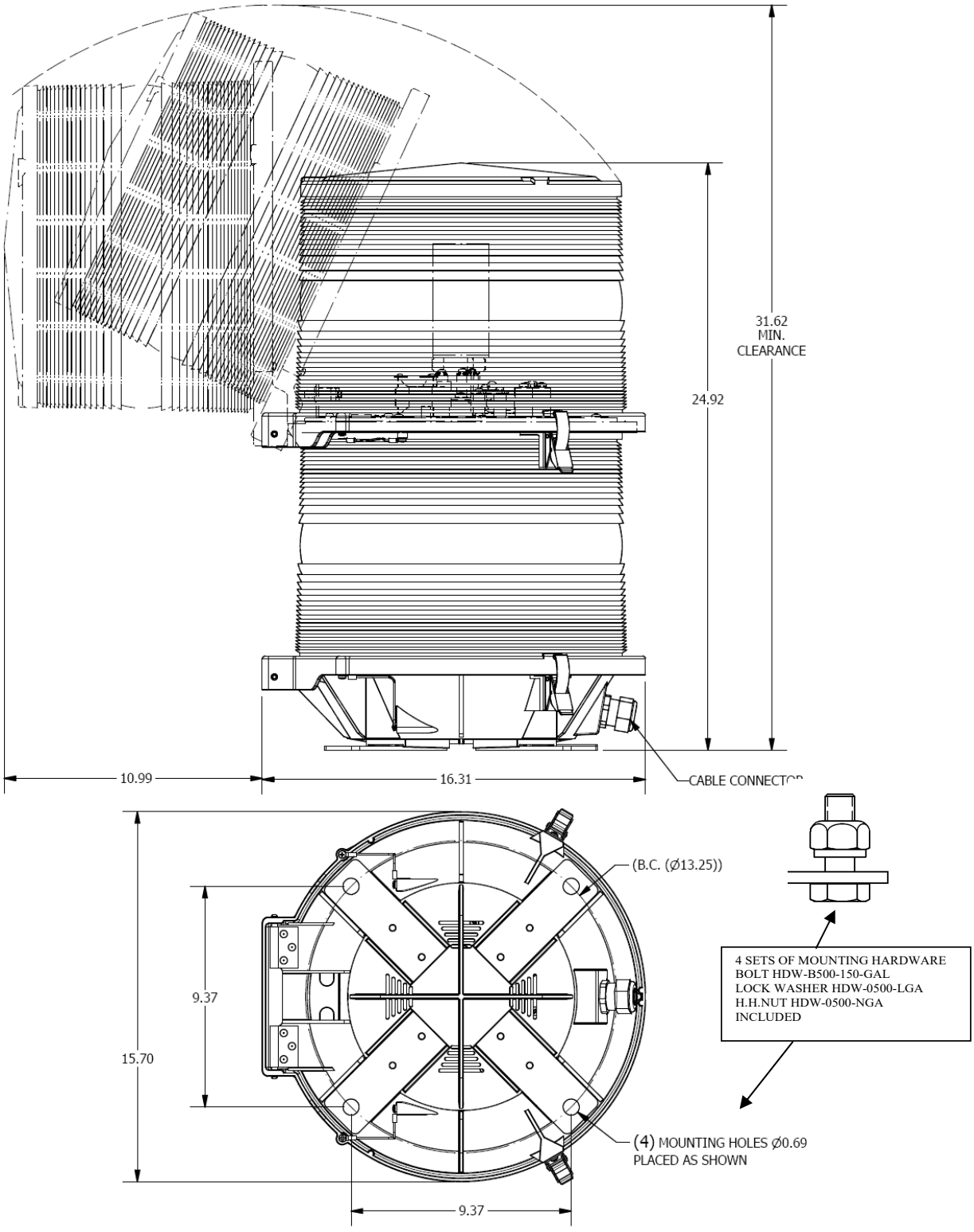


Figure 18: IFH-3400 Dual Flash Head Dimensions and Mounting Detail - 1

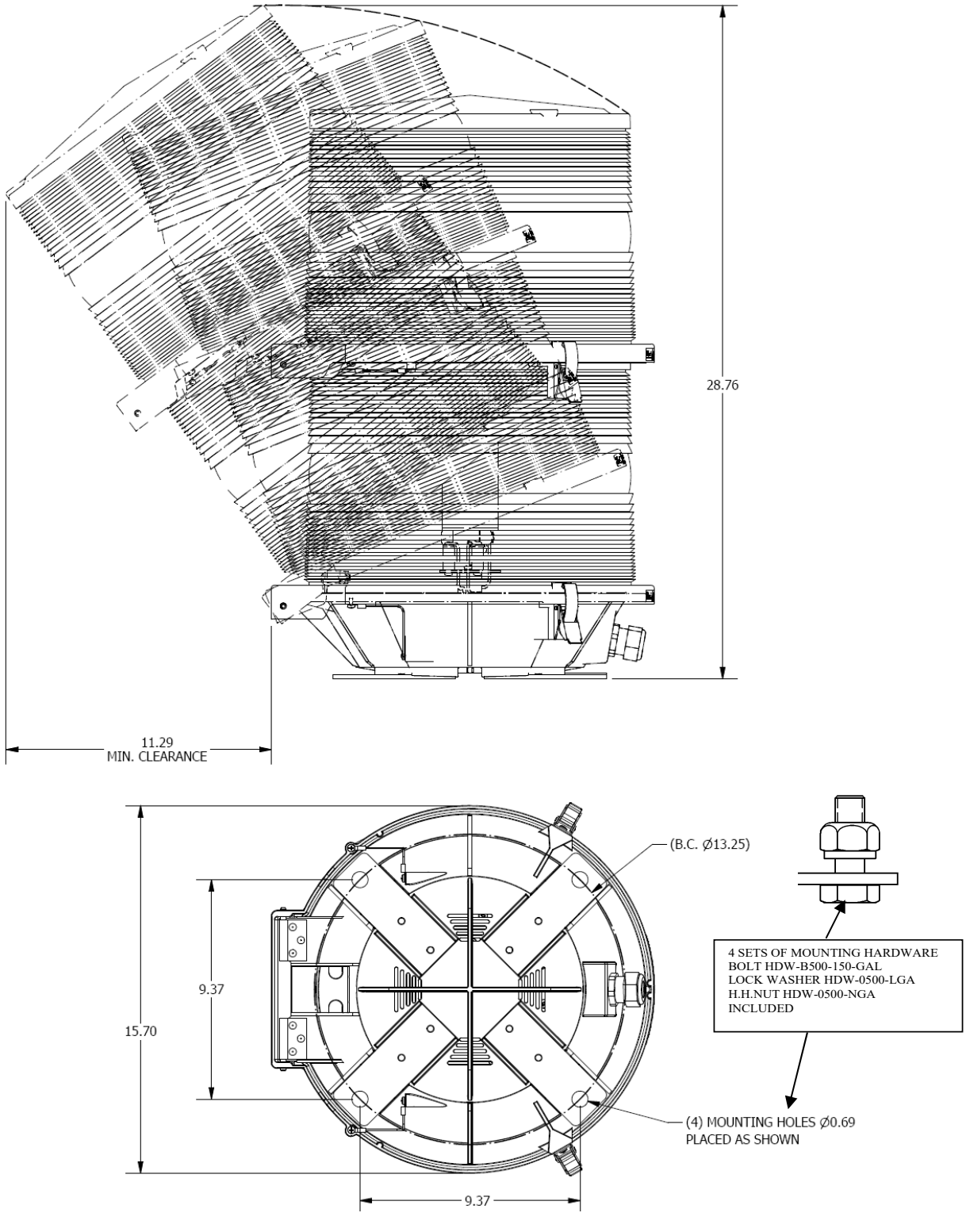


Figure 19: IFH-3400 Dual Flash Head Dimensions and Mounting Detail - 2

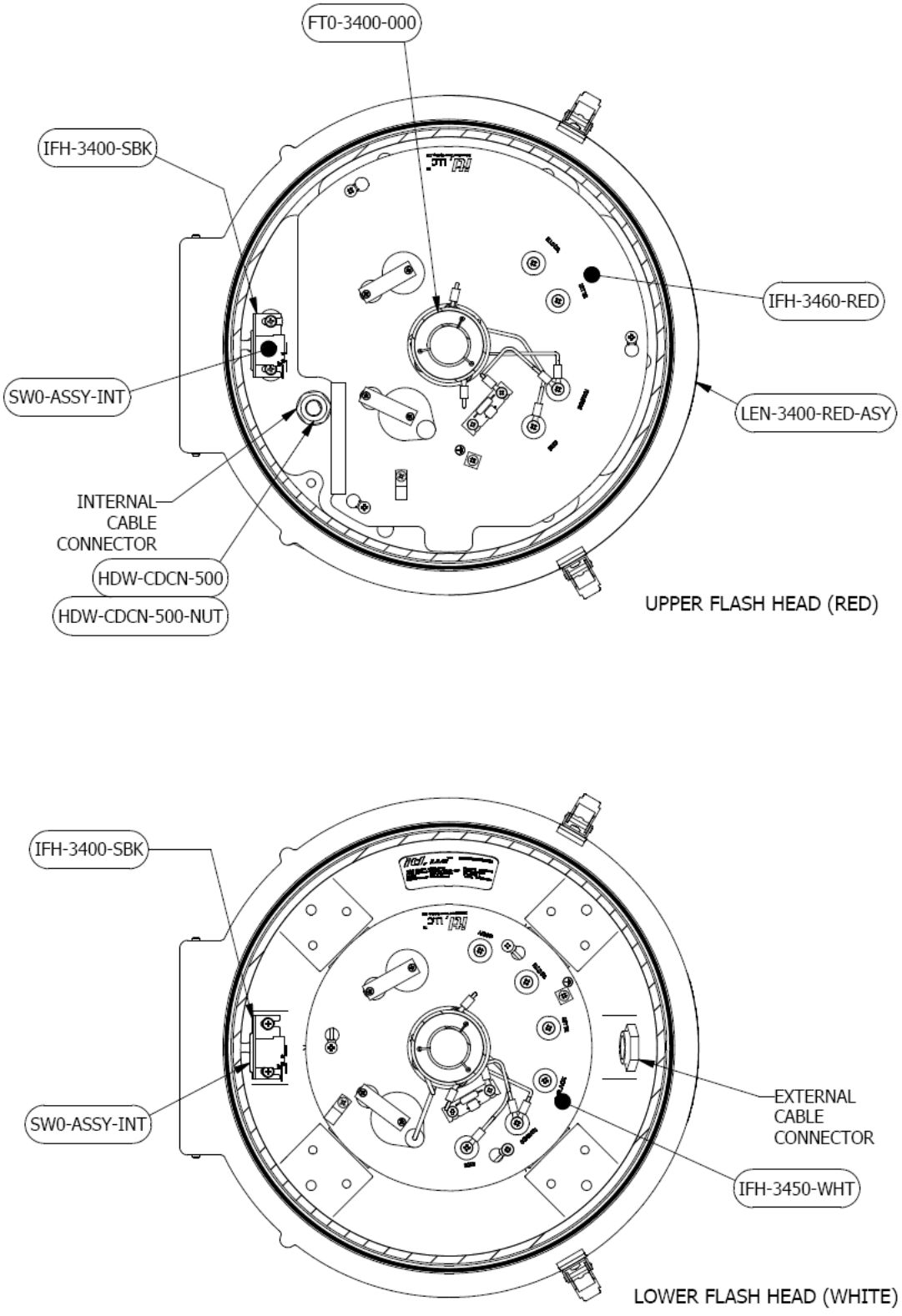
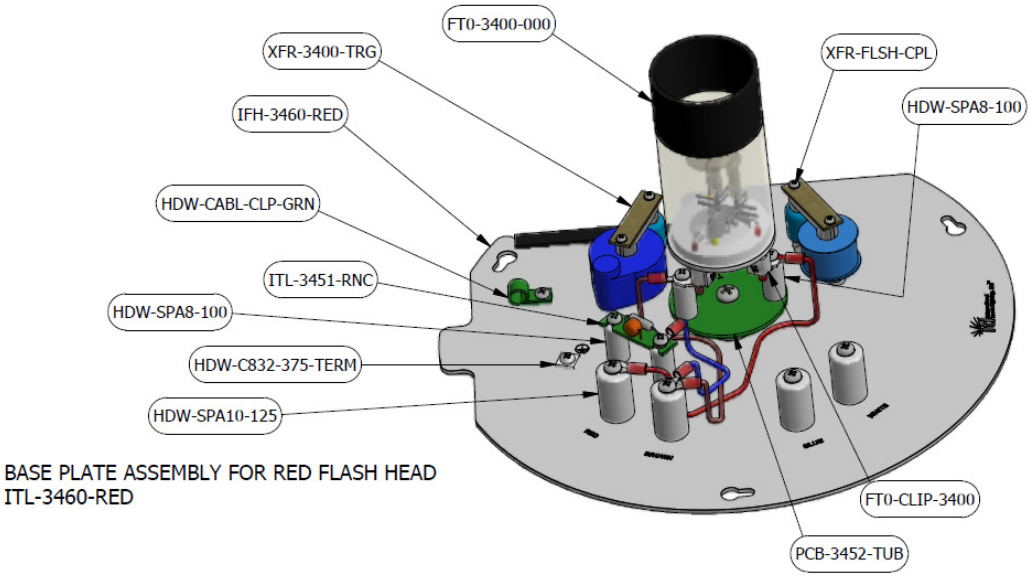


Figure 20: IFH-3400 Dual Flash Head Component Layout, Top View



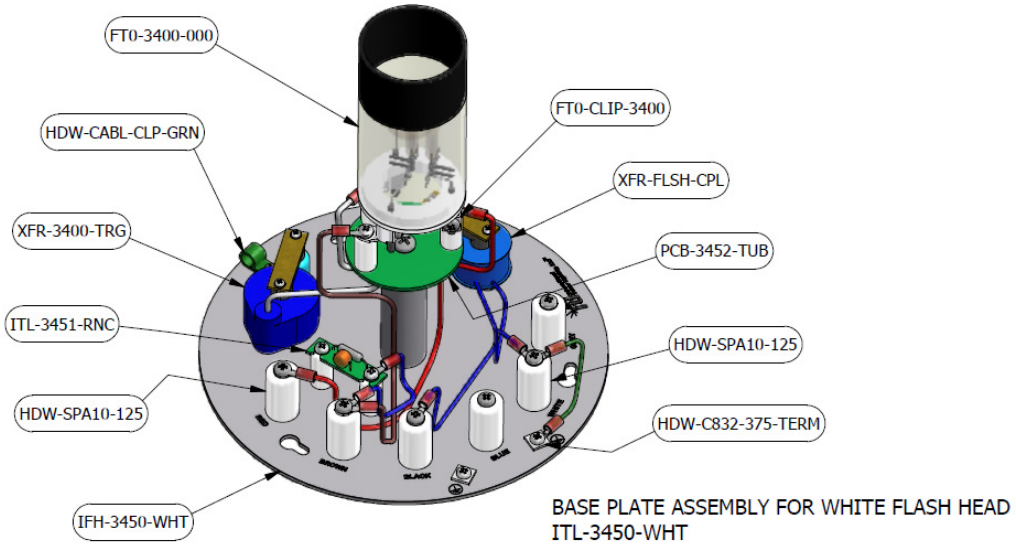


Figure 21: IFH-3400 Dual Flash Head Component Layout, Isometric View

QTY	PART NUMBER	DESCRIPTION
2	FT0-3400-000	FLASHTUBE
6	FT0-CLIP-3400	FLASHTUBE MOUNTING CLIP
10	HDW-SPA10-125	SPACER , CERAMIC, 10-32 x 1.25
10	HDW-SPA8-100	SPACER , CERAMIC, 8-32 X 1
2	ITL-3451-RNC	RC BOARD FOR IFH-3400
1	LEN-3400-CLR-ASY	CLEAR LENS ASSEMBLY WITH MOUNTING RING AND MIDDLE RING
1	LEN-3400-RED-ASY	RED LENS ASSEMBLY WITH MOUNTING RING AND COVER
2	SW0-ASSY-INT	INTERLOCK SWITCH
2	XFR-FLSH-CPL	COUPLING TRANSFORMER
2	XFR-3400-TRG	TRIGGER TRANSFORMER

Figure 22: IFH-3400 Dual Flash Head Parts List Table

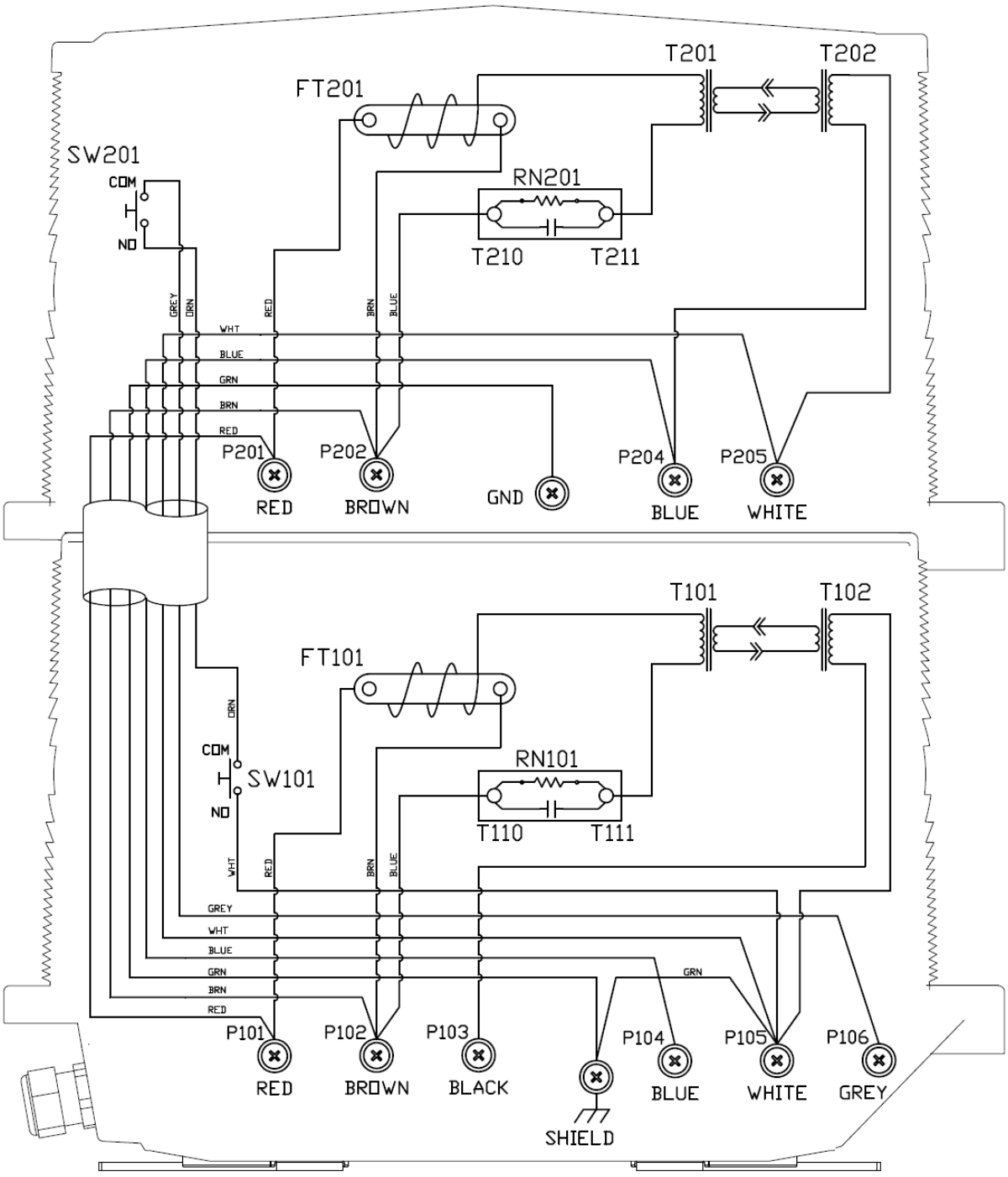


Figure 23: IFH-3400 Dual Flash Head Wiring Diagram

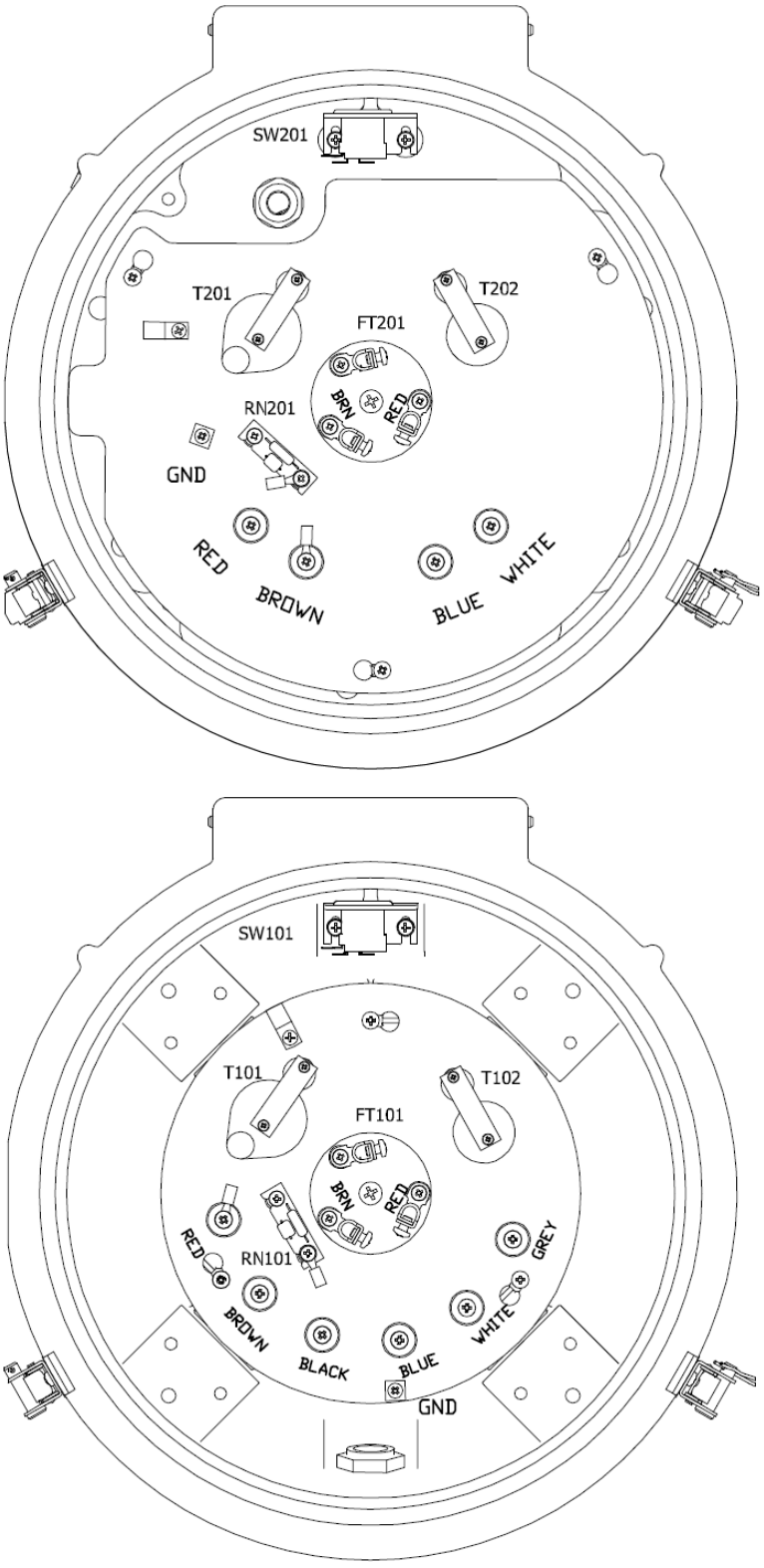
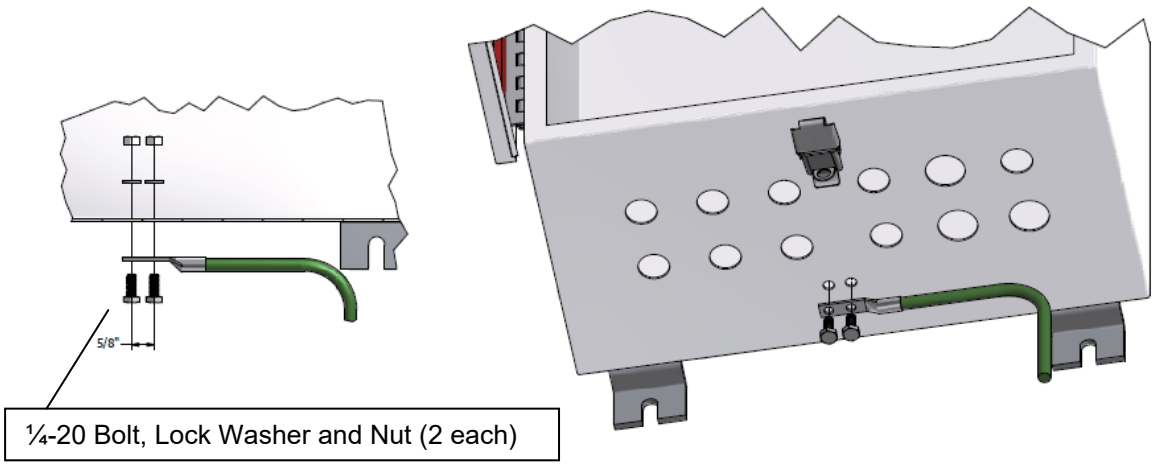


Figure 24: IFH-3400 Dual Flash Head Component Locator Diagram

Power Supply Grounding

The power supply enclosure must be bonded to the site ground bus via a low impedance electrical connection. Mounting holes are provided on the bottom center of the enclosure for attachment of a two-hole (5/8" centers) compression lug for bonding to earth ground. AWG 6 copper conductor should be used.



Power Supply

The Power Supply needs to be mounted to a properly grounded H-frame or a structure which provides a direct low impedance connection to earth ground.

The mounting can not obstruct access to the power supply's internal components for the purpose of installing and maintaining the equipment. The following diagrams detail the mounting dimensions and clearance for proper access.

IPS-3400 Power Supply Mounting

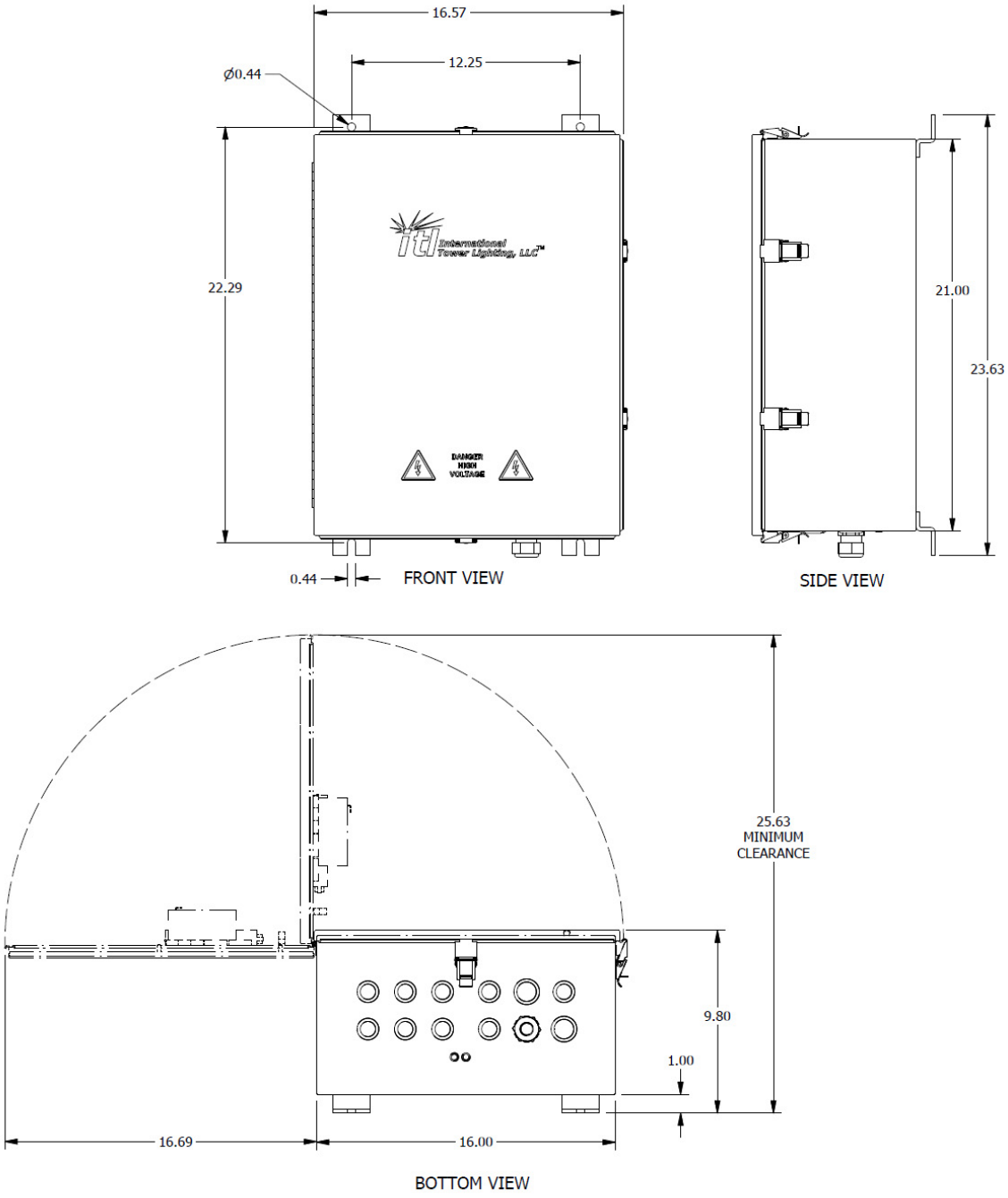


Figure 25: IPS-3400 Power Supply Dimensions and Mounting Details

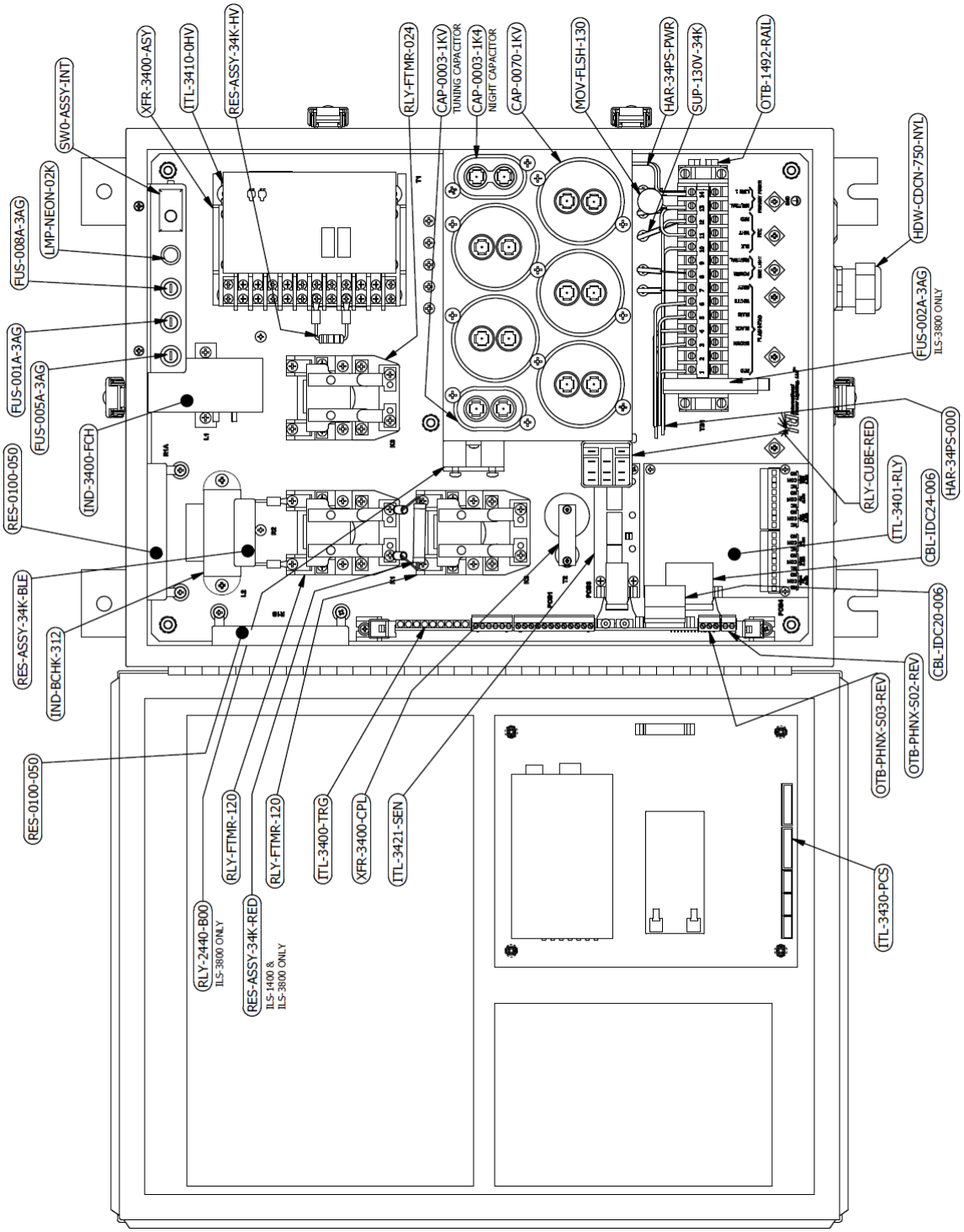


Figure 26: IPS-3400 Power Supply Overall Component Layout

QTY	PART NUMBER	DESCRIPTION
1	CAP-0003-1KV	TUNING CAPACITOR, 3uF, 1KV
1	CAP-0003-1K4	NIGHT CAPACITOR, 3uF, 1.4KV
5	CAP-0070-1KV	DAY CAPACITOR, 70uF, 1KV
1	ENC-3400-000	NEMA 4X ENCLOSURE
1	FUS-001A-3AG	FUSE 1A, 3AG, SLO-BLO
1	FUS-005A-3AG	FUSE 5A, 3AG, SLO-BLO
1	FUS-008A-3AG	FUSE 8A, 3AG, SLO-BLO
1	IND-3400-FCH	FLASH CHOKE, IPS-3400
1	IND-BCHK-312	NIGHT CHOKE, ILS-3400/2400
1	ITL-3400-TRG	TRIGGER BOARD
1	ITL-3401-RLY	ALARM BOARD
1	ITL-3410-0HV	HIGH VOLTAGE BOARD
1	ITL-3421-SEN	SENSE BOARD
1	LMP-NEON-02K	NEON LAMP, RED, 120V
1	MOV-FLSH-130	MOV, 130V, 70J
2	OTB-1492-ANC	TERMINAL BLOCK, END ANCHOR, HEAVY DUTY
1	OTB-1492-END	TERMINAL BLOCK, END BARRIER
1	OTB-1492-RAIL	TERMINAL BLOCK, MOUNTING RAIL
14	OTB-1492-TER	TERMINAL BLOCK, 600V, 55A
2	RES-0100-050	NIGHT RESISTOR, 100 OHM, 50W
1	RES-ASSY-34K-BLE	RESISTOR 25K, 20 W , WITH RING LUG
1	RES-ASSY-34K-HV	RESISTOR ASSEMBLY FOR IPS-3400, HV WITH RING LUG
1	RES-ASSY-34K-RED	(ILS-1400 ONLY)
	RLY-CUBE-RED	RELAY CUBE,301, 310, 312
1	RLY-FTMR-024	POWER RELAY, DPST, 24V
2	RLY-FTMR-120	POWER RELAY, DPST, 120V
5	SUP-130V-34K	SUPPRESSOR ASSEMBLY W/MOV 130V & RING LUG
1	SW0-ASSY-INT	INTERLOCK SWITCH
1	XFR-3400-ASY	TRANSFORMER FOR IPS-3400 POWER CONVERTER
1	XFR-3400-CPL	COUPLING TRANSFORMER

Note: Additional Parts for IPS-3800 see Appendix A

Figure 27: IPS-3400 Power Supply Parts List Table

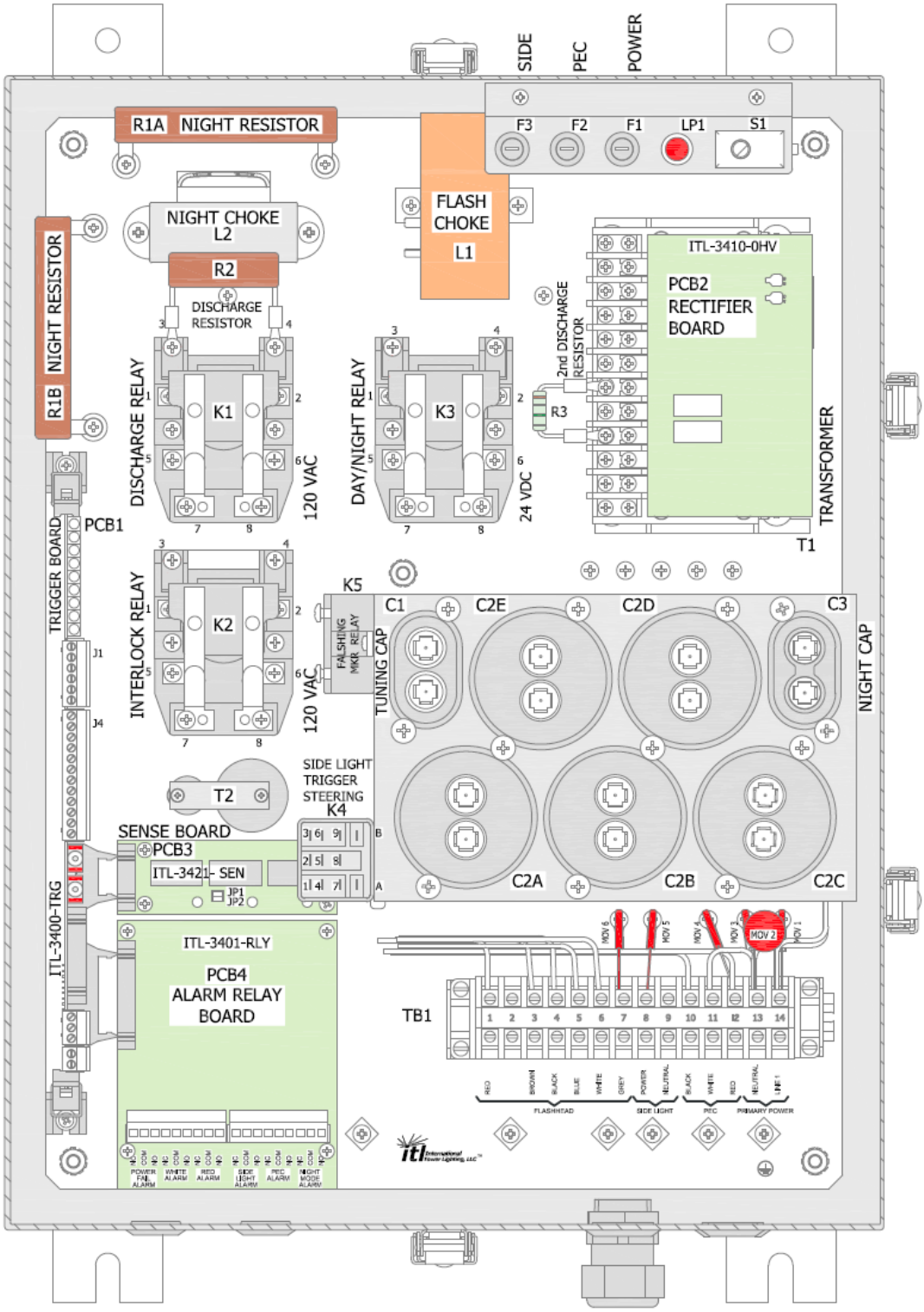


Figure 28: IPS-3400 Power Supply Panel Component Locator

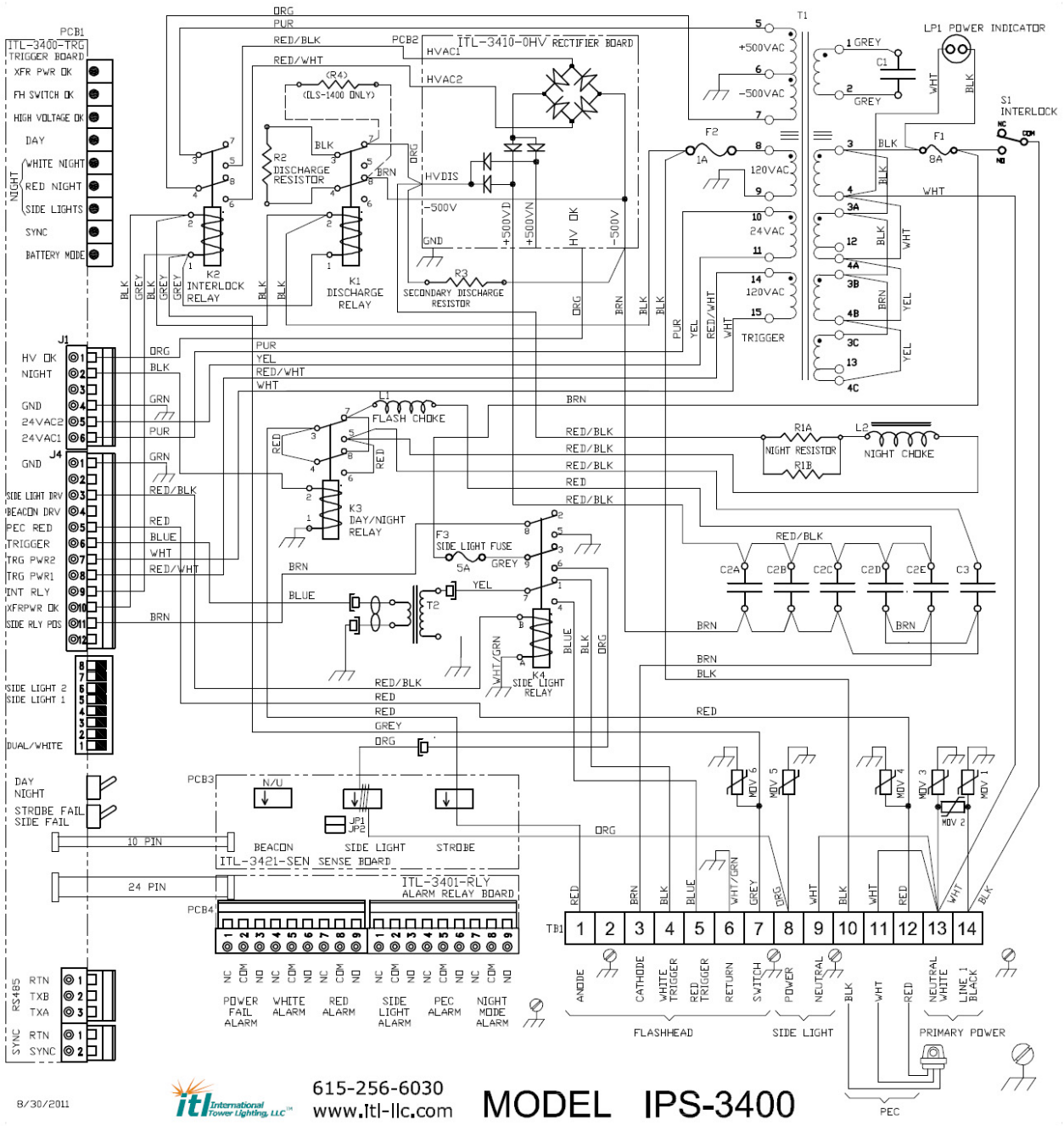


Figure 29: IPS-3400 Power Supply Wiring Diagram

Note : Wiring Diagram for IPS-3800 see appendix A

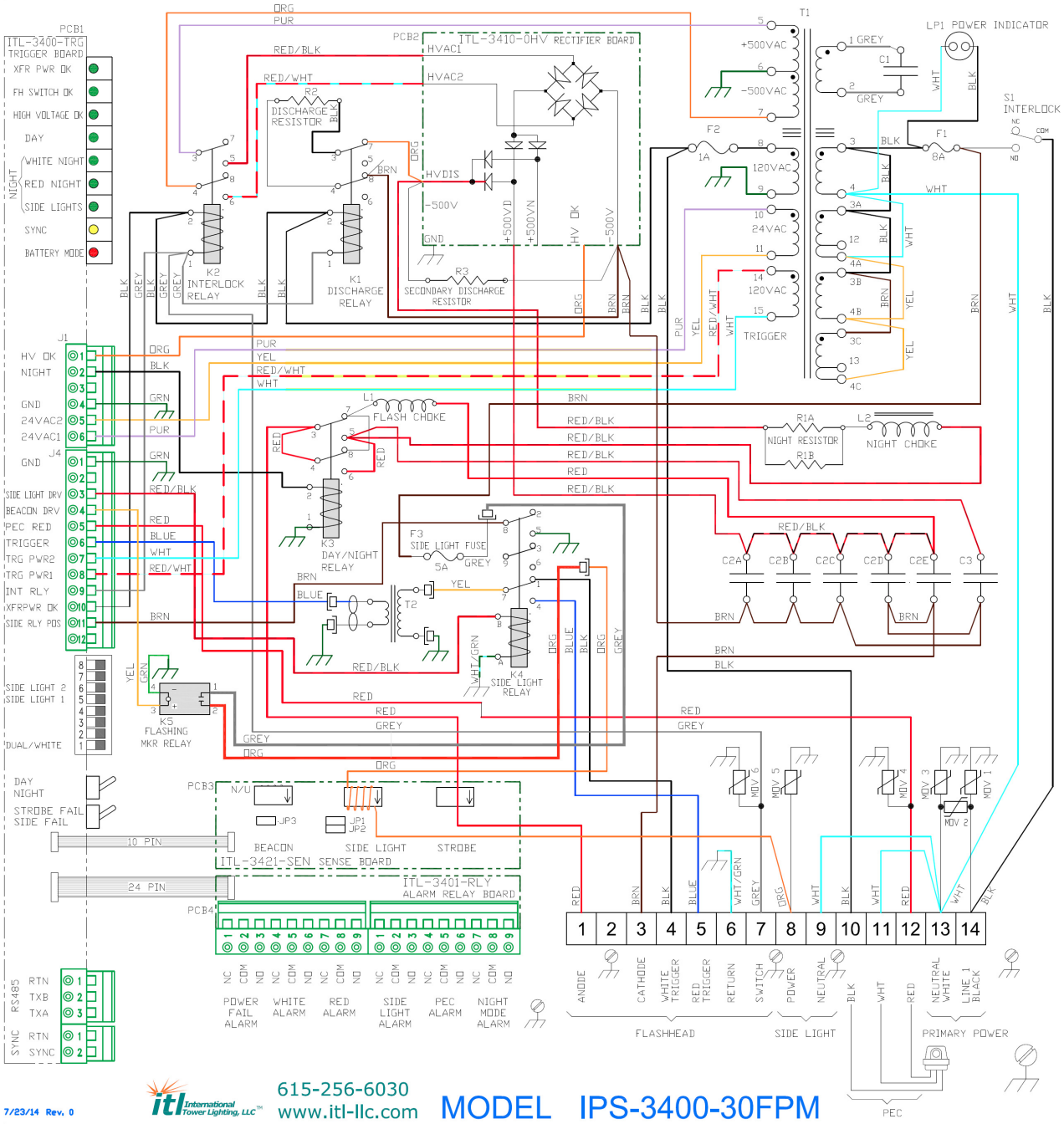


Figure 30: IPS-3400-30FPM Power Supply Wiring Diagram with Flashing Side Lights

Power Transformer Input Voltage Wiring

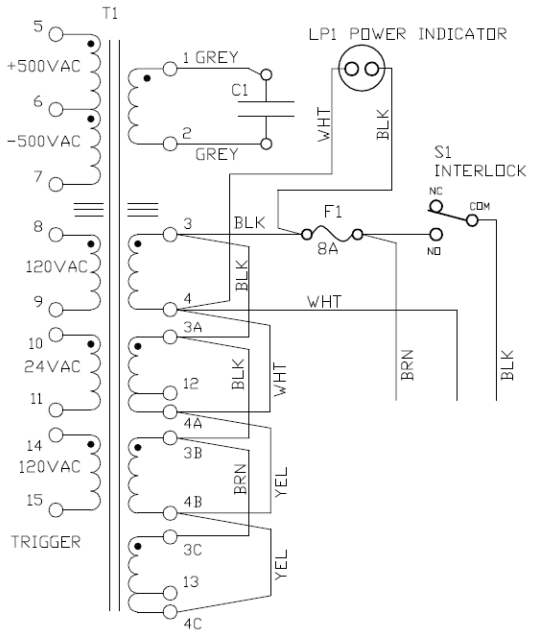


Figure 31: IPS-3400 120VAC Primary

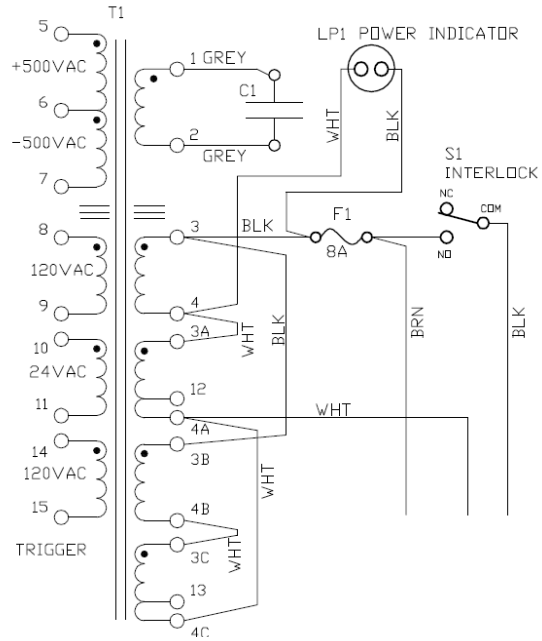


Figure 32: IPS-3400 230/240VAC Primary

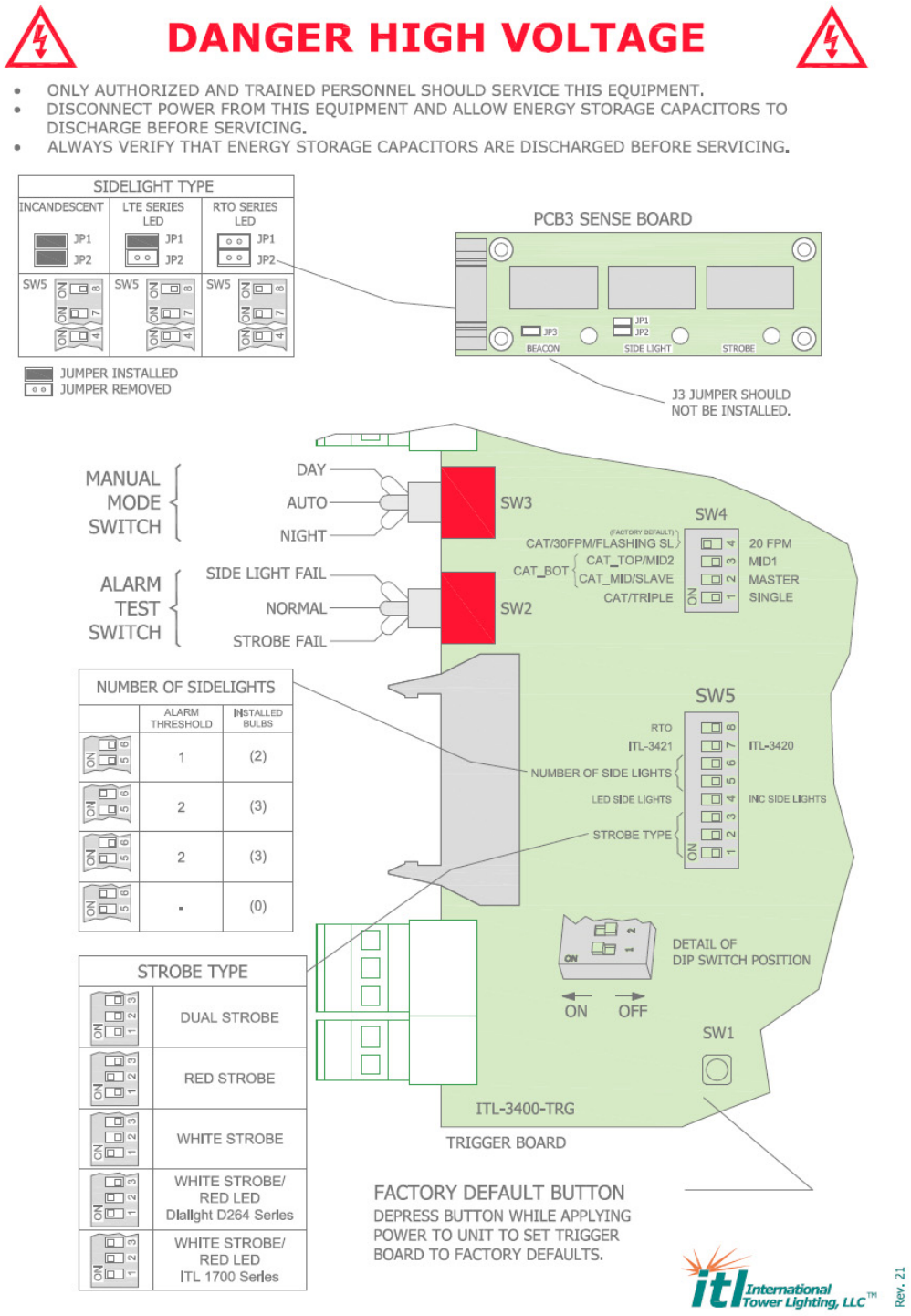


Figure 33: IPS-3400 Configuration Quick Info Guide

PEC Mounting and Wiring

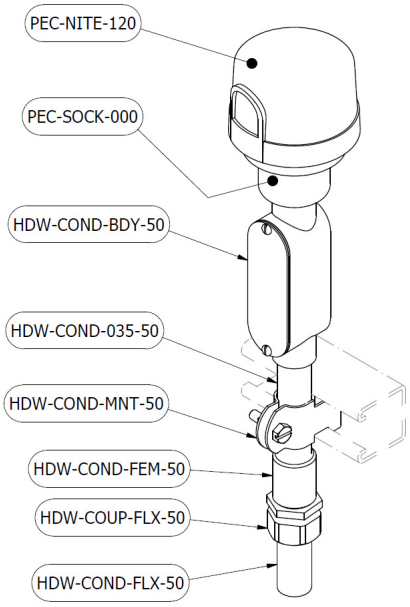


Figure 34: PEC Assembly Drawing

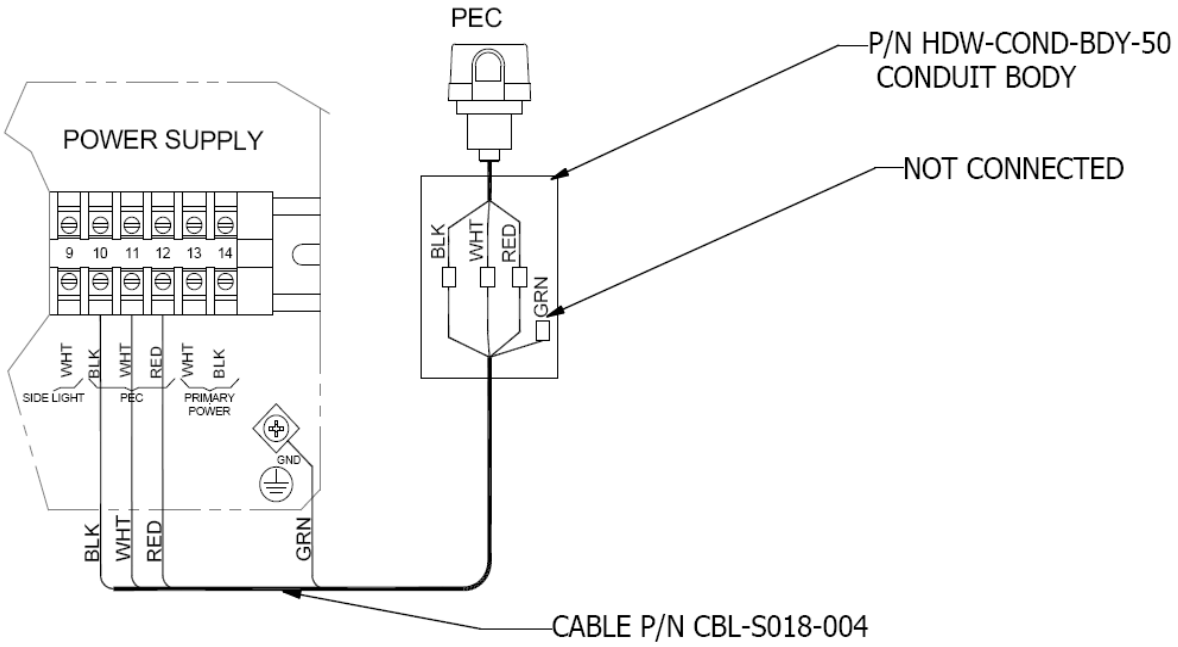
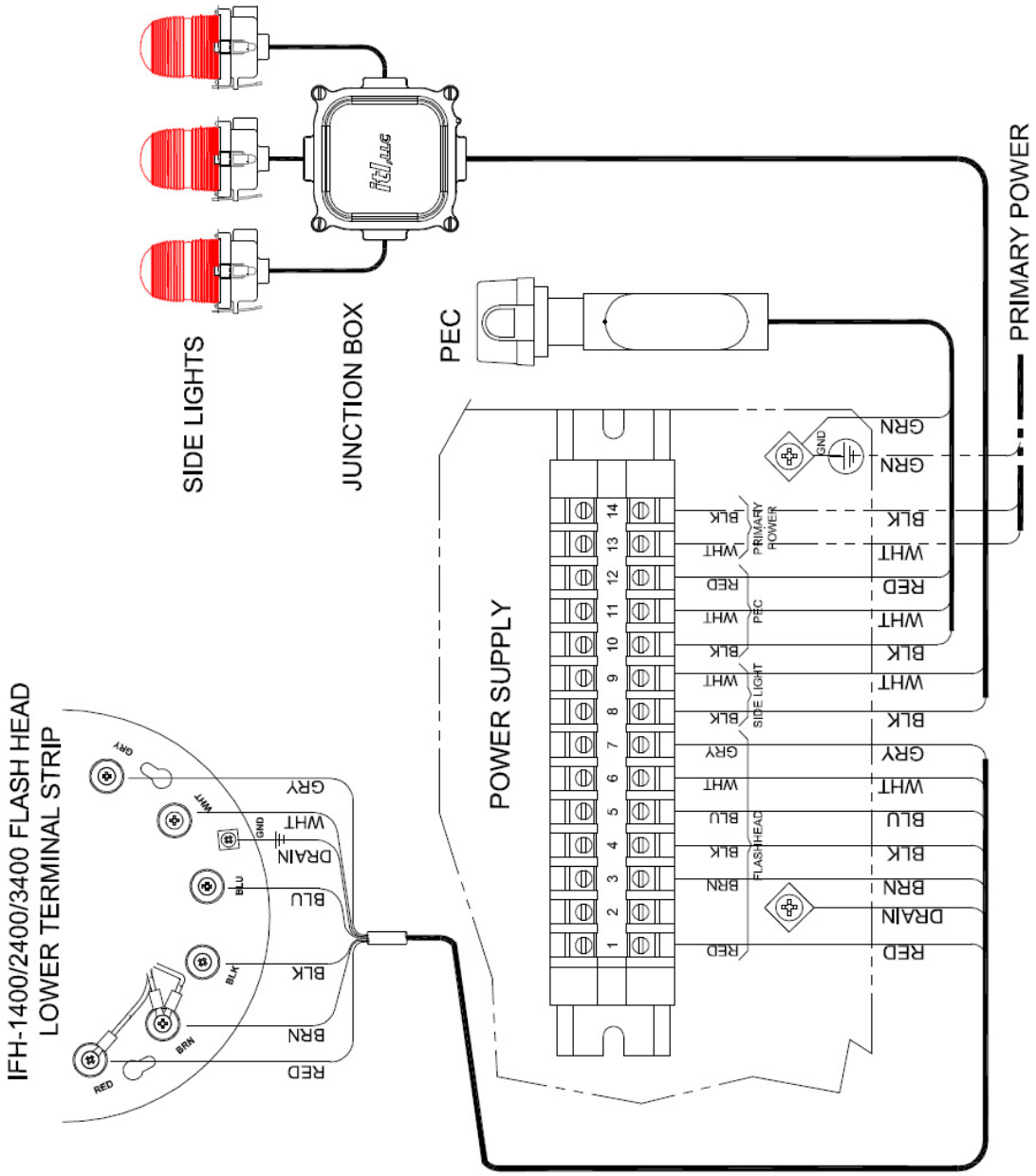


Figure 35: PEC Wiring Diagram

QTY	PART NUMBER	DESCRIPTION
8 ft	CBL-S018-004	SO-Cord, Cable 18 AWG, 4 Wires (BLK, WHT, GRN, RED)
1	HDW-COND-035-50	Conduit Fitting 1/2" NPT x 3.5", AL
1	HDW-COND-BDY-50	Conduit Body 1/2"Npt, Type C, With Gasket & Cover
1	HDW-COND-FEM-50	Conduit Coupling, 1/2" NPT, AL
6 ft	HDW-COND-FLX-50	Liquid-Tight Flexible Metal Conduit ½”
1	HDW-COND-MNT-50	Strut-Mount Clamp Kit For 1/2" Conduit
2	HDW-COUP-FLX-50	Fitting For Flex Conduit 1/2" With 1/2" Npt
1	HDW-ORNG-075	O-Ring I.D. 0.75”
1	PEC-NITE-120	Photoelectric Cell (Pec)
1	PEC-1800-120	Photoelectric Cell (Pec) Ils-1400 Only
1	PEC-SOCK-000	Socket For Photoelectric Cell

Figure 36: PEC Assembly Parts List Table



NOTES:
1. USE A CONTINUOUS CABLE FROM THE POWER SUPPLY TO THE FLASH HEAD WITHOUT TERMINAL STRIPS OR SPLICES.
2. SUPPLY LIGHTNING PROTECTION FOR THE TOP FLASH HEAD.

Figure 37: ILS-1400 / ILS-2400 / ILS-3400 Installation Wiring Diagram

Note: For ILS-3800 Installation Diagram see Appendix A

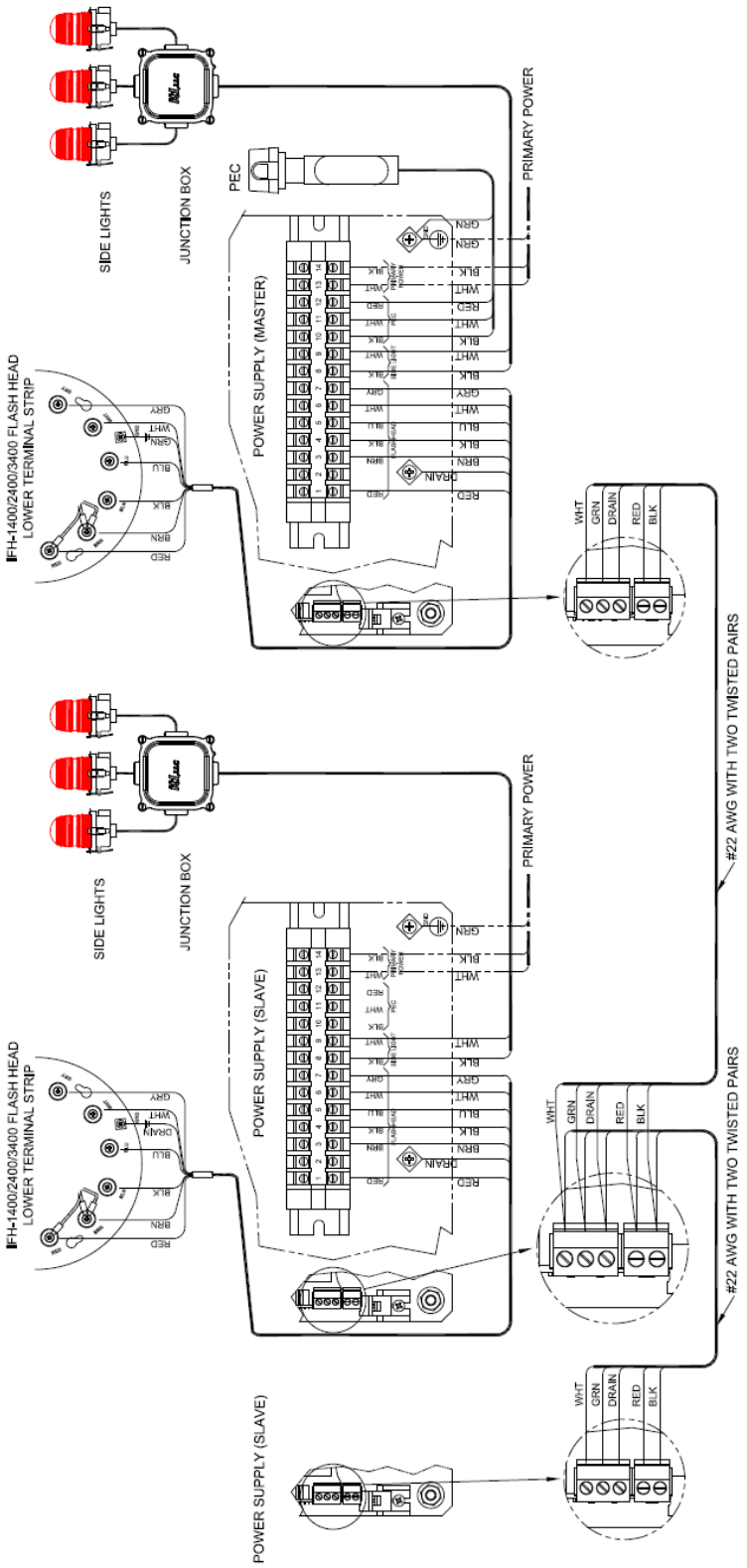


Figure 38: ILS-1400 / ILS-2400 / ILS-3400 Triple System Installation w/Sync and Data Link

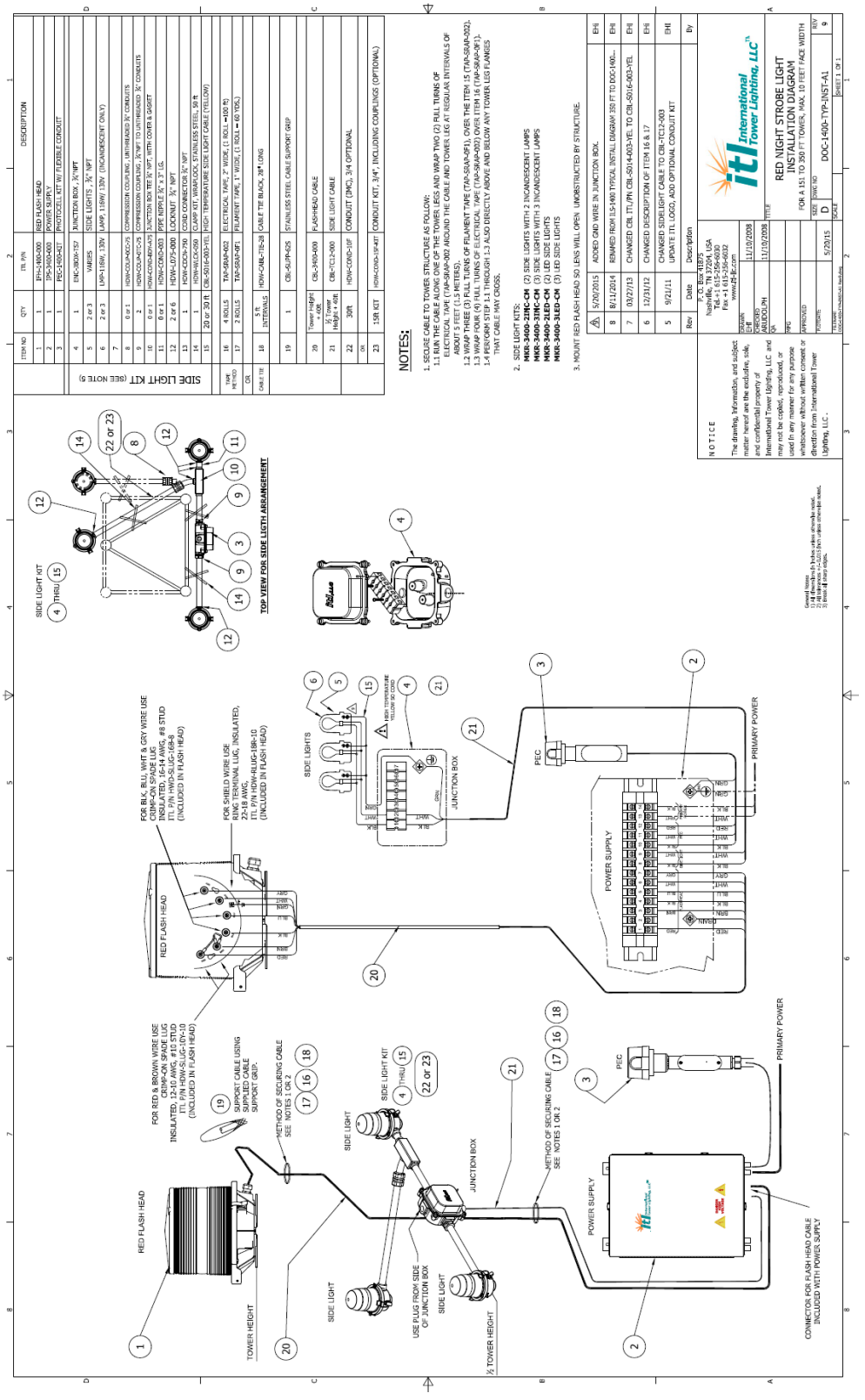


Figure 39: ILS-1400 Single System Typical Installation Diagram – 350'

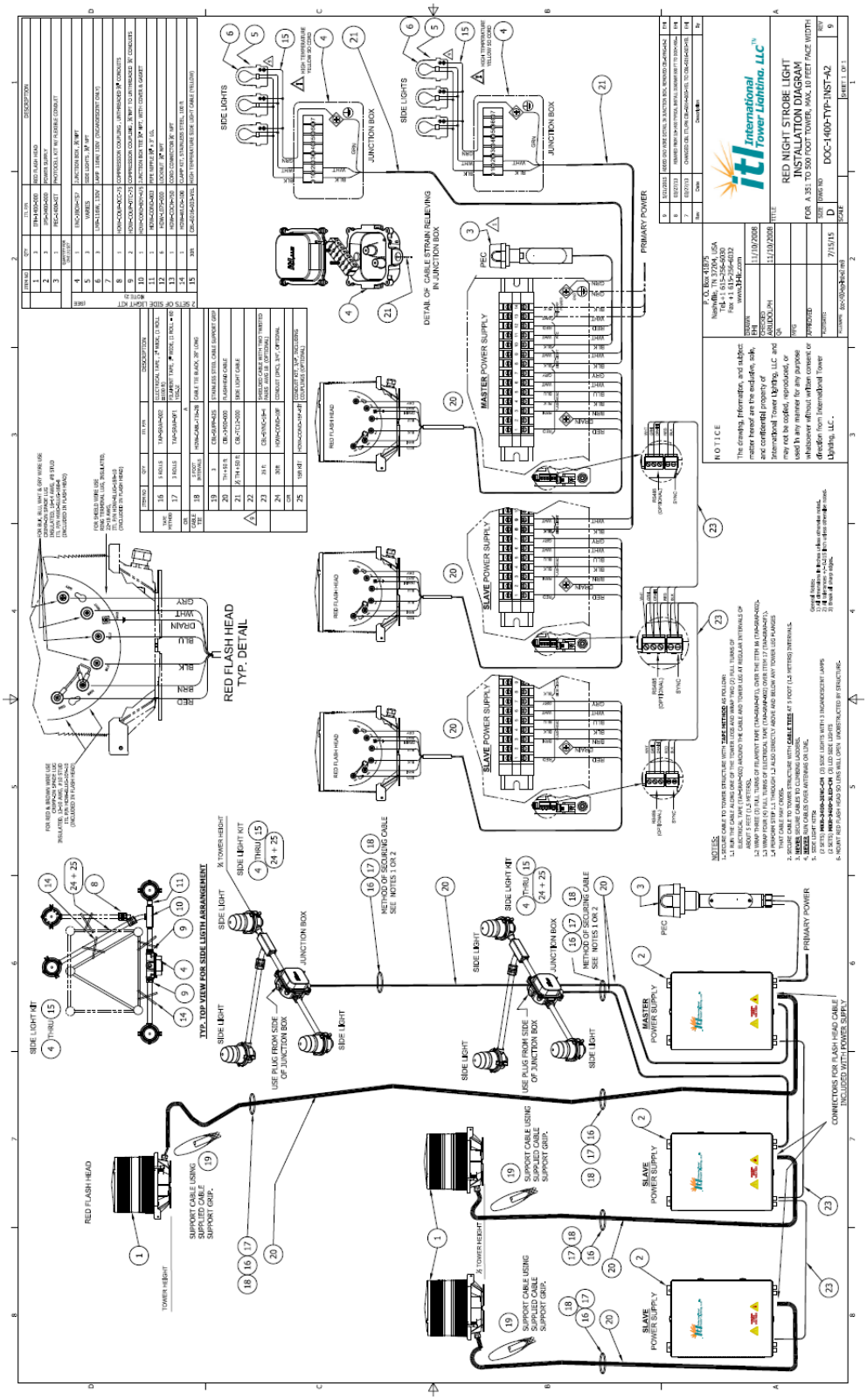


Figure 40: ILS-1400 Triple System Typical Installation Diagram – 500'

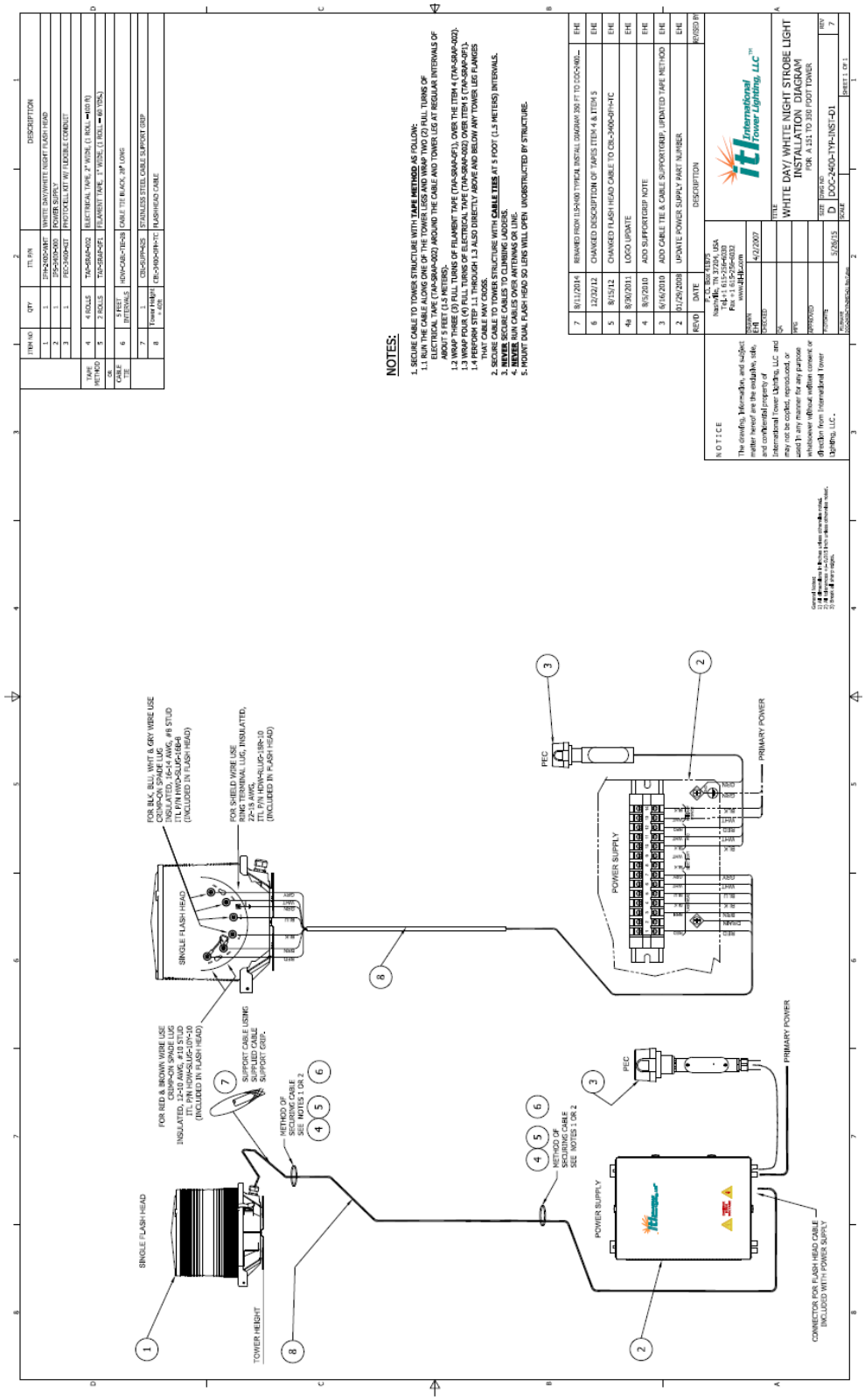


Figure 41: ILS-2400 Single System Typical Installation Diagram – 350'

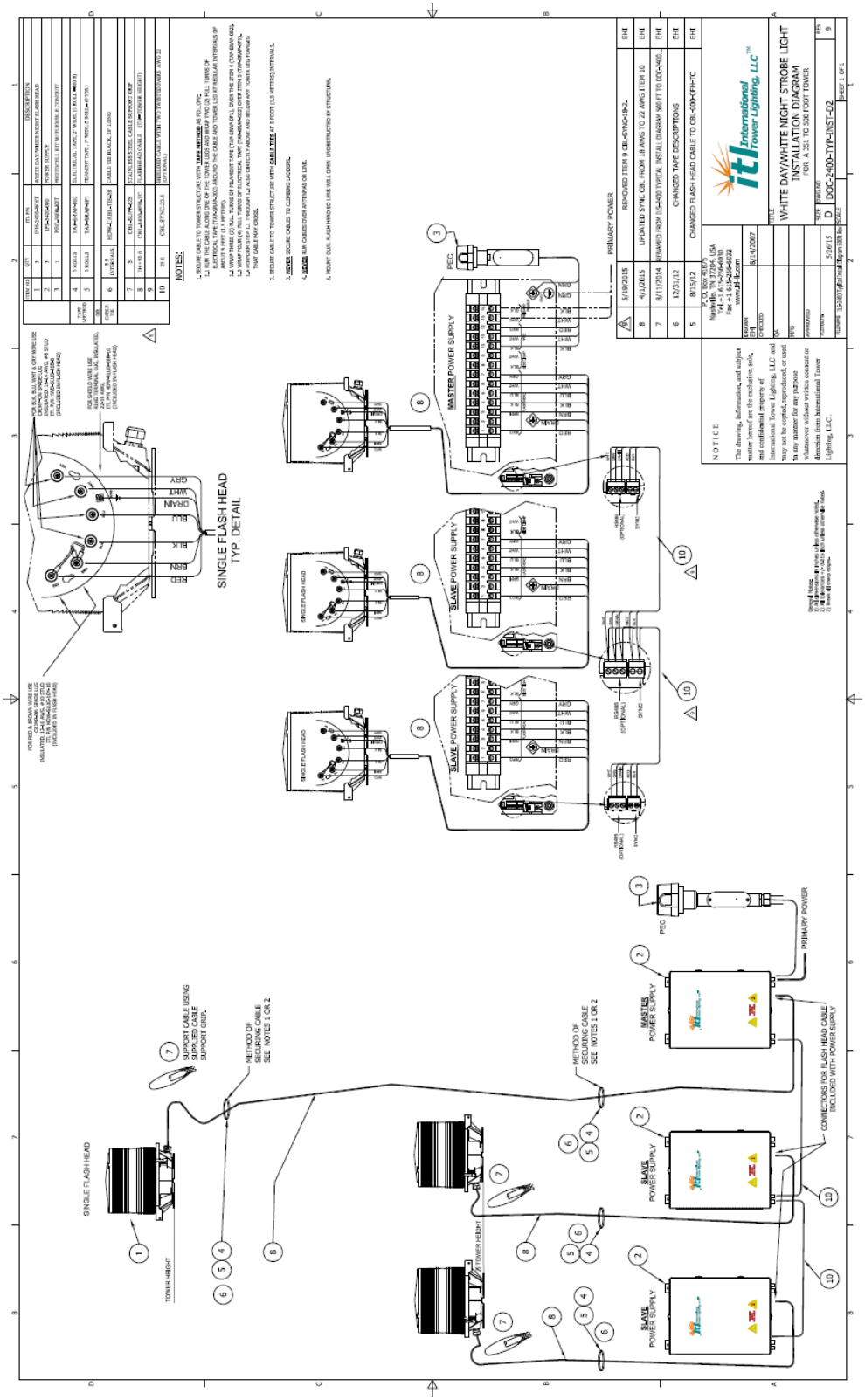


Figure 42: ILS-2400 Triple System Typical Installation Diagram – 500'

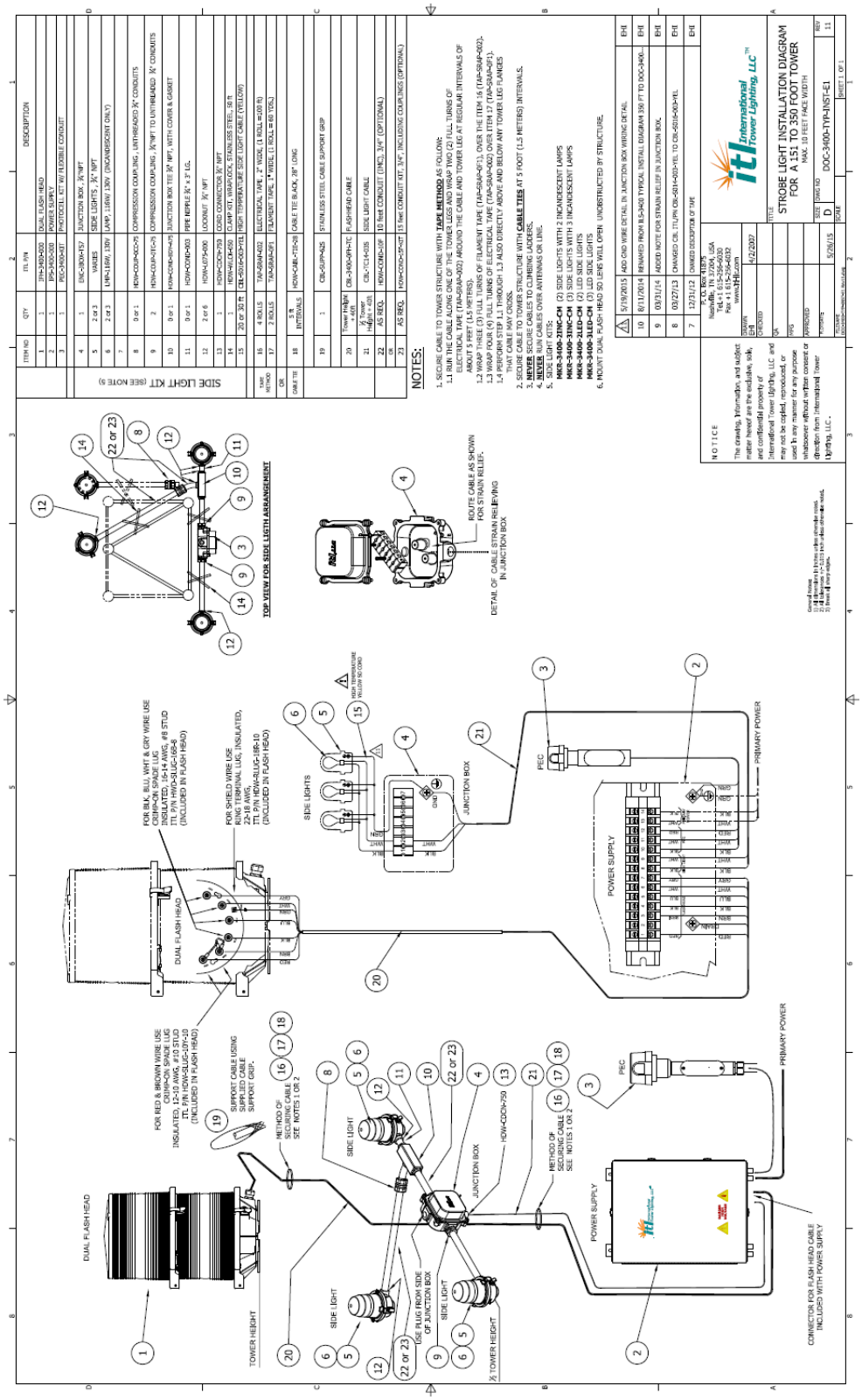


Figure 43: ILS-3400 Single System Typical Installation Diagram – 350'

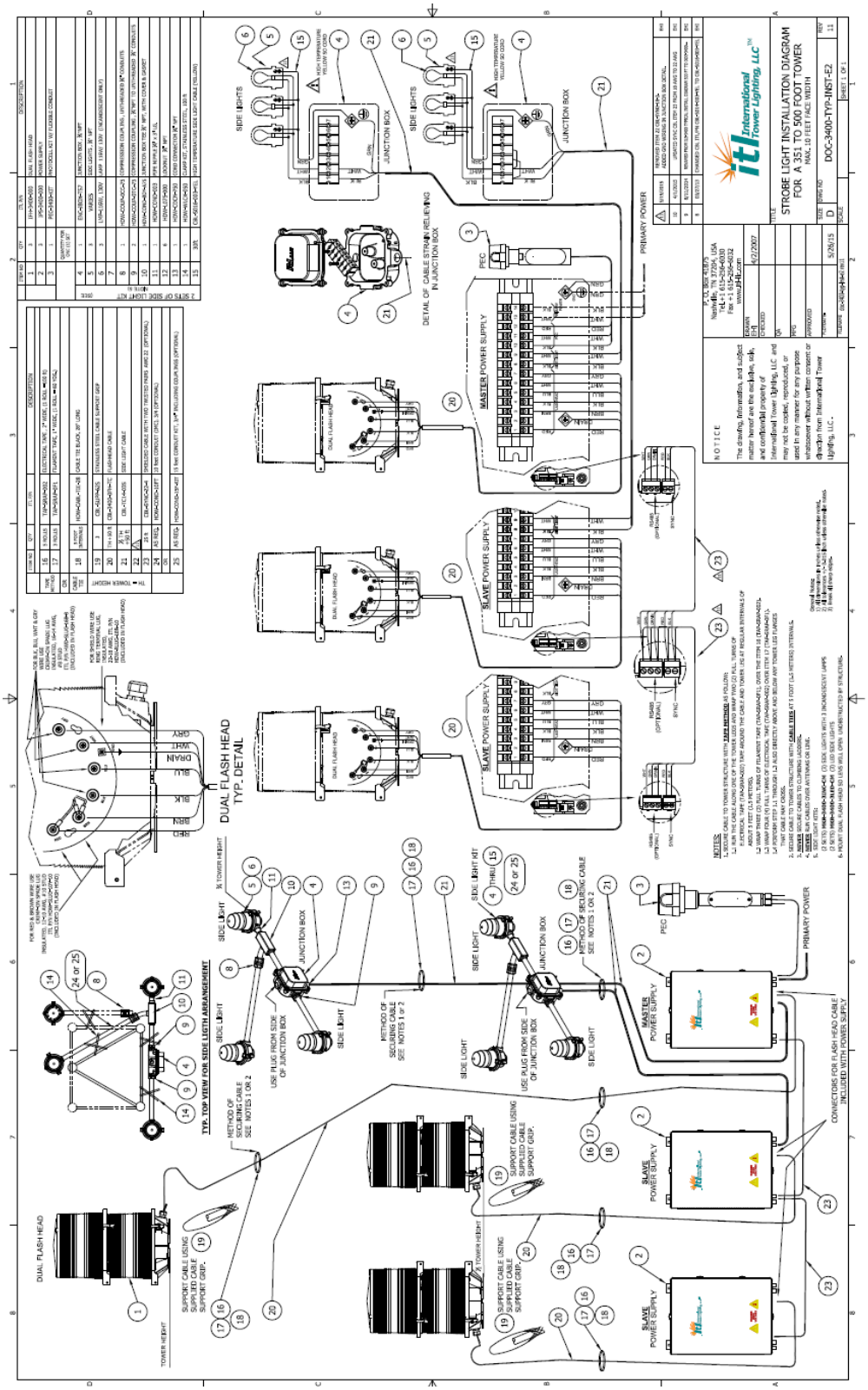


Figure 44: ILS-3400 Triple System Typical Installation Diagram – 500'

Circuit Boards

The following section describes each all of the ILS-1400/2400/3400 circuit boards.

1. ITL-3400-TRG Trigger Board

The ITL-3400 is the power supply's main board. This microprocessor controlled circuit board controls and monitors all functions relating to the strobe light.

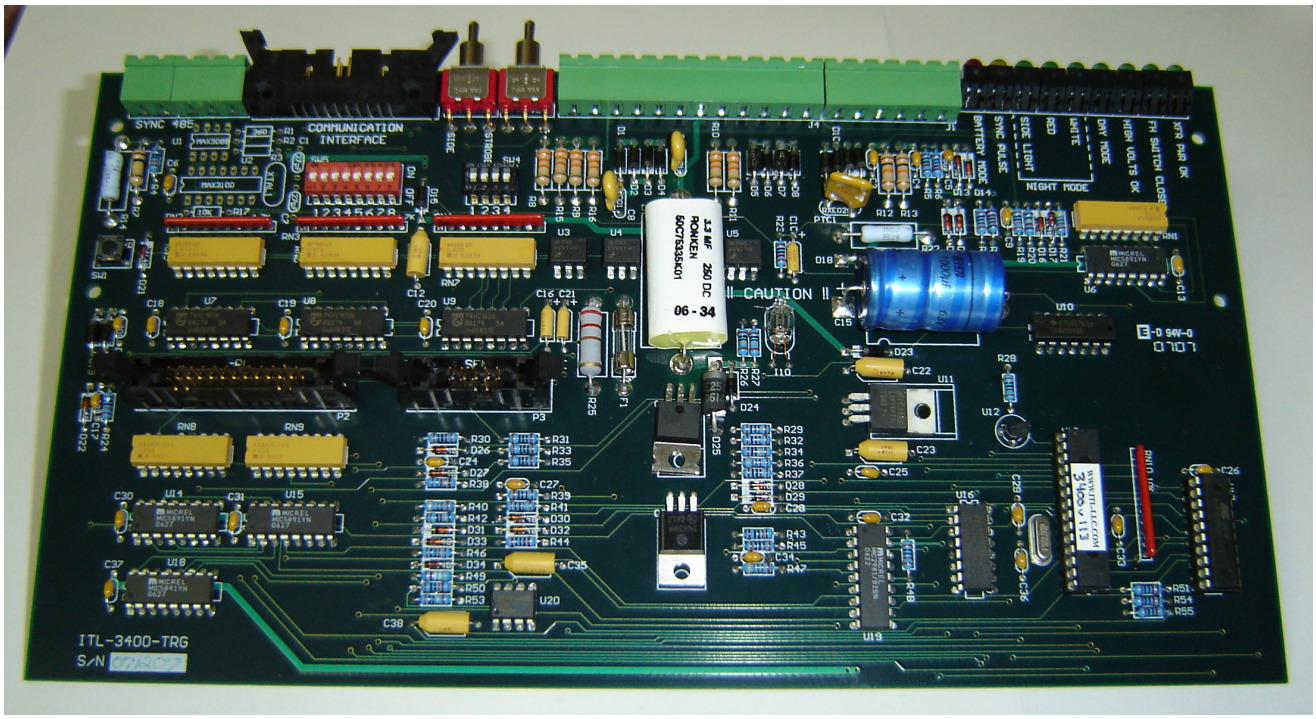


Figure 45: ITL-3400 Main Board Picture

A. LEDs and Caution Neon Light

An array of LEDs provides visual feedback relating to the boards current function and alarm status. Red LEDs are utilized for alarm functions only. Any red LED which is lit indicates an active alarm condition.

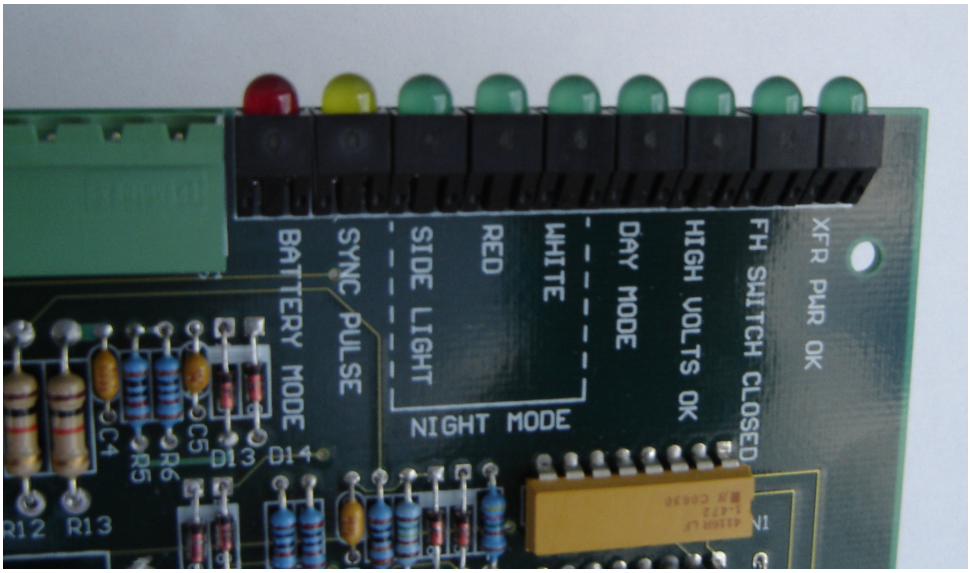


Figure 46: ITL-3400 LEDs Location Detail

LED	Color	Function
XFR PWR ON	Green	ON if primary power is OK
FH SWITCH CLOSED	Green	ON if all flash head switches are closed
HIGH VOLTS OK	Green	ON if high voltage is detected
DAY MODE	Green	ON if board is operating in Day Mode BLINKING if PEC alarm, or override Mode
WHITE NIGHT MODE	Green	ON if board is operating in White Night Mode BLINKING if PEC alarm, or override Mode
RED NIGHT MODE	Green	ON if board is operating in Red Night Mode BLINKING if PEC alarm, or override Mode
SIDE LIGHT	Green	ON if board is in Night Mode and Sidelights are enabled (see SW5 for configuration)
SYNC PULSE	Yellow	ON every time a sync mode pulse is sent, every 1.5-3s
BATTERY MODE	Red	ON if board is operating in battery mode, alarm indicator

Figure 47: ITL-3400 LEDs Table

A caution neon indicator light is located in the center of the board indicating the presence of trigger voltage when lit. The indicator will temporarily flicker when the trigger capacitor is discharged during flashing. The location of the neon indicator is shown below.

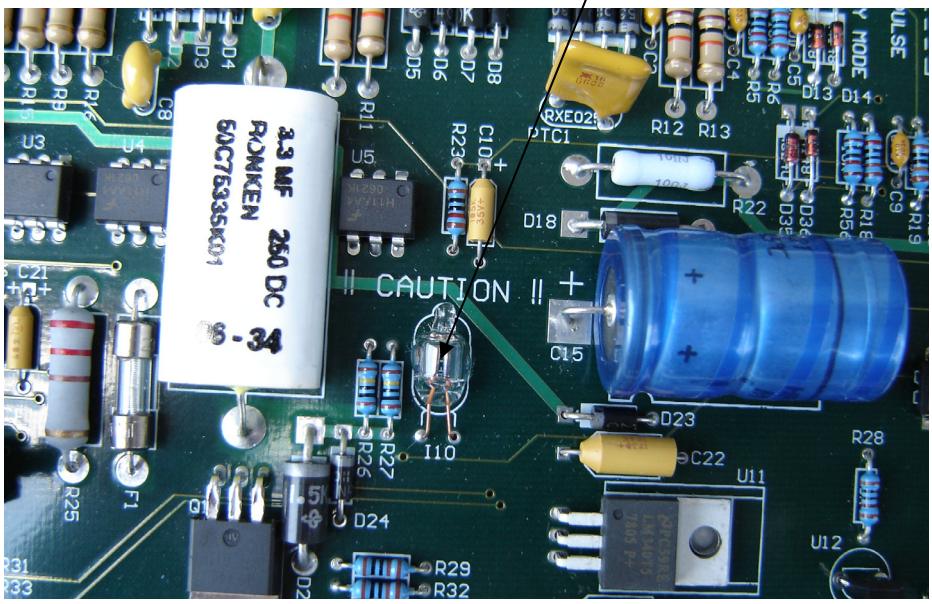


Figure 48: ITL-3400 Neon Trigger Indicator Location Detail

B. Switches

i. Toggle Switches

The ITL-3400 has two toggle switches, SW2 and SW3. SW2 is a spring-loaded momentary switch which allows on-site personnel to momentarily generate either a sidelight or strobe alarm based on the switch position. This is useful for trouble shooting purposes and for generating alarms to a remote network operations center (NOC).

SW3 is also for test purposes and allows overriding the PEC function by forcing the circuit board to operate either in day or night mode based on the switch position. The corresponding Day Mode or White Night or Red Night LED will blink indicating this special mode.

To assure that this switch is not accidentally left in the wrong position the ITL-3400 will automatically generate a PEC alarm if SW3 is not in its neutral position.

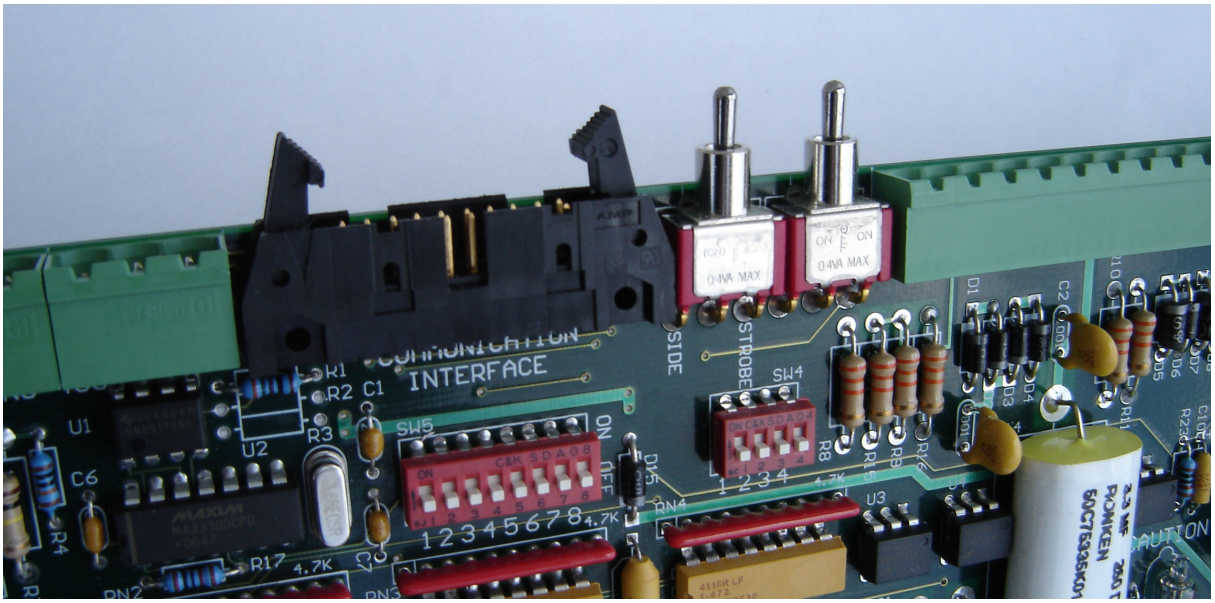


Figure 49: ITL-3400 Toggle Switches Location Detail

ii. Configuration DIP Switch

In addition to the two toggle switches the ITL-3400 has a two hardware configuration switches, SW4 and SW5 . The board will follow operation of this hardware configuration switch unless overridden by remote software. This is only the case for systems which are connected to a separate ITL monitoring product and communicate with ITL's ADP family of software tools.

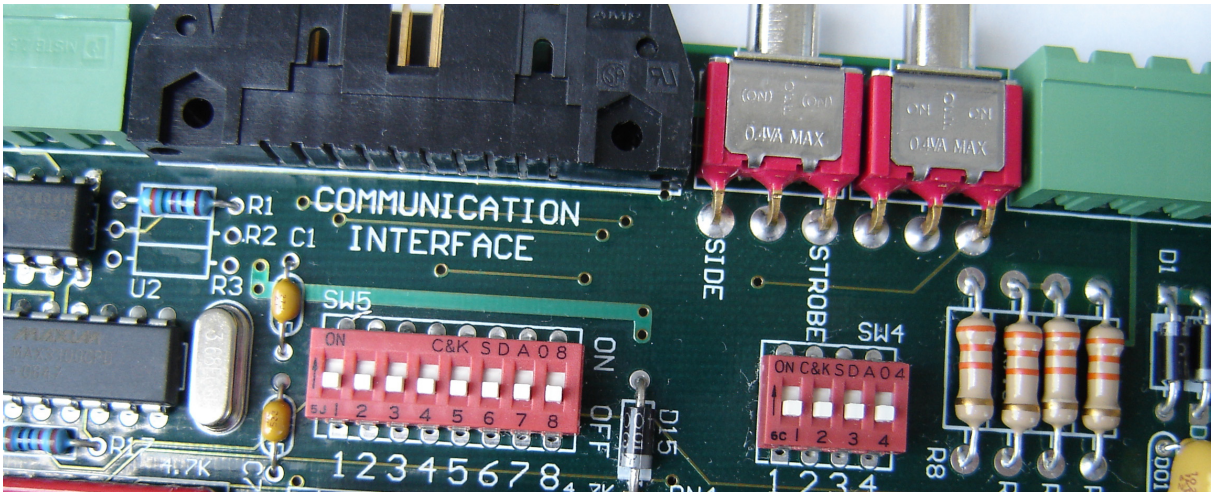


Figure 50: ITL-3400 DIP Switch Location Detail

DIP Switch	ON	OFF
1	CAT / Triple	Single
2	CAT_MID / Slave/ CAT_BOT	Master
3	CAT_TOP / MID2/ CAT_BOT	MID1
4	CAT / 30FPM / Flashing SL (Factory Default)	20 FPM

Figure 51: ITL-3400 Configuration DIP Switch SW4 Table

DIP Switch	ON	OFF
1	Strobe Configuration Detail Table (see below)	
2	Strobe Configuration Detail Table (see below)	
3	Strobe Configuration Detail Table (see below)	
4	LED Sidelights	Inc. Sidelights (Factory Default)
5	Sidelight Configuration Table (see below)	
6	Sidelight Configuration Table (see below)	
7	ITL-3421-SEN (Factory Default)	ITL-3420-SEN
8	RTO Enable	(Factory Default)

Figure 52: ITL-3400 Configuration DIP Switch SW5 Table

.SW5-1	SW5-2	SW5-3	Strobe Type
OFF	**OFF**	**OFF**	**Dual Strobe**
OFF	ON	OFF	Red Strobe
ON	OFF	OFF	White Strobe
ON	ON	OFF	White Strobe / Red LED Dialight Series
ON	ON	ON	White Strobe / Red LED ITL-1700 Series

Figure 53: Strobe Configuration Detail Table

SW5-5	SW5-6	Alarm Threshold	Installed Bulbs
OFF	OFF	1	2
OFF	ON	2	3
ON	OFF	2	3
ON	ON	0	0

Figure 54: Sidelight Configuration Detail Table

If the ITL-3400 does not seem to respond to the configuration switches the board may have been configured with remote software. If necessary the board can be reset to factory defaults and will then follow the setup of the hardware configuration switches.

iii. Factory Reset Switch

SW1 can be used to clear all remote custom programming and reset the main board's non-volatile memory to factory defaults. This is useful if a board is moved from one power supply to another and particularly if remote communication is not utilized. To perform this reset, hold the switch down for 5 seconds during power up only.

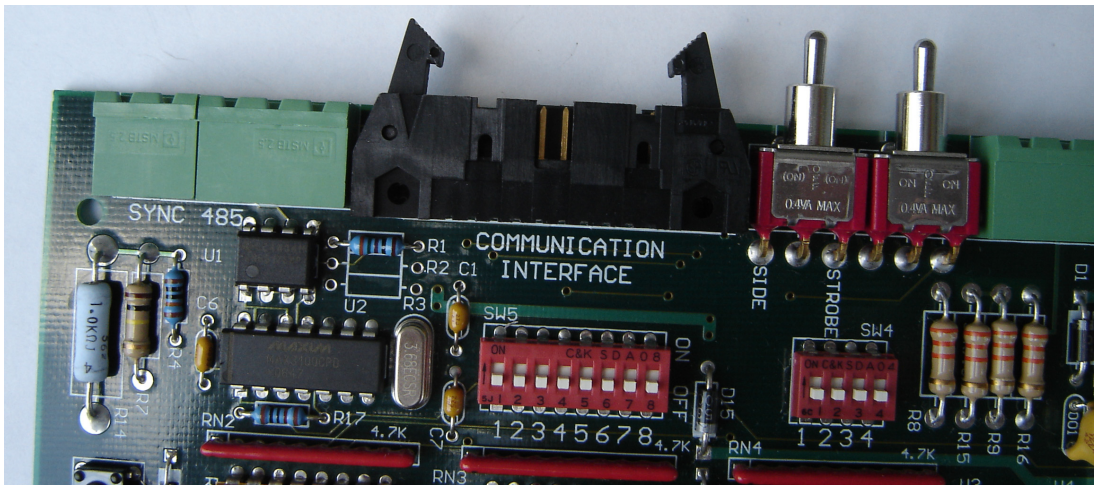


Figure 55: ITL-3400 Factory Reset Switch Location Detail

C. Hardware vs. Software Configuration

As already indicated in the sections above relating to the hardware configuration switch and factory reset switch the ITL-3400 main board can be configured both with hardware configuration switches or remote software. The normal configuration mode and factory default is that the board will follow the settings of the two configuration switches SW4 and SW5. This is in fact all that is required for normal and full functionality of the ILS-1400/2400/3400 systems.

Separate ITL communication products are designed to conveniently interface to the ITL-3400 via a ribbon cable connected to the board's *Communication Interface* connector P1. For more information on those products please contact ITL's Sales Department.

D. Sync Line and RS485 Interface

The ITL-3400 has two means of interfacing to other ITL-3400 boards if used in a configuration where three power supplies are interconnected. Basic sync and mode information is communicated from any board to the others via the SYNC connector J2. This connection should be made with a twisted pair shielded cable.

Connector J3 is used for smart communication only and communicates additional information between ITL-3400 boards. This interface is only utilized in systems which connected to additional ITL communication boards.

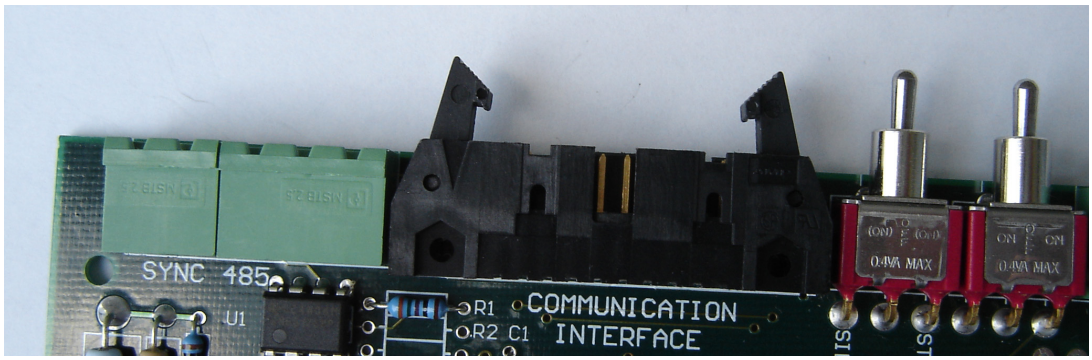


Figure 56: ITL-3400 SYNC Connector Location Detail 1

E. Connectors

Connectors J1 and J4 connect the ITL-3400 circuit board to the IPS-3400's internal harness. For specific information, please consult the *IPS-3400 Power Supply Wiring Diagram.* Connectors J3 and J4 are describe in section *Sync Line and RS485 Interface*.

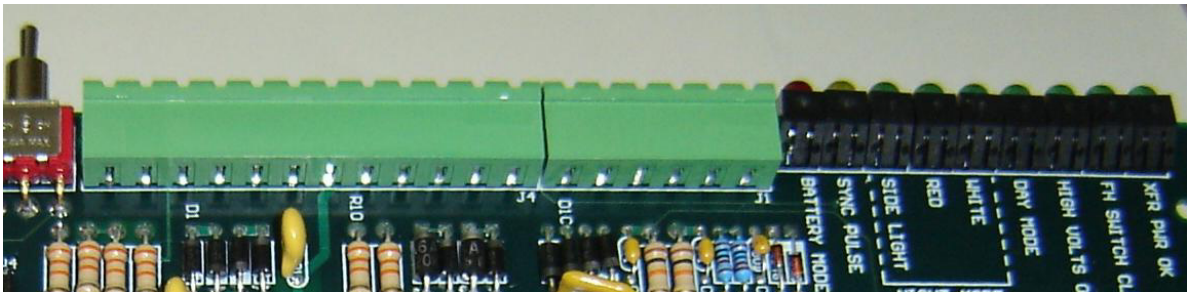


Figure 57: ITL-3400 Connector Location Detail 2

2. ITL-3401-RLY Relay Board

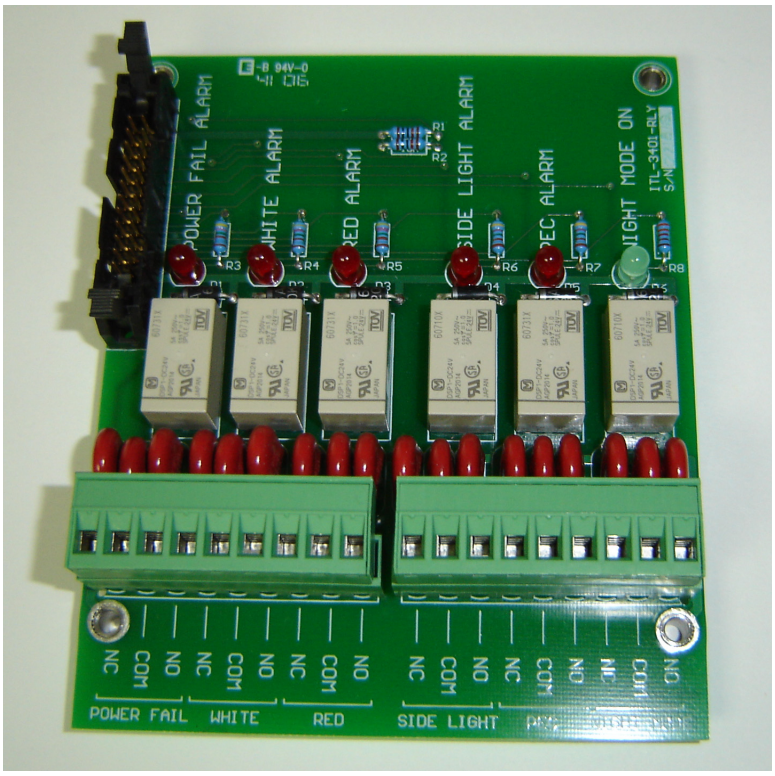


Figure 58: ITL-3401-RLY Alarm Relay Board Picture

The ITL-3401-RLY alarm relay board connects directly to the ITL-3400 main board and contains all Form-C dry contact alarm relays indicating alarm status of the ILS-1400/2400/3400 system. In addition, the board contains one mode relay indicating day or night mode operation.

Each relay has one corresponding LED indicating the state of the relay. In the alarm state a relay is disengaged, i.e. no power, and the corresponding red LED is lit. The green night mode LED is lit when the unit is operating in night mode.

For connection detail, please refer to the *IPS-3400 Power Supply Wiring Diagram.*

3. ITL-3420-SEN / ITL-3421-SEN Sense Board

Figure 59: ITL-3420-SEN Sense Board Picture

The ITL-3420-SEN / ITL-3421-SEN board connects directly to the ITL-3400 main circuit board. It contains the strobe and sidelight sense transformers. Additionally, a set of jumpers allow for configuration of the sidelight type. For details on the jumper settings please refer to the *Configuration DIP Switch* section (Page 55 & 56).

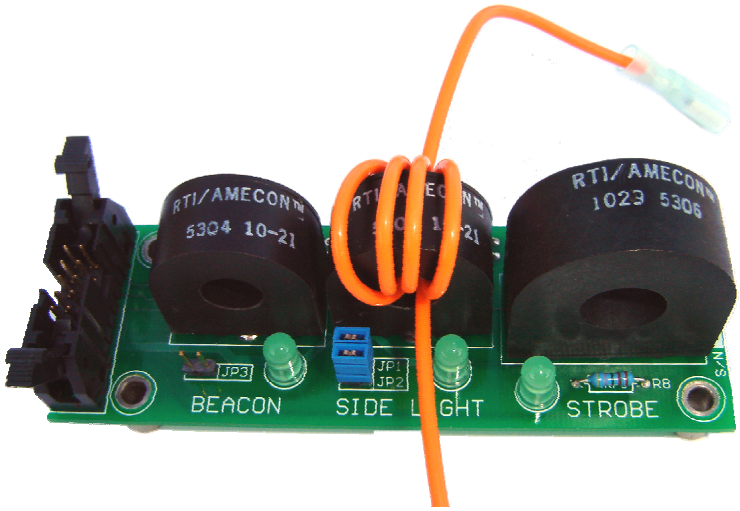


Figure 60: ITL-3421-SEN Sense Board Picture

4. ITL-3410-0HV High Voltage Board

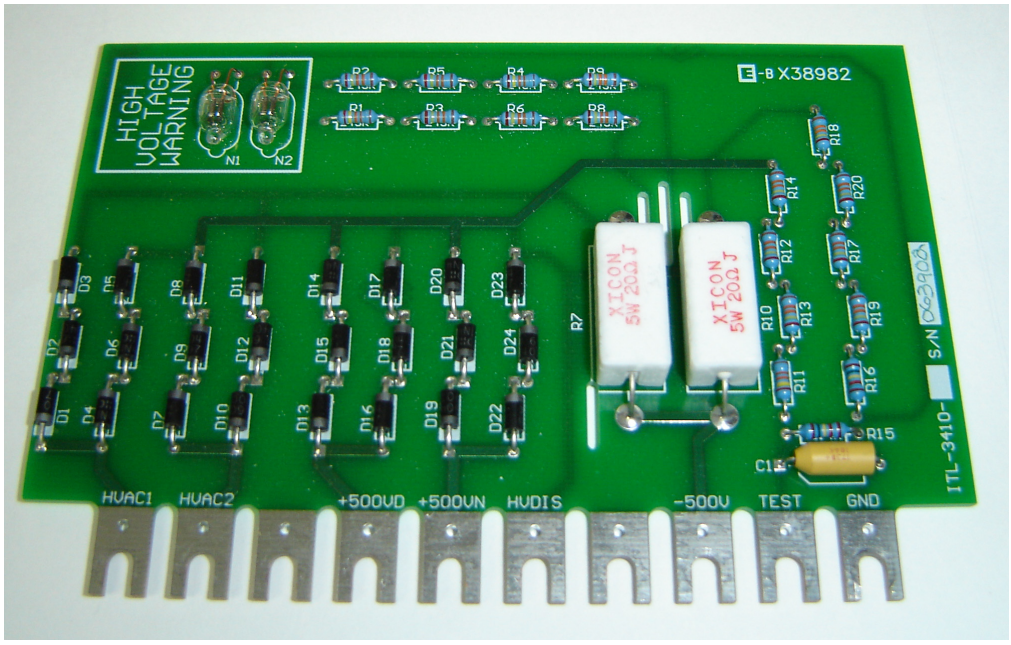


Figure 61: ITL-3410-0HV High Voltage Board Picture

The ITL-3410-0HV high voltage board rectifies the incoming 1000VAC for energy storage in the day and night bank capacitors. Two neon indicators show the presence of high voltage. Capacitor C1 shows a low voltage representation of the AC voltage and connects to the ITL-3400 main board's A/D inputs.

5. ITL-3451-RNC R/C Network Board

Figure 62: ITL-3451-RNC R/C Board Picture

The ITL-3451-RNC circuit board contains a resistor-capacitor network and is installed in the IFH-2400 and IFH-3400 flash head. The IFH-3400 contains two of these circuit boards.

Maintenance / Trouble-Shooting

Please read section *Safety Warning* in this manual before servicing this equipment.

The trouble-shooting section is divided into two parts and explains how to trouble shoot the ILS-1400/2400/3400 strobe lighting systems. The first section contains helpful background information while the second section contains a flowchart with specific trouble shooting guidelines. If you are familiar with this or similar lighting systems you may want to proceed directly to the section *Troubleshooting Flowchart*.

Recommended Tools

The following is a list of recommended electrical equipment for troubleshooting the ILS-1400/2400/3400 strobe lighting systems.

- Digital multi-meter capable of reading 600VAC/DC and capacitance (Fluke 177 or 179)
- Clamp-on type AC Current Meter (Fluke 322 or equivalent)
- #2 Phillips Screwdriver
- 5/16 Flat Head screwdriver
- Crimp Tool
- Needle Nose Pliers

Maintenance

The maintenance outlined below should be performed at least once annually.

- Verify that the fixture is functional in all operating modes with no indication of an alarm condition on alarm indicator lights, alarm dry contacts, or digital monitoring interfaces.
- Verify that the photoelectric control operates the system in the correction operating mode (day/night), light color (white/red) and intensity (day/night intensity) when exposed to light and dark ambient lighting conditions.
- Inspect the fixture for any type of obstruction that could block light output at any point along the 360 degree horizontal output of the fixture. Note that multiple fixtures may be used to achieve 360 degree coverage.
- Inspect lenses and transparent covers for damage.
- Clean the fixture lens or transparent cover using a mild detergent and soft nonabrasive cloth.
- Inspect all electrical wiring connections for corrosion, arcing, damage, insulation degradation or loosening of the connection. Correct, replace or secure as needed.
- Inspect all interconnecting cables and power supply cables and conduits for damage.
- Verify the all cables are fastened securely at appropriate intervals to prevent damage.
- Inspect all electrical components for evidence of damage caused by lightning or power line induced electrical surges. Replace any components showing evidence of damage.
- Inspect fixtures and enclosures for water infiltration and insect infiltration. Replace any damaged gaskets or seals. Install plugs to close any unused conduit ports that may allow insect infiltration.
- Verify that all breathers and drain holes are clear of blockages.

Strobe Light Basics

A simplified strobe light schematic diagram is shown below applicable to any strobe lighting system. An AC power source is stepped-up by the transformer then rectified and used to charge the capacitor bank. When the capacitor bank is fully charged, a trigger is applied to the flash tube. The trigger ionizes the xenon gas in the flash tube which then becomes conductive and quickly discharges the capacitor bank producing light from the flash tube.

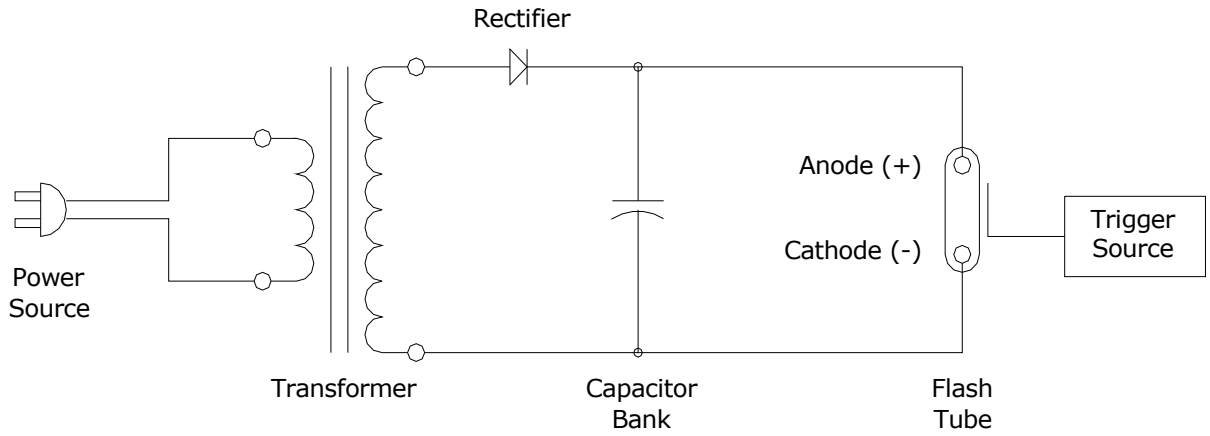


Figure 63: Strobe Light Simplified Diagram

Three Essentials

A strobe light must have three things present to produce light from the flash tube, ***High Voltage***, a ***Trigger pulse***, and a working ***Flash Tube***.

Input Power

The input power for the ILS-1400/2400/3400 comes in on TB1 terminal 14 then proceeds through the interlock switch S1 and fuse F1 to the power transformer primary on T1 terminals 3, 3A, 3C, and 4A.

The Ferro-resonant power transformer T1 provides 500VAC center tapped on terminals 5, 6, and 7. The +/-500VAC goes to the Interlock Relay K2 and is then supplied to the High Voltage Rectifier board, PCB2 on terminals HVAC1 and HVAC2.

The High Voltage Rectifier board performs full-wave rectification and charges the Day Capacitor Bank, C2A-E, on terminals +500VD and -500V and the Night Capacitor, C3, on terminal +500VN and -500V to 1000VDC between Anode and Cathode.

Day Circuit

The Day capacitors C2A-C2E get charged through the high voltage rectifier board PCB2 output +500VD to 1000VDC. The positive side of the capacitors (red wire) connects to TB1-1 through the flash choke L1 and day/night relay K3 terminal 7. In Day mode relay K3 is de-energized.

Night Circuit

The Night capacitor C3 gets charged through the high voltage rectifier board PCB2 output +500VN, the night resistors R1A and R1B), and the night choke L1 to 1000VDC. The positive side of the night capacitor (red/black wire) connects to TB1-1 through the day/night relay K3 terminal 5. In Night mode relay K3 is energized.

Discharge Circuit

The discharge circuit is used to remove high voltage from the system by automatically discharging the day and night capacitors when power is removed from the strobe light or one or more flash head interlock switches are opened. The coil of the discharge relay K1 is powered by the secondary 120VAC from the power transformer T1 terminal 8. When power is applied to the strobe light and the interlock switches are engaged the discharge relay energizes enabling the capacitors to charge through the high voltage rectifier board.

Discharge resistor R2 is wired to the cathode side of the capacitors. The other terminal of R2 goes through the normally-closed terminals on the discharge relay K1 to high voltage rectifier board PCB2 terminal HVDIS. The HVDIS circuit on the high voltage rectifier board is connected together with the day bank capacitors through diodes insuring that all capacitors discharge. Under normal conditions R2 will discharge the capacitors in less than 20 seconds. Once all capacitors have been discharge correctly both neon lights on the high voltage are off.

The system also has a secondary or backup bleeder resistor R3. Due to the size of R3 it will take several minutes to discharge the system with this resistor.

Trigger Circuit

The trigger circuit begins on power transformer T1 terminals 14 and 15. This is a 120VAC output winding dedicated for the trigger. This 120VAC connects to the trigger board PCB1 on connector J4 pins 7 and 8.

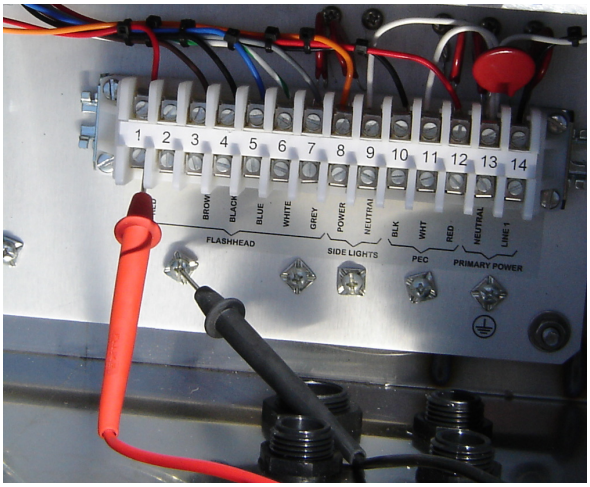
On the timing and trigger board this voltage is full-wave rectified and used to charge a 3.3uF trigger capacitor. For the purpose of triggering a SCR is used to quickly discharge

this capacitor creating a high current pulse that is sent to the flash head. In the flash head the trigger pulse is stepped up by 1000 times to about 20KV and applied to the flash tube.

Measuring High Voltage

Set your meter to measure *DC Voltage*. Touch the *BLACK* meter lead to the chassis of the strobe light. Touch *RED* meter lead to terminal 1 on TB1. The meter should indicate approximately 500VDC (450 to 550 typical).

Touch the *RED* meter lead to terminal 3 on TB1. The meter should indicate approximately –500VDC.



Measuring Side Light Voltage

Set your meter to measure *AC Voltage*.

Touch the black meter lead to the chassis of the strobe light. Touch the red meter lead to terminal 8 on TB1. Put the strobe light in night mode using the Day Night Switch on the Trigger Board.

Your meter should indicate about 120VAC.

Measuring Side Light Current

Use clamp-on type current meter to read *AC Current* around wire connected to terminal 8 on TB1. Put the strobe light in night mode using the Day Night Switch on the Trigger Board. Your meter should indicate about 1Amp for each side light burning.

Measuring Capacitance

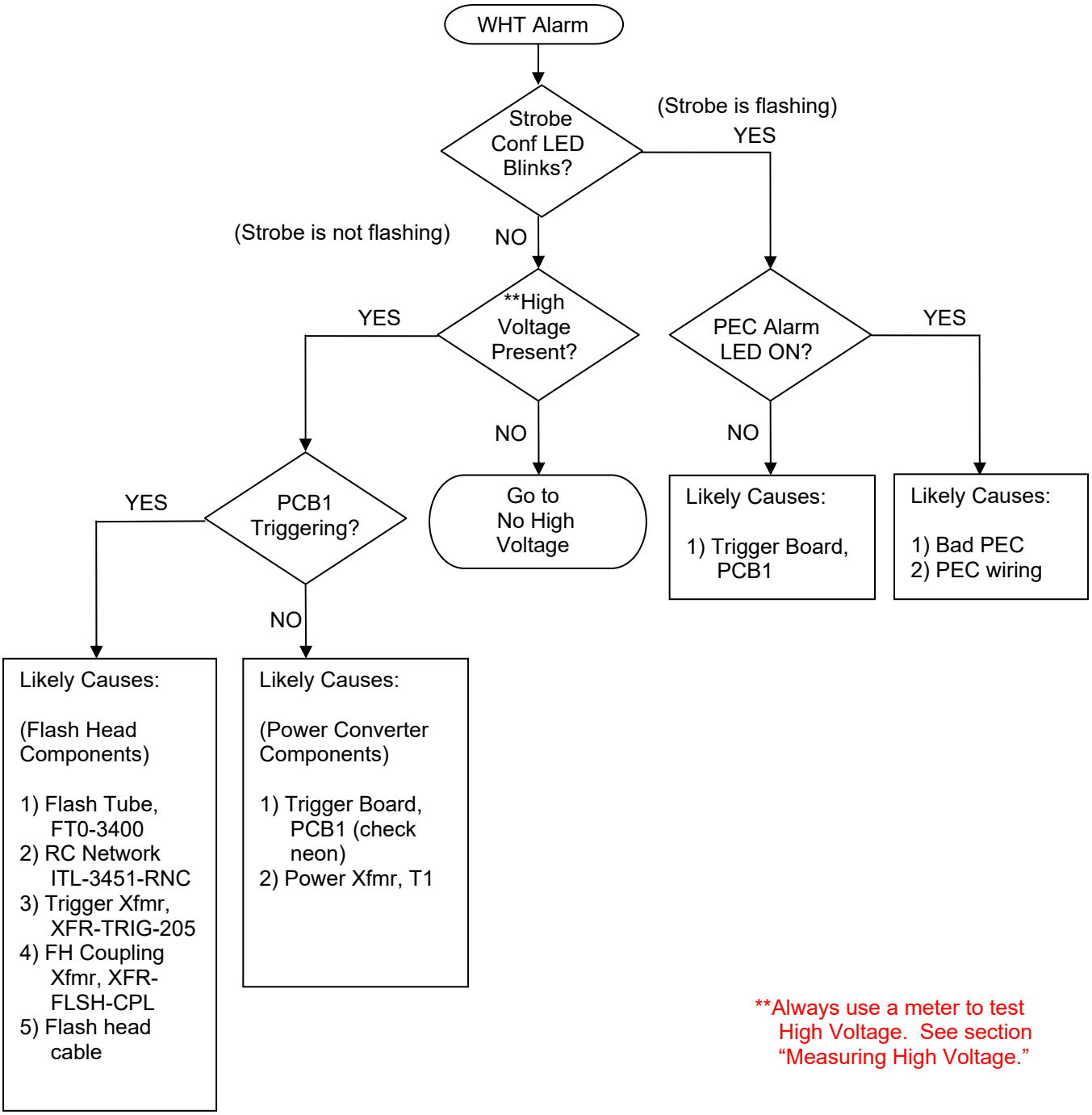
Verify that the capacitors are fully discharged. Follow the steps in the "High Voltage Danger" section before attempting to measure capacitance.

Set your meter to measure capacitance. Touch one meter lead to each terminal of a capacitor. The meter may take several seconds to complete the reading. The IPS-3400 strobe lights use five 70uF capacitors for the Day bank. That means you should measure about 350uF since the capacitors are wired in parallel.

The night capacitor must be measured separately and should read about 3uF. Remove all wires from one terminal of the capacitor to keep other circuitry from interfering with the measurement.

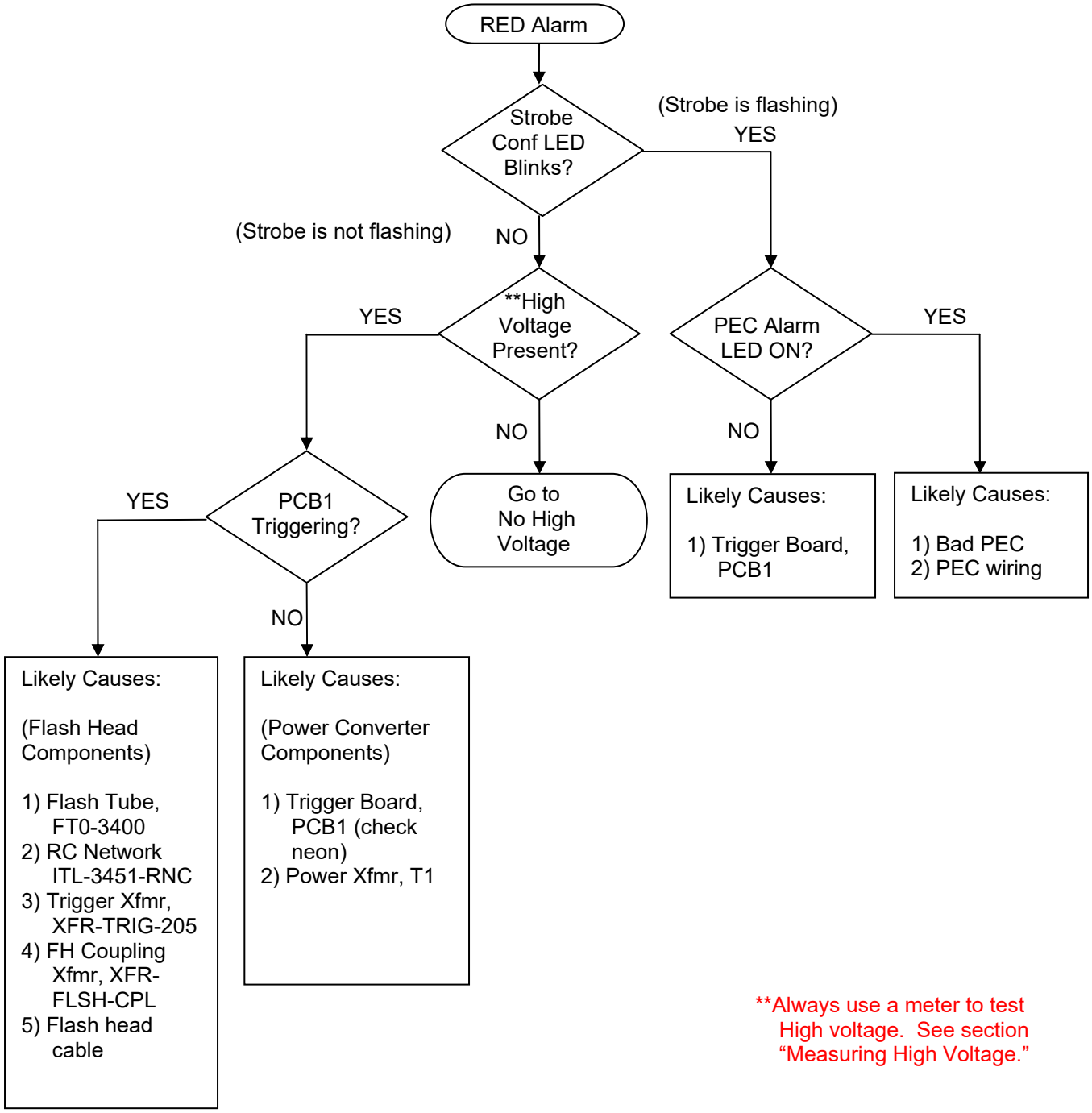
Troubleshooting Flowchart

WHITE Alarm



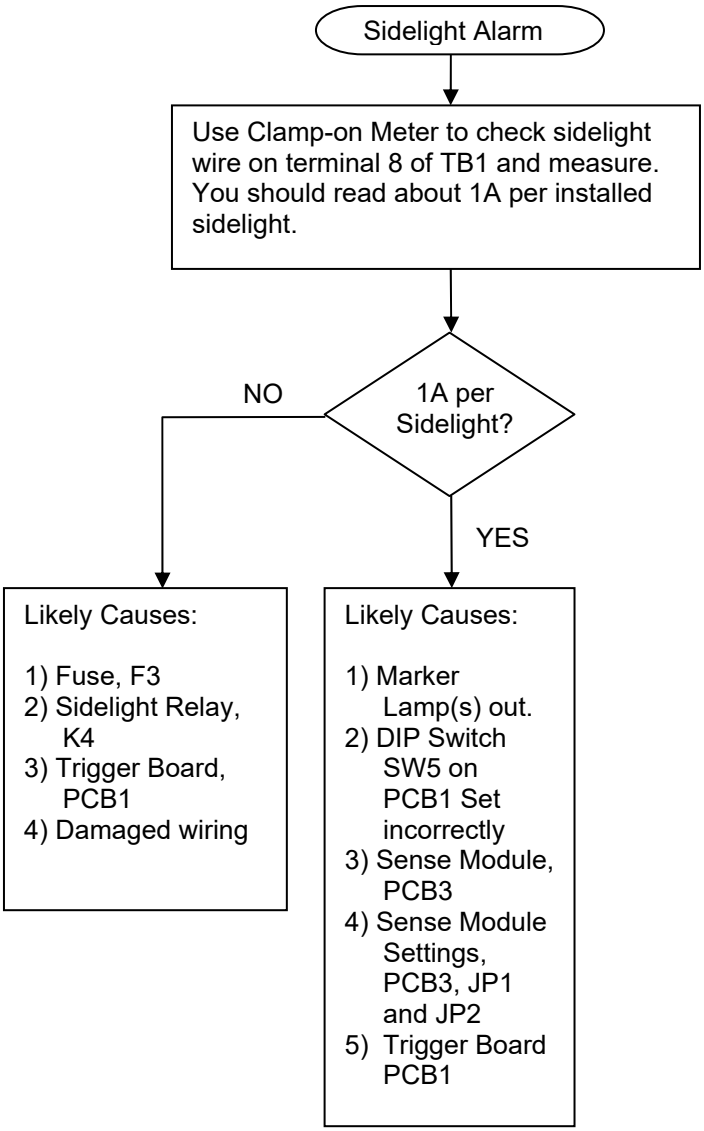
**Always use a meter to test High Voltage. See section "Measuring High Voltage."

RED Alarm

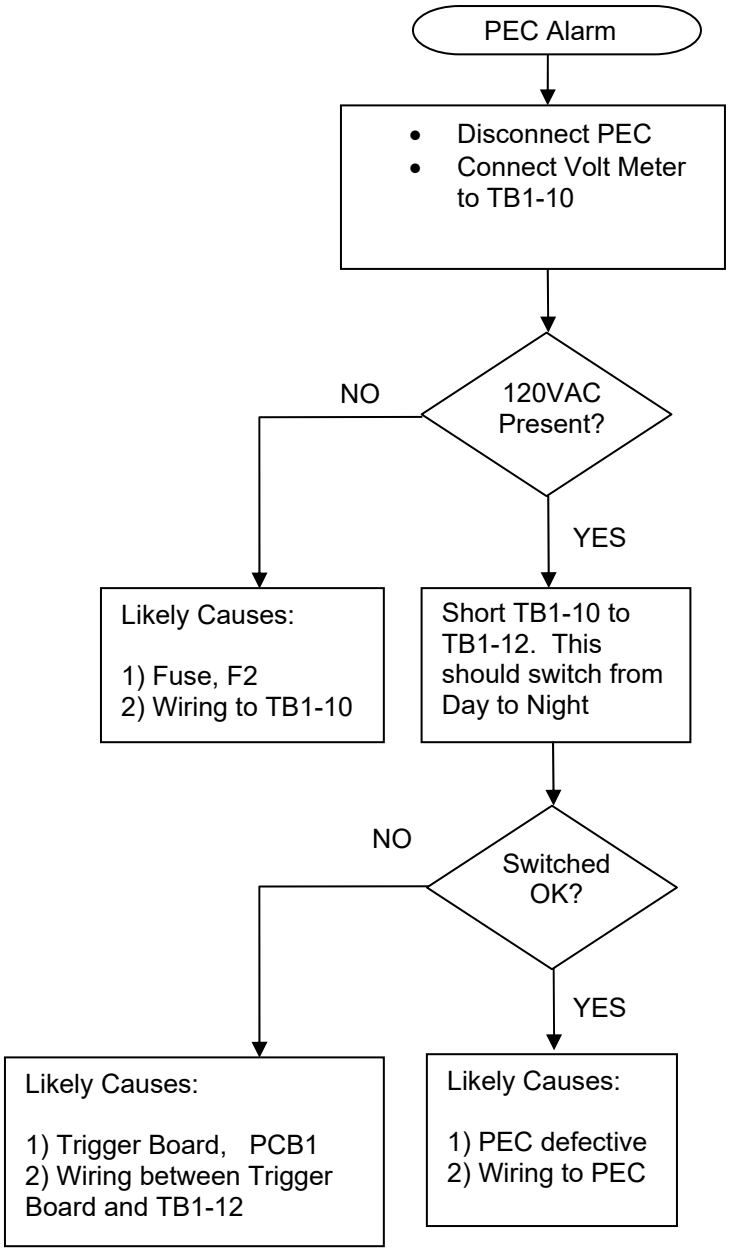


**Always use a meter to test High voltage. See section "Measuring High Voltage."

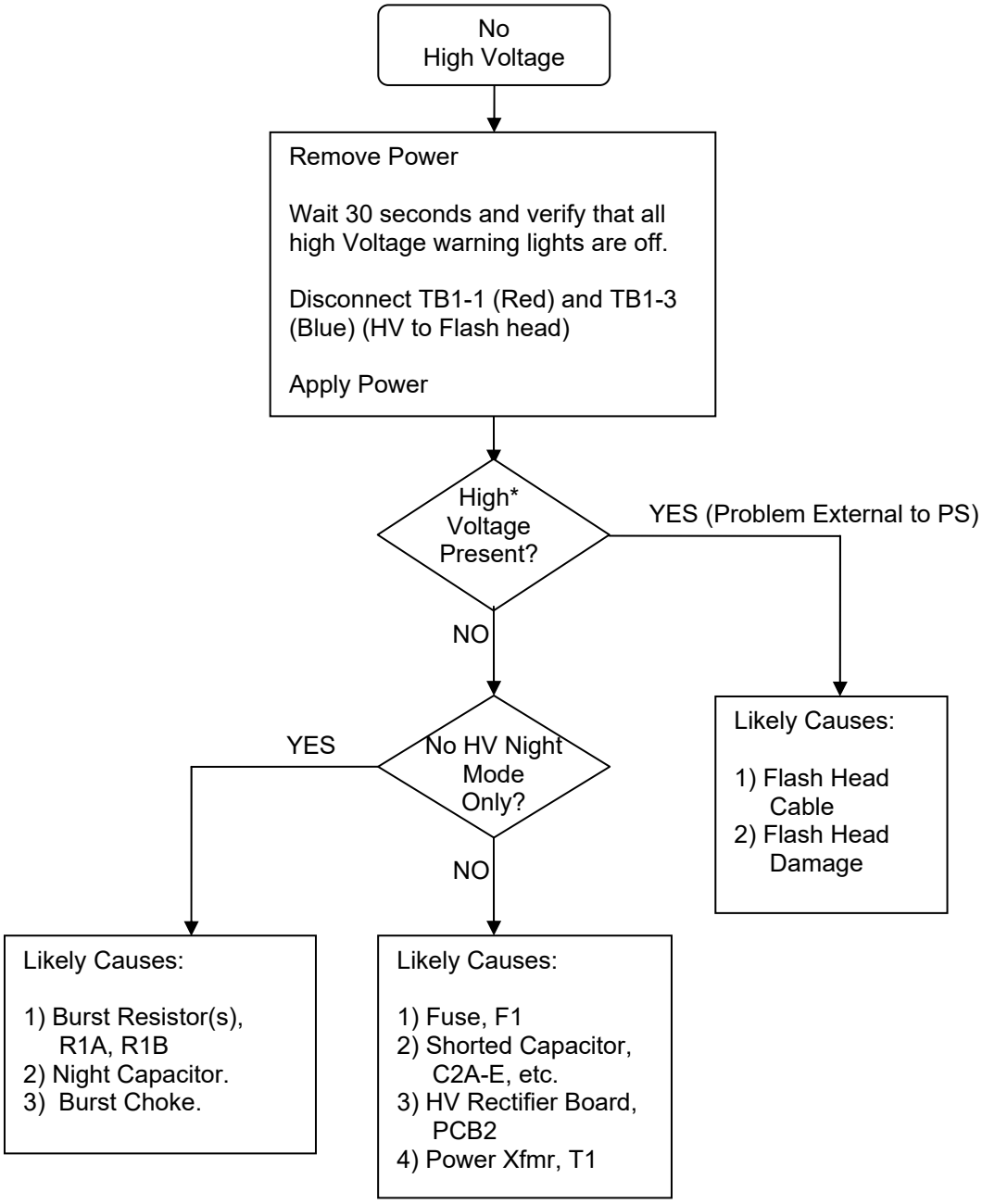
SIDELIGHT Alarm



PEC Alarm LED



No High Voltage



** Measure High Voltage using a volt meter as describe in section above. Both +500VDC anode and -500VDC cathode voltages must be present*

Spare Parts & Replacement Parts

For parts regarding the ILS lighting systems please see the following sections and tables

- *IPS-3400/3800 Power Supply Parts List Table, Page 35 & 80*
- *IFH-2400 White Flash Head Parts List Table, Page22*
- *IFH-3400 White Flash Head Parts List Table, Page 29*
- *PEC Assembly Parts List Table. Page, 41*

Technical Support and Contact Info

Contact Info

For information on the ITL strobe lighting systems' basic functions, refer to this manual and the accompanying drawings. For additional help with the installation or operation of any ITL products, please contact ITL, LLC at one of the following below.

Web and Internet Sites

Corporate home page: http://www.itl-llc.com

Customer Support Technicians

8:00 AM - 5:00 PM Central Time

US and Canada call: +1-615-256-6030

Toll Free: +1-866-624-8309

Email: support@itl-llc.com

RMA

Please contact ITL, LLC before returning equipment for repair and obtain a Return Material Authorization (RMA) number.

Appendix

A – Lighting System ILS-3800

Product Description

The ILS-3800 FAA type L-864(L)/L-865 is a medium intensity strobe lighting system as defined by the FAA's advisory circular, AC150-5345-43F. The lighting system meets or exceeds the specifications as defined in the advisory circular. For more information on those specifications, please refer directly to the FAA website www.faa.gov/airports_airtraffic/airports.

The system consists of a power conversion unit, the IPS-3800, a strobe cable, a red LED (IFH-1700-000) and white strobe (IFH-2400) flash head.

See major component block diagram below.

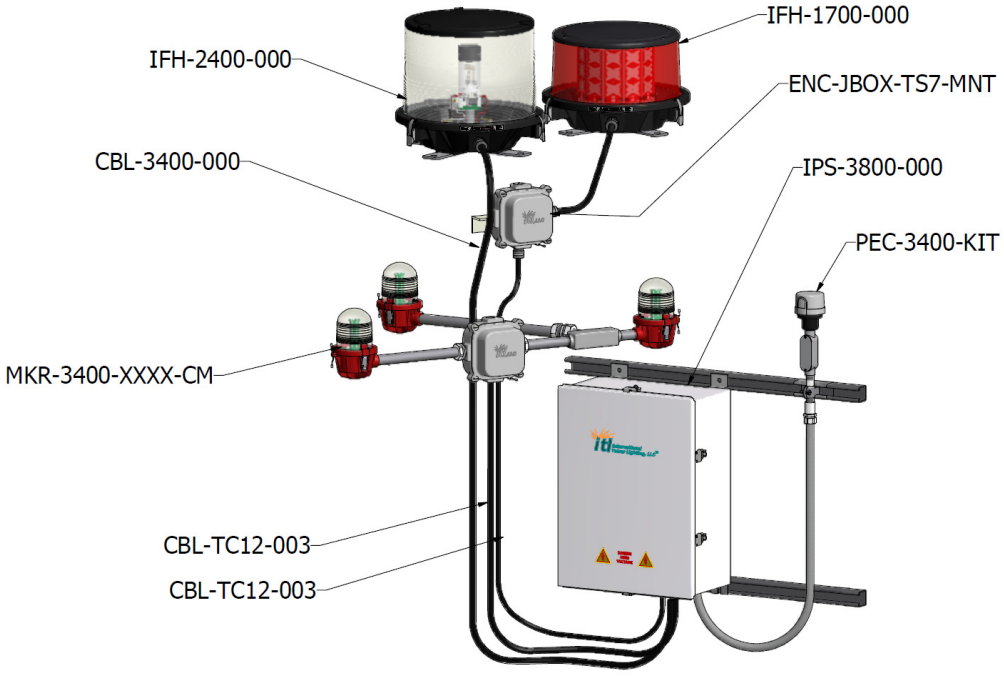
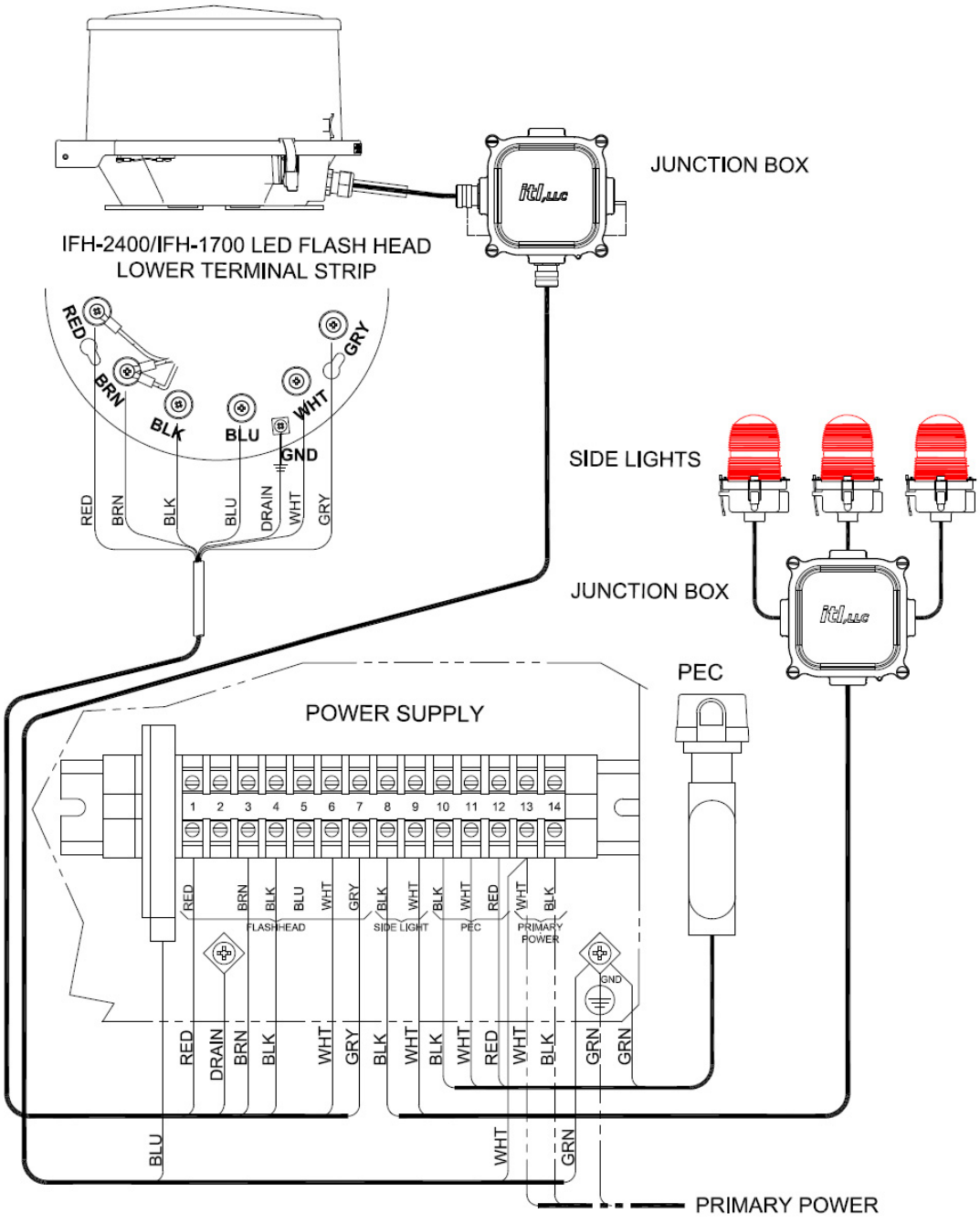


Figure 64: ILS-3800 Strobe/LED System

Installation



NOTES:

3. USE A CONTINUOUS CABLE FROM THE POWER SUPPLY TO THE FLASH HEAD WITHOUT TERMINAL STRIPS OR SPLICES.
4. SUPPLY LIGHTNING PROTECTION FOR THE TOP FLASH HEAD.

Figure 65: ILS-3800 Installation Wiring Diagram

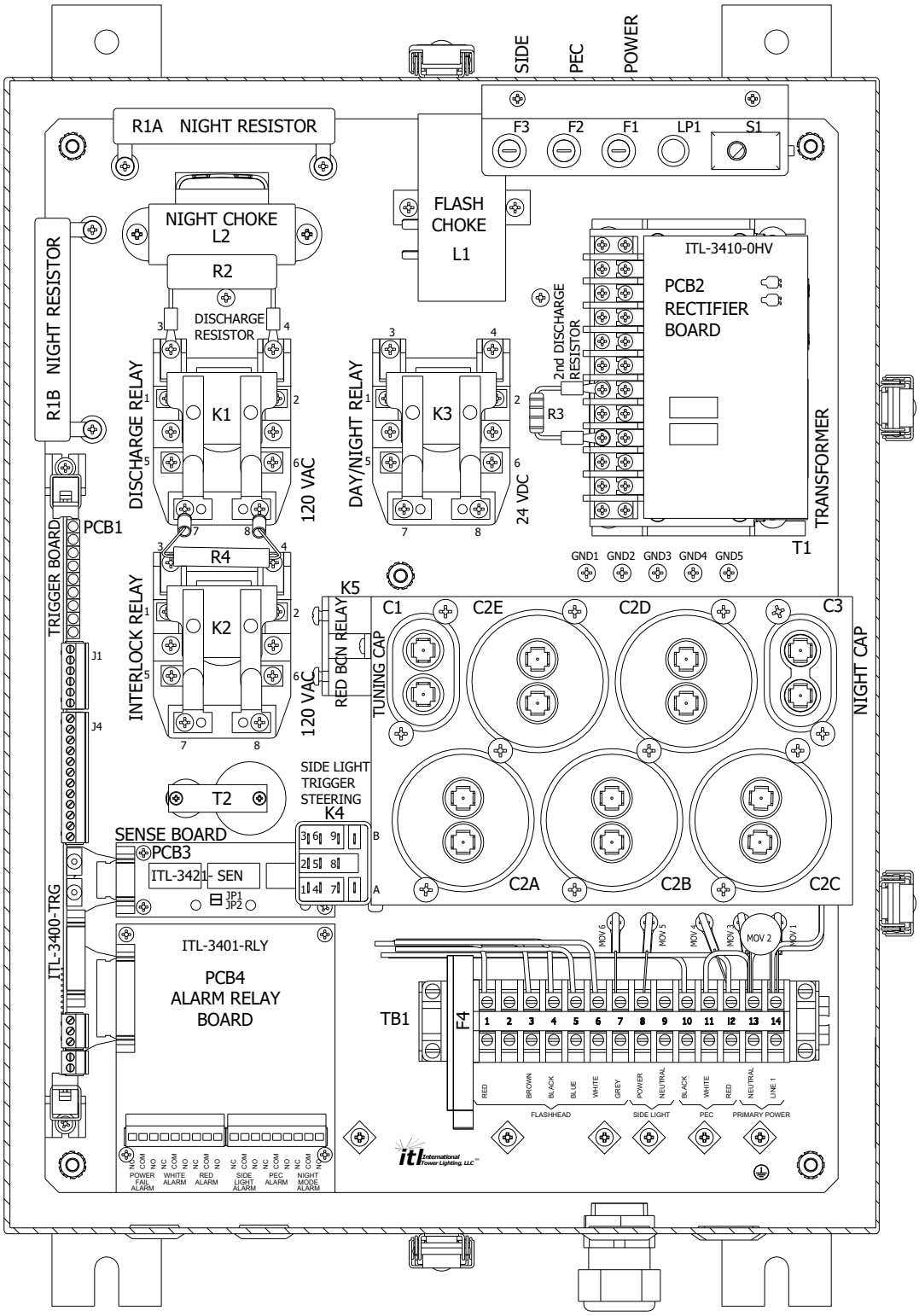


Figure 66: IPS-3800 Power Supply Panel Component Locator

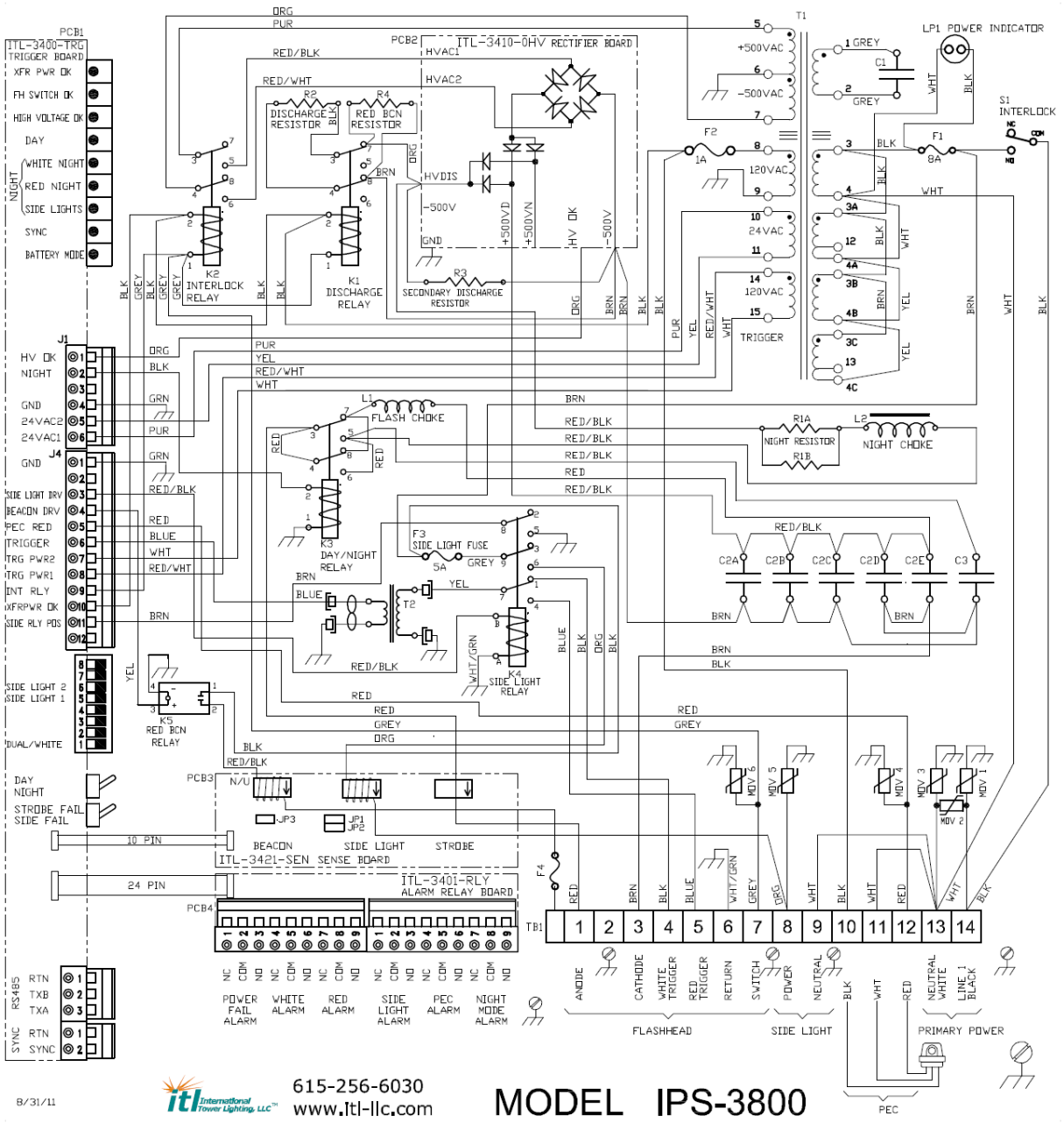


Figure 67: IPS-3800 Power Supply Wiring Diagram

DANGER HIGH VOLTAGE

- ONLY AUTHORIZED AND TRAINED PERSONNEL SHOULD SERVICE THIS EQUIPMENT.
- DISCONNECT POWER FROM THIS EQUIPMENT AND ALLOW ENERGY STORAGE CAPACITORS TO DISCHARGE BEFORE SERVICING.
- ALWAYS VERIFY THAT ENERGY STORAGE CAPACITORS ARE DISCHARGED BEFORE SERVICING.

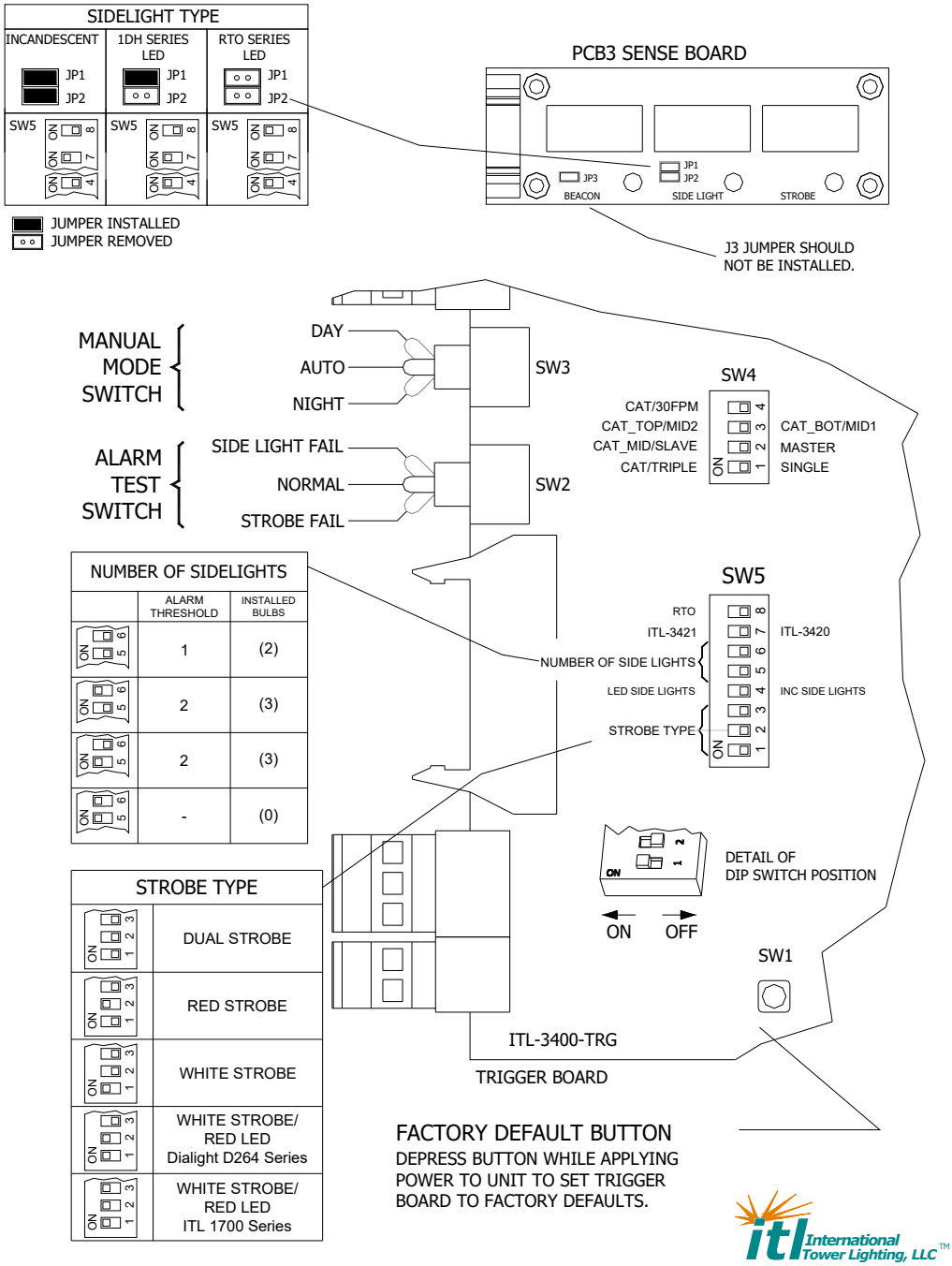


Figure 68: IPS-3800 Configuration Quick Info Guide

QTY	PART NUMBER	DESCRIPTION
1	FUS-002A-3AG	FUSE 2A, 3AG, SLO-BLO
2	OTB-1492-0FB	TERMINAL BLOCK, FUSE BLOCK
1	OTB-1492-EFB	END BARRIER FOR FUSE BLOCK
1	RES-ASSY-34K-RED	SOLID STATE RELAY

Note: Additional Parts for IPS-3800 see Page 35

Figure 69: IPS-3800 Power Supply Parts List Table

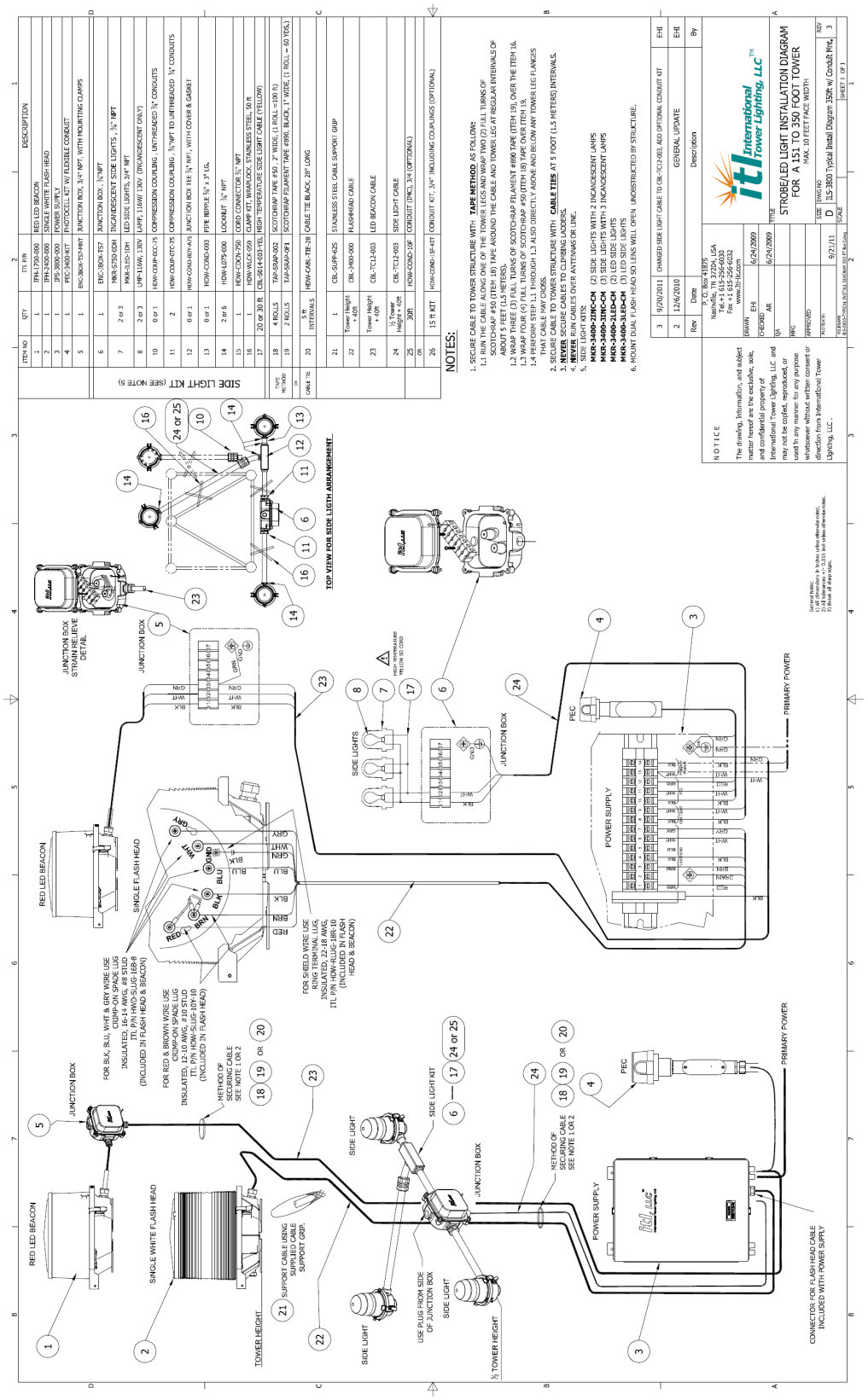


Figure 70: IPS-3800 Single Typical Installation Diagram – 350'

Reference

Glossary

Capacitor

A component that stores electrical charge. Capacitance is measured in Farads. Used to store energy to be discharged into the flash tube.

Choke / Inductor

A device consisting of a coil of wire. An inductor opposes the flow of AC and variations in the flow of DC current. Used to protect flash tube.

Flash tube

Three terminal device which consists of a glass tube filled with xenon gas. The tube contains two electrodes across which a voltage is applied and a third electrode used to trigger the tube.

Fuse

A protective device for electric circuits containing a wire designed to melt and open the circuit under abnormally high electric loads. Used for incoming power, sidelights and PEC.

MOV

Metal Oxide Varistor. A device used to protect sensitive components from voltage transients. Used throughout the equipment.

Relay

An electrically controlled mechanical device that opens and closes electrical contacts when a voltage (or current) is applied to a coil. A relay provides isolation of control signals from switched signals. Used to switch from day to night mode, discharge capacitors, control transformer and provide alarm contacts.

Resistor

An electronic component that opposes the flow of electrical current. Resistance is measured in Ohms. Used in night circuit.

Terminal Block

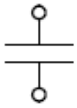
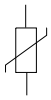
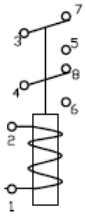
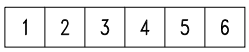
An insulating base with binding posts to make connections where sets of terminals are mounted. Use to connect flash head cable, power, sidelights and PEC.

Transformer

A device used to increase or decrease electricity's voltage and current. Used to step-up incoming voltage to 1000VAC before rectification.

Schematic Symbols

The schematics symbols for the major electrical components used in this document can be found in the table below.

Component	Symbol	Designator	Units
Resistor		R1	Ohms (Ω)
Capacitor		C1	Farad uF (Micro-Farad)
Inductor		L1	Henry mH (Milli-Henry)
Fuse		F1	Amp
Transformer		T1	n/a
Metal-oxide Varistor (MOV)		VR1	Volts, Joules
Switch		SW1	n/a
Relay		K1	n/a
Terminal Block		TB1	n/a

Index - Everything from A to Z

Revision	Description of Change	Date	Preparer / Approval
15-15b	Update cover sheet, update FAA type from L-864(L), L-810(L) for LED Lights	8/2/2012	Prepared By: Elke Hinson Approved By: Andy Rudolph
16	Update Switch Design Page 39 & 79	11/02/2012	Prepared By: Elke Hinson Approved By: Andy Rudolph
17+17a	Changed P/N of Coupling Transformer for Flash Heads from XFR-3400-CPL to XFR-FLSH-CPL (Pg21,22, 28+29), Changed P/N of Night Choke from IND-3400-NCH to IND-BCHK-312 (pg. 34&35) Changed P/N of PEC Strut-Mount from HDW-COND-MNT to HDW-COND-MNT-50 (Pg. 40 & 41), Update text for leveling.	6/06/2013	Prepared By: Elke Hinson Approved By: Andy Rudolph
18	Updated spare parts table (pg 35), added note & details for Power Supply Grounding, added ground wire in Flash Heads. updated Quick Info Guide detail for SW4.	7/08/2014	Prepared By: Elke Hinson Approved By: Andy Rudolph
19	Added installation note “All fixtures, enclosures and junction boxes …”, Added maintenance outline.	8/22/2014	Prepared By: Elke Hinson Approved By: Andy Rudolph
19a	Removed note “Remove power from the strobe light” for Measuring Side Light Current page 68	12/08/2014	Prepared By: Elke Hinson Approved By: Andy Rudolph
20	Updated warranty statement. Updated Part List Tables. Updated Installation Diagrams with Sync Cable Information.	7/15/2015	Prepared By: Elke Hinson Approved By: Andy Rudolph
21	Added Wiring Diagram for IPS-3400-30FPM. Updated Quick Info Guide. Added DIP Switch SW4 Table.	11/13/2017	Prepared By: Elke Hinson Approved By: Andy Rudolph
22	Updated IPS-3400 Configuration Quick Info Guide, SW4 for CAT_BOT	3/4/2019	Prepared By: Elke Hinson Approved By: Andy Rudolph
23	Corrected Page error pg reference on page 60. Updated Title, added “Pulsar Xenon Series”.	9/22/2021	Prepared By: Elke Hinson Approved By: Andy Rudolph