



Troubleshooting Guide

For

FG3000 Dual Medium Intensity Lighting System

Manual No. MPR-00000010-001

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HISTORY OF REVISIONS

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Please visit www.oblighting.com
for current warranty policy



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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 Hughey & Phillips, 136 East Court, Urbana, OH 43078. 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. Hughey & Phillips 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	120/240 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 that comes with each system.

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. Hughey & Phillips 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 Hughey & Phillips Technical Support

The Hughey & Phillips Technical Support department can be reached at (877) 285-4466. Normal hours are 8:00 am to 5:00 pm Eastern. If you have any questions or are unsure about installation or troubleshooting methods, please call our Technical Support 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	120/240VAC 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

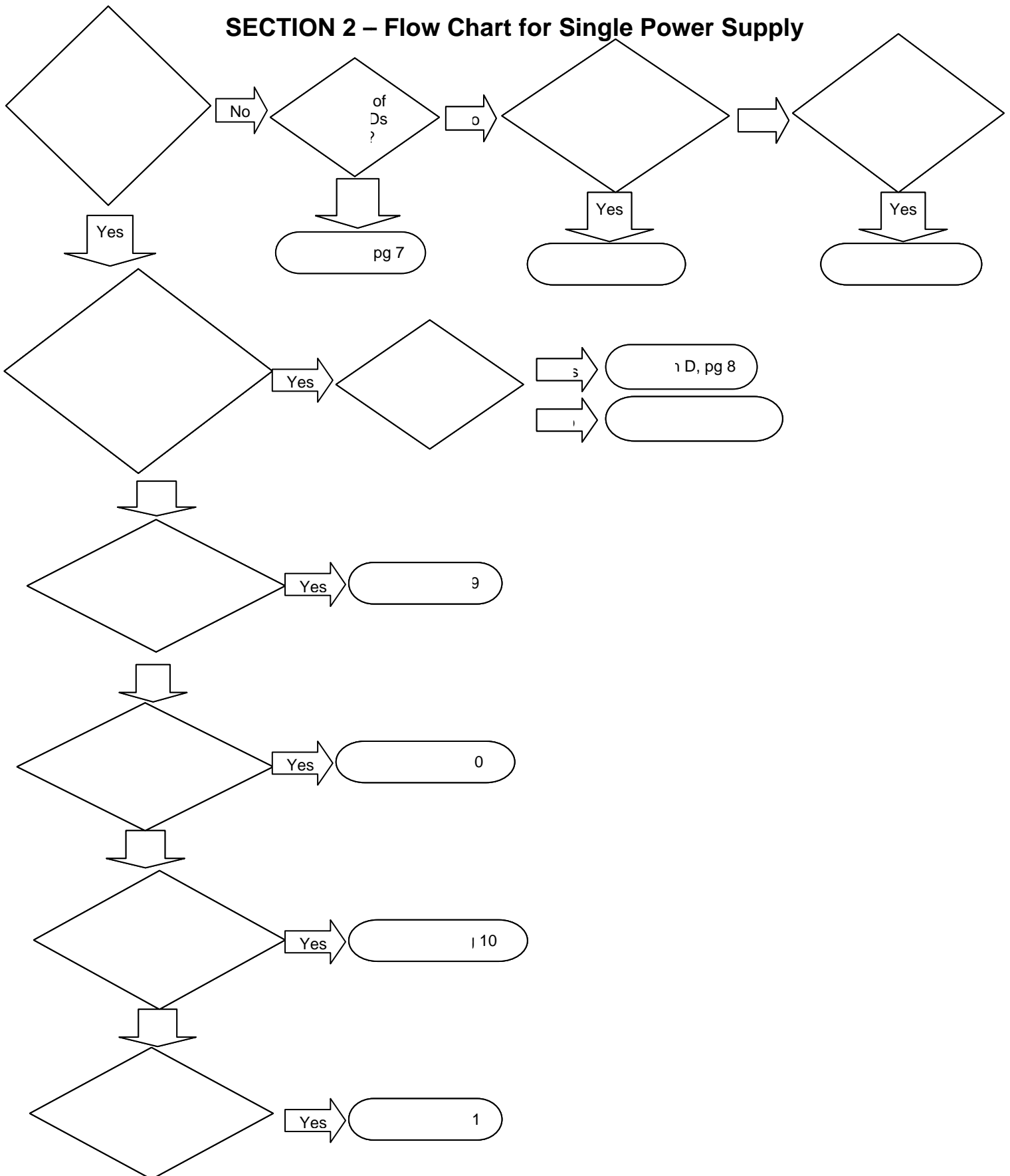
LED Lamps:

Sync/Monitor Board Sync out, master (flashing red); fault relay (green)
Trigger Control Board..... Sync line active (flashing green); red Strobe ON (red)

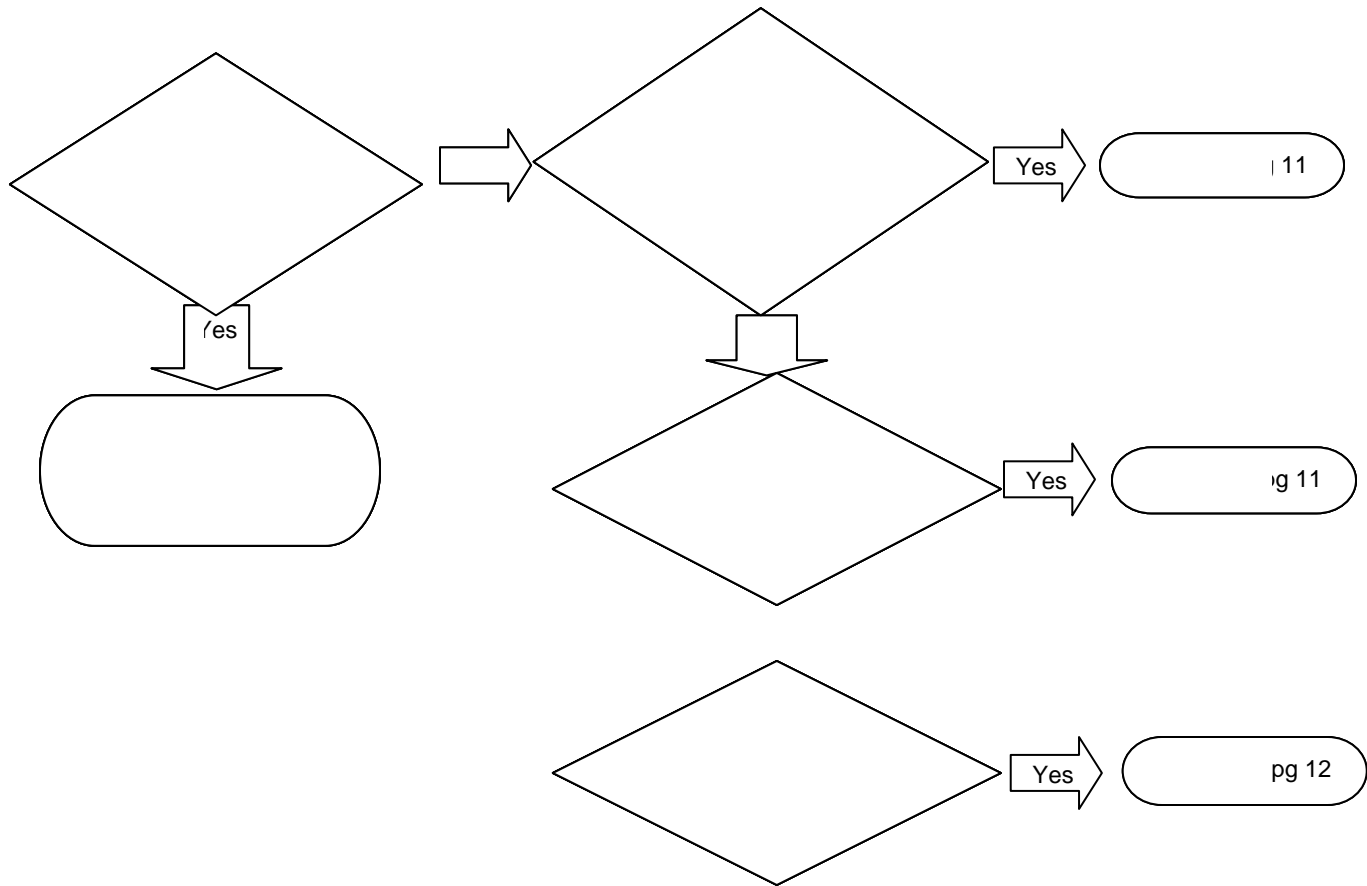
Fault Indication

Strobe	relay closure
Sidelight(s).....	relay closure

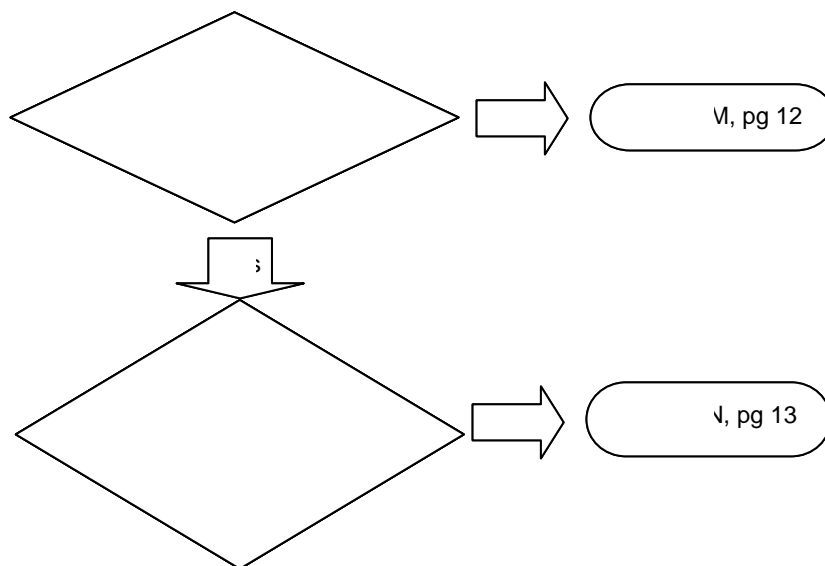
SECTION 2 – Flow Chart for Single Power Supply



SECTION 3 – Flow Chart for Multiple Power Supplies



SECTION 4 – Flow Chart for Sidelight Failures



SECTION A

Flashhead does not operate in any mode, no internal LEDs on.

Possible Cause: Input power incorrect.

Diagnostic Test: Measure input power – it should be 120 VAC $\pm 10\%$ on both sides of fuse.

Corrective Action: Supply correct input power.

Possible Cause: Power supply interlock switch not engaged.

Diagnostic Test: Press the power supply interlock switch and hold it down.

Corrective Action: Close the unit – the system should operate properly.

Possible Cause: Blown F1 (6 Amp) fuse, or transformer (630mA) fuse.

Diagnostic Test: Remove all three circuit boards and check for damage. Remove the photocell wiring from TB1-1 and TB1-2. Perform Flashhead Isolation Test (Section 5) and check for improper resistances. Leave the Flashhead cable disconnected, replace the fuse and apply power. Replace the strobe cable, the photocell wiring, and the circuit boards one by one to determine which one will blow the fuse.

Corrective Action: Replace the defective component.

SECTION B

Flashhead does not operate in any mode, control power light on, high voltage neon lamp off.

Possible Cause: Flashhead interlock switch not engaged.

Diagnostic Test: Remove the flashhead wires TB2-5 and TB2-6 (gray and white), and measure resistance between them – it should be less than 5Ω .

Corrective Action: Re-seat the flashhead cover, making sure the interlock switch engages when the cover is closed. If the system still does not have continuity between TB2-5 and TB2-6, replace the flashhead interlock switch and/or inspect the strobe cable for damage.

Possible Cause: Relay K1 not energizing.

Diagnostic Test: When the interlock switches are engaged, the K1 relay should energize. If not, measure for 120 VAC across the relay coil. Alternatively, remove the connectors and check resistance across the K1 coil – it should be 300Ω .

Corrective Action: Replace the K1 relay.

Possible Cause: Faulty High Voltage Board.

Diagnostic Test: Visually check the traces on the high-voltage board. Check for any shorted diodes. Use diode check function on multimeter if available.

Corrective Action: Replace the High Voltage Board.

SECTION C

Flashhead will not operate in any mode. Control power indicator on, high voltage neon lamp on.

Possible Cause: Trigger Control Board defective, or incorrect DIP switch setting.

Diagnostic Test: Perform Flashhead Isolation test (Section 5) and Power Supply Isolation Tests (Section 6) also compare trigger board DIP switch settings with default settings in *Operation and Installation Guide*.

Corrective Action: Set DIP switches according to specifications. If no trigger output is observed when performing Trigger Test (Section 5) replace the Trigger Control Board.

Possible Cause: Insufficient trigger voltage to the flashhead.

Diagnostic Test: If tower height is greater than 340 feet, remove the connector at terminal E13 on the motherboard, and connect it to E14. This will boost the voltage to the flashhead by approximately 10%.

Corrective Action: Leave the connector at E14.

SECTION D

Flashhead operates properly in day mode, but goes into white night mode and trips strobe alarm

Possible Cause: Red flashtube and/or red trigger transformer faulty.

Diagnostic Test: Disconnect the wire from TB2-3 in power supply. Leave it open (disconnected). Put the unit in night mode via test switch.

Corrective Action: If system flashes night mode through the white flashtube, with the strobe alarm off, replace the red flashtube and/or red trigger transformer.

Possible Cause: Trigger Control Board faulty.

Diagnostic Test: Perform Trigger Test in Power Supply Isolation Test (Section 5) to check for trigger pulses.

Corrective Action: Replace the trigger control board.

Possible Cause: Diode board DB1 faulty.

Diagnostic Test: Remove the two mounting screws on the control panel. Disconnect DB1, and measure resistance both ways across each diode. Make sure CR1/2/3 have no shorts. If shorted, DB1 is faulty. **Note:** The diode board DB1 is located under the control panel where the test switches are.

Corrective Action: Replace DB1.

SECTION E

Flashhead operates properly in night mode. Flashhead does not operate during day mode and trips alarm.

Possible Cause: Day Enable switch SW2-5 on the Trigger Control Board set to OFF.

Diagnostic Test: Set SW2-5 on the Trigger Control Board to ON then test the unit in day mode.

Corrective Action: Leave SW2-5 ON

Possible Cause: White flashtube and/or white trigger transformer faulty.

Diagnostic Test: Disconnect input power at circuit breaker panel. Disconnect the wire at TB2-3 in power supply. Connect it to TB1-10 in power supply. Turn power to system back on. Put the system in day mode via test switch.

Corrective Action: If system flashes day mode through the red flashtube, with the strobe alarm off, replace the white flashtube and / or white trigger transformer.

Possible Cause: Trigger Control Board faulty.

Diagnostic Test: Perform Trigger Test in Power Supply Isolation Test (Section 6) to check for trigger pulses.

Corrective Action: Replace the trigger control board if test fails.

Possible Cause: Day capacitor/s or 20 Ω resistors faulty, or connections loose/open.

Diagnostic Test: With all conductors attached, check resistance across the terminals of any C2 capacitor. Resistance should be @ 40 Ω .

Corrective Actions:

1. If resistance is near 0 Ω , one or more C2 capacitors is shorted. Remove conductors to each capacitor, and individually check / replace each capacitor.
2. If resistance is too high, one or more C2 capacitors may a loose connection, or one or more of resistors R2, R3, and R4 may be defective or have a loose connection. Tighten connections to all C2 capacitors and resistors R2, R3, and R4. If resistance is still too high, individually disconnect / check / replace the resistors.

Note: The resistors R2, R3, and R4 are located under the control panel (where the test switches are) below the diode board DB1. R2 is at the bottom, R3 in the middle, and R4 is topmost of the three.

Possible Cause: Diode Board **DB1** faulty.

Diagnostic Test: Remove the two mounting screws on the control panel. Disconnect DB1, and measure resistance across each diode.

Test Procedure: Set meter to Resistance/Diode feature. Place Black lead to line side, red lead to black side. Meter should read ~0.46V. Replace DB1 if any diodes have shorted. **Note:** The diode board DB1 is located under the control panel where the test switches are.

Corrective Action: Replace DB1.

SECTION F

System will not switch day and night modes correctly.

Possible Cause: Mode switches in wrong position.

Diagnostic Test: Put both mode switches in Remote position. Illuminate the photocell for a minute or so to approximate daytime conditions. The system should go into day mode.

Cover the photocell with a thick, dark, opaque material, to approximate nighttime conditions. Wait for a minute or so. The system should go into night mode. If the system does not respond correctly to the photocell, try changing modes by using the mode switches on the control panel.

Corrective Action: If the system responds to the switches, but not to the photocell, replace the photocell.

Possible Cause: K2 mode relay malfunctioning.

Diagnostic Test: Set the day mode switch to Remote, night mode to Test. The K2 relay should energize. If not, measure for 120 VAC across the relay coil. Alternatively, remove the connectors and check resistance across the K2 coil – it should be @ 300Ω.

Corrective Action: Replace the K2 relay.

SECTION G

System operates properly in day mode, but goes into white strobe at night with no alarms.

Possible Cause: Sync Monitor Board switch S1-3 set to white night mode – OFF position.

Diagnostic Test: Check S1-3 for proper setting.

Corrective Action: Change switch setting to red night mode – ON position.

Possible Cause: K1 relay in flashhead is defective.

Diagnostic Test: Disconnect the wire at TB2-3 in the power supply. Connect it to TB1-10 in power supply. Put the system in night mode via test switch.

Corrective Action: If system flashes red night mode through the white flashtubes, replace K1 in the flashhead.

Possible Cause: K3 relay on Motherboard is defective.

Diagnostic Test: Perform the Power Supply Isolation Test (Section 6). Measure the Voltage between TB2-3 and TB2-6 in power supply. In day mode, it should read 0VAC. In night mode, it should read 120VAC for about 2 seconds, while the red LED on the trigger card is ON. If 120VAC is not present, K3 is defective.

Corrective Action: Replace Motherboard.

SECTION H

Flashhead flashing slow, in white night, and strobe alarm on.

Possible Cause: Mis-configured or defective sync monitor board.

Diagnostic Test: Ensure the DIP switches on the sync monitor board are set correctly per the *Operation and Installation Guide*. Visually verify that the red LED on the sync monitor board is pulsing at 40 fpm.

Corrective Action: If the DIP switch settings are correct, and the red LED is not pulsing at 40 fpm, replace the Sync Monitor Board.

Possible Cause: Current sense transformer wires are crossed, or current sense transformer is defective.

Diagnostic Test: The brown wire should connect to the capacitor side of the current sense transformer, the purple wire towards TB2.

Corrective Action: If the transformer wires are correct, replace the current sense transformer.

SECTION I

Red night mode very bright, no alarms.

Possible Cause: K2 relay open.

Diagnostic Test: Put the system in night mode. Visually check to see that K2 energizes. Check for 120 VAC across the coil of the K2 relay. Alternatively, remove the connectors and check resistance across the K2 coil – it should be 1,200 Ω with green coil and 300 Ω with blue coil.

Corrective Action: Replace the K2 relay.

SECTION J

Flashheads are operating but out of sync. Slave flashheads are in white night while master in red night.

Possible Cause: Sync Monitor Board on the master power supply not configured as master.

Diagnostic Test: DIP switch S1-4 in the master unit should be set to OFF

Corrective Action: DIP switch S1-4 in the master unit should be set to OFF

Possible Cause: Interconnecting wire between master and slave power supplies missing.

Diagnostic Test: Inspect wiring between power supplies. TB1 position 3 should be daisy-chained between each power supply, per the installation wiring diagram, Figure 4.

Corrective Action: Install interconnecting wiring.

SECTION K

All lights are in sync, but there is a double flash or flashing faster than 40 fpm.

Possible Cause: More than one Sync Monitor Board is set as master.

Diagnostic Test: Inspect the DIP switches on each Sync Monitor Board. In the master power supply, DIP switch S1-4 should be set to OFF, which is the master position. In all the other power supplies, this switch 4 should be set to ON which is the slave position

Corrective Action: Reconfigure sync monitor boards. Refer to the *Operation and Installation Guide* for correct positions.

SECTION L

Master unit switches to night mode at night, but slave units remain in day mode.

Possible Cause: Interconnecting wire between master and slave power supplies missing.

Diagnostic Test: Inspect wiring between power supplies. TB1 position 1 should be daisy-chained between each power supply, per the installation wiring diagram for multiple units, Figure 4.

Note: Do not interconnect TB1-2 between power supplies, only TB1-1.

Corrective Action: Install interconnecting wiring.

SECTION M

Sidelights not operating at night.

Possible Cause: Verify correct wiring per installation diagram, Figure 4.

Corrective Action: Verify and correct wiring of sidelights.

Possible Cause: F3 fuse open.

Diagnostic Test: Remove the F3 fuse. Check for continuity.

Corrective Action: Reseat / Replace.

Possible Cause: Power supply mode switches are in the wrong position.

Diagnostic Test: Make sure both switches are in the Remote position, and that the photocell is not illuminated by artificial lighting.

Corrective Action: Change switch settings.

SECTION N

Sidelights in alarm

Possible Cause: Sidelight lamp burned out.

Diagnostic Test: On the sidelight module, set the DIP switches to monitor 1 (one) less sidelight than the current number. Alternatively, measure the current going out to your sidelights through the wire on TB1-11 and/or TB1-12. Each incandescent sidelight will draw ~1A at 120VAC.

Corrective Action: Replace burned out sidelight.

Possible Cause: Wrong DIP switch setting on the sidelight alarm module.

Diagnostic Test: Match DIP switch setting with the actual number of sidelights to monitor.

Possible Cause: Low input voltage.

Diagnostic Test: Check input voltage at TB1, 9&10. It should be 120 VAC +/- 10%.

Corrective Action: Increase input voltage.

If the sidelight alarm board appears to be damaged or not working properly, please call Hughey & Phillips Technical Support for additional troubleshooting assistance.

SECTION 5 – Flashhead Isolation Test

Disconnect the seven-conductor cable from power supply at terminal block TB2. Using an Ohmmeter, check the resistance between the conductors of the disconnected flashhead cable, and compare to the expected values:

TB2-1 Red:	Open to all conductors
TB2-2 Brown:	< 5 Ω to blue and black, open to all others
TB2-3 Black:	\approx 3000 Ω to gray & white, open to all others
TB2-4 Blue:	< 5 Ω to brown, open to all others
TB2-5 White:	< 5 Ω to gray, \approx 3000 Ω to black, open to all others
TB2-6 Gray:	< 5 Ω to white, \approx 3000 Ω to black, open to all others
TB2-7 Ground:	Open to all conductors

Flashhead Test Results

1. Correct readings do not ensure that the flashhead and cable are good, but this is a quick check for obvious problems.
2. If the readings above are correct, proceed to Power Supply Isolation Test, next page.
3. If TB2-3 (Black) to either TB2-5 (Gray) or TB2-6 (White) is not close to 3000 Ω , suspect that either the MOV or K1 relay in the flashhead have shorted or opened. If the value is near a short (0 Ω), this will cause the 630mA fuse to blow on the power transformer during night mode.
4. If the resistance between TB2-5 (gray) and TB2-6 (white) is greater than 5 Ω , or is open, suspect that the flashhead interlock switch is not depressed.
5. For other inconsistencies with the above chart, the probable causes are miswiring, or conductors shorted and/or opened. If possible, disconnect the flashhead cable at both ends and perform a Megger' test with a Megohm Meter.

SECTION 6 – Power Supply Isolation Test

Leave the seven-conductor strobe cable disconnected from the power supply at terminal block TB2. Install a jumper wire between terminals TB2-5 and TB2-6 to simulate the interlock switch being depressed. Apply power to the system and perform the following voltage measurements and trigger tests.

Voltage Measurements

Using a voltmeter, measure the voltages of the conductors to ground terminal 7. Check the measurements in both day and night modes, and compare to the expected values:

#1, Red: +500 VDC to ground	#4, Blue: -500 VDC to ground
#2, Brown: -500 VDC to ground	#5, Gray: 120 VAC to ground
#3 See Note 1	#6, White: 120 VAC to ground

If either the red or the brown conductor does not have +500 VDC or -500 VDC respectively, there is most likely a problem in the T1 transformer, the high voltage board, or a capacitor has failed. Check the input and output voltage of the transformer. Check the high voltage board for bad diodes. Check each capacitor for the proper value. If your meter will not measure capacitance (Farads) then check the capacitors for opens or shorts.

***Note 1:** Use a voltmeter to measure between TB2-3 (Black) and TB2-6 (White). Use the TEST switch positions to change between day and night mode. The voltage should be 0VAC in day mode, and 120VAC for 2-3 seconds during switch to night mode.

Trigger Test

Install a neon lamp (Radio Shack catalog # 272-1102, Hughey & Phillips Part # 77-2342) across the trigger output. For the FG3000, install the neon lamp in TB2-2 and TB2-4 if checking for Day triggers. The neon lamp should be flashing per mode of power supply. With the power supply in day mode, you should see one quick flash. When the system is put into night mode, you should see a long 'burst' of flashes for a few seconds. Then the lamp should begin flashing short 'bursts' of flashes. This happens because the power supply can tell that the red flashtubes are not operating, so it tries to go into backup white night mode.

If the neon tube will never flash, you most likely have a problem with the trigger board. Check the dip switch settings with those in the *Operation and Installation Guide*, and replace the board if necessary.

If the neon tube flashes slowly, you most likely have a problem with the sync board. Check the dip switch settings with those in the *Operation and Installation Guide*, and replace the board if necessary.

If the neon lamp is flashing correctly, and the voltages are correct, the power supply is probably working, and the problem is likely in the flashhead or the strobe cable.

Remove neon lamp & jumper from TB2 before reconnecting the flashhead.

SECTION 7 - 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 8 - 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 9 - Maintenance

9.1 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**

9.2 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**

9.3 Scheduled Maintenance

The light output from the flashtubes decreases with use. The flashtubes in Hughey & Phillips'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.



9.4 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 10 - Orders and Returns

When ordering Hughey & Phillips equipment, please contact:

Hughey & Phillips
136 East Court Street
Urbana, OH 43078

Phone: 937-652-3500

Fax: 937-652-3508

Toll Free : 877-285-4466

Email: oblighing@hugheyandphillips.com

Website: www.oblighting.com

When returning purchased Hughey & Phillips 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.

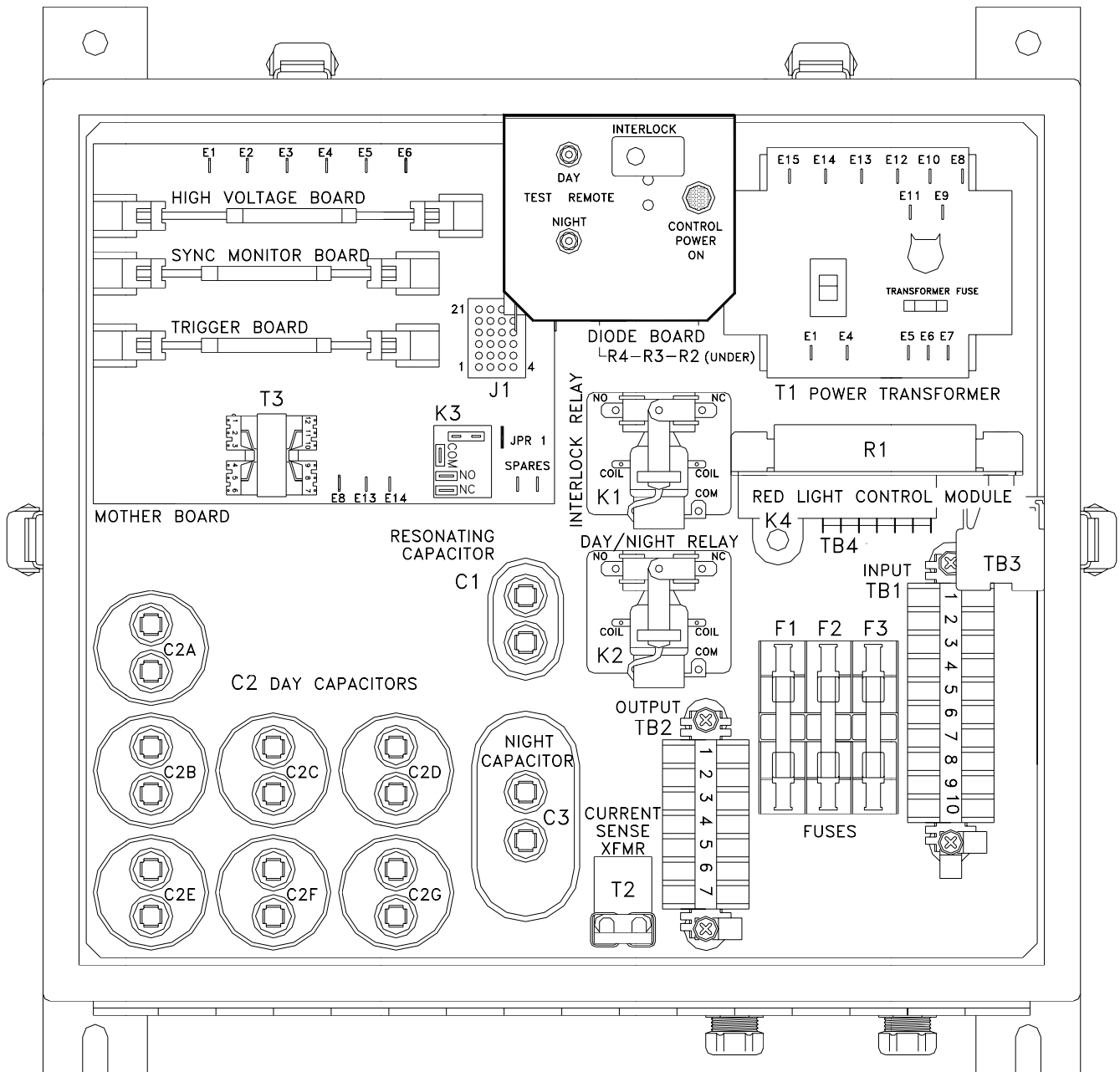


Figure 1 – Power Supply Component Locations

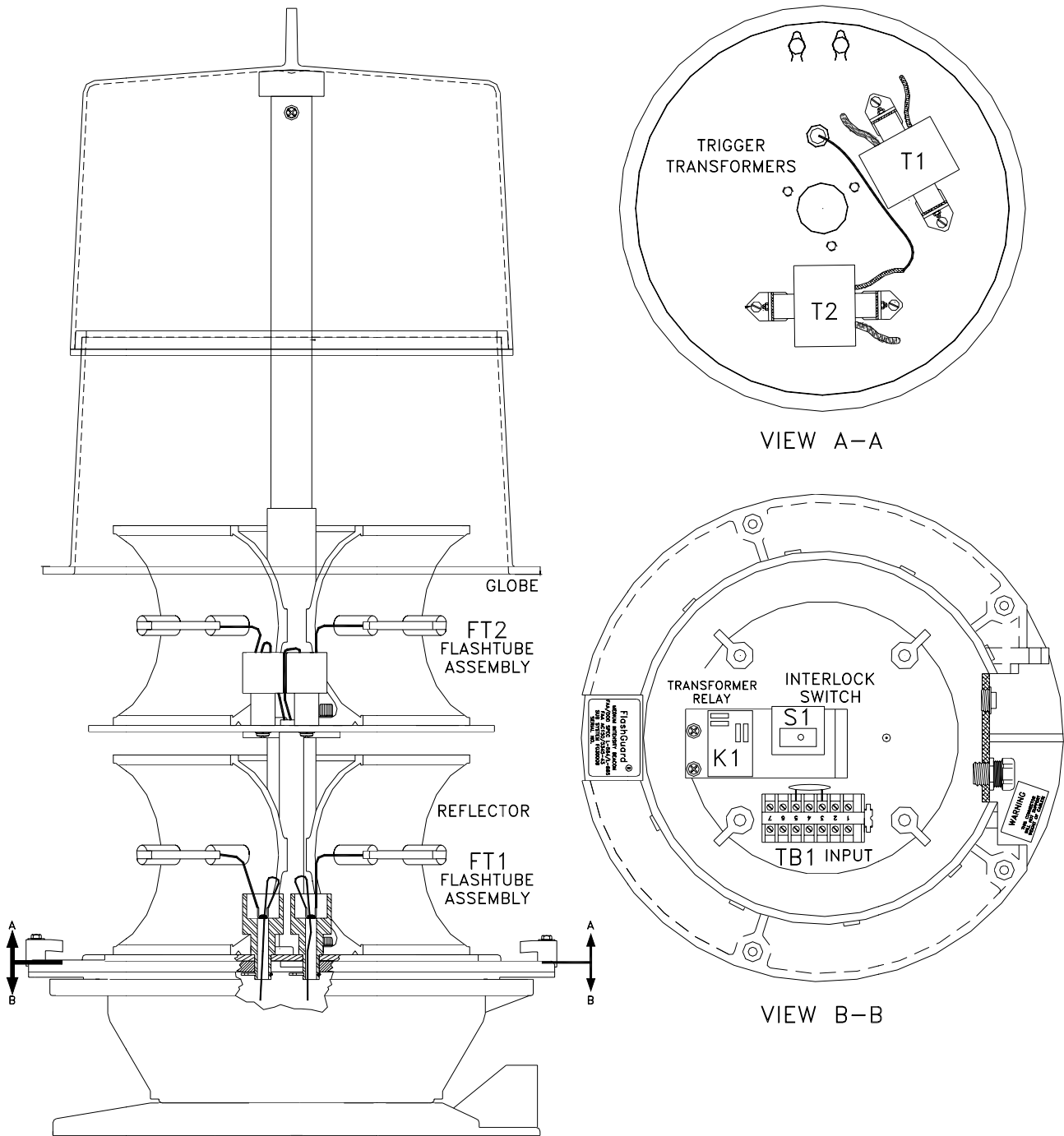


Figure 2 – Flashhead Component Locations

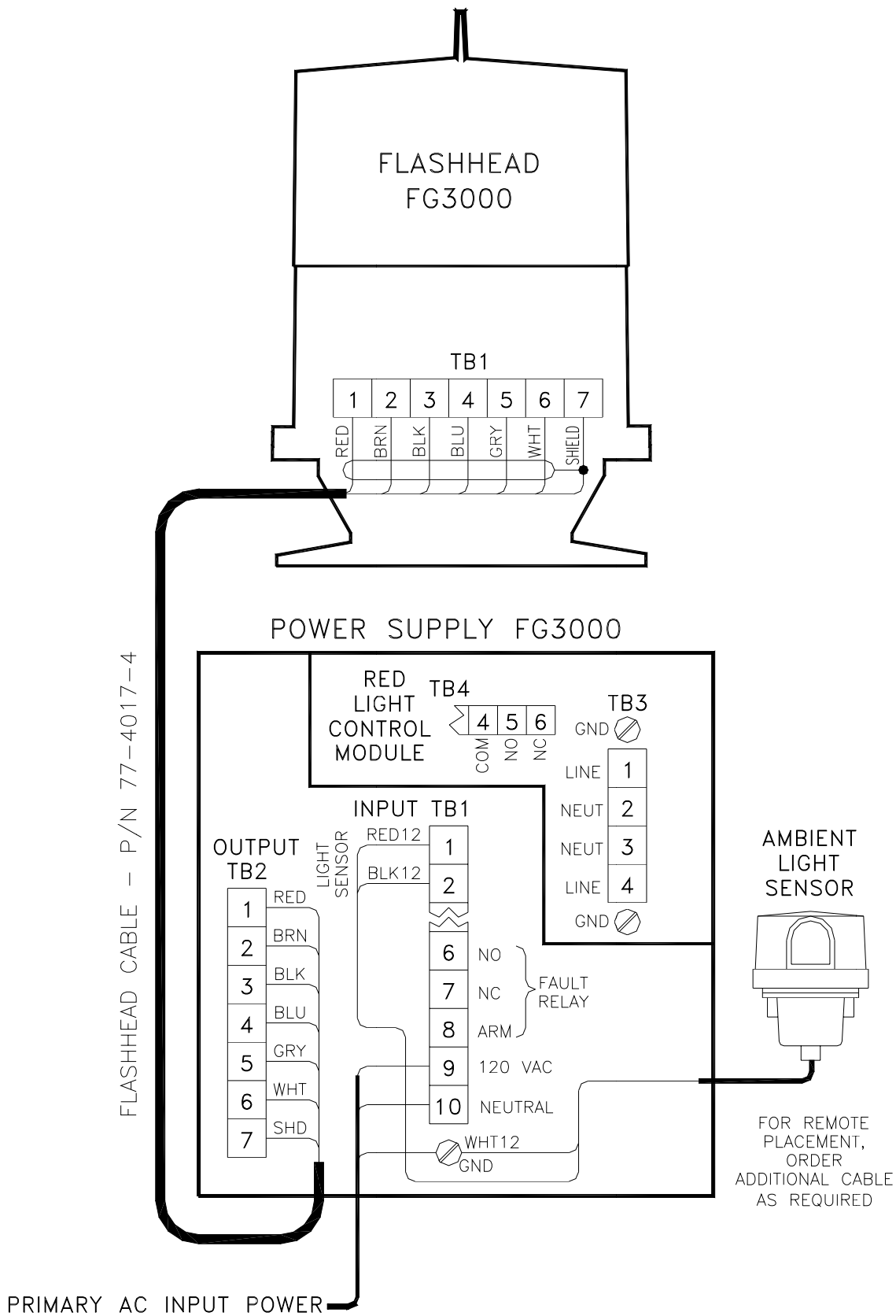


Figure 3 – Single FG3000 Interconnections

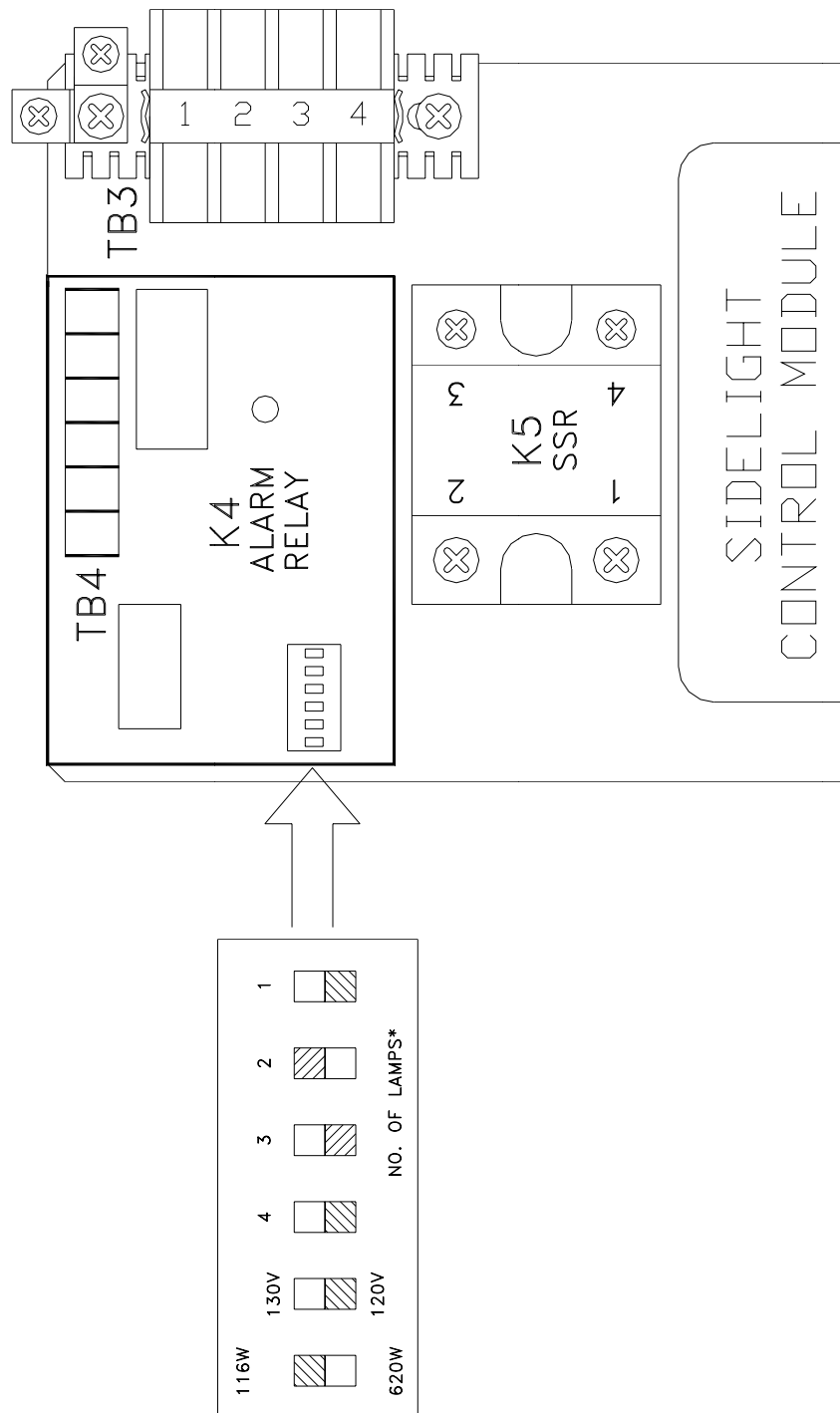


Figure 4 – Sidelight Module Detail

FG3000 SYNCH BOARD SWITCH SETTINGS

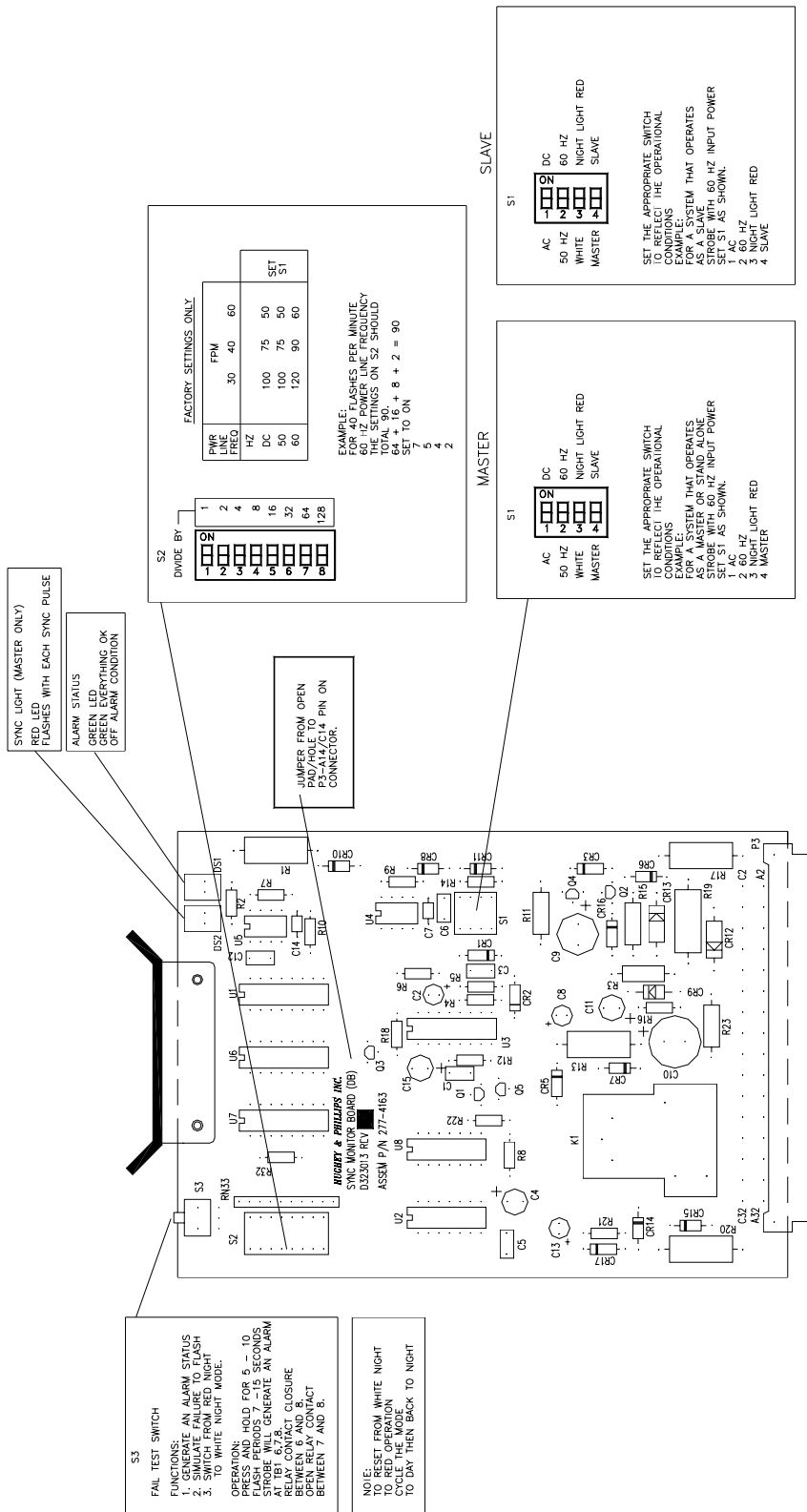


Figure 5 – Sync/Monitor Board Details

FC3000 TRIGGER BOARD SWITCH SETTINGS

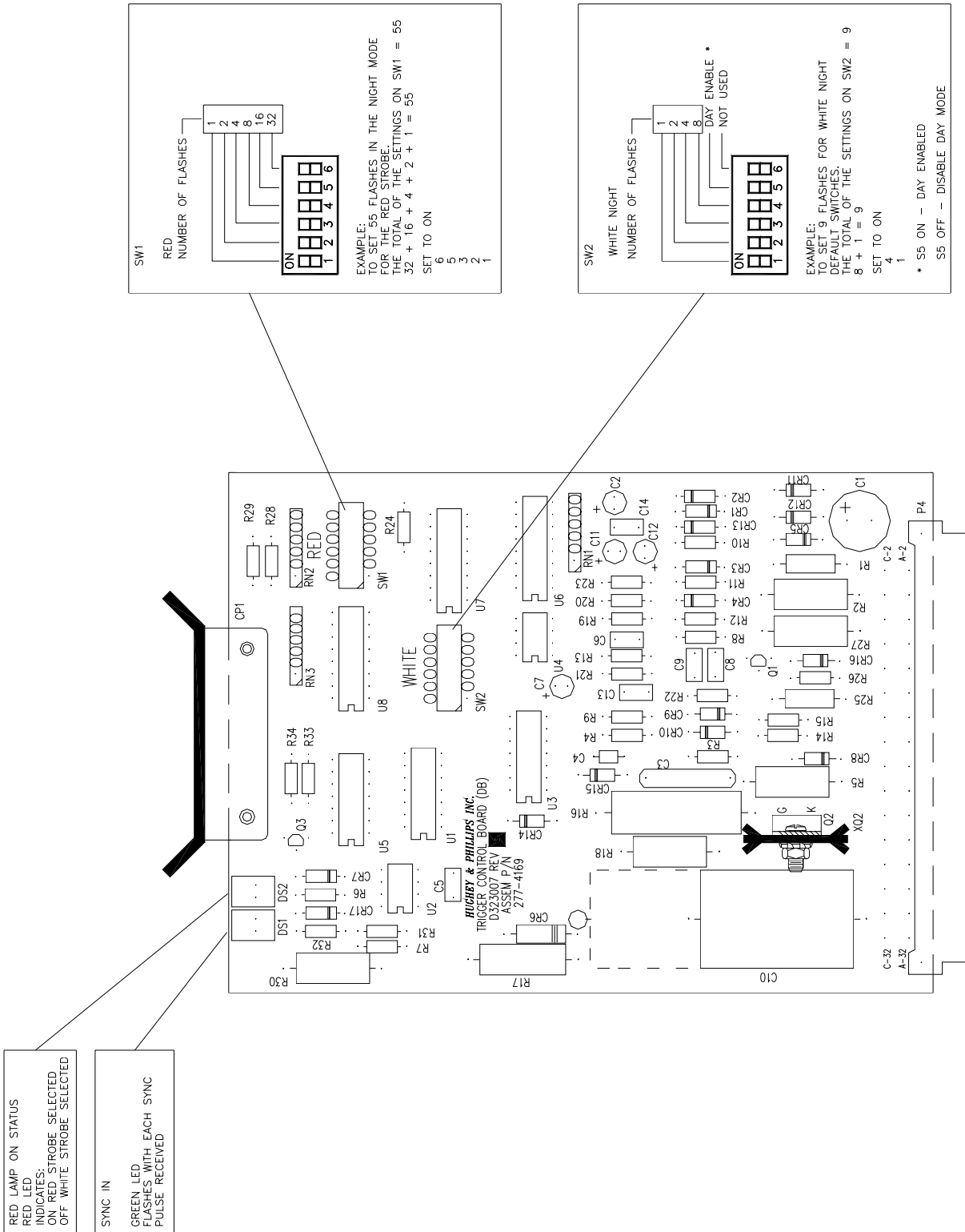
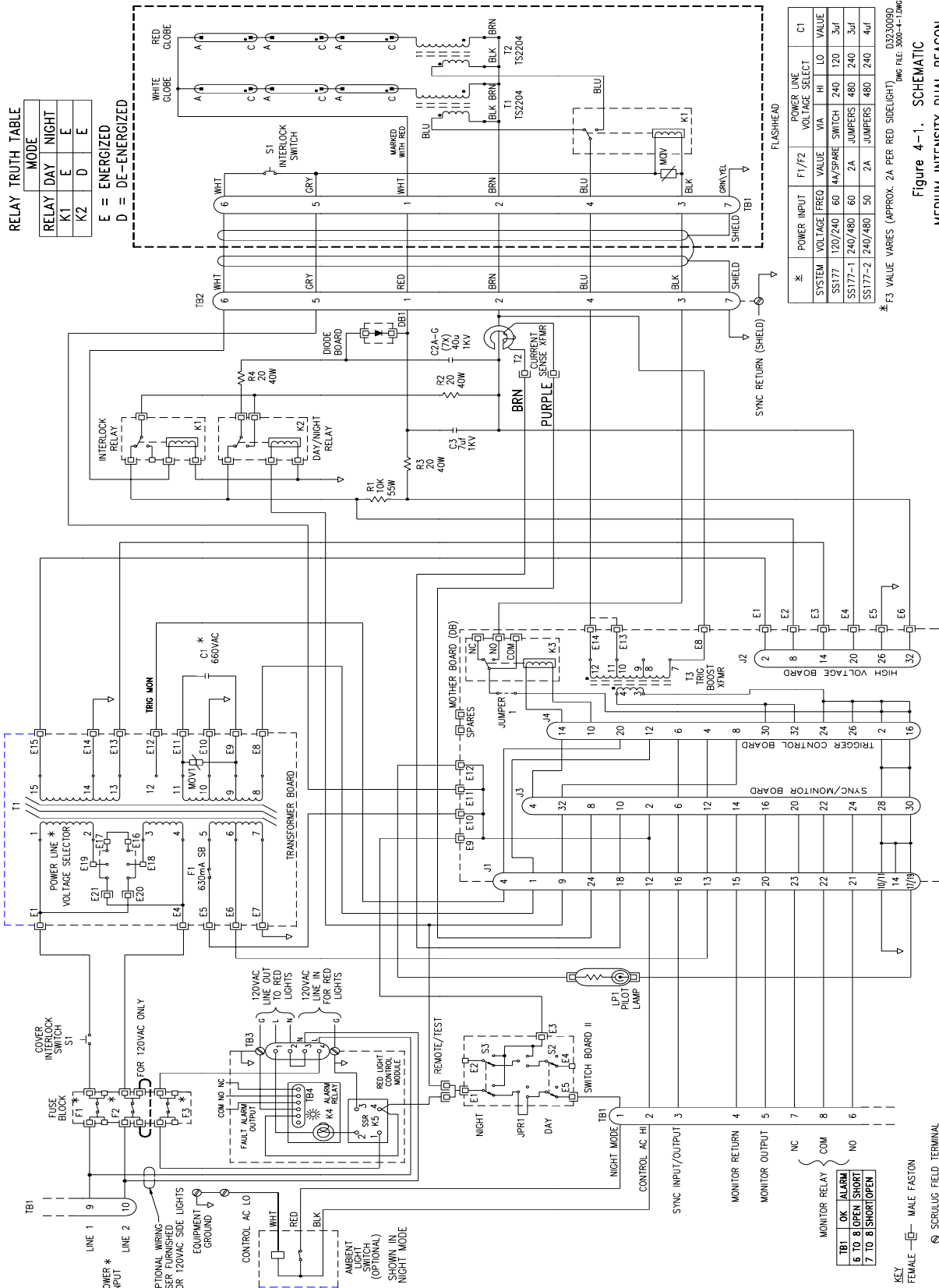


Figure 6 – Trigger/Control Detail



RELAY TRUTH TABLE

MODE	
RELAY	DAY NIGHT
K1	E E
K2	D D

E = ENERGIZED
 D = DE-ENERGIZED

SYSTEM	VOLTAGE	FREQ	VALUE	SWITCH	HI	LO	VALUE	C1
SS177	120/240	60	14N/SPARE	240	120	3uF		
SS177-1	240/480	60	2A	JUMPFERS	480	240	3uF	
SS177-2	240/480	50	2A	JUMPFERS	480	240	4uF	

⊗ F3 VALUE VARIES (APPROX. 2A PER RED SIDE LIGHT) D323009D
 DWG FILE: 3000-4-1.DWG

Figure 4-1. SCHEMATIC
 MEDIUM INTENSITY DUAL BEACON

Figure 7 - FG300 System Schematic