



SERIAL NUMBER

# **FTC 2201 Red Light Controller**

**Reference Manual  
Part Number F7903667**

## **Front Matter**

### ***Abstract***

This manual contains information and instructions for installing, operating and maintaining the FTC 2201 Red Light Controller.

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### ***Warranty***

Flash Technology warrants all components, under normal operating conditions, for 2 years.

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# Section 1 – Introduction

## FTC 2201 Controller

The FTC 2201 Controller controls one L-864 FH 309 (halogen) or one LED Flashhead and/or up to seven L-810 marker lights (incandescent, halogen or LED). The FTC 2201 Controller directs beacon flashing, and reports light operating status. It allows photocell or manual override mode control.

The PEC 510 Photocell detects changes in ambient light conditions for the controller.

## Specifications

| Parameter   | Specification  |
|---|--|
| FTC 2201 Controller<br>Physical Dimensions (H x W x Depth, Wt)<br>(See Figure 2-2 for mounting dimensions)<br>Operating Temperature Range<br>AC Line Voltage<br><br>Power Consumption<br>Alarm Relay Contact Rating             | 9.62 x 7.5 x 4.74 in., 4 lbs.<br>244 x 191 x 121 mm., 1.81 kg<br>-40 to +85 degrees Centigrade<br>120/240 VAC ±10% 60 Hz ±5% single phase<br>230 VAC ±10% 50 Hz ±5% two phase<br>4 Watts<br>5 Amp @ 250 VAC, Isolated contacts   |
| L-864 FH 309 Flashhead:<br>Application<br>Physical Dimensions (H x Diameter, Wt)<br>Flash Intensity (nominal)<br>Flash Rate<br>Effective Wind Area<br>Beam Spread<br>Power Requirement:<br>Non-flashing<br>Flashing w/ FTC 2201 | L-864<br>16.95 x 18.23 in, 23.0 lbs / 430.5 x 463 mm, 10.4 kg<br>Night (Red) 2,000 ± 25% ECD<br>20 fpm<br>0.93 sq. ft. / 0.0864 sq. m<br>Horizontal: 360° / Vertical: 5°<br><br>420 VA<br>250 VA   |
| L-810 Incandescent Marker:<br>Application<br>Physical Dimensions (H x Diameter, Wt):<br>OL-1<br>OL-2<br>Flash Intensity (nominal)<br>Effective Wind Area:<br>OL-1<br>OL-2<br>Beam Spread<br>Power Requirement: Non-flashing     | L-810<br><br>7.25 x 5.3 in, 2.9 lbs / 184.15 x 134.62 mm, 1.31 kg<br>8.0 x 11 in, 6.3 lbs / 203.2 x 279.4 mm, 2.85 kg<br>Night (Red) 32.5 ± 25% ECD<br><br>0.27 sq. ft. / 0.0248 sq. m.<br>0.54 sq. ft. / 0.0496 sq. m.<br>Horizontal: 360° / Vertical: 10°<br>116 VA per bulb |
| L-810 Halogen Marker:<br>Application<br>Physical (H x Diameter, Wt):<br>Flash Intensity (nominal):<br>Effective Wind Area:<br>Beam Spread:<br>Power Requirement: Non-flashing   | L-810<br>9.0 x 5.3 in, 3.85 lbs / 228.6 x 134.62 mm, 1.74 kg<br>Night (Red) 32.5 ± 25% ECD<br>0.29 sq. ft. / 0.0273 sq. m.<br>Horizontal: 360° / Vertical: 10°<br>45 VA per bulb   |

## **Operation**

### **Controller**

The DAY/AUTO/NIGHT manual override mode switch, which controls day or night operation or automatic operation directed by the photocell, is located on the right center of PCB1 Controller Board. For normal operation, leave the switch in the AUTO position.

The controller begins operation as soon as power is turned on with the main power.

### **Flashhead/Marker Connection**

The FTC 2201 controller has two connections for flashheads and markers labeled “Steady” and “Flashing”. If the controller is being used to flash a flashhead and run steady marker lights, the flashhead is wired to L1 and L2 of the “Flashing” connection point (TB1-6,7) and the markers are wired to L1 and L2 of the “Steady” connection point (TB1-4,5). If the FTC 2201 controller is being used to flash marker lights only, they will be wired to the “Flashing” connection point (TB1-6,7). The board firmware must be adjusted depending on what type and number of lights used and where they are connected.

### **Normal LED Operation**

The LEDs on the PCB1 Controller Board should operate as described in the following list with the DAY/AUTO/NIGHT switch in AUTO:

- The ALARM LEDs are out.
- The DAY or NIGHT mode LED is glowing according to the sky lighting conditions.
- The FLASH LED should be flashing if in NIGHT mode.

## **Manual Override Operation**

Select the desired mode of operation (DAY or NIGHT) by using the DAY/AUTO/NIGHT switch.

The DAY or NIGHT position of the switch overrides photocell control provided by the AUTO position. The override does NOT timeout.

PCB1 has jumpers, switches, connectors, and LEDs whose functions are described in Table 1-1. Figure 1-1 provides a pictorial of the PCB1 Controller Board.

**Table 1-1 PCB1 Jumpers, Switches, Connectors, and LEDs**

| <b>Jumper</b>              | <b>Description</b>  |
|----------------------------|---|
| JP1                        | 120 VAC or 240 VAC operation. Installed for 120 VAC.  |
| JP2                        | 116 or 100 watt incandescent marker bulbs. Installed for 116 watt bulb.                                     |
| JP3                        | Installed for 230/240 VAC operation.  |
| JP4 & JP5                  | Installed for 120 VAC operation.  |
| Manual Override Switch SW1 | Auto: Normal operating position<br>Day: Manual override to DAY mode<br>Night: Manual override to NIGHT mode |
| LED I1                     | Flashing = Syncs with NIGHT mode flash of flashing circuit<br>Steady Off = No power or DAY mode             |
| LED I2                     | DAY - On = DAY mode; LED will flash if unit is in Manual Override to DAY mode.                              |
| LED I3                     | NIGHT - On = NIGHT mode; LED will flash if unit is in Manual Override to NIGHT mode.                        |
| LED I4                     | PEC Alarm - On = Photocell alarm; indicates no mode change in 19 hours.                                     |
| LED I5                     | Marker Alarm - On = Marker Alarm installed on "Steady" Connection.  |
| LED I6                     | Beacon Alarm - On = Beacon Alarm or Flashing Marker Alarm depending on installation.                        |
| SW2                        | Marker Alarm Switch - Set to the number of marker bulbs installed to establish alarm condition.             |

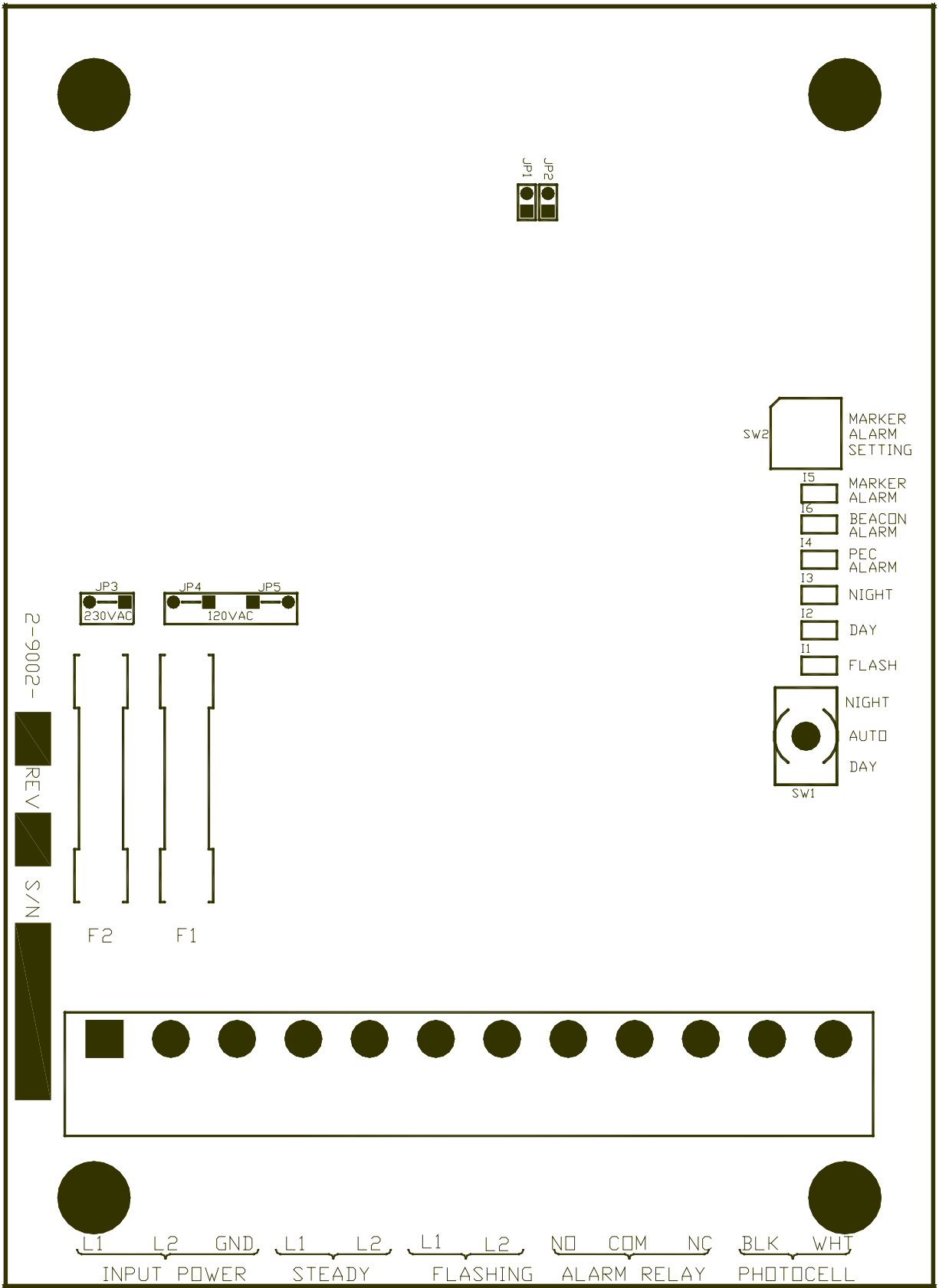


Figure 1-1 PCB1 Controller Board

## **Checkout Procedure**

### **Using the Photocell**

Turn the DAY/AUTO/NIGHT Switch to AUTO:

The system is now under photocell control.

Cover the photocell so as to block all light from it. With no alarms or errors and after a 60 second delay:

- The system is now in NIGHT mode.
- The beacons should be on and flashing (if installed).
- The markers should be on steadily (or flashing depending on configuration).

Uncover the photocell so as to allow light to strike it, or shine a light on it. With no alarms or errors:

- The system is now in DAY mode.
- The beacons and markers should turn off.

### **Using the Mode Override Switch**

1. Turn the DAY/AUTO/NIGHT Switch to DAY:

With no alarms or errors:

- The system is now in DAY mode.
- The beacons and markers should turn off.

2. Turn the DAY/AUTO/NIGHT Switch to AUTO:

With no alarms or errors:

- The system is now under photocell control.
- The beacons and markers should be off during daylight and on at night.

3. Turn the DAY/AUTO/NIGHT Switch to NIGHT:

With no alarms or errors:

- The system is now in NIGHT mode.
- The beacons should be on and flashing (if installed).
- The markers should be on steadily (or flashing depending on configuration).

If the operation is not as described, go to Troubleshooting in Section 3.

## Section 2 – Outline, Mounting and Installation

### **Unpacking**

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

### **Tools**

#2 Phillips-head screwdriver with 10" shank

### **Controller Access**

A quick-release latch secures the door. When you release the latch you can open the door for internal access.

### **Mounting**

Outline, mounting, and clearance dimensions for the controller are shown in Figure 2-1 and those for the photocell are shown in Figure 2-2.

### **Location**

Locate the FTC 2201 Controller in an area with restricted access. You can place the controller anywhere within 400 feet of the most distant light. Consult with the factory if a greater distance is necessary.

### **Controller**

Use the following guidelines for mounting the controller:

- Ensure that adequate space exists around the equipment for access during installation, maintenance and servicing.
- Allow space for air flow around the controller.

FTCA does not furnish mounting hardware unless you order it as part of an installation kit.

### **Photocell Sensor**

Mounting and outline dimensions for the photocell are shown in Figure 2-2.

Use the following guidelines for the photocell:

Locate the photocell where it has an unobstructed view of the polar sky.

It must not view direct or reflected artificial light.

The photocell may be supported directly by electrical conduit.

Mount the photocell vertically on the top end of a vertical length of conduit to prevent water from entering and damaging the unit.

### **Installation Wiring**

#### **NOTE**

Only general information for a typical installation is presented here, and more specific information may be needed for your site. In particular, because the L-810 marker (side-light) lighting components for red nighttime lighting are often purchased from others, and have many variations, only general hook-up information is included.

This manual may not contain all the information about installation wiring required for your site. Consult any installation drawings prepared especially for your site or supplied with the equipment. Site installation drawings should take precedence.

**Follow all national and local electrical codes.**

## Wiring

### NOTE

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

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.

To wire the PEC 510 use #16 AWG stranded wire. The photocell is supplied with an attached cable.

All installation wiring should have an insulation rating of 600 volts.

Wire size for the lights on each wire run is calculated from the number of flashheads or beacons and marker lights, and the length of the wire on that run. Wire for the lights should be sized so that the voltage drop at the bulb sockets or the FH 309 should not exceed 3%. Total power required is the sum of all these and 4 watts additional for the FTC 2201 Controller. Consult power requirements for each type of light in the Specifications in Section 1.

Use the supplied cable for the photocell wiring.

Figure 2-3 shows the FTC 2201 Controller wiring in a typical flashhead/marker installation.

Make electrical connections at the following terminal blocks:

- Alarm: TB1-8 and TB1-9 (NO) or TB1-9 and TB1-10 (NC)
- Photocell: (control) TB1-11 and TB1-12

- Beacon 1 (TOP) or Flashing Marker: TB2-6 (power) and TB3-7 (neutral)
- Marker 1-2, steady: TB2-4 (power) and TB3-5 (neutral)

## Photocell

Connect the photocell to the controller: the black wire to TB1-11 and the white wire to TB1-12.

Ground the wire shield around the photocell wires, if one is present. Do not ground the shield to the photocell, but ground it at the Controller at TB1-3.

## Lightning Protection

All Flash equipment is designed to withstand severe transient over-voltages. However, a lightning arresting system should be installed to prevent eventual damage by lightning. Transient suppressors from line-to-line and line-to-neutral are recommended at the primary power load center.

## Installation Checklist

Use the following checklist when installing the system:

1. Equipment Damage:  
Inspect all equipment for damage.
2. Required Equipment:  
Verify the received equipment against the packing list to ensure completeness.
3. Consult site installation drawings for placement, mounting, wiring details, and power phasing.
4. Provide a power disconnect switch or a circuit breaker.
5. Check the lightning protection system.
6. Be sure that junction boxes will drain properly.

7. Position and mount the controller allowing adequate clearance for removing the cover.

- Ensure that the unit is mounted upright.
- Check the internal hardware to ensure that the chassis mounting screws are tight.
- Ensure that no holes are punched or drilled on the top surface of the cover.
- Ensure that air can flow around the enclosure.

Complete the following steps before applying power:

8. Examine the installation drawings:

- Check for proper incoming service voltage. Verify that primary power voltage is the value stated on the ID plate.
- Wire each unit according to the instructions.
- Check all electrical connections for tightness.
- Check all terminal strip connections for tightness.
- If external alarm detection circuit responds to closed contacts, ensure that they are wired to the contacts on TB1-8 and TB1-9 (NO) that close on alarm.
- If external alarm detection circuit responds to open contacts, ensure that they are wired to the contacts on TB1-9 and TB1-10 (NC) that open on alarm.
- Protect alarm wiring by using shielded wires, grounding the shield, and placing wires in a conduit.

- Connect the photocell to the controller: the black wire to TB1-11 and the white wire to TB1-12. After running the photocell wires, check for continuity and shorts.

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

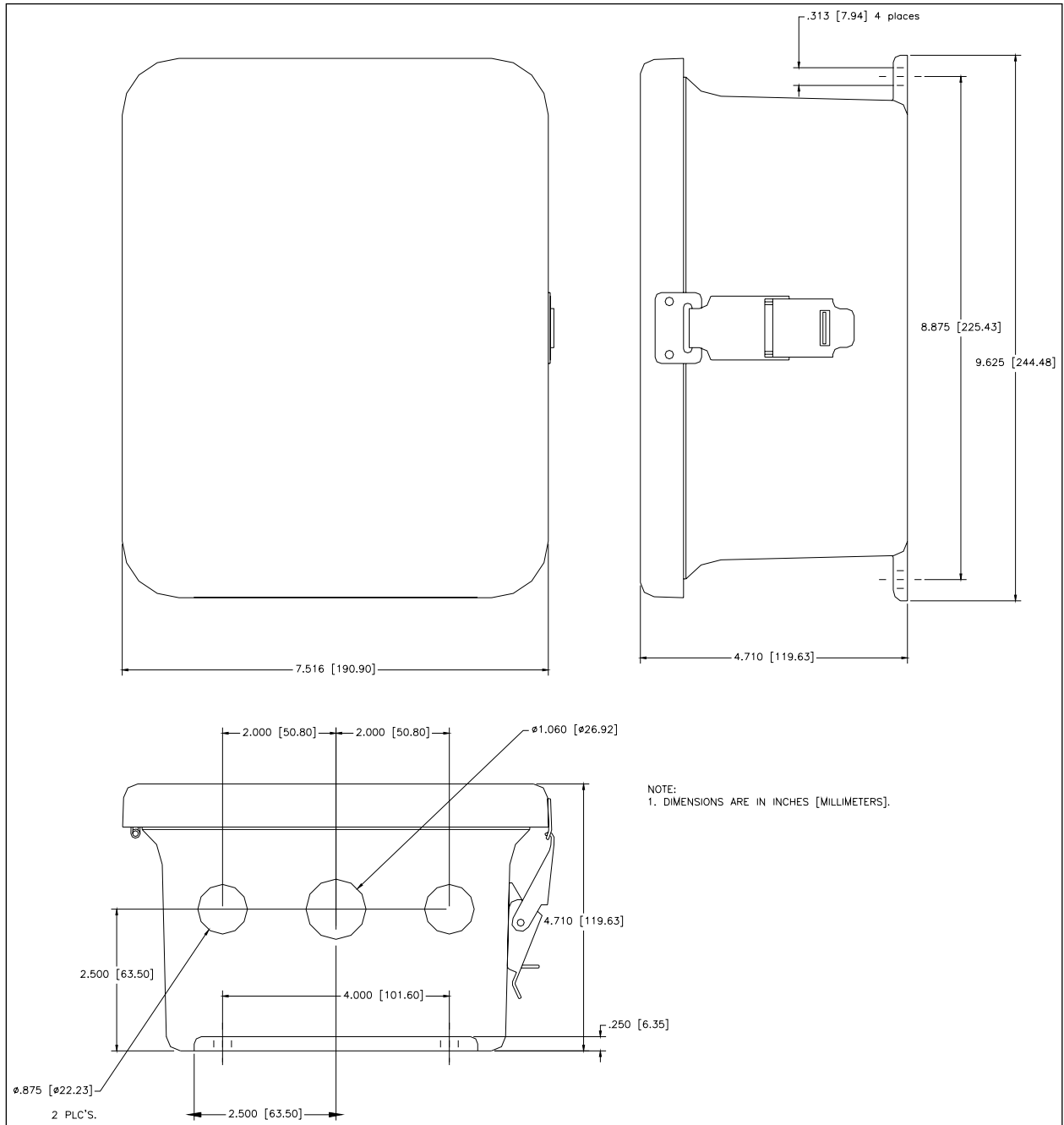


Figure 2-1 FTC 2201 Controller Mounting and Outline

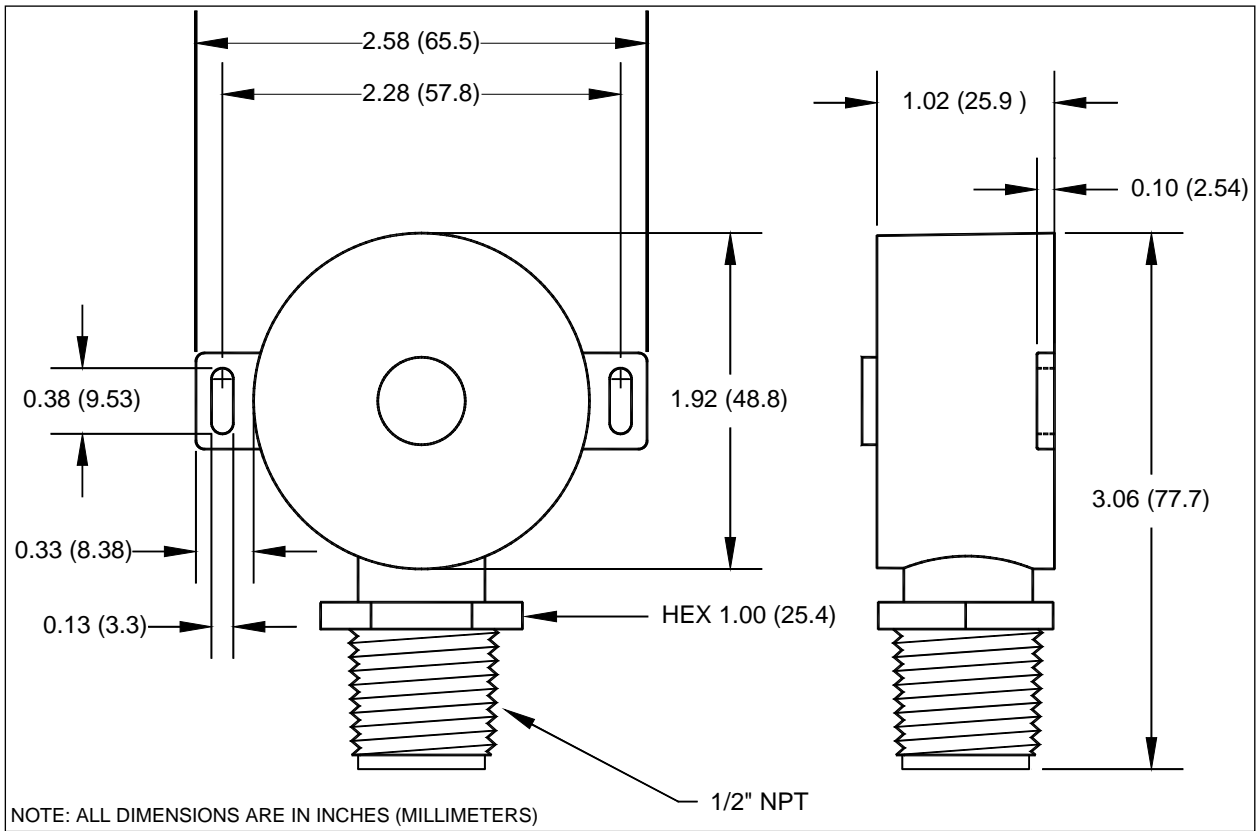


Figure 2-2 Photocell Sensor Mounting and Outline





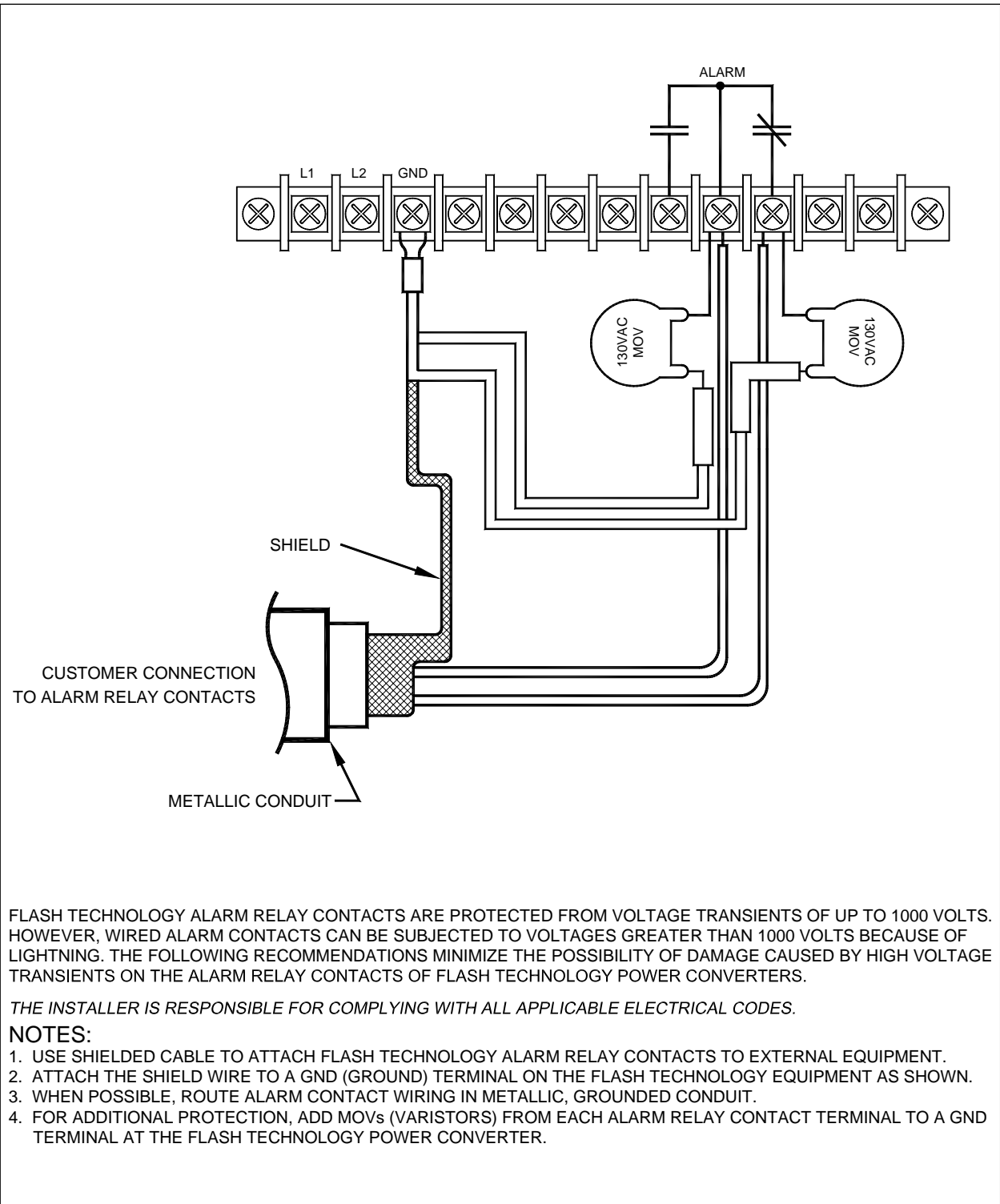


Figure 2-5 FTC 2201 Recommended Alarm Wiring

## Section 3 – Maintenance and Troubleshooting

### **Maintenance**

The circuit boards should be kept free of accumulated dust. Brush and vacuum as necessary.

#### **NOTE**

Do not use compressed air to clean this equipment.

### **Troubleshooting**

The most effective troubleshooting procedure begins with observing the behavior of the system. This often leads directly to a faulty component or other abnormal condition.

Table 3-1 contain information to help locate the cause of a problem.

### **Failing to Switch State**

Switch the DAY/AUTO/NIGHT switch on the PCB1 Monitor Board through the modes and see if the lights follow the mode indicated by the switch position. The lights should be off in DAY mode, on in NIGHT mode, and in AUTO, flash according to the prevailing lighting conditions as determined by the photocell.

Note that some lights may be difficult to see in bright daylight.

### **Flashhead**

If a flashhead is not flashing, first check the flashhead's lamp for continuity and discoloration and then check the cable and its connections to that flashhead. PCB1 operates a relay that transfers power to the flashhead (beacon). If PCB1 control is absent, the flashheads default to always on, also the side markers turn on.

Check the voltage on the TB1 connections to the tower lights. "Steady" light connections should have a steady voltage.

"Flashing" connections should show a voltage pulse rate of 20 flashes per minute.

### **Lamps**

**CAUTION: Halogen lamps are under pressure, wear safety glasses when handling.** Ensure that the lamp in the FH 309 Flashhead is cool before replacing it. It can be very hot and cause severe burns. Never handle lamps with bare skin whether hot or not. Do not handle lamps except with a clean cloth. Oils deposited from skin or other sources can greatly shorten the life of the halogen lamp.

### **LED Displays**

The DAY LED in the PCB1 Monitor Board should be lit during daylight and the NIGHT LED should be lit at night.

The Marker Alarm LED will be lit if there is a marker failure based on the Marker Switch (SW2). Switch should be set to number of bulbs installed.

The Beacon Alarm LED will be lit if either the beacon(flashhead) has a failure or, in the case of using the controller to flash markers, one of the markers has a failure.

### **Component Removal and Replacement**

Note the wiring connections and wire colors when you remove wires from their connections. These must be replaced exactly as they were.

For all service that requires removal or replacement, turn off the power or disconnect the power.

**Table 3-1 Major Troubleshooting Symptoms**

| <b>Symptom</b>  | <b>Possible Cause in Likely Order of Frequency</b>   |
|---|--|
| All lights fail   | - Main power failure<br>- External circuit breaker<br>- PCB1 failure   |
| Single light fails  | - Bulb or lamp<br>- Check fuse<br>- Check wiring for short or open in that line  |
| Erratic operation   | - Loose connections<br>- PCB1  |
| Alarm   | - Normal if a light or tier is out   |
| False alarm   | - Check for correct alarm connections: normally open (NO) contacts close on alarm, normally closed (NC) contacts open on alarm<br>- PCB1 |
| AUTO switch position fails to switch system from day to night or night to day | - Photocell<br>- PCB1  |

## **PCB1 Controller Board**

### **Removal**

1. Disconnect cable connectors and wires. A Phillips screwdriver is needed to loosen the screws that hold the wires.
2. Loosen four Phillips-head screws located near the corners of PCB1.
3. Lift the board out of the enclosure.

### **Replacement**

1. Reverse the removal procedure.

## Section 4 – Major Replaceable Parts

### **Customer Service**

Customer Service 1-800-821-5825

FTCA Telephone: (615) 261-2000

Facsimile: (615) 261-2600

Internet Address:

<http://www.flashtechology.com>

Shipping Address:

Flash Technology Corporation of America  
332 Nichol Mill Lane  
Franklin TN 37067

### **Ordering Parts**

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

### **Controller Parts**

Table 4-1 lists the major replaceable parts for the controller. Refer to Figure 1-1 for component locations.

### **Photocell Parts**

The part number for the PEC 510 Photocell is PN #1855001. The photocell consists of only one component.

### **Repackaging the Controller**

Equipment must be returned in a container that provides maximum protection during shipping and handling.

If the original cartons and packaging material are no longer available, package the Controller in a strong double corrugated carton using a double thickness cardboard container and adequate padding. Do not drop. Use appropriate warning labels on the outside of the container.

**Table 4-1 Major Replaceable Parts**

| Item           | Description      | Part Number |
|----------------|------------------|-------------|
| F1,F2 (240VAC) | †Fuse, 5A        | 4900345     |
| F1 (120VAC)    | †Fuse, 12A       | 4903736     |
| PCB1           | Controller Board | *29002XX    |
| PEC510         | Photocell        | 1855001     |

† Recommended as a spare part.

\* Depends on configuration ordered.

## ***Returning Equipment – Return Material Authorization (RMA)***

If a product purchased from Flash Technology must be returned for any reason, please follow the procedure below:

**NOTE:** An RMA number must be requested from Flash Technology prior to shipment of any product. No returned product will be processed without an RMA number. This number will be the only reference necessary for returning and getting information on the product's progress.

1. To initiate an RMA, customers should call the Alarm Response & Compliance Center at (800-821-5825) to receive technical assistance and a case number. The following information is required before a case number can be generated:
  - Site Name/Number / FCC Registration number/ Call Letters or Airport Designator
  - Site Owner (provide all that apply – owner, agent or subcontractor)
    - Contractor Name
    - Contractor Company
  - Point of Contact Information: Name, Phone Number, Email Address, Fax Number and Cell Phone (or alternate phone number)
  - Product's Serial Number
  - Product's Model Number or part number
  - Case Number (if previously given)
  - Reason for call, with a full description of the reported issue
2. The case number will then serve as a precursor to receiving an RMA number if it is determined that the product or equipment should be returned. To expedite the RMA process, please provide:
  - Return shipping method
  - Purchase Order (if non-warranty repair)
  - Shipping Address
  - Bill To Address
  - Any additional information to assist in resolving the issue or problem
3. A P.O. is required in advance for the replacement of product that may be under warranty. Flash will then, at its discretion issue a credit once the validity of the warranty has been determined.
4. A purchase order (P.O.) is also required in advance for all non-warranty repairs. **NOTE:** the purchase order is required prior to the issuance of the RMA number.
  - If the P.O. number is available at the time of the call, an RMA number will be issued and the customer must then fax or email the P.O. with the RMA number as the reference, to ensure prompt processing.

- If the P.O. number is NOT available at the time of the call, a Case Number will be given to the customer and should be referenced on the P.O. when faxed or emailed to RMA Rep.
  - Flash will then, at its discretion repair or replace the defective product and return the product to the customer based on the shipping method selected.
  - The customer may purchase a new product before sending in the existing product for repair. If Flash Technology determines the existing product is still covered under warranty a credit will be issued to the customer for the new product.
5. After receiving the Flash Technology RMA number, please adhere to the following packaging guidelines:
- All returned products should be packaged in a way to prevent damage in transit. Adequate packing should be provided taking into account the method of shipment.  
**Flash Technology will not be responsible for damaged items if product is not returned in appropriate packaging.**
6. All packages should clearly display the RMA number on the outside of all RMA shipping containers. RMA products (exact items and quantity) should be returned to:
- Flash Technology  
Attn: RMA #XXX  
332 Nichol Mill Lane  
Franklin, TN 37067
7. All RMA numbers:
- Are valid for 15 business days. Products received after may result in extra screening and delays.
  - Must have all required information provided before a RMA number to be assigned.

### **Return to Stock Policy**

- Parts can be returned within 90 days of ship date and will be subject to a 20% restocking fee. Product must:
  - Be in the original packaging
  - Not be damaged
- After 90 days no parts can be returned

# Appendix 1 - GPS Synchronization Option

## **Operation**

This option permits synchronization of multiple FTC 2201 Controllers with no separation limit between units and no additional interconnect wiring required. Each FTC 2201 Controller must use a PCB1 Controller with GPS board as shown in Figure A-1 having a GPS Receiver board and antenna to obtain a GPS sync signal. A 'SAT ERROR' LED indicates status of the GPS synchronization. Otherwise, operation of the Controller is unchanged.

## **Antenna Mounting**

Mount the Antenna to the top of an outdoor structure facing an unobstructed view of the sky. If possible, provide a material below it that attracts the antenna's magnet. Do not place any materials above the antenna (including materials used to secure it) that block RF Energy.

## **Error Condition**

If the SAT ERROR LED (I7) is ON, it indicates that less than three satellites are being received and that the Controller is not synchronized. This may be caused by improper antenna location. The Satellite Error LED may remain lit up to approximately 20 minutes after power up as the unit acquires satellites. If it remains lit for over 20 minutes, it is probable that the antenna needs to be repositioned to improve reception. The ideal position is to allow the antenna to view a full hemisphere of sky without any barriers blocking reception. GPS information travels by "line of sight" and cannot penetrate through most barriers such as buildings, towers, and trees.

## **Ordering Parts**

To order spare or replacement parts, contact customer service at 1-800-821-5825.

**Table A-1 GPS Option Major Replaceable Parts**

| <b>Item</b> | <b>Description</b>        | <b>Part Number</b> |
|-------------|---------------------------|--------------------|
| PCB1        | Controller Board with GPS | *29002XX           |
| RCVR        | GPS Receiver Board        | 6903298            |
| ANT         | GPS Antenna with Cable    | 6903299            |

\* Depends on configuration ordered.

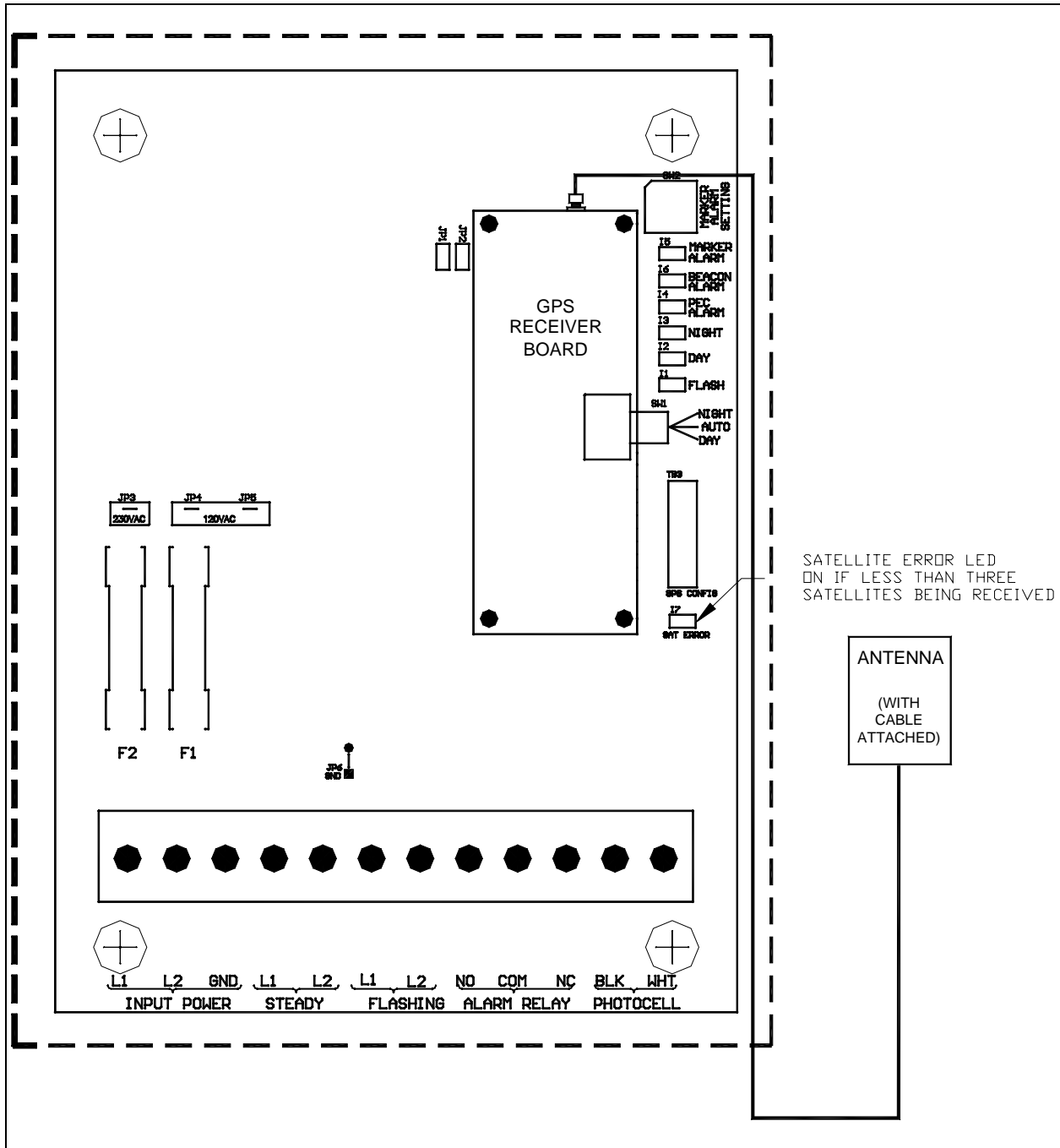


Figure A-1 FTC 2201 Controller with GPS