

Training Guide
For
FG3000 Dual Medium Intensity
Lighting System

Manual No. MPR-00000009-001

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HISTORY OF REVISIONS

REV	DATE	COMMENT	APPROVAL
A	7/25/02	Release per ECO 3623	JAJ

The following is Honeywell’s standard Limited Warranty for Airport Systems Products (“Products”). This warranty applies unless a different warranty has been specifically agreed to and signed by Honeywell’s authorized representative.

LIMITED WARRANTY

(a) “Nonconformance” means a defect in workmanship or material; a failure to comply with applicable Honeywell drawings; or a failure to comply with applicable FAA specifications. Normal wear and tear (including but not limited to incandescent lamp failure) or the need for periodic maintenance shall not constitute a Nonconformance.

(b) Honeywell warrants that at time of delivery to Buyer, its Products will comply with applicable Honeywell drawings and FAA specifications and will be free from defects in workmanship and material. These warranties shall run to Buyer, its successors and assigns. The duration of these warranties shall be as follows:

- (1) for non-LED-based airfield and obstruction lights and for Control and Monitoring Systems (excluding software and third-party components), twenty-four (24) months after shipment of the Product or twelve (12) months after date of first use, whichever occurs first;
- (2) for LED-based airfield and obstruction lights, five (5) years after shipment of the Product;
- (3) for Control and Monitoring System software developed by Honeywell, ninety (90) days from date of first use; and
- (4) for third party hardware and software components of Control and Monitoring Systems, in accordance with the warranty from the third party.

(c) Buyer must notify Honeywell in writing of a Nonconformance within the warranty period and return the Product to Honeywell within thirty (30) calendar days after such notice, in accordance with instructions which shall be issued by Honeywell. Honeywell’s obligation and Buyer’s remedy under this warranty is limited to either repair or replacement, at Honeywell’s option, of the nonconforming Product. All Products repaired or replaced hereunder shall be warranted only for the unexpired portion of the original warranty period. Honeywell agrees to assume round trip transportation costs for a nonconforming Product in an amount not to exceed normal ground shipping charges to the warranty service facility designated by Honeywell. The risk of loss or damage to all Products in transit shall be borne by the Party initiating the transportation of such Products.

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SECTION 1.0 - GENERAL INFORMATION

1.1 Scope

This training manual provides information about the component function, component location, system installation, and general operation of the FG3000 Medium Intensity Dual Lighting System, part number FG3000 manufactured by Honeywell, 2162 Union Place, Simi Valley, California 93065, telephone (805) 581-5591. The lighting systems described in this manual are Federal Aviation Administration (FAA) type L-864/865.

WARNING

Modifications to the Power Supply are required for certain applications.

1.2 General Description

FlashGuard medium intensity strobes are FAA approved lighting systems. Honeywell manufactures many different models to meet various lighting requirements. The following models are the most common, however, only the FG3000 will be discussed in this training manual:

<u>Model</u>	<u>FAA Type</u>	<u>Color</u>	<u>Input Voltage</u>
FlashGuard 3000	L-864/L-865	Dual Red/White	120 VAC, 60 Hz

Several other models are available, and there are many similarities between all models. This training manual is meant to supplement the "Installation and Operation Guide" which comes with each system. For drawings, circuit diagrams and more detailed information, please refer to the end of this guide or the Owner's manual.

1.3 Safety Precautions

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of this equipment. Honeywell assumes no liability for the customer's failure to comply with these requirements, as listed below.

1. Any interruption of the protective grounding conductor (inside or outside the instrument) or disconnecting the protective earth ground terminal is likely to make this equipment dangerous. Intentional interruption is prohibited.
2. Whenever it is likely that the ground protection has been impaired, the equipment must be made inoperative by removing AC line power, and then shall be secured against any unintended operation.
3. Ensure that only fuses with the required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.
4. Electrical energy available at many points may result in personal injury or death if touched. Any adjustment, maintenance, and repair of the opened equipment while power is applied shall be avoided as much as possible, however some maintenance described in this manual is performed with power supplied to the equipment while protective covers are removed. When repair with power applied is unavoidable, maintenance shall be carried out only by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
5. Do not install substitute parts or perform any unauthorized modification to the equipment.
6. Capacitors inside the equipment may still be charged after the equipment has been disconnected from its power source, even though the equipment was designed to drain charge from the capacitors when power is removed. Do not put hands or tools in the Flashhead until the High Voltage Indicator neon lamp on the High Voltage board is extinguished.

WARNING

The **WARNING** sign in this manual denotes a hazard. The **WARNING** calls attention to a procedure or practice which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

WARNING

This system uses lethal voltages in the Flashhead. Unless absolutely necessary, do not attempt to service or adjust the equipment with AC line power applied.

Safety interlock switches are provided in the Flashhead enclosure to interrupt main AC power to the power supply. These interlock switches are activated when the Flashhead door is opened in a conventional manner. No interlock is provided when other means of access are used. Never tamper with (remove, short circuit) the interlocks in any way.

AC LINE VOLTAGE IS STILL PRESENT WHEN INTERLOCKS ARE ACTIVATED. DISCONNECT POWER AT THE MAIN AC CIRCUIT BREAKERS BEFORE INSPECTING OR SERVICING, UNLESS ABSOLUTELY NECESSARY TO PERFORM MAINTENANCE WITH POWER ON.

WARNING

Flashtubes in this lighting system produce brilliant flashes of light containing some ultraviolet radiation which can cause temporary or permanent eye damage.

DO NOT LOOK DIRECTLY AT THE FLASHHEAD WHILE IT IS IN OPERATION.

1.4 Honeywell Technical Support

The Honeywell Technical Support department can be reached at (805) 581-5591. Normal hours are 7:00 am to 5:00 pm Pacific. If you have any questions or are unsure about installation or troubleshooting methods, please call our service department. Incorrect wiring can cause permanent damage to the system.

1.5 Specifications

Light Output:

Day Intensity.....	20,000 ±25% effective candelas, single flash
Night Intensity.....	2,000 ±25% effective candelas, burst of flashes
Beam Pattern	360° horizontally, 3° min. vertically max. intensity of 3% of peak at -10°
Flash Rate: Day	40 fpm - single white flash
Night.....	40 fpm - red burst of flashes
Master/Slave Operation	up to 4 slave units

Electrical Input:

Power Supply	120VAC 60Hz
Sidelights.....	1 to 4 type L-810 116W, 120V lamps or 120V LED fixtures

Mechanical Properties:

Flashhead	
Weight	34 pounds (15.3 kg)
Dimensions.....	16.5"w (419.1mm) x 23"h (584.2mm)
Surface Area	1.98 square feet
Wind Load.....	105 pounds at 150 mph (240kph)

Power Supply

Weight	53 pounds (23.85 kg)
Dimensions	18.5"w (469.9mm) x 16.5"h (406.4mm) x 9.63"d (244.6mm)

Operating Environment:

Operating Temperature	-55°C to +55°C
Humidity.....	95% relative humidity

System Operating Status Indicators:

Neon lamps	PWR Line and High Voltage indicators
LED Lamps:	
Sync/Monitor Board	Sync out, master (red); fault relay (green)
Trigger Control Board	Sync line active (green); red Strobe ON (red)
Fault Indication	
Strobe	relay closure
Sidelight(s)	relay closure

SECTION 2.0 - INSTALLATION

2.1 Power Supply

The power supply can be located anywhere up to 500 feet away from the flashhead. When the system is shipped, it has been tested with a particular length of strobe cable to suit the specific installation. Although the enclosure for the power supply is a NEMA 4X equivalent indoor/outdoor enclosure, most users prefer to install the power supply in the communications shelter. This makes maintenance and repair easier during bad weather, and reduces the chances of vandalism.

2.2 Photocell

The photocell should be mounted *upright*, and rotated so that the window has an unobstructed view of the northern sky. If there is a light source nearby, such as flood lighting, which might affect the photocell's operation, the photocell may be mounted higher on the tower.

2.3 Flashhead

When mounting the flashhead, care should be taken to make the flashhead as level to the horizon as possible. Even if the flashhead is only a couple of degrees off level, the 'ground scatter' light will increase significantly.

The flashhead should be mounted so that no part of the tower or antennas blocks the light output of the strobe. If a significant portion of the light must be blocked, two strobes should be mounted at opposite sides of the tower to provide an unobstructed view of at least one strobe from any angle. Some sites that use wide panel antennas utilize two strobes at the top level to assure 360° coverage.

2.4. Wiring and Alarm Connections

Good wiring terminations are critical for reliable operation. Make sure that each conductor has enough insulation removed to make good contact, and that no part of the wire's insulation is caught in the terminal block. Do not use crimp on connectors on the conductors before inserting them into the terminal block, as this can create a resistive hot spot.

Wiring diagrams for specific models are located in the installation and operation guide. The following connections must be made:

2.4.1 Input Power

Make sure the proper voltage has been supplied before energizing the unit for the first time. Ensure that polarity of the incoming power conductors is correct. Honeywell recommends that the tower lighting system has its own circuit breaker, so that power can be interrupted for servicing the system. Some users use a separate breaker for each strobe to prevent total outages when a circuit breaker trips. Honeywell recommends the use of a 10Amp circuit breaker per power supply.

2.4.2 Strobe Cable

A special seven-conductor strobe cable is run continuous between the flashhead and the power supply. This cable carries high voltages and must not be spliced. Honeywell's part number for this cable is *77-4017-4, and we require the use of this cable. Honeywell provides cable ties for attaching the cable to the tower. The cable ties should be applied in a cross or bow tie fashion to prevent slippage and cable damage.

2.4.3 Sidelight Cable

Tray Cable, Honeywell p/n WC23012CL0T (3-conductor) or WC23012DL0T (4-conductor), should be used between the power supplies and the sidelight junction boxes. On towers up to 350' with one level of sidelights, a three-conductor cable is used with Line, Neutral and Ground. On towers over 351' with two levels of sidelights; a four-conductor sidelight cable is used. Each level has it's own line conductor (either red or black) and both levels share the neutral and ground conductors.

2.4.4 Photocell Wiring

Connect the photocell leads to the power supply. For multiple strobe systems, the photocell should be connected to the "Master" power supply only. The photocell comes with a 12" pigtail, additional #14-AWG wire will be required to mount remotely.

2.4.5 Power Supply Interconnection

(Multiple flashhead systems only) When multiple power supplies are used, they must be interconnected to provide synchronous flashing, and uniform day/night mode switching. This is done by daisy-chaining the TB1-1 (day/night) terminal from each power supply together, and daisy chaining the TB1-3 (sync) terminal from each power supply together.

2.4.6 Alarm Wiring

Honeywell provides dry contact alarms that can be monitored by remote alarming system. Depending on the type and number of alarm channels your system has available, there are several ways to alarm the lighting system. Several examples are included in the installation and operation guide. It is usually a good idea to separate flashhead alarms from sidelight alarms when using a dual lighting system. This allows you to distinguish a reportable failure (flashing light or top light outage) from a non-reportable failure (intermediate steady burning light outage.) Alarm contact information is included at the end of this manual.

SECTION 3.0 – COMPONENT DESCRIPTIONS & FUNCTIONS

3.1 Power Supply

This is the stainless steel enclosure that contains the necessary strobe circuitry. The power supply provides the charge and the trigger pulse needed to flash the strobe, turns the sidelights on and off, and monitors the operation of the strobe and sidelights. Each power supply provides power for one flashhead and up to four steady burning sidelights. The power supply includes the following components:

Test Switches

- Put either day or night switch in 'test' position to override photocell control.
- Both should be left in 'remote' position for automatic switching via the photocell.

Interlock Switch

- Three position switch for power input to high voltage transformer
 - Pulled out to turn system on for ease of troubleshooting
 - Middle position is OFF
 - Engaged (depressed) to turn system ON (door closed)

Terminal Blocks

TB1 – Power input, photocell, alarms

- TB1-1 – Photocell connection (red wire), *connection to slave unit*
- TB1-2 – Photocell connection (black wire)
- TB1-3 – Sync Output to slave unit (if required)
- TB1-4 – Sync Output to slave unit(s) for catenary system (TOP)
- TB1-5 – Sync Output to slave unit(s) for catenary systems (BOTTOM)
- TB1-6 – Alarm Output (Normally Open, closed on failure)
- TB1-7 – Alarm Output (Normally Closed, open on failure)
- TB1-8 – Alarm Common
- TB1-9 – Input Power, Line, 120VAC
- TB1-10 – Input Power, Neutral

TB2 – Strobe Output

- TB2-1 - +500 VDC, RED
- TB2-2 - -500 VDC, BROWN
- TB2-3 – 0VAC or 120VAC , BLACK, Trigger Transformer coil
- TB2-4 - +500 VDC, BLUE, Trigger Pulse to trigger transformer relay
- TB2-5 – 120 VAC, GREY, Interlock Switch
- TB2-6 – 120 VAC, WHITE, Interlock Switch
- TB2-7 – Ground, Bare Shield

TB3 – Sidelight Output

- TB3-1 – 120 VAC, Line output to sidelight(s)
- TB3-2 – Neutral output to sidelight(s)
- TB3-3 – Factory side wiring, Neutral to TB3-2
- TB3-4 – Factory side wiring, 120 VAC to sidelight module
- TB3-Lug - Ground

TB4 – Sidelight Alarm

- TB4-COM – Sidelight Alarm Common
- TB4-NO – Normally Open, closed on failure
- TB4-NC – Normally Closed, open on failure

Fuses – F1 & F3

- F1 – Input power fuse, 4 Amp SLO-BLO
- F3 – Sidelight circuit power fuse, 10 Amp, SLO-BLO

Discharge Resistors – R2 & R3

- Provide discharge path for capacitor bank when interlock switch is disengaged
- R2 discharges the Night capacitor, R3 discharges the Day Capacitor bank

Interlock Relay K1

- Energizes when both the flashhead and power supply interlocks are engaged.
- Provides input voltage to power transformer T1 (120 VAC systems)
- De-energizes if the power supply or flashhead is opened. This stops all high voltage generation from the power supply and discharges the capacitors for safety.

Power Transformer T1

- Converts incoming AC to 1000V peak-to-peak AC.
- Provides 20 VAC for circuit boards.
- Provides 120 VAC control voltage for relays & photocell.
- Normal switch setting is '115' for 120 VAC installations

High Voltage Circuit Board

- Rectifies high voltage from Transformer T1. (AC⇒DC)
- Neon lamp acts as warning light when high voltage is present.

Resonating capacitor C1

- Regulates capacitor charge voltage to 1000 VDC to compensate for changes in input voltage.

Day/Night Relay K2

- Energized in night mode, de-energized in day mode.
- In night mode, the following occurs:
 - Day capacitor bank C2 is removed from the circuit.
 - Control voltage is applied to Trigger/Control Board and Sync/Monitor Board
 - Sidelights are switched on (Dual lighting systems only)

Day capacitors C2

- Charged up and discharged during day mode only.

Night Capacitor C3

- Charged up and discharged during day and night modes.

Diode Board

- Steers current from day capacitors to flashtubes in day mode.
- Blocks current from charging day capacitors in night mode.

Current Sense Transformer T2

- Senses output current to flashtubes.
- Sends current value to Sync/Monitor Board to verifies strobe is flashing.

Sync Monitor Board

- DIP switch selects master or slave operation, S1-4. Master = OFF, Slave = ON. For a tower with more than one flashhead, one power supply is set as the 'master', and the rest are set as 'slaves.'
- When set as the master, the Sync/Monitor board generates a sync pulse that is sent to all Trigger/Control boards. This provides synchronous flashing of all flashheads.
- DIP switch selects AC or DC input power, S1-1.
- DIP switch selects 50 or 60 Hz, S1-2.
- DIP switch selects night color (white or red), S1-3.
- DIP switches set the number of flashes per minute for red night mode, S2.
- Detects failure of flashhead by monitoring current pulses.
- Green LED lights to indicate proper operation of the flashhead. Green LED shuts off when strobe alarm is generated.
- Red LED blinks to indicate a sync signal has been sent to the Trigger/Control board (master mode only).
- Test switch, S3, on top edge of board simulates flash failure if held down for greater than 10 seconds, causing the system to go into alarm. On dual red/white systems, if the system is in red night mode before the test switch is activated, backup white night mode operation will begin.

Trigger Control Board

- Provides a trigger pulse to primary of the trigger transformer in the flashhead to initiate the 'flash'. Trigger pulse provides a single flash for day mode operation and a burst of flashes when operating in night mode.
- DIP switches (SW1 and SW2) used to set the number of flashes in a burst for night operation. **NOTE:** *These should not be changed from factory settings.*
- Red LED lights up when system is in red night mode (dual systems only).
- Green LED blinks to indicate that the sync pulse has been received from the master Sync/Monitor board.
- Initiates a flash sequence on its own if a sync pulse is not received from the master Sync/Monitor board within 3 to 4 seconds.

Red Light Control Module

- Turns on sidelights during nighttime operation.
- Monitors sidelights for lamp failure.
- DIP switches select the number of lamps to alarm for, 120V or 130V operation, and 116W or 620W lamps. For LED type L-810 fixtures, an extra loop through the current sensor is required.

Photocell

- AC Systems: Switched Leg Photocell
- The photocell is attached to the power supply by three wires: Black (line), White (neutral) and Red (switched leg). The Red line is 120 VAC during night mode and 0 VAC in day mode.

3.2 Flashhead

The flashhead is connected to the power supply by a continuous run of a special seven-conductor strobe cable. The flashhead consists of the following components:

Flashtubes FT1 and FT2

- A string of three Xenon gas flashtubes for light output.
- FT1 used for white operation, FT2 used for dual system red operation.

Trigger Transformers T1 and T2

- Receive and boost trigger pulse from power supply to ignite flashtubes and initiate the 'flash'.
- T1 used for white operation, T2 used for red operation.

Trigger Transformer Relay K1

- Switches the trigger pulse between trigger transformers for red or white operation.

Interlock Switch S1

- Three position switch for safety during maintenance of flashhead
 - Pulled out to turn system on for ease of troubleshooting
 - Middle position is OFF, *de-energizes high voltage in power supply*
 - Engaged (depressed) to turn system ON (flashhead closed)

SECTION 4.0 - Status Indicators

Control Power ON

- Located on the control panel (top center) near the test switches. This indicator is illuminated whenever input power is present and the power supply interlock switch is engaged.

High Voltage Neon Lamp

- Located on the high voltage circuit (top) board, this lamp indicates that the high voltage circuits are active.
- This lamp flutters when the strobe is flashing.
- Extreme caution should be used when the neon lamp is on!

Flashhead Alarm Status LED DS1

- Located on the sync monitor (middle) board, this LED will be green when the flashhead is operating correctly.
- If the LED is off, the system is in alarm mode.

Sync Out LED DS2

- Located on the sync monitor (middle) board, this LED blinks red to indicate that a sync signal has been generated.
- In a multiple flashhead system, only the 'master' sync/monitor board' sync out LED will blink.

Sync In LED DS1

- Located on the trigger control (bottom) board, this LED blinks green to indicate that a sync signal has been received from the sync/monitor board.

Flashtube Status LED DS2

- Located on the trigger control (bottom) board, this LED is red if the red flashtubes are in operation.
- If the white flashtubes are being used, the LED is off.

Sidelight Failure LED

- Located on the red light control module, this LED turns red to indicate a sidelight lamp failure.
- This LED is off when the sidelights are operating properly.

SECTION 5.0 - Alarms

The following chart depicts the alarm contact points available for the FG3000.

Alarm Name	Terminal Block Location	Alarm Points	Normal Status	Fault Status	Indicator	Normal	Fault
Strobe Alarm	Power Supply TB1	#6 to #8	Open	Closed	Green LED, Sync Board	GREEN	OFF
		#7 to #8	Closed	Open			
Sidelight Alarm	Sidelight Module TB4	C to NO	Open	Closed	Red LED, Sidelight Module	OFF	RED
		C to NC	Closed	Open			

SECTION 6.0 - Maintenance

6.1 Spare Parts – Power Supply

<u>Component Description</u>	<u>Part Number</u>	<u>Spare Parts Kit (qty)</u>
Strobe Power Fuse, F1	*DP-1020	Yes (5)
Sidelight Power Fuse, F3	*77-2040	Yes (5)
Transformer Fuse	*DP-1019	Yes (5)
Photocell	*77-3259	Yes (1)
Panel Relays, K1 & K2	*77-2013	Yes (1)
Diode Board	*277-3939	Yes (1)
High Voltage Board	*277-3937	Yes (1)
Sync Monitor Board	*277-4163	Yes (1)
Trigger Control Board	*277-4169	Yes (1)
Sidelight Module	*277-4195	No

Power Supply Spare Parts Kit **FG3000PS-SPK**

6.2 Spare Parts – Flashhead

<u>Component Description</u>	<u>Part Number</u>	<u>Spare Parts Kit (qty)</u>
Trigger Transformer, White	*77-4040W	No
Trigger Transformer, Red	*77-4040R	Yes (1)
Trigger Transformer Relay	*77-4192	Yes (1)
Flashtube	12S00602	Yes (1)

Flashhead Spare Parts Kit **FG3000FH-SPK**

6.3 Scheduled Maintenance

The light output from the flashtubes decreases with use. The flashtubes in Honeywell's FG3000 lighting system should be replaced as follows:

- White Flashtube & Trigger Transformer – every 3 years
- Red Flashtube & Trigger Transformer – every 6 years

No scheduled maintenance is required inside the power supply.

6.4 Tools required for maintenance

- Small flat screwdriver (used on sidelight module)
- Long flat screwdriver for terminal blocks
- 5/16" nut driver for flashhead
- Clean gloves for flashtube handling
- Digital multi-meter with Ohm reading and a minimum 500 VDC scale
- Jumper wire with alligator clips for hands free voltage readings

Section 7.0 - Orders and Returns

When ordering Honeywell equipment, please contact:

Honeywell
2162 Union Place
Simi Valley, CA 93065

Phone: 805-581-5591
Fax: 805-581-5032
Email: lighting.webrequest@honeywell.com
Website: www.oblighting.com

When returning purchased Honeywell equipment, please contact our main office and request a Return Merchandise Authorization (RMA) number. This will be used for internal tracking of your returned materials. This number should be written on the outside of the mailing box and also on piece of paper that describes the known problem(s) of the merchandise that is being returned. Please send all materials to the address listed above.

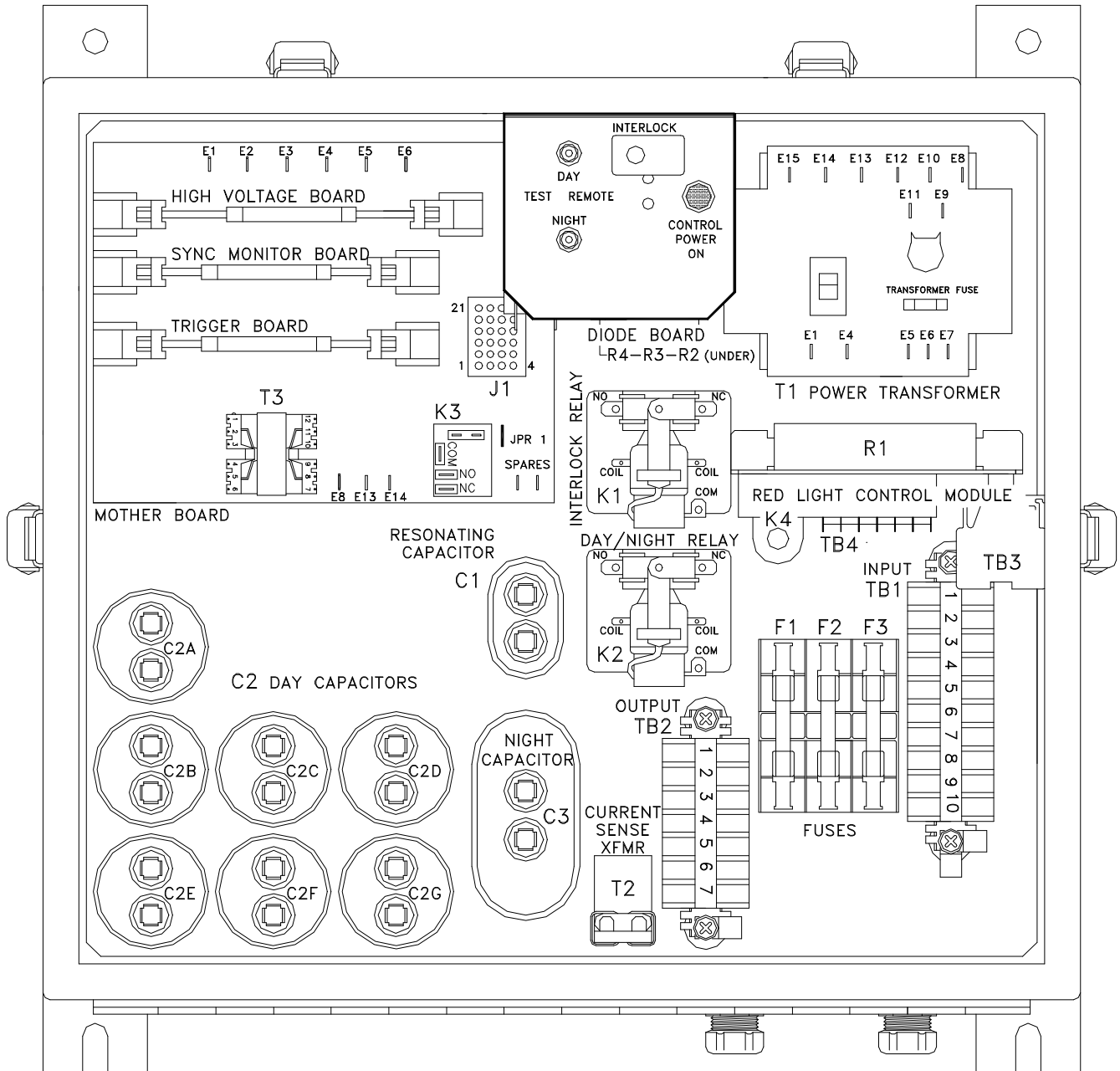


Figure 1 – Power Supply Component Locations

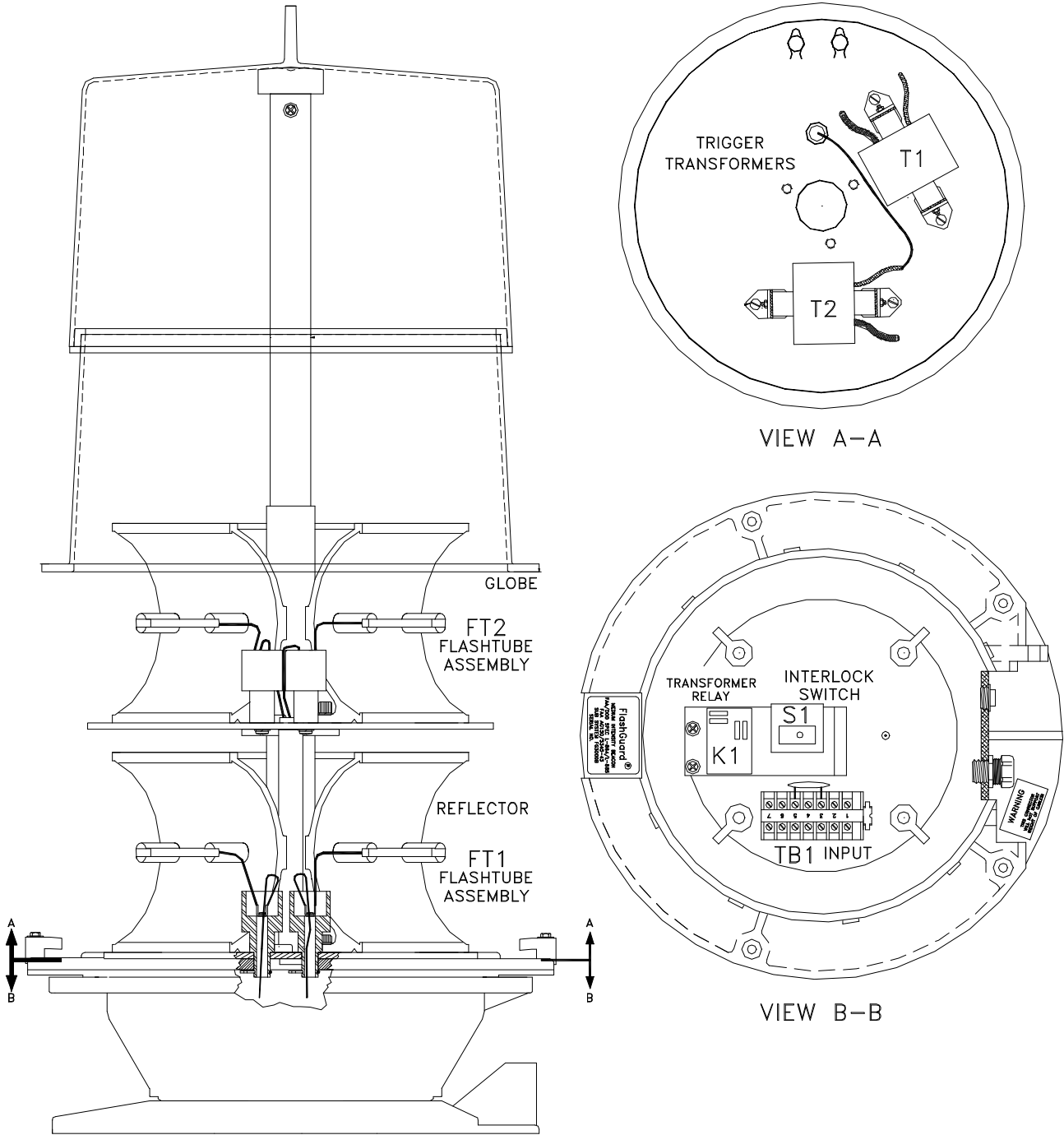


Figure 2 – Flashhead Component Locations

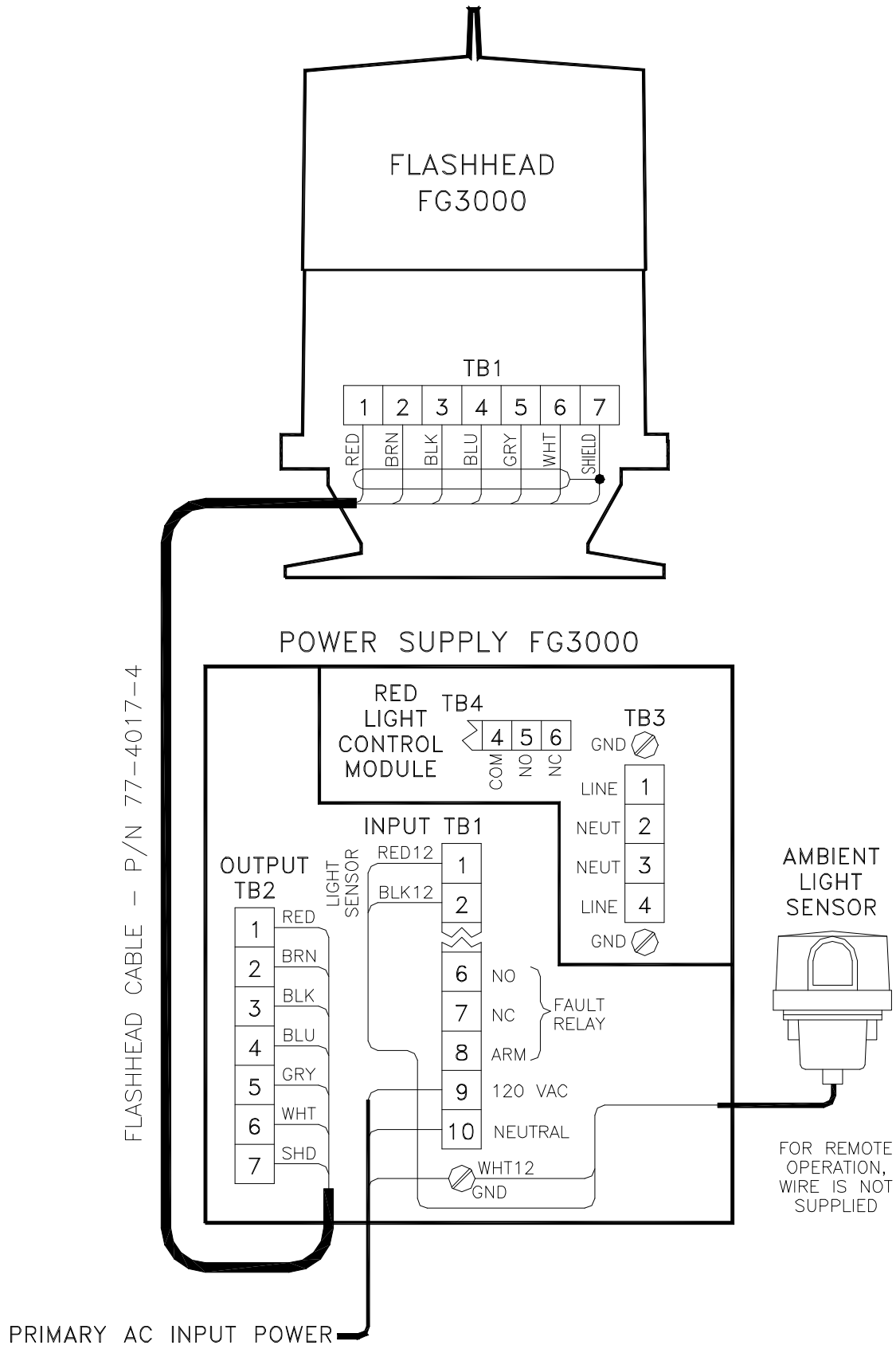


Figure 3 – Single FG3000 Interconnections

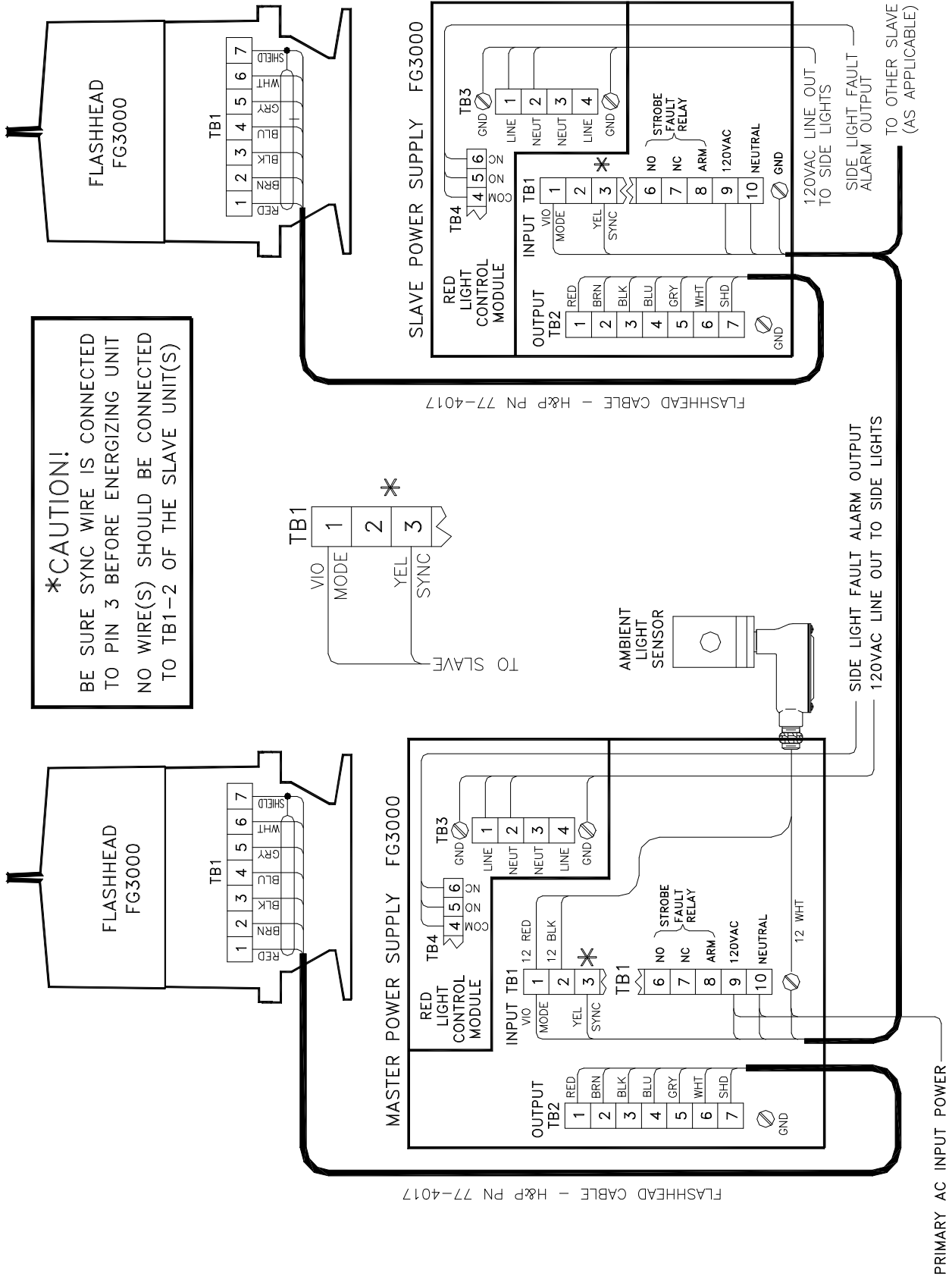


Figure 4 – Multiple FG3000 Interconnections

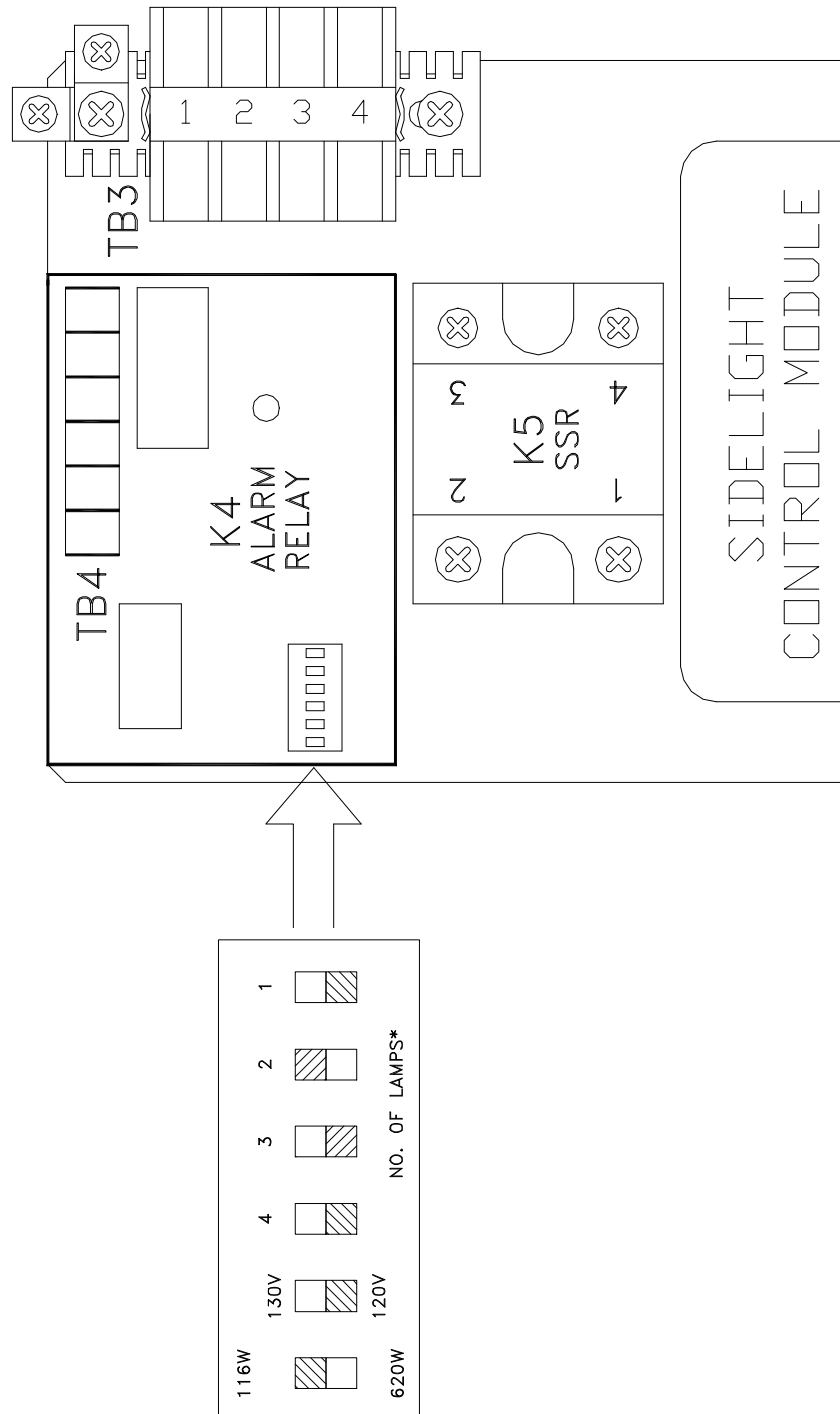


Figure 5 – Sidelight Module Details

FG3000 SYNCH BOARD SWITCH SETTINGS

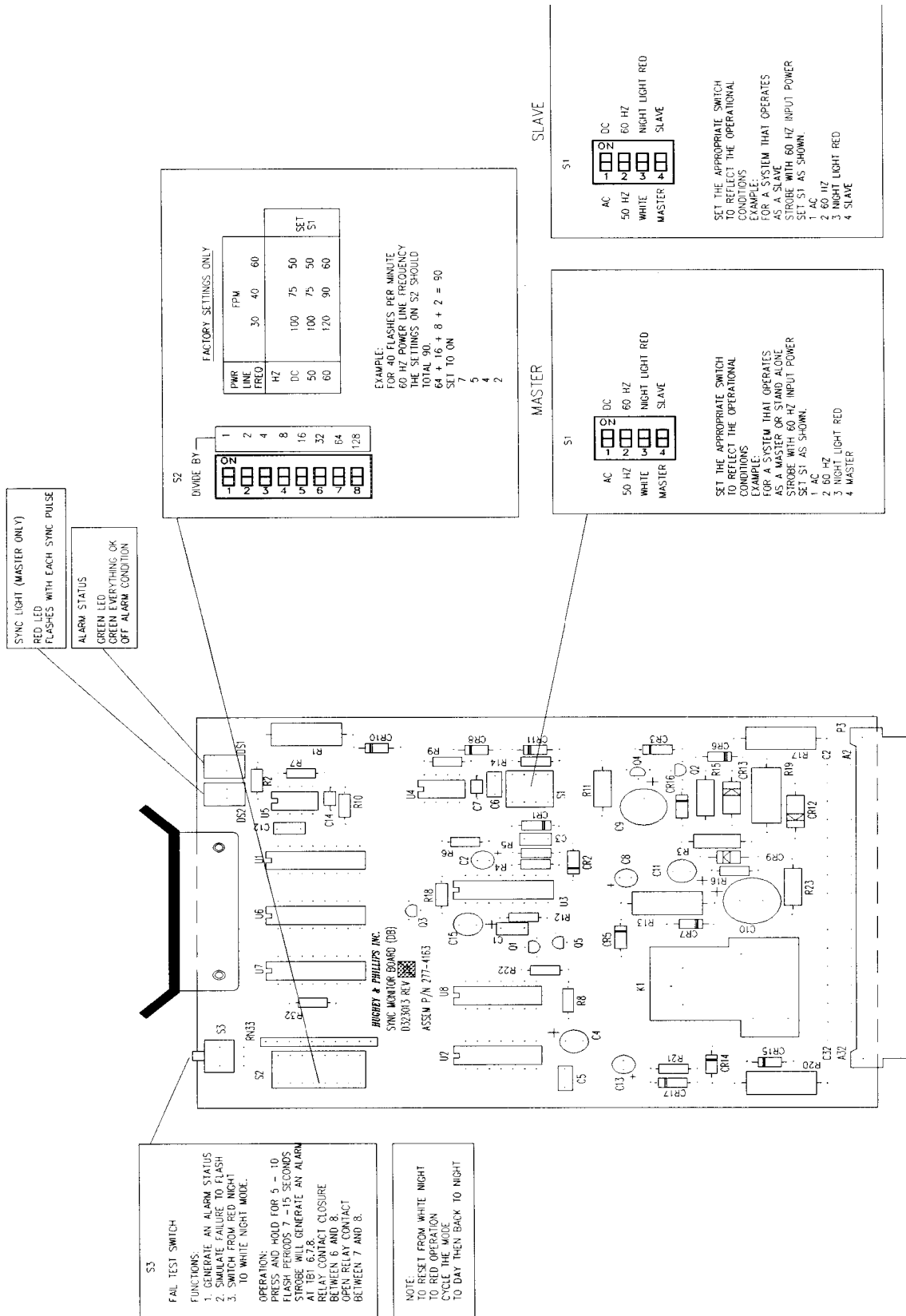


Figure 6 – Sync/Monitor Board Details

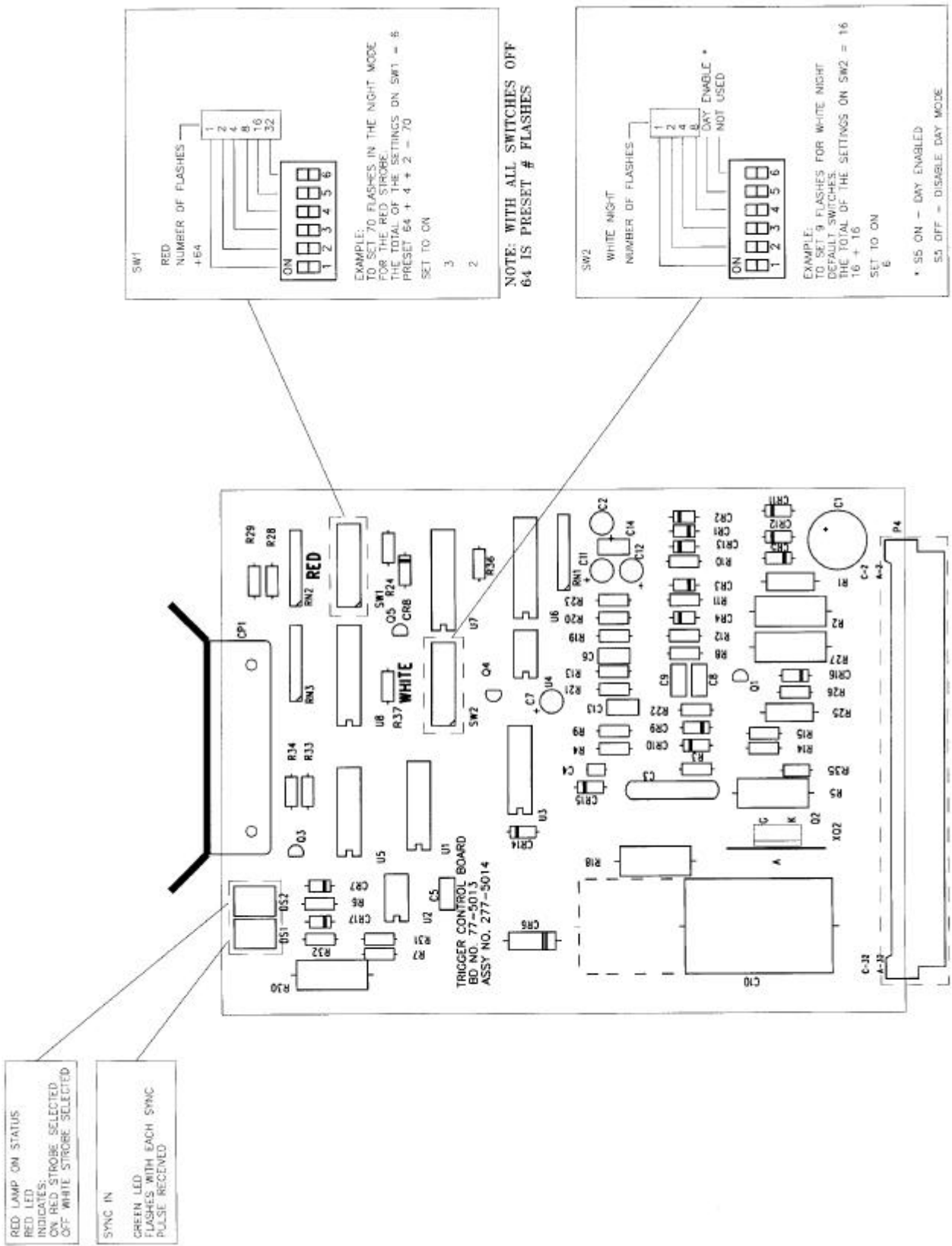


Figure 7 – Trigger/Control Board Details

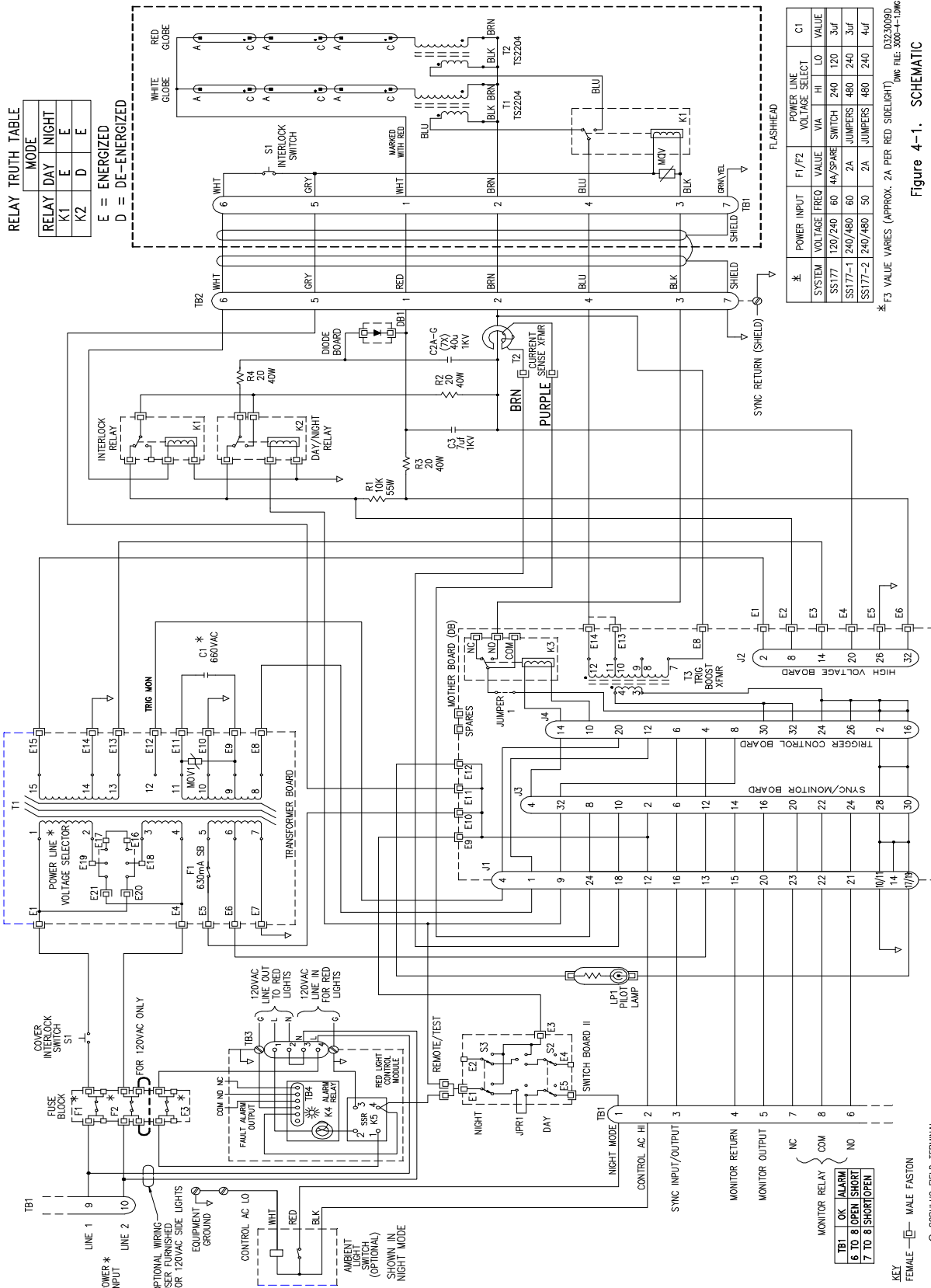


Figure 4-1. SCHEMATIC
MEDIUM INTENSITY DUAL BEACON

Figure 8 – FG3000 Schematic

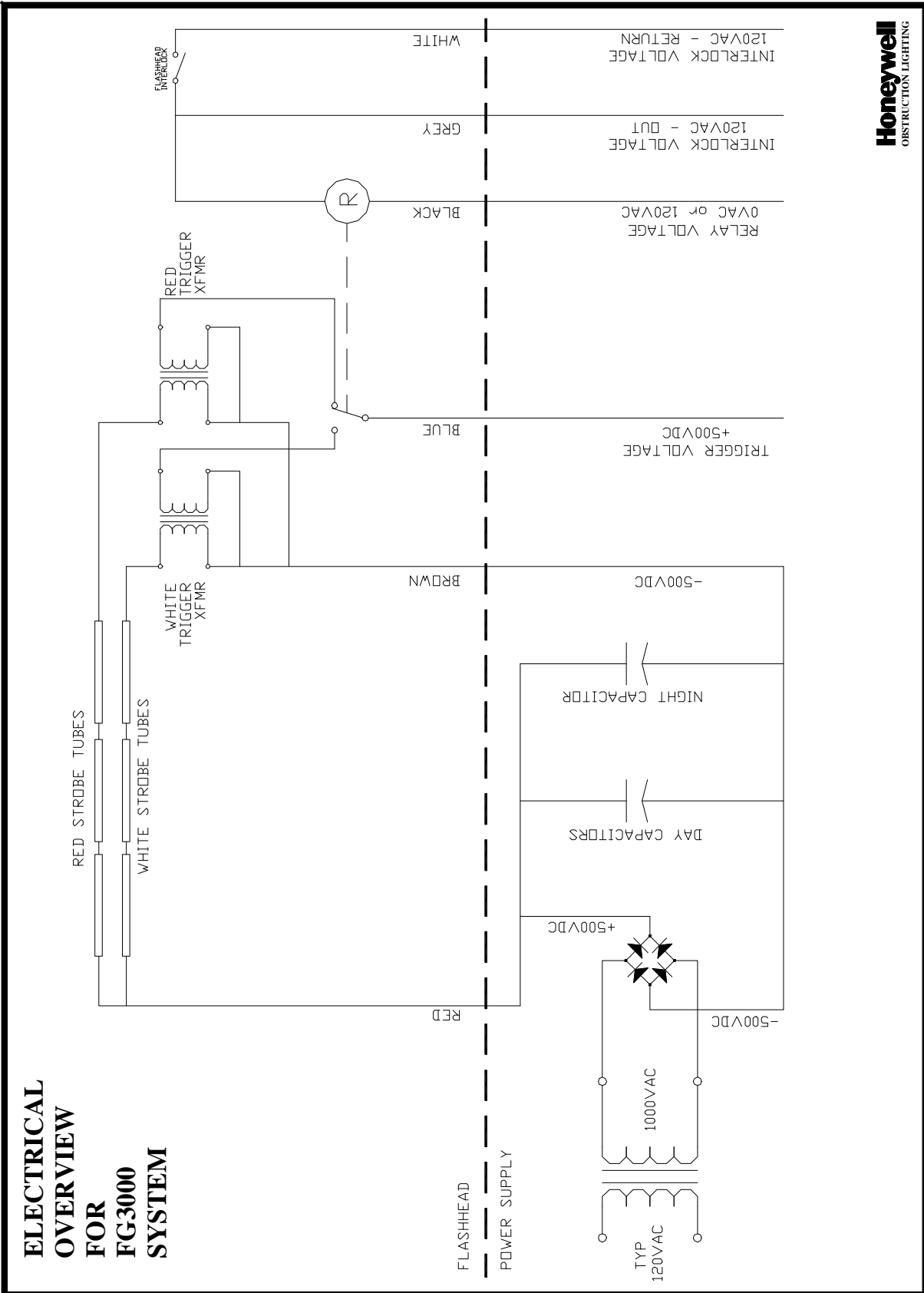


Figure 9 – General Electrical Overview