FLASH TECHNOLOGY
A Dielectric Company

SN

FTB 302-2, FTB 302-2S

Medium Intensity, Obstruction Lighting System FAA Type L-865/L-864 Equipment Reference Manual

P/N 7913022

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Front Matter

Abstract

This document briefly describes the FTB 302-1, FTB 302-1S Medium Intensity Obstruction Lighting System.

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Applicable Specification

This equipment meets or exceeds requirements in Advisory Circular 150/5345-43 for FAA Type L-865 medium intensity obstruction lights.

Disclaimer

While every effort has been made to ensure that the information in this manual is complete, accurate and up-to-date, Flash Technology Corporation of America assumes no liability for damages resulting from any errors or omissions in this manual, or from the use of the information contained herein. Flash Technology Corporation of America reserves the right to revise this manual without obligation to notify any person or organization of the revision.

In no event will Flash Technology Corporation of America be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of or the inability to use this manual.

Parts Replacement

The use of non-OEM parts or unauthorized modification of this equipment will void the warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.

Warranty

All components are fully warranted, under normal operating conditions, for two years.

Pub. No. 0594-3021-0001SR

PERSONNEL HAZARD WARNING

DANGEROUS VOLTAGES

Dangerous line voltages reside in certain locations in this equipment. Also, this equipment may generate dangerous voltages. Although FTCA has incorporated every practical safety precaution, exercise extreme caution at all times when you expose circuits and components, and when you operate, maintain, or service this equipment.

Avoid Touching Live Circuits

Avoid touching any component or any part of the circuitry while the equipment is operating. Do not change components or make adjustments inside the equipment with power on.

Dangerous Voltages Can Persist with Power Disconnected

Under certain conditions, dangerous voltages can be present because capacitors can retain charges even after the power has been disconnected.

Protect yourself — always turn off the input (primary) power and wait for one minute for storage capacitors to drain their charge. Then check between the red and blue wires on the flashhead terminal block with a voltmeter for any residual charge before touching any circuit element or component.

Do Not Depend on Interlocks

Never depend on interlocks alone to remove unsafe voltages. Always check circuits with a voltmeter. Under no circumstances remove or alter any safety interlock switch.

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Section 1 — Introduction and Operation

System

FTB 302-2 omnidirectional Medium Intensity Lights are available in two models:

1. The FTB 302-2 consists of an FH 308 Flashhead and PC 302-2 Power Converter. The power converter uses a 2904411 Timing and Trigger Board. This *white* light operates at 40 flashes per minute at two intensity levels for day and night use. The FTC 140 System Controller controls this light.

2. The FTB 302-2S consists of an FH 308 Flashhead and PC 302-2S Power Converter. The power converter uses a 2904410 Timing and Trigger Board. This *white* light operates at 40 flashes per minute at two intensity levels for day and night use. The FTC 121 System Controller controls this light.

The FTB 302-2 lights are intended primarily as Antenna Obstruction Lights (AOL) for lighting masts or protuberances on a supporting structure.

Description

The lights are two-part units consisting of a flashhead and power converter in separate outdoor enclosures. An electrical cable connects these two units, which may be separated in a normal installation by up to 500 hundred feet. If greater separation is required, consult Flash Technology's Customer Service at 1-800-821-5825.

The flashhead is usually mounted at the tip of a mast or antenna. The power converter supplying energy to the flashhead is normally mounted at the base of the mast or antenna.

These lights contain circuitry for two flash intensity levels for white lights and switch from one intensity level to the other in response to a signal from the System Controller. This same signal also synchronizes the flashing of all other lights in the system. However, if the System Controller should be disconnected or fail, the lights continue to flash at full intensity. Simultaneous flashing with the other lights usually continues even without the System Controller.

To monitor the entire system, the System Controller receives status signals from all lights in the system. These signals travel through two-wire shielded conductors.

Specifications

Physical:

Power Converter:

(H x W x Depth, Wgt)

21 x 17 x 9.5 in., 64 lbs.
533.2 x 432 x 241 mm., 29 kg.

Flashhead:

(H x Diam, Wgt)

17 x 18.25 in., 17 lbs.
430.5 x 463 mm., 34.8 kg.

Performance Characteristics:

Application: L-865/L-864

Flash Intensity and Rate:

FH 308

Full intensity (white)	20,000 ± 25% CD
Low intensity (white)	2,000 ± 25% CD
Rate	40 flashes per minute

Beam Spread:

Horizontal: 360º (omnidirectional)
Vertical: 5º

Electrical (factory wired for nameplate voltage):

AC voltage	120/208/240/480 VAC, 60 Hz
	230 VAC 50 Hz
Volt-Amperes	250 VA peak; 175 VA avg.
FTB 302-2/302-2S	Day - 130 Watts
	Night - 75 Watts

Aerodynamic Wind Area:

Flashhead	.93 sq. ft.; .0864 sq. m.
Power Converter	2.5 sq. ft.; .23 sq. m.

Environmental:

FAA Advisory Circular 150/5345-43 compliance

Control and Monitoring:

ElectroFlash System Controller

Power Converter Operation

This equipment operates automatically, but operation can be modified for special situations by methods later described. The center of operations for each light is the Timing and Trigger Board (PCB1) located in the power converter. PCB1 contains indicator lights useful for troubleshooting or checking the operation of the light's power converter.

The pattern of lights is determined by the light's height on the structure (the *tier),* and its location or compass point around the structure: Beacon 1 is northerly; Beacon 2 is easterly; Beacon 3 is southerly; and Beacon 4 is westerly. FTCA convention designates the lowest tier of lights on a structure as Tier 1, the next Tier 2, and so on.

NOTE

Please note that lights are referred to as beacons for programming purposes only.

The AOL unit always occupies the highest point on any structure and is programmed as Beacon 2 of that tier. *Figure 1-2* shows PCB1 for the AOL. A typical installation is shown in *Figure 1-1*.

The System Controller and PCB1 (2904411) govern all the functions for operation of the FTB 302-2. PCB1 (2904410) governs all functions of the FTB 302-2S. Signals from all lights on the structure travel over the same pair of wires. PCB1 programming allows a System Controller to distinguish its signal from other lights for monitoring and control purposes.

PCB1 has nine light emitting diode (LED) indicators, and one clear neon indicator that you can use to monitor equipment operations during checkout and troubleshooting. To monitor operation, observe the specified LEDs. The essential features on PCB1 for troubleshooting are shown in *Figure 1-2* and *Figure 1-3*.

Flash Modes: Night, Day, Catenary, and 60/50Hz Operation

A Photoelectric Control (PEC) connected to the System Controller detects lighting conditions. As they change, the System Controller sends an intensity signal to all lights on the structure.

Night

At night, the PC 302-2 or -2S switches to Night Mode operation to operate the flashhead at the night intensity of 2,000 ± 25% candellas.

Twilight

At twilight, the PC 302-2 or -2S switches to Twilight Mode operation to operate the flashhead at the day intensity of 20,000 ± 25% ECD.

Day

In daylight, the PC 302-2 or -2S switches to Day Mode operation to operate the flashhead at the day intensity of 20,000 ± 25% ECD.

Catenary

Beacons flashing in a distinct pattern to alert air traffic of catenary wires is called Catenary Mode. The FAA requires the flash sequence for catenary lighting to be middle-top-bottom with a flash rate of 60 fpm. A maximum of three tiers are supported in catenary mode. You select Catenary Mode operation with the handheld terminal (p/n 1903776). See section 5. *Catenary Mode operation is usually set up by the factory for your installation.*

60/50Hz

PCB1 operates from either a 60Hz or a 50Hz power source.

Manual Operation

Mode Control (PCB1-2904411)

Table 1-1 explains how to force the light to operate continuously at a fixed flash intensity (mode), useful for troubleshooting the light to check its operation at all flash intensities. The handheld terminal (p/n 1903776) may also be used.

Table 1-1 Mode Control (PCB1-2904411)

Intensity	Test Point	Procedure: Connect a jumper between Test Point 5 (TP5) labelled TEST and the indicated Test Point.
DAY (High)	TP6	TP6 forces: PC 302-2 day mode; daylight intensity
NITE (Low)	TP4	TP4 forces: PC 302-2 night mode
LTV	-	*Factory use only.* Causes continuous triggering. ***Do not use.***

Mode Control (PCB1-2904410)

Table 1-1 explains how to force the Beacon to operate continuously at a fixed flash intensity (mode), useful for troubleshooting the Beacon to check its operation at all flash intensities. The handheld terminal (p/n 1903776) may also be used..

Table 1-2 Mode Control (PCB1-2904410)

Intensity	Test Point	Procedure: Connect a jumper between Test Point 5 (TP5) labelled TEST and the indicated Test Point.
DAY (High)	TP6-DAY	TP6 forces: PC 302-2S day mode.
TWI (High)	TP5-TWI	TP5 forces: PC 302-2S day mode.
NITE (Low)	TP4-NITE	TP4 forces: PC 302-2S night mode.
-	-	-
LTV		*Factory use only.* Causes continuous triggering. ***Do not use.***

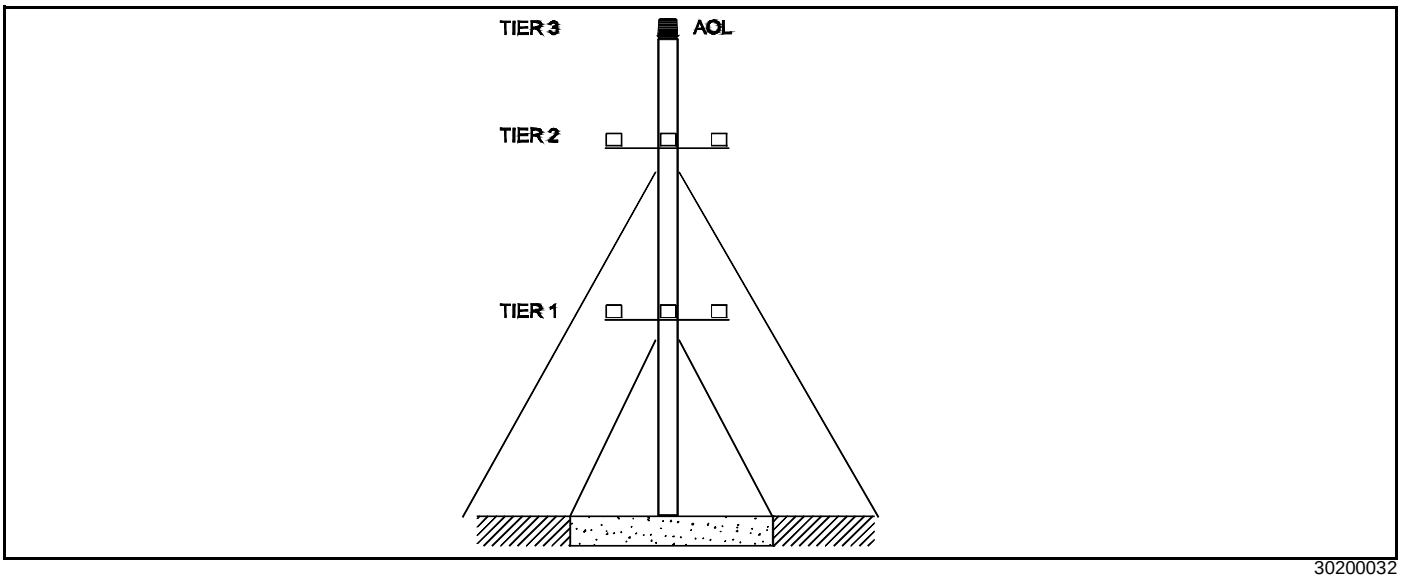

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Figure 1-1 Typical FTB 302-2 Structure Installation

PCB1 (2904411) Functions

Setting Up PCB1 (2904411)

Programming is done with the handheld terminal, see section 5.. Upon your order, the factory sets up the desired operation. However, you can change some operations in the field by using the handheld terminal (p/n 1903776). Also, *Figure 1-2* is useful for monitoring the equipment's operation.

Indicator LEDs and Lamps (2904411)

Nine indicator LEDs and one neon lamp on (PCB1) indicate equipment operation. A name on PCB1 adjacent to the lamp identifies each LED. *Figure 1-2* shows the location of these lamps. *Table 1-3* lists the LEDs and lamp on PCB1 (2904411) and indicates their functions.

Table 1-3 PCB1 (2904411) LEDs and Lamps

LED/Lamp	Name	Color	Function
ALARM	I 1	Red	On — Main Alarm, follows main alarm relay.
SYNC	I 2	Grn	On — Valid sync signal was received on the CONTROL terminal (Pin 6).
CONF	I 3	Grn	On — Flash confirmation signal is present on the MONITOR terminal (Pin 5).
NITEI	I 4	Grn	On — NITE mode is active. The PC 302-2 operates at night intensity.
TWI	I 5	Grn	On — TWILIGHT mode is active. *TWILIGHT MODE is the same as DAY MODE for a PC 302-2. It operates at daylight intensity.*
DAY	I 6	Grn	On — DAY mode is active. PC 302-2 operates the flashhead at daylight intensity.
	I 7	Red	Photocell Alarm
	I 8	Red	Intensity Alarm.
NEON Lamp	I 9	Clear	On — 120 VAC trigger voltage is present. This lamp may flicker.
CONTROL	I10	Grn	Flashes on and off when communications is active.

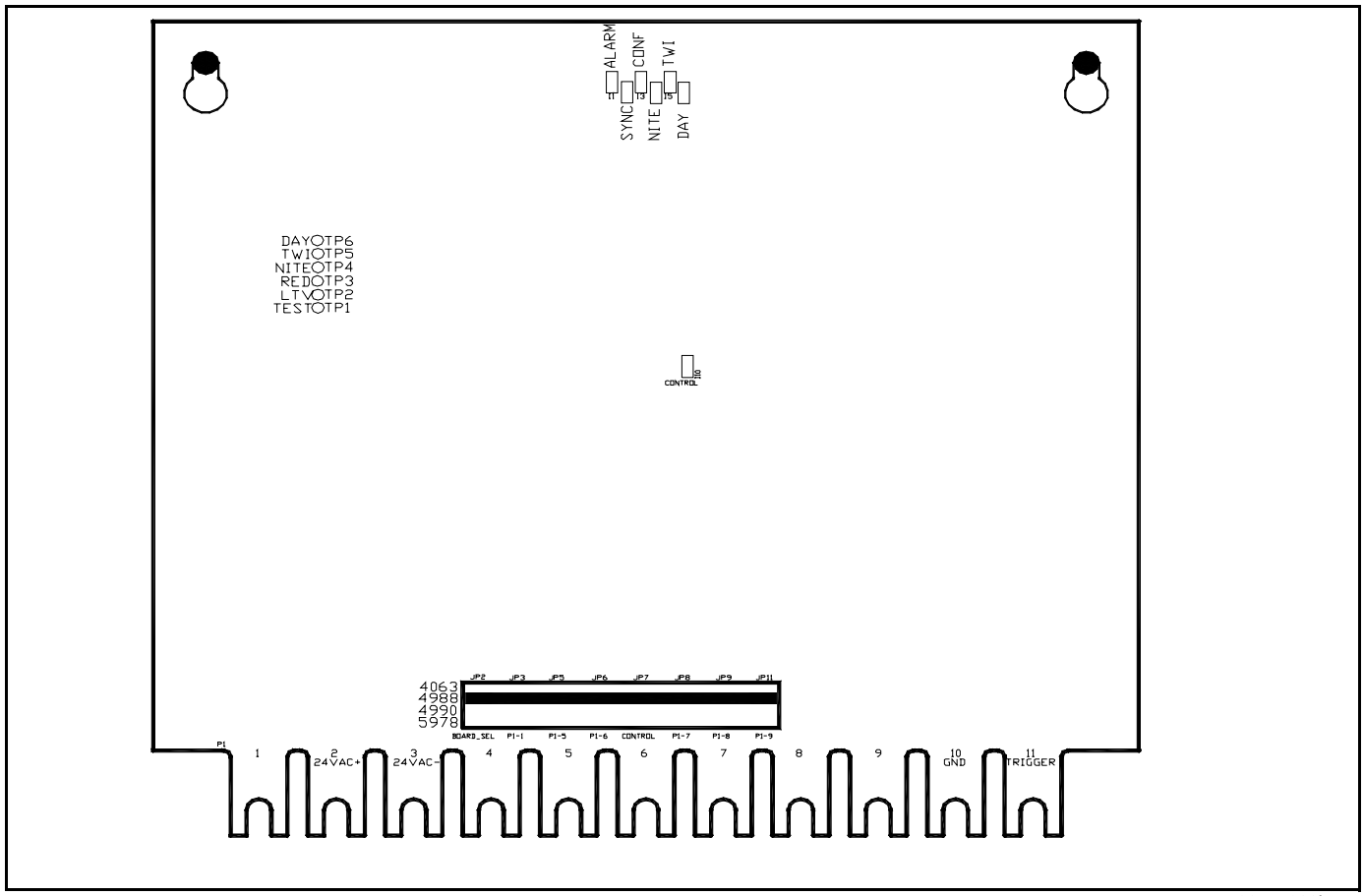

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Figure 1-2 PCB1 Timing and Trigger Board (2904411)

PC 302-2 System Checkout

You must operate the System Controller in Day Mode or Night Mode to observe the LED lamps on PCB1 and observe the flashhead as described next:

Day/Twilight Operation

Switch the System Controller to Day Mode. Observe the LED lamps on the PCB1 as follows:

1. SYNC LED I 2 blinks.
2. CONF LED I 3 blinks.
3. DAY LED I 4 is on. The PC 302-2 light operates at daylight intensity (20,000 candelas).
4. TWI LED I 5 is off.
5. NITE LED I 6 is off.
6. NEON LAMP I 9 is on.
7. Switch the System Controller back to AUTO.

Night Operation

Switch the System Controller to Night Mode. Observe the LED lamps on the PCB1 as follows:

1. SYNC LED I 2 blinks.
2. CONF LED I 3 blinks.
3. DAY LED I 4 is off.
4. TWI LED I 5 is off.
5. NITE LED I 6 is on. The PC 302-2 light operates at night intensity (2,000 candelas).
6. NEON LAMP I 9 is on.
7. Switch the System Controller back to AUTO.

If any responses are not as indicated, see *Troubleshooting* in *Section 3.*

PCB1 (2904410) Functions

Setting Up PCB1 (2904410)

Beacon positions are programmed with the handheld terminal see section 5.

Replacement circuit boards may require programming for beacon position on the structure. Use the handheld terminal (p/n 1903776) see section 5. Consult FTCA before changing programming, and follow their direction.

CAUTION

The factory programs PCB1 boards for operation and position, *and they have different part numbers*. Boards are programmed differently and thus are not interchangeable between all lights on a structure.

Indicator LEDs and Lamps (2904410)

Ninet indicator LEDs and one neon lamp on PCB1 indicate operation. A name adjacent to the indicator identifies it. The neon lamp has no name. *Figure 1-3* shows PCB1 with LED and lamp locations. *Table 1-4* lists the functions of the LEDs and neon lamp on the board.

Table 1-4 PCB1 (24990xx) LEDs and Lamps

LED/Lamp	Name	Color	Function
Alarm	I 1	Red	On — Alarm present.
SYNC	I 2	Grn	On — valid sync signal received from the System Controller (once every 6 seconds).
CONF	I 3	Grn	On — power converter flash sensing circuit issued a flash confirmation signal.
NITE	I 4	Grn	On — current operating mode is *night* mode.
TWI	I 5	Grn	On — current operating mode is *twilight* mode.
DAY	I 6	Grn	On — current operating mode is *day* mode.
	I 7	Grn	On — Photocell Alarm.
	I 8	Grn	On — Intensity Alarm.
NEON Lamp (Trigger)	I 9	Clear	On — 120 VDC trigger voltage at PCB1. Lamp may flicker while triggering flashtube.
CONTROL	I 10	Grn	Flashes on and off when communications is active.

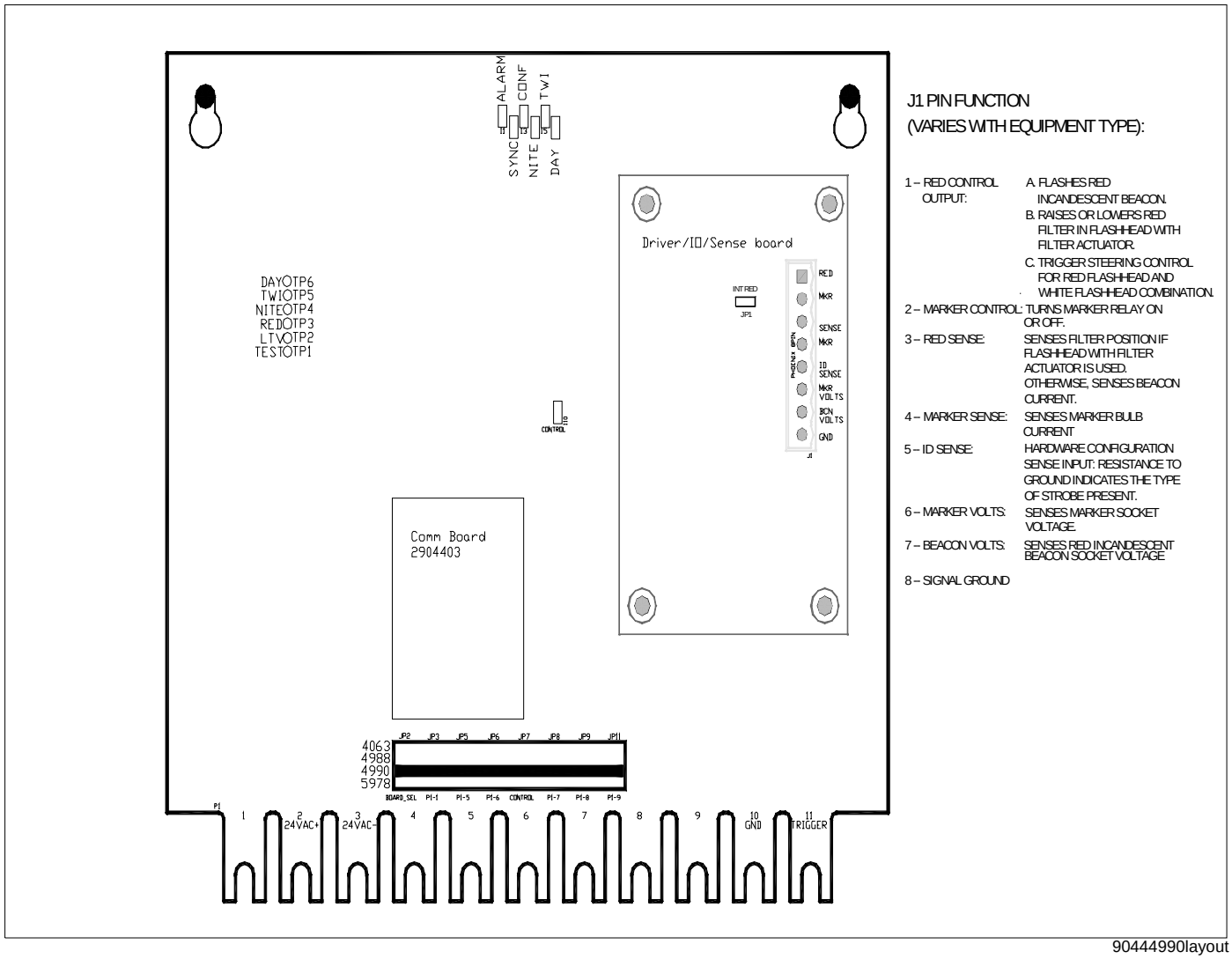

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Figure 1-3 PCB1 Timng and Trigger Board (2904410)

PC 302-2S System Checkout

To operate and observe the PC 302-2S you must operate the System Controller in Day Mode, Twilight Mode, or Night Mode to observe the LED lamps on PCB1 and observe the flashhead as described next:

Day Operation

NOTE: The FTB 302-2S operates its white flashhead at daylight intensity.

Switch the System Controller to day mode operation. During daylight hours, some LED lamps on PCB1 may be difficult to observe. Observe the following LEDs on the PCB1.

1. I 6 DAY is on. *On* indicates that current operation is day mode.
2. I 5 TWI is off.
3. I 4 NITE is off.
4. I 2 SYNC flashes each time a valid sync signal is received from the System Controller.
5. I 3 CONF blinks on. *On* indicates that PCB1 issued a flash confirmation signal because the flash was good.
6. I 1 ALARM is off. *On* indicates that an alarm is present in PCB1. This usually indicates a flash failure but it may indicate other failures.
7. NEON I 9 is on. *On* indicates that trigger voltage is present on PCB1.

Twilight Operation

NOTE: For *twilight* System Controller commands, the FTB 302-2S operates in *daylight* intensity.

Switch the System Controller to twilight mode operation. Observe the following LEDs on PCB1.

1. I 6 DAY is on. *On* indicates daylight mode operation
1. I 5 TWI is off.
2. I 4 NITE is off.
3. I 2 SYNC flashes each time a valid sync signal is received from the System Controller.
4. I 3 CONF flashes on. *On* indicates that PCB1 issued a flash confirmation signal because the flash was good.
5. I 1 ALARM is off. *Off* indicates that no alarm is present in the board. This usually indicates a flash failure but it may indicate other failures.
6. NEON I 9 is on. *On* indicates trigger voltage is present on PCB1.

Night Operation

NOTE: The FTB 302-2S operates the white flashhead at *night* intensity.

Switch the System Controller to night mode operation. Observe the following LEDs on the PCB1.

1. I 6 DAY is off.
2. I 5 TWI is off.
3. I 4 NITE is on. *On* indicates night mode operation.
4. I 2 SYNC flashes each time a valid sync signal is received from the System Controller.
5. I 3 CONF blinks on. *On* indicates that PCB1 issued a flash confirmation signal because the flash was good.
6. I 1 ALARM is off. *Off* indicates that no alarms are present in the board. (An on condition usually indicates a flash failure but it may indicate other failures.)
7. NEON I 9 is on. *On* indicates that trigger voltage is present on PCB1.

Section 2 — Mounting, Outline, and Installation

Unpacking

Inspect shipping cartons for signs of damage before opening them. Check package contents against the packing list and inspect each item for visible damage. Report damage claims promptly to the freight handler.

Tools

Although no special tools are necessary, the following hand tools are suggested for installation:

- Phillips®-head screwdriver, #2
- 9- or 12-inch (# 2 - $^{3}/_{16}$"), flat-blade screwdriver
- 9- or 12-inch (# 3 - $^{5}/_{16}$"), flat-blade screwdriver
- Medium, slip joint pliers
- Set of combination wrenches
- Long-nose pliers
- 8-in. adjustable wrench
- Assorted nut-driver handles ($^{1}/_{4}$", $^{5}/_{16}$", $^{3}/_{8}$")
- Universal terminal crimper
- Triplett™ Model 630-NA VOM, or equivalent analog volt-ohm meter

Access

WARNING

Read the warning on Page iii now. Disconnect primary power before opening enclosures.

Power Converter

Latches secure the cover. When you release these, you can swing open the cover for internal access.

Flashhead

You may pivot the lens open by disengaging two quick-release latches. Be careful that the rim of the lens clears nearby objects during opening and closing. Normally, the flashhead contains no interlock. Turn off primary power before opening the flashhead. Wait one minute for storage capacitors to drain down. Open the flashhead and use a voltmeter to ascertain that no high voltage exists between the red and the blue wires. Look for these wires on the ceramic terminal posts.

Mounting

Power Converter

Mounting and package dimensions for the power converter are shown in *Figure 2-2*. FTCA does not furnish mounting hardware unless you order it as part of an installation kit. Use the following guidelines:

- Ensure that adequate space surrounds the equipment for access during installation, maintenance and servicing.
- Allow space for air flow around the power converter.
- Use a bonding strap and bond the case to the site grounding system.

Flashhead

Mounting dimensions for the flashhead are shown in *Figure 2-1*. The flashhead must be protected from lightning strikes. The flashhead may be mounted to painted or unpainted surfaces. One of the legs in the base of the flashhead contains a built-in electrical ground connection. Use the following guidelines for mounting the flashhead; use:

- A lightning rod extended above the flashhead to protect it when it is mounted at the uppermost part of the structure. Avoid locating the rod where it would prevent tilting the lens open or interfere with access by maintenance or service personnel.
- A bonding strap when mounting the flashhead. Fasten the bonding strap to the flashhead with the mounting bolt that goes through the leg containing the ground connection.

Leveling

Flashheads must be level for correct vertical beam alignment. Two leveling vials—aligned with the mounting feet—are permanently attached to the flashhead. Typically, the mounting surface for the flashhead is level and no adjustments are required. When the flashhead is level,

both leveling vials show centered bubbles. Use the following guidelines:

- If adjustment is necessary, raise the appropriate mounting foot with shims or washers. Raising one foot by $\frac{1}{16}$ inch (1.6 mm) tilts the beam about $\frac{1}{2}$ degree.
- Take extreme care to ensure that all four feet rest snugly against a firm mounting surface before tightening the mounting bolts. Failure to do so could result in serious damage to the base when you tighten the bolts.

Installation

This manual may not contain all the information about installation wiring required for your installation.

NOTE

If installation drawings prepared specifically for your site disagree with information provided in this manual, the installation drawings should take precedence. *Consult any site-specific installation wiring diagram supplied with your equipment.*

Note: FTCA wiring diagrams define only minimum requirements recommended for satisfactory equipment operation. *It is the responsibility of the installer to comply with all applicable electrical codes.*

You can find conduit and other distribution wiring details on electrical installation diagrams provided by FTCA or others. *Installation instructions concerning red light marker fixtures are not part of this manual.*

All installation wiring should have an insulation rating of 600 volts. Size power service wiring to satisfy the load demand of the red light system (if present) and the power converters. *Read the notes on the installation wiring diagrams supplied both in this manual and with the equipment.*

Power Converter Wiring

Consult the installation wiring drawings. For service wiring, consider the voltage, length of the wire run, and the total load (number of lights). Assume a load of 175 volt-amperes per light, and do not permit the line voltage to drop by more than 5% caused by wire resistance. Also assume a load of 175 volt-amperes per light to determine the appropriate *slow-acting* fuse ratings at the power distribution panel. Use a value of 250 volt-amperes per light to determine *fast-acting* fuse ratings at the power distribution panel.

The operating voltage and frequency is imprinted on a label inside the power converter near the fuse block. Two internal fuses are sized according to the operating voltage. When Line 2 is neutral, the factory replaces Fuse F2 with a jumper wire.

Flashhead Wiring

A flashhead cable interconnects the power converter and flashhead. When FTCA Part Number 6340, or equivalent cable, is used, the two may be separated by a distance up to 600 feet. Consult Customer Service at 1-800-5825 when a greater distance is necessary. The cable requires five conductors with 600 volts (minimum) insulation. Two of the conductors must be #10 AWG. The other three may be #16 AWG (minimum; for mechanical strength) if you are cabling together individual wires.

To ensure long-term equipment reliability, use continuous wiring between the power converter and flashhead without intervening junctions or splices.

Securing the Flashhead Cable

Use the following procedure for securing the flashhead cable to a skeletal structure:

1. Run the cable along one of the tower legs and wrap one full turn of two-inch Scotchwrap™ #50 tape, or the equivalent, around the cable and tower leg at regular intervals of about 5 feet (1.5 meters).
2. Wrap three full turns of one-inch Scotchwrap Filament #890 tape, or the equivalent, over the Scotchwrap #50 tape.
3. Wrap four full turns of two-inch Scotchwrap #50 tape, or the equivalent, over the Scotchwrap Filament #890 tape.
4. Perform steps 1 through 4 also directly above and below any tower leg flanges that the cable may cross.

Installation Checklist

Complete the following steps before applying power:

1. Equipment Damage:
   Inspect all equipment for damage.
2. Required Equipment:
   Verify the received equipment against the packing list to ensure completeness.
3. Power Converter Mounting:
   Position and mount each unit allowing adequate clearance for opening the covers. Also, use the following guidelines:
   - Ensure that the case is mounted upright and grounded with a bonding strap from the case leg to the site grounding system.
   - Check hardware inside the case to ensure that the chassis mounting screws and nuts are tight.
   - Ensure that only the bottom of the case has drain holes and that they are clear.
   - Ensure that no holes are punched or drilled on the top surface of the case.
   - Ensure that air can flow around the case.
   - Mount the power converter away from radio frequency interference (RFI).
4. Flashhead Mounting:
   - Ensure that the flashhead lens can be opened without striking other objects.
   - Level and aim the flashhead.
5. Power Converter Wiring:
   Examine the installation drawings and use the following guidelines:
   - Check for proper incoming service voltage.
   - Wire each unit according to the instructions.
   - Ensure that all three power converters are on the same main line breaker.
   - Check all electrical connections for tightness.
   - Check all terminal strip connections for tightness.
   - Ground the power converter using a bonding strap from the case leg to the site grounding system.
6. Flashhead Wiring:
   - Protect the top flashhead against lightning strikes.
   - Ground the flashhead leg with the ground connection by using a bonding strap to the tower.
   - Check the wiring of the flashhead cable to the flashhead.
   - Secure the flashhead cable to the tower. Support and tape the cable to prevent its movement by the wind.

After completing all the steps listed above, turn on the power and perform an operational checkout from procedures in *Section 3* of this manual.

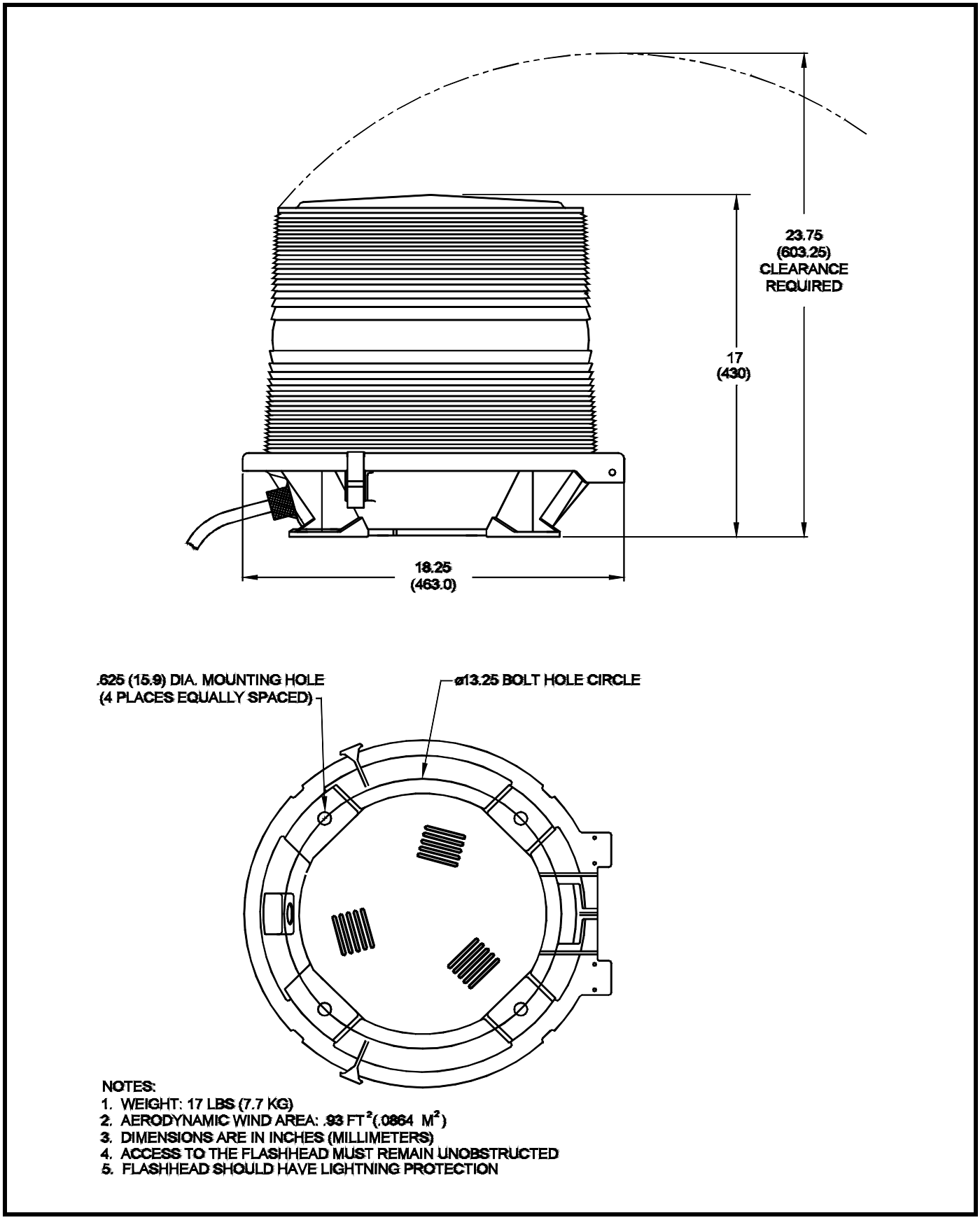

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Figure 2-1 Flashhead Mounting and Outline

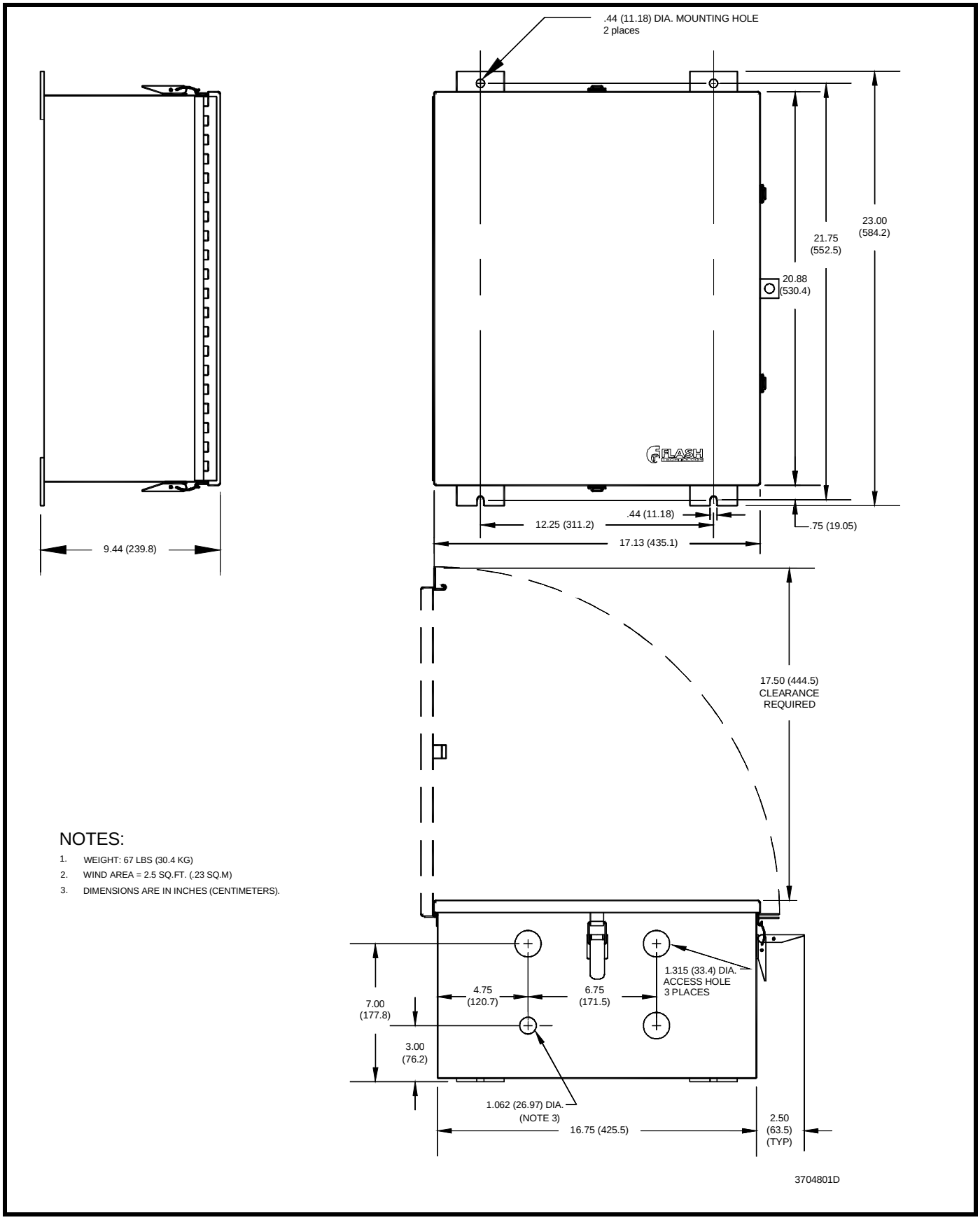

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Figure 2-2 Power Converter Mounting and Outline

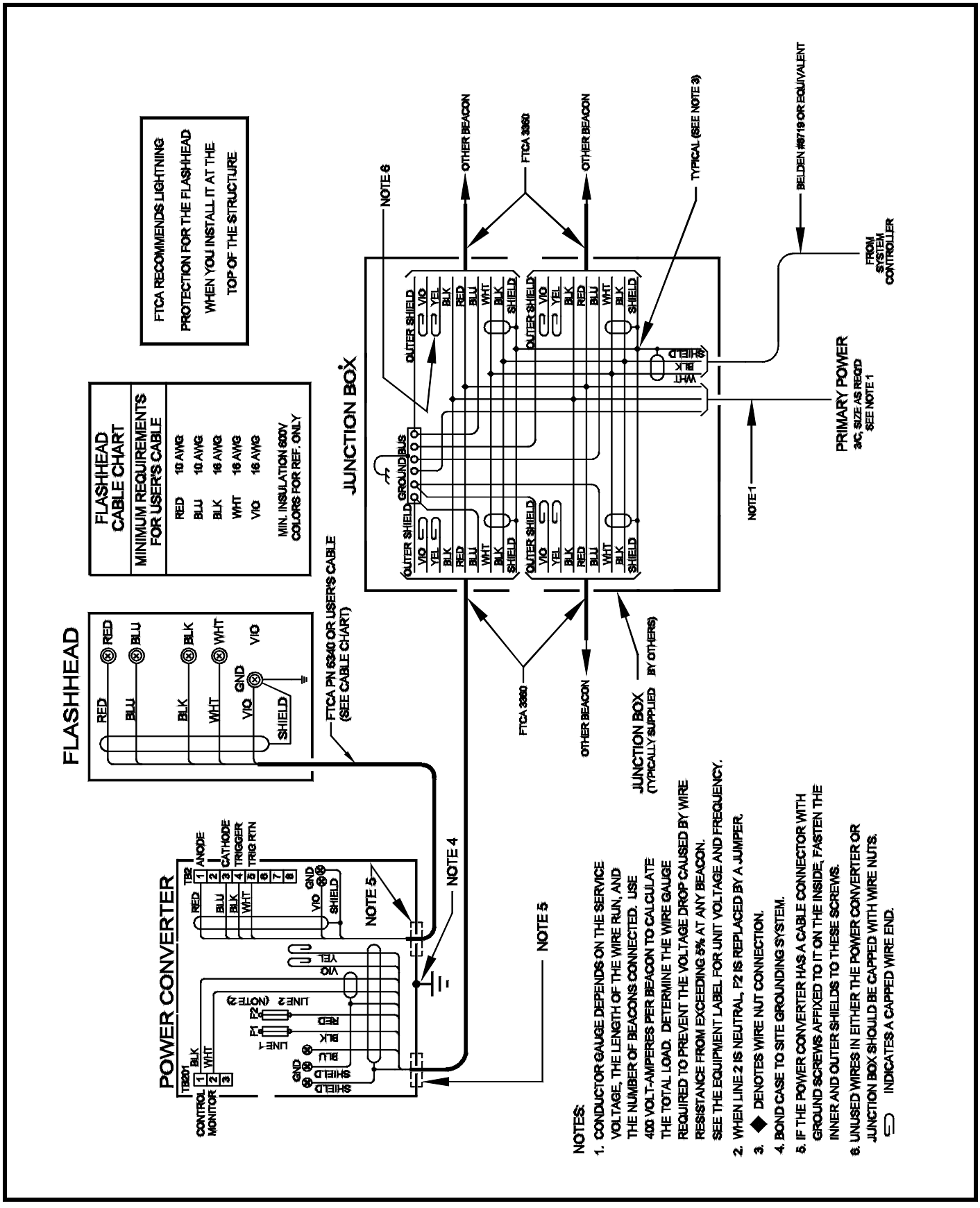

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Figure 2-3 Single-phase Wiring Guideline

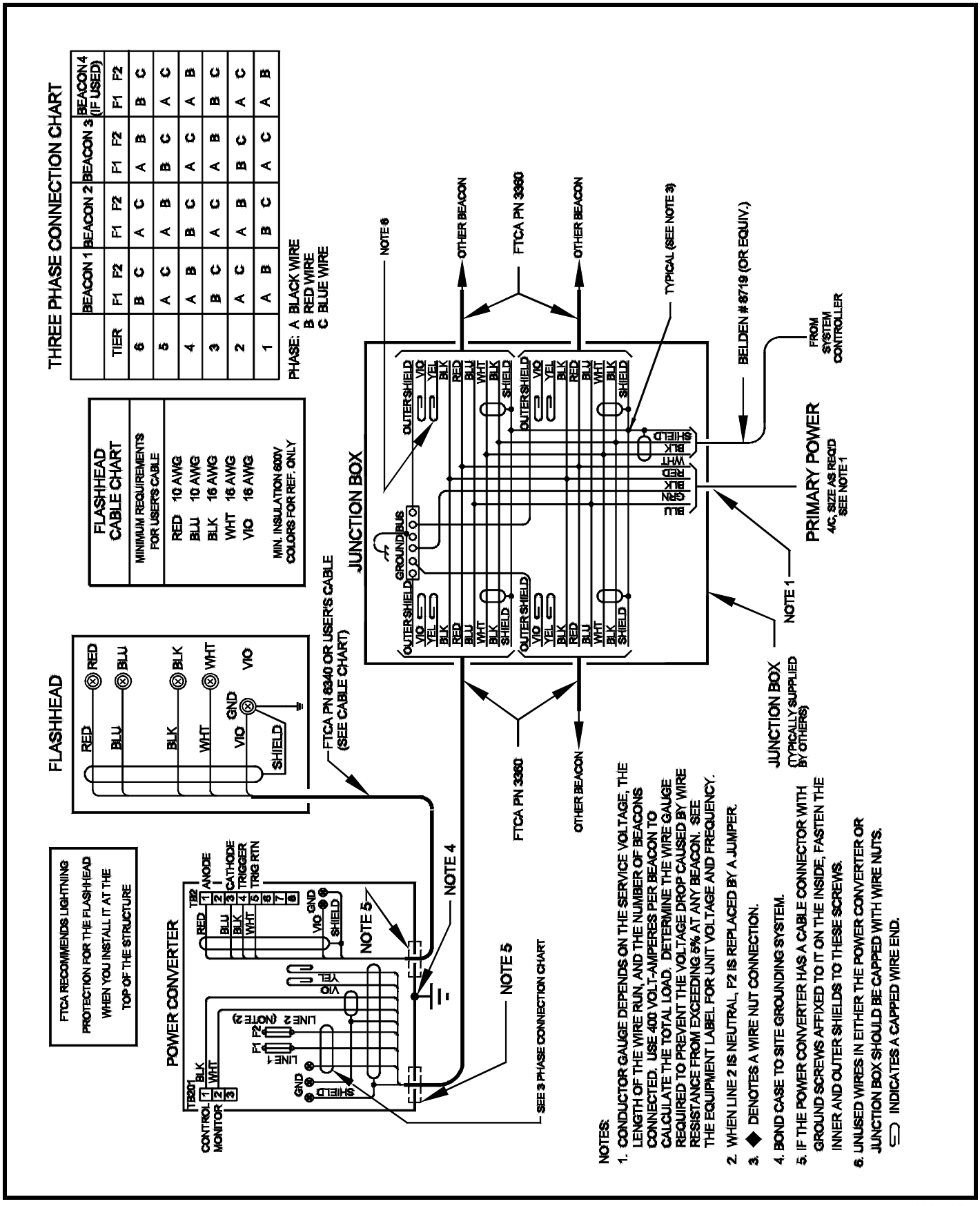

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Figure 2-4 Three-phase Wiring Guideline

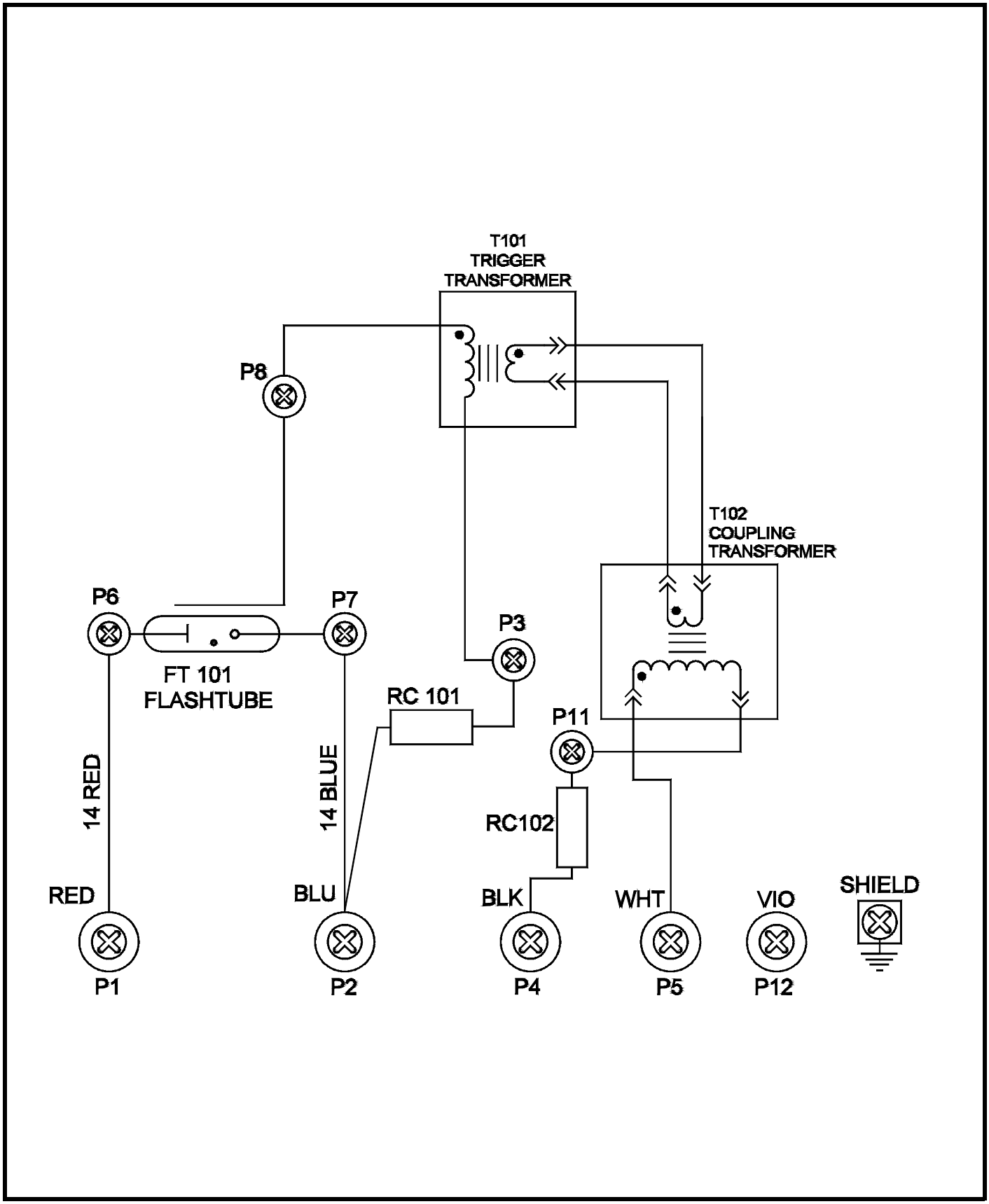

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Figure 2-5 Flashhead Internal Wiring

Section 3 — Maintenance and Troubleshooting

Preventive Maintenance

Carry out the following inspection and cleaning procedures at least once a year:

1. Verify that moisture does not accidentally enter the equipment through gaskets or seals, or collect as condensation.
2. Verify that all drain holes are clear.
3. Check terminal blocks and relays for evidence of corrosion and electrical arcing. Clean or replace any component that shows evidence of high-voltage damage.
4. Check flashtube connections for signs of pitting or arcing. Verify that anode and cathode connections are firmly tightened.
5. Check all electrical connections for tightness and verify the absence of corrosion or electrical arcing.
6. Clean the outside surface of the lens with liquid detergent and water. Wipe it gently with a soft cloth or paper towel.
7. Clean the inside surface of the lens with an FTCA-approved professional plastic cleaner. Wipe the lens with cheesecloth only. *Do not use regular cloth or paper towels.* A lens cleaning kit, PN 8630801, is available from FTCA. Contact Customer Service at 1-800-821-5825.

Troubleshooting

NOTE

Before proceeding—read the warning on Page iii.

RFI Problems

Presence of radio frequency interference (RFI) can cause a light to flash intermittently, at the wrong rate, or at the wrong intensity. RFI can enter the light by way of *any* wire to or from the unit. For example:

- RFI on *primary power* wires could cause errors in flash rate and intensity.
- RFI on the *control* wire could cause a light to stay at NITE mode. RFI would not normally cause a light to stay at DAY mode.
- RFI on the *monitor* wire could cause lights and the system controller to malfunction.
- Strong RFI could burn out circuit board components.

While FTCA designed circuits to reject or bypass RFI, complete immunity cannot be guaranteed beforehand. It may be necessary after installation to add external filters or use other methods to reduce RFI entering the equipment. FTCA provides all reasonable technical assistance to achieve satisfactory operation.

Diagnostic Troubleshooting

The most effective troubleshooting begins with careful observations of operating behavior. This often leads directly to the cause of a problem.

If any LED lamps are not as indicated, try replacing PCB1 for that unit, unless all units have the same or very similar problems. System-wide problems may be caused by an incorrectly operating System Controller or improper system wiring.

Table 3-1 lists some symptoms a malfunctioning light might exhibit. *Table 3-2* correlates these symptoms with component assemblies or conditions that might cause the malfunction.

Each item in *Table 3-2* is weighted to indicate the estimated likelihood that it would be causing the problem. For example, suppose the light does not flash at all but some of its circuits are still functioning; that is, fuses are not blown, relays operate, and so forth. This is symptom C in *Table 3-1*. *Table 3-2* indicates that symptom C behavior would most likely be caused by a defective PCB1 board. The next most likely cause would be a defective rectifier board. The third would be the C1/C2 capacitor bank, and so on.

When a problem has been traced to a specific component, see *Subsection Component Testing* and *Subsection Component Removal and Replacement* for further assistance.

Table 3-1 Major Troubleshooting Symptoms

Symptoms	Flash Conditions		Code†
	DAY	NITE	
All circuits are dead	NO	NO	A
Primary line fuse repeatedly blows	NO	NO	B
Some circuits functioning	NO	NO	C
No confirmation	OK	OK	D
NITE flash fails	OK	NO	F
NITE too bright - ragged flash	OK	HIGH	G
	SKIPS	OK	H
	LOW	HIGH	I
	LOW	SKIPS	J
	SKIPS	SKIPS	K
Resistor on PCB2 burned out	NO	NO	L
Inconsistent and erratic flash behavior			N
No FAIL indication	NO	NO	O

† See Table 3-2.

Table 3-2 Fault Locator

Probable Cause		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
DAY capacitor bank	C1/C2			4												
NITE capacitor	C3			3			4									
Tuning Capacitor	C4								2							
Primary Line Fuses	F1/F2	1														
Flashtube	FT101			6								2				
Low Intensity Relay	K2							2		1	1					
Burst Choke	L2						3									
Rectifier Board	PCB2			2			2									
Timing And Trigger Board	PCB1			1	1			1		2	2		2		2	1
Burst Resistor	R2						1									
Interlock Switch	S1	2														
Power Transformer	T1	3	2	5												
Sense Module	PCB3				3											
Coupling Transformer	T3			7								3				
Suppressor Assembly	VR1		1													
Note 1									1							
Note 2									1							
Note 3												1			3	
Note 4					2											
Note 5													1	1		
Note 6												4			4	

Note 1 Blown fuse in one leg of 3-phase power distribution: all beacons on the same phase would be affected.
Note 2 Wrong phase between system controller and light.
Note 3 Trigger potential arcing to chassis.
Note 4 Wrong confirmation programming at light.
Note 5 RF interference
Note 6 Poor connection in discharge circuit between capacitors and flashtube or arcing to chassis.

Component Testing

The following procedures describe how to check most of the unit's major electrical components. Always make resistance measurements with the primary power turned off. However, you must make voltage measurements with power applied. Thus, *for your safety,* carry out all preliminary steps such as connecting test leads or circuit jumpers, or disconnecting existing circuit connections with the power turned off and storage capacitors discharged.

WARNING

Read the warning on Page iii.

Power Converter

Capacitors

You may test capacitors with an analog ohmmeter capable of measuring one megohm or greater. Use the procedure described below. Resistance measured between the terminals of a fully discharged capacitor is initially zero and increases steadily with time if analog ohmmeter leads are left across the terminals. Eventually, an open circuit condition occurs. The time it takes for the complete transition depends upon the total amount of capacitance. A capacitor, disconnected from other circuitry, is defective if it does not exhibit this behavior. The capacitor must be manually discharged before this measurement can be repeated. *This procedure may not detect a failure that occurs only at high voltage.*

A bank of capacitors connected in parallel may be checked as a single unit. First disconnect any leads that connect the capacitors to external circuits. Connect the ohmmeter leads to the terminals of any one of the capacitors. If a short circuit is indicated, the individual capacitors must be disconnected and checked separately. A shorted capacitor is indicated if the measured resistance does not rise above zero after several seconds of measurement.

NOTE

Some instruments make incorrect readings near a radiating antenna. Make measurements when the power to the antenna is turned OFF or use a meter known to be unaffected by an RF field.

C1 and C2 Capacitor Banks

Check these capacitor banks as described in *Subsection Capacitors*. Each bank can be checked as a whole at one time by connecting the meter leads to the terminals of anyone of the individual capacitors in the bank and pressing the armature of the K3 Bleeder Relay.

C3 and C4 Capacitors

Check these capacitors as described in *Subsection Capacitors*.

K2 — Low Intensity Relay, 24-volt DC Coil

A malfunctioning relay may have faulty contacts, a sticky mechanism or a defective coil. The first two possibilities may be determined by inspection and manually exercising the armature. A defective coil can be confirmed by measuring the resistance.

To measure the resistance of the K2 Relay, first remove the PCB1 timing and trigger board. The resistance from TB4-8 and TB4-9 to TB4-10 or chassis should be approximately 290 ohms.

K3 - Discharge Relay - 120 VAC Coil

The resistance of the K3 Relay coil should be approximately 290 ohms.

L1 — Burst Choke

The measured resistance of this choke should be approximately 15 ohms.

PCB1 — Timing and Trigger Board

Replace this board with one known to be in good condition.

PCB2 — HV Rectifier Board

Replace this board with one known to be in good condition.

PCB3 — Sense Module
Replace this board with one known to be in good condition.

R1 — Discharge Resistors
The measured resistance should be 35 kohms.

R2A & R2B — Burst Resistors
The measured resistance should be 750 ohms for each resistor in the PC 301-2 or PC 301-2S.

T1 — Power Transformer
To test this transformer, first remove the timing and trigger board (PCB1) and the HV rectifier board (PCB2). Apply power to the unit and measure secondary winding voltages at the terminals indicated in *Table 3-3*.

Table 3-3 T1 Voltages

Terminals	Voltage Range Allowed
TB4-1 to TB4-9	900 to 1050 VAC[1]
TB3-1 to TB3-10	110 to 120 VAC
TB3-2 to TB3-3	22 to 26 VAC
Across C4	550 to 600 VAC

1. If this AC voltage is substantially below the specified minimum value, check the C4 Tuning Capacitor.

VR1 — Suppressor Assembly
To check this component first remove one of its leads from a fuse block terminal. The measured resistance across VR1 on the x110 kohm scale should be infinite.

Flashhead

FT101 — Flashtube
Visually inspect the flashtube for broken electrodes, cracked glass, and the solder connections of the pins. A darkened envelope does not necessarily mean the light output would be unacceptable. Before concluding that a faulty flashtube is responsible for an inadequate flash, first rule out other possible causes such as weak or absent discharge voltage or triggering pulses.

T101 — Trigger Transformer
The measured resistance of the secondary winding (potted assembly) should be approximately 1.5 ohms. Check the ferrite core for cracks. Check the mounting screws for tightness.

Component Removal and Replacement

Component location diagrams are provided in *Figure 4-1*, *Figure 4-2* in Section 4 — *Recommended Spare and Replaceable Parts*. A flashhead electrical wiring diagrams is provided in *Figure 2-5*. *Power converter internal wiring diagrams* are provided on the ***Information Card*** that is supplied with your system. The ***Card*** is fastened inside the power converter cover.

Note the location and color of all wires that you disconnect.When you replace the wiring after you replace the components, ensure that the wiring conforms exactly to the wiring diagrams.

The general procedure for removing components is a logical one and is as follows:

1. Obtain access to the component in question:
   a. Disconnect completely or partially the wiring to components first that prevent clear access.
   b. Completely remove or relocate these components.
3. Disconnect the wiring to the component that you want to replace.
4. Remove this component.
5. Replace everything in the reverse order: first the component, then the wiring, then the components that allowed you access. In some cases, you may have to place some wires on the component before you fasten it in place, then replace the remaining wires.

Most components are relatively easy to access for removal. Only those that are more difficult are described.

Power Converter

C1/C2 — Capacitors
Before removing or replacing a capacitor always make sure it is discharged by checking with a voltmeter directly across the terminals. You may manually discharge a

capacitor by placing a resistance (25 watts, 10,000 ohms or greater) between its terminals. Direct shorting may damage the capacitor, while connecting the terminals to the equipment chassis may fail to discharge it.

Remove Fuse F1 for this procedure to prevent accidental application of power if the interlock switch is accidently pressed.

Removal

Remove circuit board PCB1 and PCB2 for access to the capacitors.

Loosen two screws at the corners of the circuit boards, loosen the screws holding the boards to their respective terminal blocks, and slide the board to clear the screw heads. Remove the boards from the unit.

The capacitors are mounted in holes in a bracket and held down to the chassis with a bolted washer. Disconnect the wires leading to capacitors. Remove the bolt and washer. Lift the capacitors from their receiving holes.

Replacement

Insert the capacitors into their respective receiving holes. Replace the hold-down bolt and washer to secure the capacitors to the chassis. Reconnect the wires to capacitors and verify that wiring agrees with the *Information Card*. Wires must be replaced *exactly* as removed. In some instances, a quick-connect wire terminal does not seat properly if it is not placed on the terminal cluster exactly as it was before removal. This is due to interference between the insulation on the wire terminal and the insulation surrounding their terminal cluster on the capacitor. FTCA recommends that you lightly squeeze the quick-connect wire terminals with pliers before reinstalling them over the capacitor terminal blades.

PCB1 — Timing and Trigger Board

Removal

1. Loosen (but do not remove) the two screws near the corners of the board.
2. Loosen the screws holding the board to its terminal block.
3. Slide the board to the right and lift the board from the chassis.

Replacement

Reverse the removal procedure.

T1 — Power Transformer

Removal

1. Disconnect wires attached to the transformer and observe how each wire is routed from the harness to its terminal on the transformer.
2. Remove the four screws holding the transformer to the chassis and remove transformer from the chassis.

Replacement

1. Reverse the removal procedure.
2. Verify that wiring agrees with the *Information Card* supplied with the power converter and that you restore wire routing to its original state.

PCB2 — HV Rectifier Board

Removal

1. Loosen the two screws near the corners of the board.
2. Loosen, but do not remove, the screws holding the HV rectifier board to the terminal block.
3. Slide the circuit board out from under the terminal block screws.

Replacement

Reverse the removal procedure.

T3 — Coupling Transformer

Removal

1. Remove the two blue wires from the primary (small number of turns) of the Coupling Transformer.
2. Remove the two blue wires from the secondary of T3 (large number of turns) to TB2-4 and TB2-5.
3. Remove the two 4-40 x 2" phillips head screws holding the transformer assembly to the bracket. Note the orientation of the molded secondary winding with respect to fixed features on the bracket, because it must be reinstalled with this same orientation.
4. Remove the outer half of the core and lift off the molded secondary winding. The seven turns of the primary winding remain hanging in place.
5. Remove the inner half of the core, taking care not to uncoil any turns of the primary winding.

Replacement

1. Reassemble the primary and secondary windings over the two halves of the core. Attach the core to the bracket using the two long screws.
2. Reattach the electrical wires. Verify that wiring is in accordance with the *Information Card* supplied with the power converter.

PCB3 — Sense Module

Removal

1. Disconnect the wire on TB2-1 that passes through the PCB3 coil on the PCB3 board.
2. Pull this wire through the coil to remove it from the coil. *Note its direction through the coil.*
3. Disconnect the two wires on the small terminal block (TB1) on PCB3 (small screwdriver needed).
4. Remove the two Phillips-head screws that hold PCB3 to the base plate. *Note that there are spacers on these screws under the board.*
5. Lift out PCB3.

Replacement

Reverse the removal procedure.

All Other Power Unit Components

All other components are mounted in the base or attached to the side walls of the power unit. They are attached by Phillips-head screws. You may need a short screwdriver for some removals.

Removal

1. Carefully note the position and color of wires on the connectors to the component you want to remove.
2. Remove the wires either fastened by screws or connector plugs (this depends on the component you are removing).
3. Remove the screws that hold the component to the chassis.

Replacement

Replace components in the reverse order of removal. That is:

1. Attach the component with its mounting screws.
2. Reattach the connecting wires by using the plugs or hold-down screws.

Flashhead

FT101 — Flashtube

Removal

Loosen the three screws (on screw lugs)—this enables you to disengage the flashtube. Carefully lift the flashtube upward from the assembly.

Replacement

Align the pins on the flashtube base with the clamps of the terminal screw lugs, making sure that the *red dot* on the flashtube base coincides with the *red dot marked on the bracket directly under it.* Then carefully insert the flashtube and settle it into place, making sure the ceramic base is resting directly on the tops of the screw lugs. Secure the flashhead by tightening the three screws on the screw lugs.

T101 — Trigger Transformer

Removal

1. At the trigger wire post adjacent to the flashtube, remove the large diameter wire coming from the trigger transformer.

2. At one of the smaller, side-mounted ceramic posts, remove the small wire to the trigger transformer. Do not disconnect the primary winding wires (seven turns of insulated wire).

3. Remove the two 4-40 x 2" phillips head screws holding the transformer assembly to the bracket. Note the orientation of the molded secondary winding with respect to fixed features on the bracket, because it must be reinstalled with this same orientation.

4. Remove the outer half of the core and lift off the molded secondary winding. The seven turns of the primary winding remain hanging in place.

5. Remove the inner half of the core, taking care not to uncoil any turns of the primary winding.

Replacement

1. Reassemble the primary and secondary windings over the two halves of the core. Attach the core to the bracket using the two long screws.

2. Reattach the electrical wires. Verify that wiring agrees with the Information Card supplied with the power converter.

T102 — Coupling Transformer

Removal and replacement are similar to the procedure for the trigger transformer (T101) in *Subsection T101 — Trigger Transformer*.

Storage

No special considerations are required for long-term storage of any major assembly, such as the power converter, flashhead, photoelectric control or any internal component. Circuit boards, when not installed in the equipment, should be

Section 4 — Recommended Spare and Replaceable Parts

Customer Service

Customer Service: 1-800-821-5825
Telephone: 615-261-2000
FAX: 615-261-2600
Shipping and Receiving:
Flash Technology Corporation of America
332 Nichol Mill Lane
Franklin, TN 37067
Internet Address:
http:\\www.flashtechnology.com

Ordering Parts

To order parts, contact FTCA customer service at 1-800-821-5825.

Power Converter Parts

Table 4-1 lists the major replaceable parts for the power converter.

Flashhead Parts

Table 4-2 lists the part numbers for the major replaceable parts for the flashhead. The flashtube mounting plate assembly (PN 8812401) is listed here because, if available at a site, you can use it to isolate a malfunction in the flashhead or the flashhead cable without first climbing the mast.

Returning Equipment

If it is necessary to return equipment to FTCA, contact Customer Service (see the following section) for a Return Material Authorization (RMA) number.

Repackaging

Return the equipment in a container that provides maximum protection during shipping and handling. If the original cartons and packaging material are no longer available, package the power converter and flashhead *separately* as described in the following subsections.

Power Converter

Package and ship the power converter in an upright position; that is, with the feet downward. Pad the power converter so that the feet cannot penetrate the box during shipment. Box each power converter separately using a double thickness cardboard container and adequate padding. Do not drop. Use appropriate warning labels on the outside of the container.

Flashhead

Package and ship the flashhead in an upright position. Box each flashhead separately and use adequate padding. Attach the flashhead base to a plate measuring 20 inches square (e.g., 3/8" plywood). Use a double thickness cardboard (or wood) container that is 20 inches square by about 26 inches high (inside dimensions). Use soft packing or a cardboard collar around the lens to prevent tipping inside the container. Do not drop. Use appropriate warning labels on the outside of the container.

Table 4-1 Power Converter Major Replaceable Parts

Reference		Description	Part Number Reference
Figure	Item		
6-1	C1/C2	Capacitor, 70 mfd, main bank	†6720401
6-1	C3	Capacitor, 1 mfd, burst (PC 302-1R)	6848202
		Capacitor, 2 mfd, burst (PC 302-1, PC 302-1S)	6848203
6-1	C4	Capacitor, 3 mfd, tuning	6577903
6-1	BR1	Diode Bridge	4902806
6-1	F1	Fuse, Power	*4900307
6-1	K2	Relay, 24V, Low Intensity Mode	*8900494
6-1	K3	Relay, 120V, Discharge	*8900493
6-1	L1	Choke, Burst	4850601
6-1	L2	Choke, Flash	4175201
6-1	PCB1	Timing and Trigger Board (PC 302-2)	*†2904411
		Timing and Trigger Board (PC 302-2S)	*†2904410
6-1	PCB2	HV Rectifier Board	*2458005
6-1	PCB3	Sense Module	8827201
6-1	R1	Resistor, Discharge, 35K 50W	6900541
6-1	R2A, R2B	Resistor, Burst, 750 ohm each, 50W (PC 302-1, PC 302-1S)	†6900533
		Resistor, Burst, 500 ohm each, 50W (PC 302-1R)	†6900532
6-1	S1	Switch, Interlock	8205501
6-1	T1	Transformer, Power	†8841501
6-1	T3	Transformer, Coupling	8336701
6-1	TB2	Terminal Strip, 8 Position	8721008
6-1	TB3 & TB4	Terminal Strip, 11 Position	8721011
6-1	TB201	Terminal Strip, 3 Position	8721003
6-1	VR1	Varistor	*†6901079

† This part number varies according to the specific equipment configuration.

* Recommended as a spare part.

Table 4-2 Flashhead Major Replaceable Parts

Reference Figure	Item	Description	Part Number
6-2	P1, P2, P4, P5, P12	Ceramic Spacer, 3/4” diameter, large	5900844
6-2	P3, P9, P10, P11	Ceramic Spacer, 1/2” diameter, short	5900842
6-2	P6, P7, P8	Ceramic Spacer, 1/2” diameter, tall	5900843
6-2	FT101	FH 308 Flashtube	*8384329
		FH 307-1 Flashtube	*8384308
6-2	RC101	R.C. Network	1403411
--	--	Flashtube Mounting Plate Assembly	†8812401
6-2	RC102	R.C. Network	1403412
6-2	T101	Transformer, Trigger	8288201
6-2	T102	Transformer, Coupling	8336701

* Recommended as a spare part.

† Acts as a flashhead for testing the power converter to avoid climbing the tower.

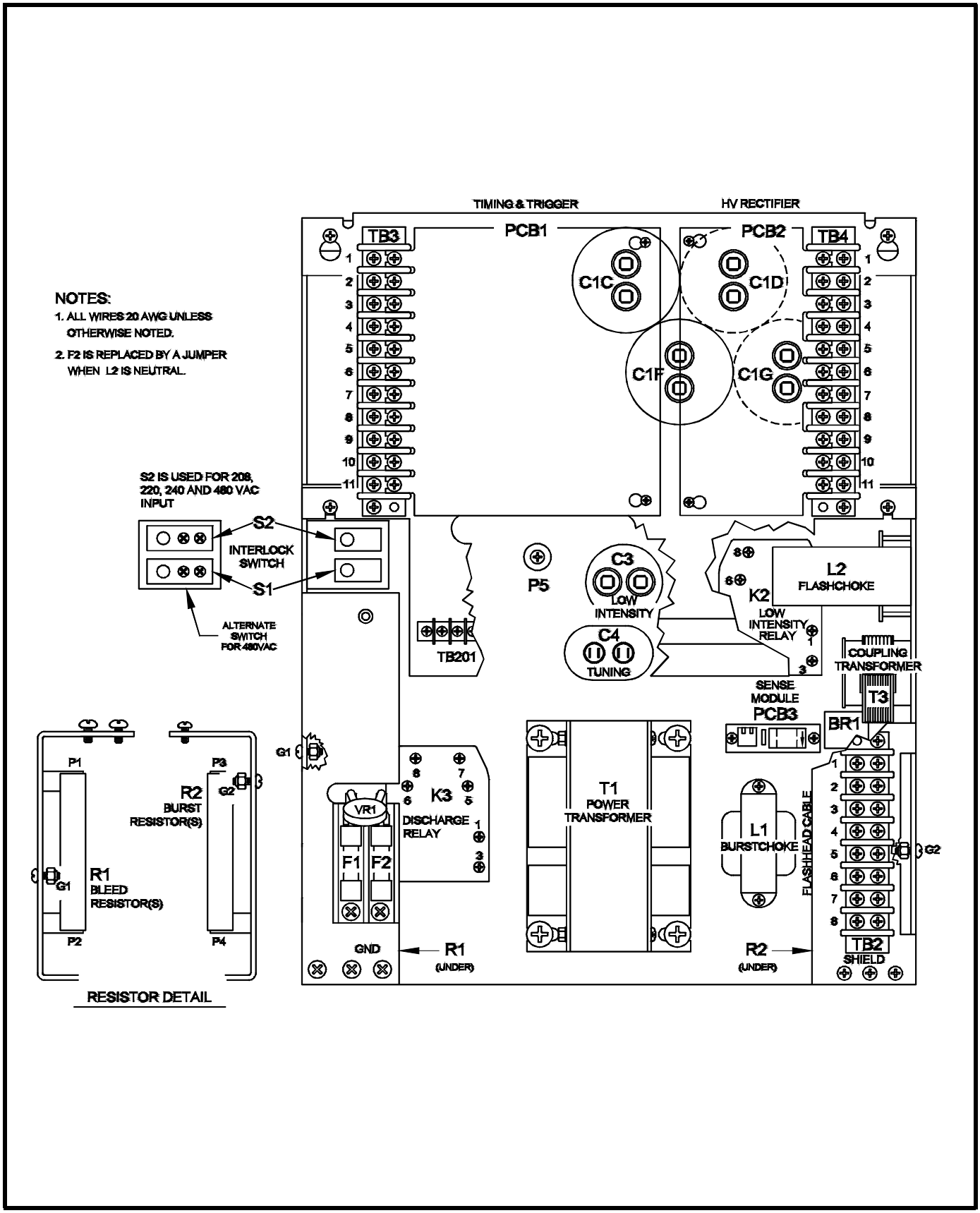

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Figure 4-1 Power Converter Component Locations

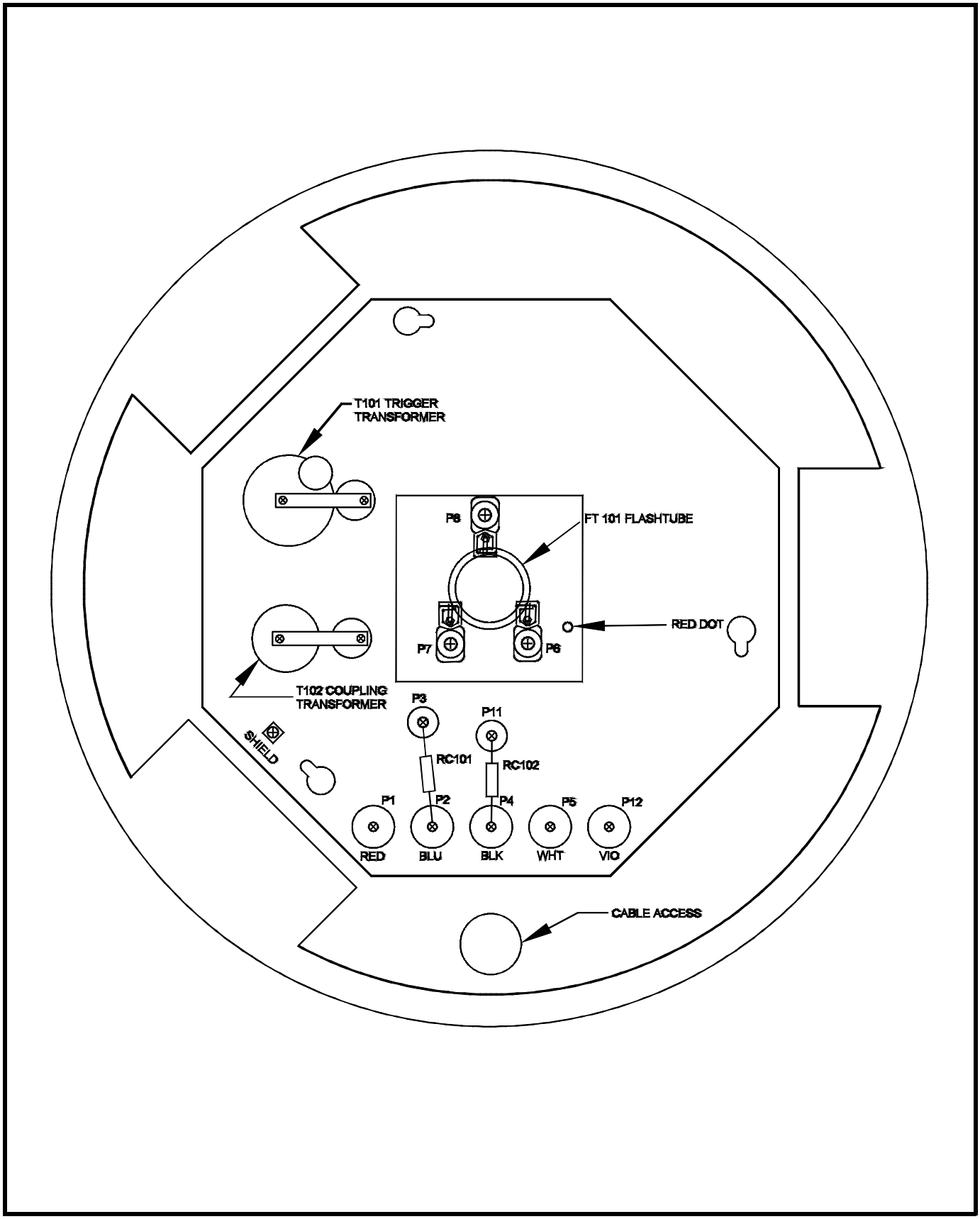

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Figure 4-2 Flashhead Component Locations

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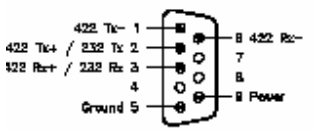
Section 5 — Programming T&T Board P/N 2904410/11

Connecting the Handheld

Table 5-1 shows the connector pin assignments for the handheld. The receive and transmit directions shown in the table are with respect to the handheld. The DB9 connector is located at the top of the handheld programmer.

Table 5-1

DB9 Female	EIA-232 Function
3	Receive +receive
6	No connection -receive
2	Transmit +transmit
1	No connection -transmit
9	Power
5	Ground



DB9 Female

A 9-pin RS-232 cable is used to connect the handheld to the 9044-01 controller board at connector J2 (9 pin Male connector). Power and ground is provided by this connector.

The same connector J2 on the 9044-01 is also used to connect a computer serial port for the enhanced user interface. This interface is used to set parameters, run production and vendor tests and display general operating information.

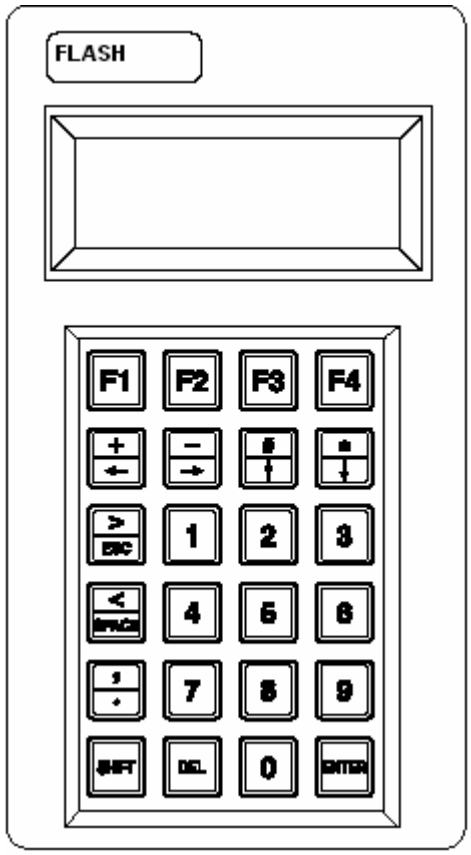


Figure 5-1 FIGURE 5-1 Handheld Programmer

Using the Programmer

The programmer has a four line LCD display and 24 keys as shown in fig. 5.1.

The following is a general discussion of how the programmer works. See Parameters under the SETUP section below for more details.

In the discussions to follow the 4 line LCD display will be represented as shown:

L1: **********

L2: **********

L3: **********

L4: **********

All the messages displayed on the LCD will be in capital letters.

The display does not show the L1: etc. this is used to represent line 1, 2, 3 and 4 on the LCD.

Once the handheld programmer is connected to the 9044-01 and power is applied the 9044-01 will automatically recognize that the terminal is connected to it and will display the sign on message . Only terminals provided by Flash Technology will work with the 9044-01.

The general format of the sign on message for non S versions is:

L1: FLASH TECHNOLOGY

L2: BOARD 4988

L3: (Blank or further information)

L4: ENTER TO CONTINUE

For S versions it is:

L1: FLASH TECHNOLOGY

L2: BOARD 4990

L3: (Blank or further information)

L4: ENTER TO CONTINUE

Once enter is pressed the first menu is displayed as follows:

L1: PRESS A FUNC KEY

L2: F1. SETUP F2. INFO

L3: F3. SHORTTEST

L4: F4. MODE CHANGE

To continue further a function key must be pressed. The function keys are on the top row of the terminal. See fig. 5.1.

F1: Enters the setup menus, used to configure the 9044-01.

F2: Enters the information menu, used to show a limited amount of useful operating info.

F3: Causes the 9044-01 to perform the short test.

F4: Enters the mode change menu, used to manually change the operating mode (DAY, TWI, and NITE). Note: DAY equals HIGH, TWI equals MED and NITE equals LOW intensity

Note: The handheld terminal will return to the sign on message from any other menu if no key is pressed within two minutes. The 9044-01 does this to take the serial port out of the handheld terminal mode if the terminal has been removed to allow the serial port to be used for the enhanced user interface. This means that if you remove the handheld terminal and connect a computer to use the enhanced interface you must wait at most two minutes before pressing any key on the computer. You can cycle the power to the 9044-01 for faster access to the computer interface.

SETUP for non S versions

The setup menu has the following format:

L1: SETUP

L2: 0-1-1

L3:

L4: OK NEXT BACK EXIT

The first line displays the current menu. The second line displays the current setup. The numbers correspond to the selected parameters. The third line is blank. The fourth line displays what functions the keys F1 thru F4 will perform if pressed; the words are spaced to be over the corre-

sponding function key. So, to move to the next menu you would press F2 (NEXT).

F1: OK- is used to enter data.

F2: NEXT- moves to the next item.

F3: BACK- moves to the previous item.

F4: EXIT- exits the setup menu.

SETUP for S versions

The setup menu has the following format:

L1: SETUP

L2: DASH 10 T 1 B 1

L3:

L4: OK NEXT BACK EXIT

The first line displays the current menu. The second line displays the current setup. The numbers correspond to the dash number tier and beacon selected. The third line is blank. The fourth line displays what functions the keys F1 thru F4 will perform if pressed; the words are spaced to be over the corresponding function key. So, to move to the next menu you would press F2 (NEXT).

F1: OK- is used to enter data.

F2: NEXT- moves to the next item.

F3: BACK- moves to the previous item.

F4: EXIT- exits the setup menu.

Parameters for non S versions

Pressing the NEXT or BACK function key from the SETUP menu takes you to the parameters. The general format is:

L1: SETUP

L2: SYSTEM

L3: 0- Std. 1- Air. 2- Cat

L4: OK NEXT BACK EXIT

The currently selected option will have the cursor under it. For example:

 0-Std 1-Air 2-Cat shows that the currently selected option for the parameter is one (1) which in this case means Standard system.

If the board your are configuring is not in the Standard mode press 1 and press F1 (OK). **Note: Even if your board is configured for Standard mode you will need to press 1 and F1 to change the tier and beacon number.**

The display will change to:

L1: SETUP

L2: TIER # 1

L3: Enter TIER #

L4: OK NEXT BACK EXIT

Press the number keys to select the tier number you wish this board to be and then press F1 (OK). The Tier number displayed will change. The display will change to:

L1: SETUP

L2: BEACON # 1

L3: Enter Beacon #

L4: OK NEXT BACK EXIT

Press the number keys to select the beacon number you wish this board to be and then press F1 (OK). The Beacon number displayed will change. When you are done press NEXT. Be sure to write the numbers on the white space provided on the board.

If settinp up a catenary system press 2 and F1 (OK). **Note: Even if your board is configured for Catenary mode you will need to press 2 and F1 to change the position.**

The display will change to:

L1: SETUP

L2: CAT TIER

L3: 0-BOT. 1-MID. 2-TOP

L4: OK NEXT BACK EXIT

Press the number keys to select the catenary tier you wish this board to be and then press F1 (OK).

To change the Flash rate press NEXT until the LCD shows:

L1: SETUP

L2: FPM 1-60 2-30

L3: 3-20 4-100 5-120

L4: OK NEXT BACK EXIT

NOTE: Valid flash rates are 40fpm and 60 fpm for standard and catenary systems respectivly.

Then press the number corresponding to the desired flash rate and press F1 (OK)

Parameters for S verions

Pressing the NEXT or BACK function key from the SETUP menu takes you to the parameters. The general format is:

L1: SETUP

L2: DASH # 10

L3: Enter Dash #

L4: OK NEXT BACK EXIT

To change the dash number enter a number and press F1 OK. Press NEXT to continue. Note: Dash numbers should only be programmed by trained Flash Technology personell or under the direction of same.

The display will change to:

L1: SETUP

L2: TIER # 1

L3: Enter TIER #

L4: OK NEXT BACK EXIT

Press the number keys to select the tier number you wish this board to be and then press F1 (OK). The tier number displayed will change. When you are done press NEXT or BACK.

The display will change to:

L1: SETUP

L2: BEACON # 1

L3: Enter BEACON #

L4: OK NEXT BACK EXIT

Press the number keys to select the beacon number you wish this board to be and then press F1 (OK). The beacon number displayed will change. When you are done press NEXT, BACK or EXIT.

INFO

The info menu has the following format for non S version:

L1: INFO

L2: BOARD 4988

L3:

L4: NEXT BACK EXIT

The info menu has the following format for S version:

L1: INFO

L2: BOARD 4990

L3:

L4: NEXT BACK EXIT

This menu is used to show a limited amount of information about the current 9044-01 operation and configuration.

The first line displays the current menu. The second and third lines display board information. The fourth line displays what functions the keys F2 thru F4 will perform if pressed; the words are spaced to be over the corresponding function key. So, to move to the next item you would press F2 (NEXT).

F2: NEXT- moves to the next item.

F3: BACK- moves to the previous item.

F4: EXIT- exits the setup menu. Items like energy, trigger voltage, flash rate and operating mode are displayed.

MODE CHANGE

The mode change menu has the following format:

L1: MODE CONTROL

L2: CURRENT DAY

L3:

L4: DAY TWI NITE EXIT

F1: DAY- Changes the mode to DAY.

F2: TWI- Changes the mode to TWI.

F3: NITE- Changes the mode to NITE.

F4: EXIT- exits the mode change menu and returns the mode to automatic.

This menu item is used to manually change the operating modes and functions just like the test jumpers on the board.

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