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# **FTC 183-1W/FTC 183-1R System Controller**

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## **Reference Manual**

# Front Matter

## Abstract

This manual contains information and instructions for installing, operating and maintaining FTC 183-1N/FTC 183-1R System Controller used with Airport Lighting Systems manufactured by Flash Technology Corporation of America® (FTCA).

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## Parts Replacement

*The use of non-OEM parts or unauthorized modification of this equipment will void the warranty.*

## Warranty

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

**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.

# Table of Contents

	Page
<b>Section 1 — Introduction and Operation</b>	<b>1-1</b>
FTC 183-1 System Controller	1-1
Specifications	1-1
Operation	1-1
Front Panel Switches and Indicators (LEDs)	1-1
Light Position LED Display	1-2
PCB100 Control Board Switches	1-2
Programming	1-2
Switches	1-2
Jumpers	1-3
Normal Operation	1-3
Manual Operation	1-3
Checkout Procedure	1-3
<b>Section 2 — Outline, Mounting, and Installation</b>	<b>2-1</b>
Unpacking	2-1
Installation	2-1
Location	2-1
Wiring	2-1
Lightning Protection	2-1
Tools	2-2
Placement	2-2
Mounting	2-2
Installation Checklist	2-2
<b>Section 3 — Maintenance and Troubleshooting</b>	<b>3-1</b>
Maintenance	3-1
Troubleshooting	3-1
Failing to Switch State in Remote Mode	3-1
Erratic or Confused Light Operation	3-1
Lights	3-1
LED Displays	3-1
Component Removal and Replacement	3-2
Safety	3-2
Rack Mount Access	3-2
Wall Mount Access	3-2
Control Board Assembly — PCB100	3-2
Display Panel Board Assembly — PCB200	3-3
Fail Relay — K1	3-3
Transformer — T1	3-3
Storage	3-3
<b>Section 4 — Major Replaceable Parts</b>	<b>4-1</b>
Ordering Parts	4-1
Major Replaceable Parts	4-1
Returning Equipment	4-1
Repackaging	4-1
Customer Service	4-1
<b>Index</b>	<b>I-1</b>

## List of Figures

	Page
.....	
Figure 1-1 PCB100 Control Board Layout .....	1-4
Figure 1-2 FTC 183-1 Front Panel Controls .....	1-5
Figure 1-3 PCB 100 Programming Switches .....	1-5
Figure 2-1 FTC 183-1R System Controller Mounting and Outline .....	2-2
Figure 2-2 FTC 183-1W System Controller Mounting and Outline .....	2-3
Figure 2-3 FTC 183-1 Controller Typical Installation Wiring .....	2-4
Figure 2-4 FTC 183-1 Panel Connections .....	2-5
Figure 2-5 FTC 183-1 Controller Internal Wiring .....	2-6
Figure 4-1 FTC 183-1 System Controller Component Locations .....	4-2

## List of Tables

	Page
.....	
Table 1-1 Control Switch .....	1-1
Table 1-2 Status Lamp Test Switch .....	1-2
Table 1-3 Front Panel Indicators — LEDs .....	1-2
Table 1-4 PCB100 Control Board Switches .....	1-2
Table 1-5 PCB100 Switch and Light Equivalence .....	1-2
Table 3-1 Major Troubleshooting Symptoms .....	3-2
Table 3-2 Symptoms Versus Possible Causes .....	3-2
Table 4-1 Major Replaceable Parts .....	4-1

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# Section 1 — Introduction and Operation

## FTC 183-1 System Controller

230 VAC 50 Hz

Watts

25

The FTC 183-1 is a System Controller. It synchronizes up to 28 lights, directs flash timing and intensity, and records and reports light operating status. It enables either automatic or manual intensity control, and continuously displays the flashing status of each individual system light. A front panel switch or a remote switch allows you to manually control intensity.

Each light transmits a confirmation signal when it flashes. All lights report to the controller over the same twisted conductor pair. This composite signal is decoded for an array of two-color LED indicators on the front panel. An assigned indicator represents each light in the system. Internal memory retains a transient failure until you reset it manually, permitting you to identify a light that only occasionally misses a flash.

The FTC 183-1R fits in a standard 19-inch equipment rack. System wiring connects to a terminal block at the rear of the unit.

The FTC 183-1W is in an enclosure allowing the controller to be wall mounted. Opening the front of the enclosure reveals the operating controls. A glass window in the front panel allows you to observe the controller's indicator lights. Otherwise, the FTC 183-1R and 183-1W are electrically the same.

## Specifications

**Physical:** See outline drawings in Section 2 for mounting dimensions.

FTC 183-1R: (H x W x Depth, Wgt)  
7 x 19 x 14.13 in., 10 lbs.  
178 x 483 x 359 mm., 4.5 kg.

FTC 183-1W: (H x W x Depth, Wgt)  
18.8 x 19 x 6 in., 29 lbs.  
478 x 483 x 153 mm., 13 kg.

## Electrical:

AC Voltage            120, 208, 240 VAC ± 10%  
60 Hz ±1% single phase

## Environmental:

-50 to +55 degrees Centigrade

## Alarm Relay:

Isolated form C contacts rated at 10 amperes,  
240 VAC or 28 VDC resistive load.

## Operation

Controls and indicators for normal operation are located on the front panel. Infrequently used programming switches are located internally on the main printed circuit board. The use of these switches, controls, and indicators is described in *Table 1-1*, *Table 1-2*, *Table 1-3*, and *Table 1-4*, in the following subsections.

The controller begins operation as soon as power is applied.

## Front Panel Switches and Indicators (LEDs)

The front panel has two switches: the Control Switch and the Status Lamp Test Switch. The Control Switch is a five-position rotary switch. It has six positions: REMOTE, H, M, L, and FLASH INHIBIT. It has the functions shown in *Table 1-1*. The Status Lamp Test Switch has the two functions shown in *Table 1-2*. *Table 1-3* describes the function of the LEDs on the front panel.

Table 1-1 Control Switch

Position	Function
REMOTE	Allows a remote intensity switching device to change the intensity of the lights.
H	Operates the lights at HIGH intensity.
M	Operates the lights at MEDIUM intensity.
L	Operates the lights at LOW intensity.
FLASH INHIBIT	Flash OFF (lighting units still have power applied)

**Table 1-2 Status Lamp Test Switch**

Position	Function
RED	Applies a fail signal to all the LED status indicators — for testing the <i>red</i> fail function of the LEDs.
TEST (CENTER) <sup>1</sup>	No test function. Normal position.
GREEN	Applies a confirm signal to all the LED status indicators — for testing the <i>green</i> confirm function of the LEDs.

1. The switch is spring-loaded and returns to the center OFF position when released.

**Table 1-3 Front Panel Indicators — LEDs**

LED	Function
HIGH	Glow steadily when the controller is operating the lights in HIGH intensity mode.
MED	Glow steadily when the controller is operating the lights in MEDIUM intensity mode.
LOW	Glow steadily when the controller is operating the lights in LOW intensity mode.
MANUAL	Glow steadily when the controller is operating in any but REMOTE mode.
ALARM	Indicates the state of the alarm relay. The alarm relay is on if a light fails three times consecutively.

## Light Position LED Display

Two-color LEDs are addressed by signals generated on PCB100. Lights that are confirming a flash set the LEDs to *green*. Non-confirming lights set the LEDs to *red*. The Status Lamp Test Switch described in *Table 1-2* tests the operation of the LEDs in the indicator array. The RED position sets all the LEDs to red. The GREEN position sets all the LEDs to green.

## PCB100 Control Board Switches

The DISPLAY push-button shows red LEDs for any lights that have missed flashes since the memory was reset. Green glowing LEDs correspond to lights that have not missed flashes. The CLEAR push-button resets the memory (all LEDs are set to green). *Table 1-4* summarizes the function of these switches.

**Table 1-4 PCB100 Control Board Switches**

Position	Function
DISPLAY	Displays the LEDs as red that correspond to the light that failed three times.
CLEAR	Clears remembered failures.

## Programming

Switches on the PCB100 board program the board and configure the controller to the lighting arrangement. Jumper JP9 on PCB100 configures the controller for 50Hz operation.

## Switches

Programming switches are located internally on the PCB100 Control Board. See *Figure 1-3*. The factory preprograms controllers for your installation. The PCB100 board has twenty-eight programming switches, one for each potential light. The switches are arranged by tier and light number, and these correspond to locations. The format is arranged to operate the lights in the sequence shown in *Table 1-5*:

**Table 1-5 PCB100 Switch and Light Equivalence**

Tier & Beacon Switch	Light
Tier 1, Beacon 1	1
Tier 1, Beacon 2	2
Tier 1, Beacon 3	3
Tier 1, Beacon 4	4
Tier 2, Beacon 1	5
Tier 2, Beacon 2	6
Tier 2, Beacon 3	7
and so forth	and so forth

For every light in the system, the corresponding switch must be closed; *all other switches must be left open*.

The controller issues a flash command to the lights every second and receives a confirmation signal from the lights every second. A failing confirmation signal causes an alarm.

### NOTE

A 50Hz system controller monitors only 25 lights. Use a second synchronized controller and separate monitor line for more lights.

A 60Hz system controller monitors only 28 lights. Use a second synchronized controller and separate monitor line for more lights.

## Jumpers

Figure 1-1 shows jumpers on PCB100. These jumpers are not useful in airport lights.

## Normal Operation

The conditions in the following list prevail during normal operation when all lights are flashing:

- All LED indicators in the Light Position display that have programming switches closed are GREEN.
- The ALARM LED is out.
- The Control Switch is in REMOTE, or set to H, M, or L.
- The MANUAL LED is off if the Control Switch is in REMOTE; it is on if the Control Switch is in H, M, or L.
- One of the mode LEDs is glowing according to the intensity of operation; HIGH, MED (MEDIUM), or LOW.
- The I 1 SYNC LED on PCB100 is blinking at a 1-second rate.

## Manual Operation

Select the desired flash intensity by using the Control Switch.

## Checkout Procedure

Perform the following steps with the CONTROL and MONITOR wires disconnected at the back of the controller.

### NOTE

For step 3 and step 4, some indicators may not operate depending on the configuration of lights. Check the position of programming switches on PCB100.

1. Apply power to the unit and observe that all the LIGHT POSITION LED indicators are RED, which have corresponding programming switches closed. The ALARM LED is illuminated.
2. Turn power off.
3. Reconnect the CONTROL and MONITOR wires
4. Put the STATUS LAMP switch to RED and verify that all the LED indicators are *red* in the LIGHT POSITION display window, which have corresponding programming switches closed.
5. Put the STATUS LAMP switch to GREEN and verify that all the LED indicators are *green* in the LIGHT POSITION window.
6. Step the CONTROL switch through H, M, and L verifying that the appropriate MODE LED becomes lit. The MANUAL LED should be lit when the switch is in any position but REMOTE.

Perform the remaining steps with the CONTROL and MONITOR wires attached for normal operation and verify that the programming switches (see *Subsection Programming*) are set correctly.

7. All LED indicators that have program switches closed should be *green* and the ALARM LED should be *out*. Refer to *Section 3 — Maintenance and Troubleshooting* if this condition is not achieved.
8. If it is possible to observe the lights, rotate the CONTROL switch through H, M, L, and FLASH INHIBIT verifying the response of the lights at each step. The FLASH INHIBIT position verifies that the lights turn off.

### CAUTION

*The units remain powered in the FLASH INHIBIT position, even though the lights are off.*

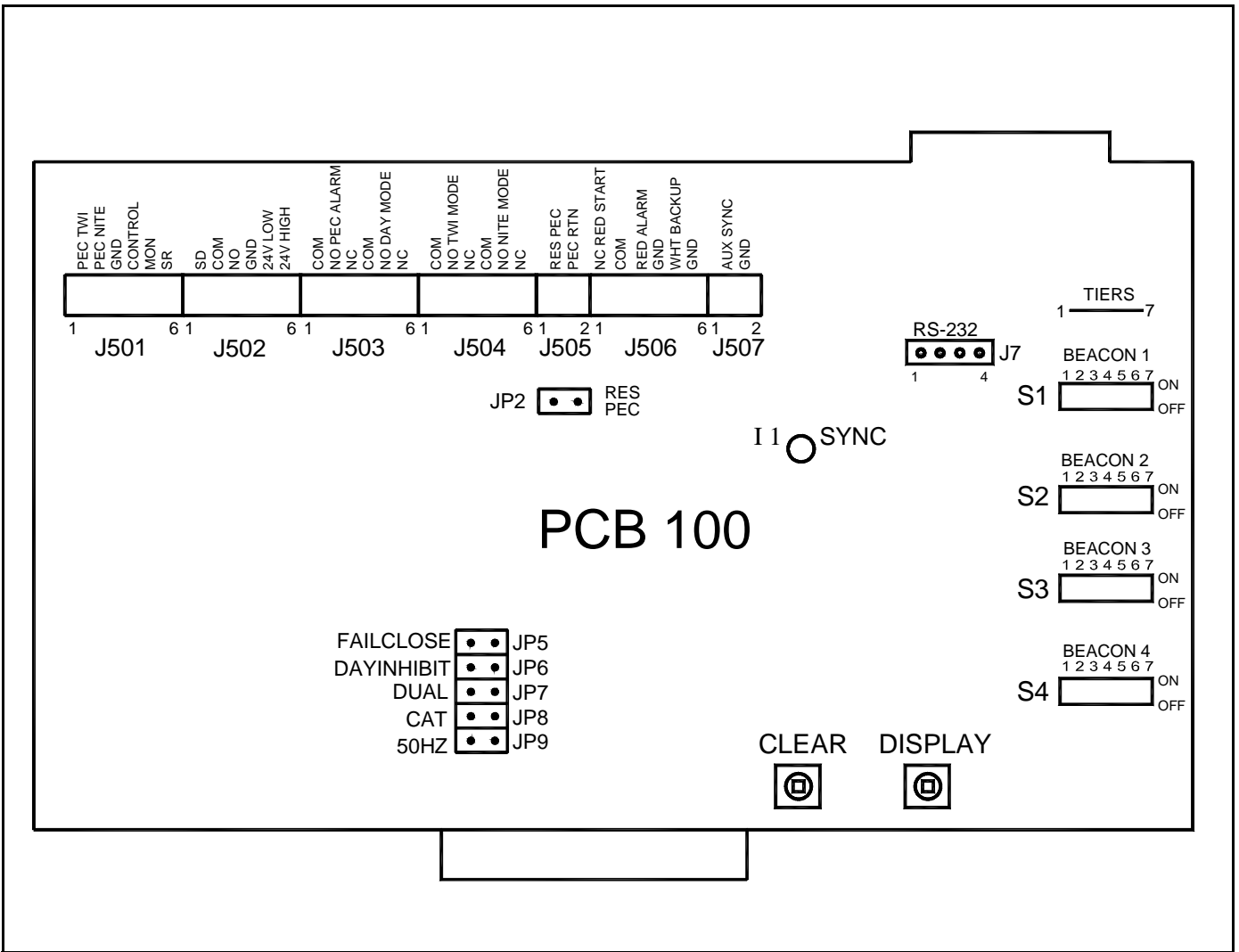
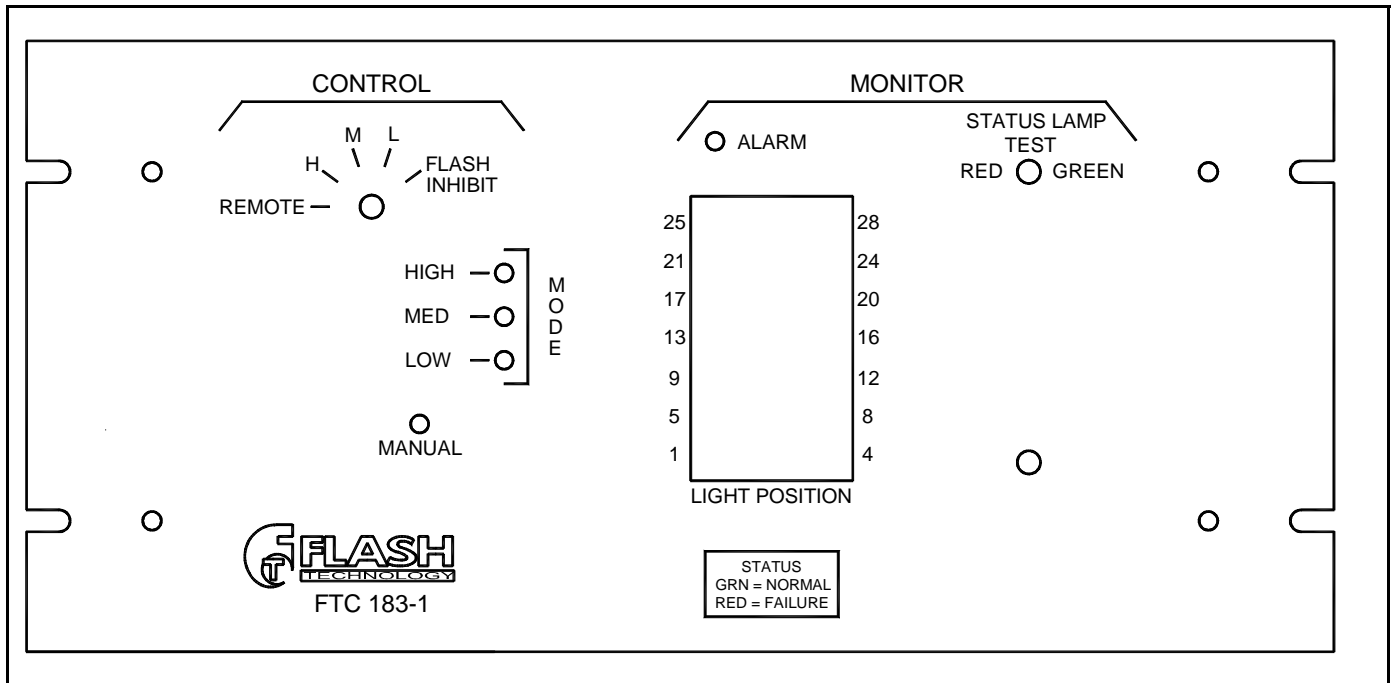


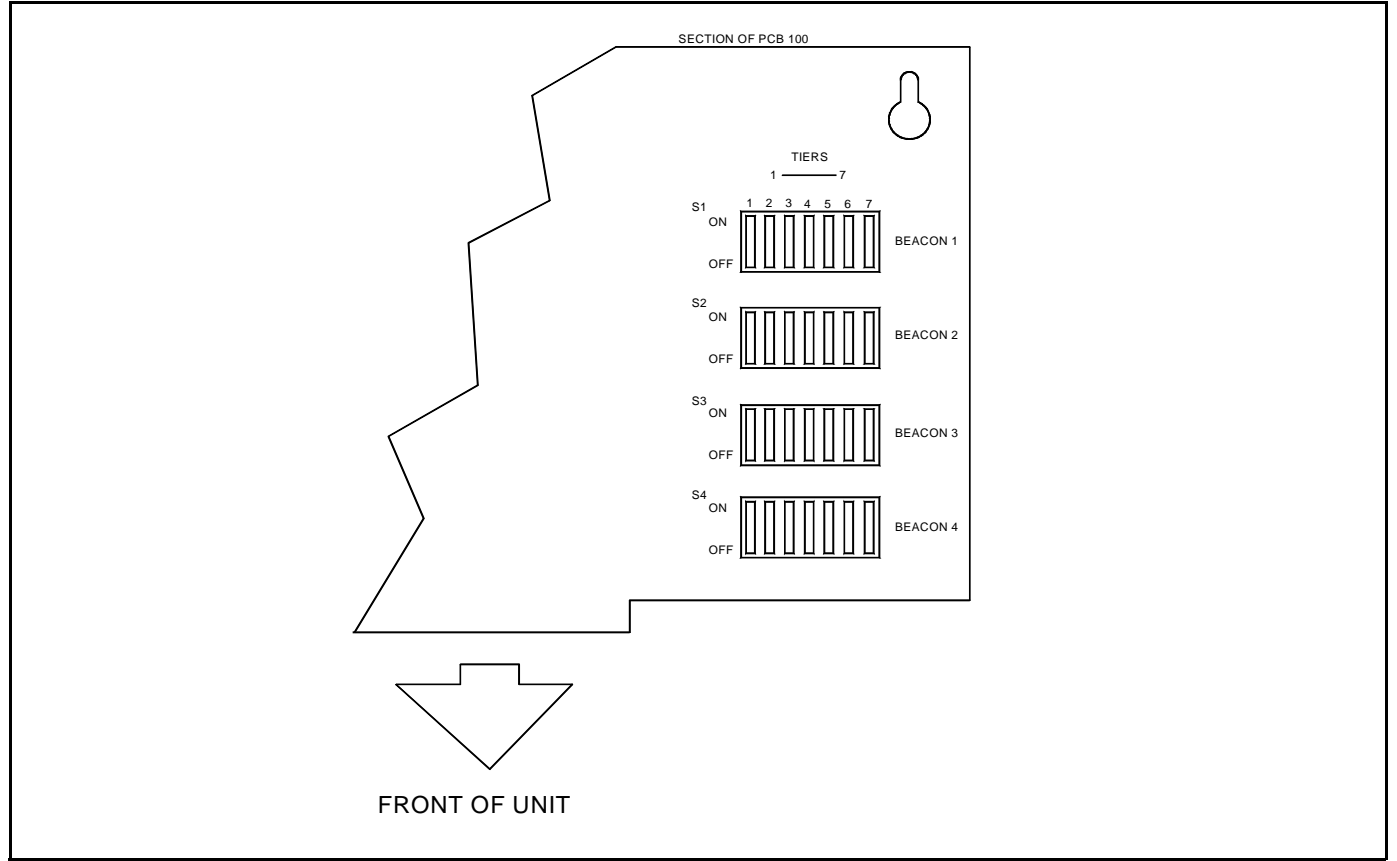
Figure 1-1 PCB100 Control Board Layout

183-01



183-02

Figure 1-2 FTC 183-1 Front Panel Controls



183-03

Figure 1-3 PCB 100 Programming Switches

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## Section 2 — Outline, Mounting, and Installation

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### NOTE

Only general information for a typical installation is presented here. Thus, more specific information may be needed for your site.

Consult any installation drawings prepared especially for your site or supplied with the equipment.

If installation drawings prepared specifically for your site disagree with information provided in this manual, the installation drawings should take precedence.

### 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.

Maintain the package identity (for example, Light 1, Light 2, and so forth) of each light in your system when it arrives. Install the system as called out on drawings because it has been factory programmed for operation at a specific location.

### Installation

Details about unit placement, conduit layout, and system wiring should appear on *system installation drawings* prepared by others. You will receive only a *typical installation drawing* from FTCA showing the installation wiring of a system similar to yours (same number of lights, accessories, and so forth).

### Location

Locate the FTC 183-1 in an area with restricted access. Controllers are available in outdoor enclosures that can be attached to any vertical surface.

You can place the FTC 183-1 anywhere within 2500 feet of the most distant light without further consideration. Consult with the factory if a greater distance is necessary.

### Wiring

Wire your system according to the wiring diagram provided with the equipment. The diagram may have been prepared by FTCA or others.

System wiring consists of primary power and signal distribution wiring. Primary power is usually taken from a load center to the various items of equipment. Signal wiring is between the lights and the FTC 183-1.

Three-phase power may be used for the system. The lights are connected line-to-line and use phases AB, BC, and AC. Connect the controller to phase AC. Failure to ensure optimum phasing as described could result in intensity control problems.

*Figure 2-3* shows the system controller wiring in a typical installation. Your installation may differ; consult the installation drawings for your site.

### NOTE

The System Controller does not control power to the lights.

Make electrical connections at the terminal block.

### Lightning Protection

All ElectroFlash equipment is designed to withstand severe transient over-voltages. However, a lightning arresting system must 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.

## Tools

No special tools are necessary.

## Placement

Considerations are access to the unit, proximity to a very strong RF field, and exposure to direct lightning strikes.

Direct exposure to strong radio frequency (RF) radiation could damage some of the components or interfere with proper performance. FTCA recommends placing the unit at an adequate distance from a powerful RF radiator.

Select a location on the wall where you can conveniently view front panel indicators related to light operation.

## Mounting

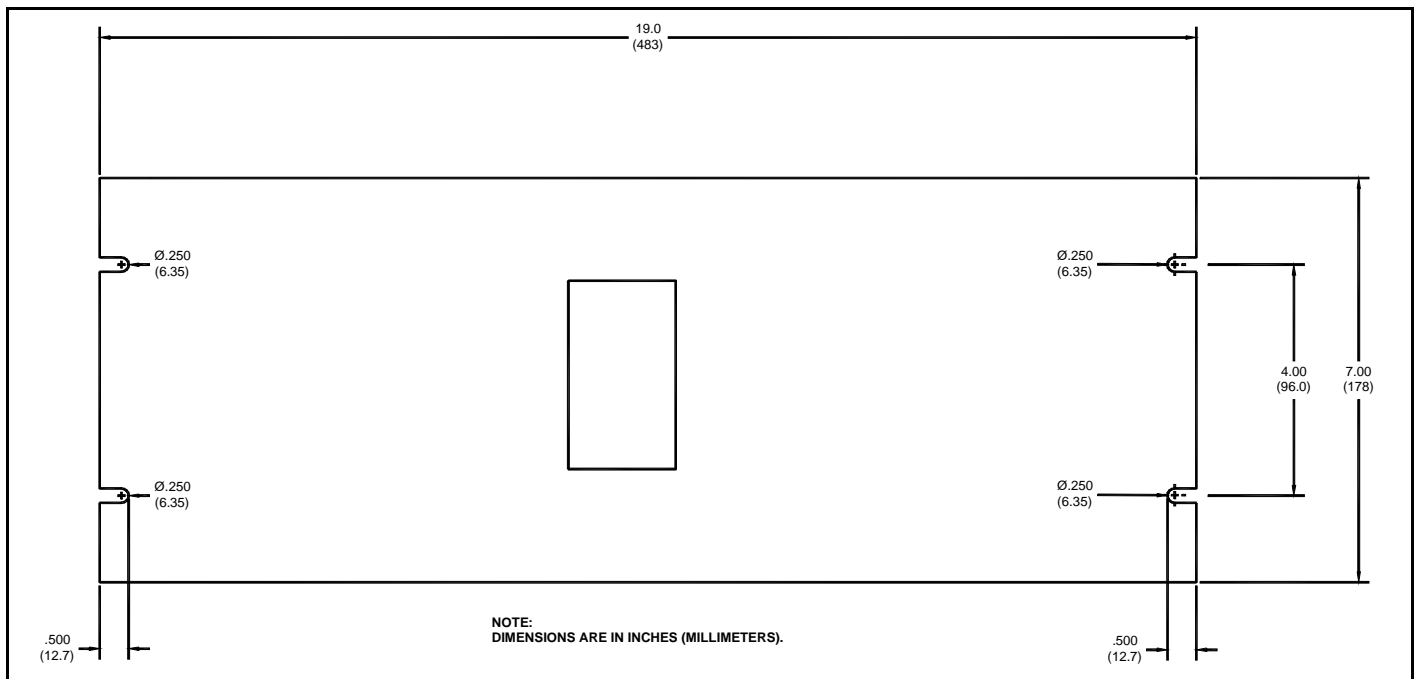
Mounting dimensions for the FTC 183-1R are shown in *Figure 2-1*. Outline, mounting, and clearance dimensions for the FTC 183-1W are

shown in *Figure 2-2*. Four 10-24 x ½-inch screws are required.

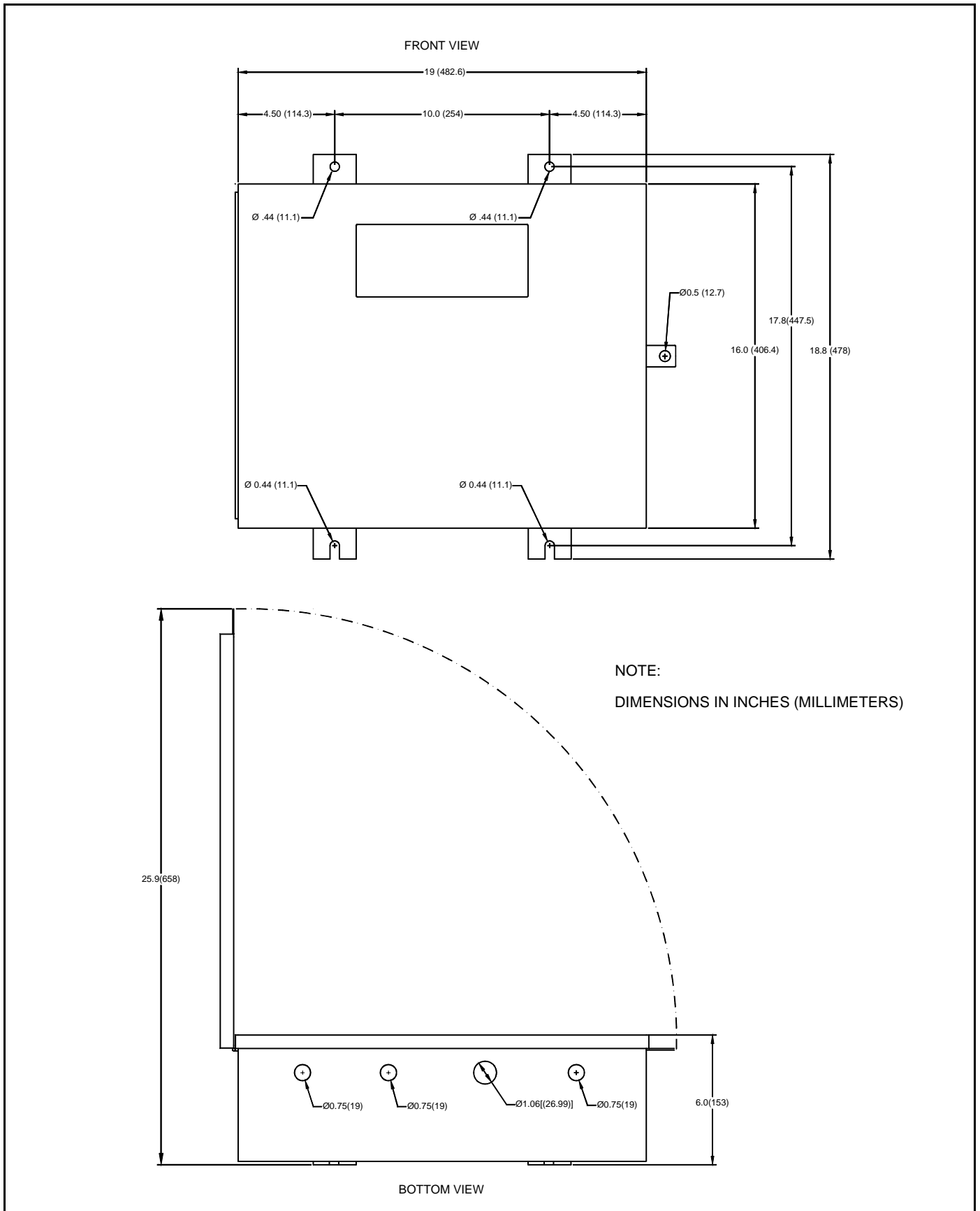
## Installation Checklist

Use the following checklist when installing the equipment:

- Inspect each unit for damage that might have occurred during installation.
- Consult any installation drawings for placement, mounting, wiring details, and power phasing.
- Verify that primary power voltage is the value stated on the ID plate.
- Provide a power disconnect switch or a circuit breaker.
- Verify that phasing is correct between each light and the System Controller.
- Check the control/monitor cable connections at the lights and the System Controller. The shield must be tied to chassis.
- Check the lightning protection system.
- Be sure that junction boxes will drain properly.

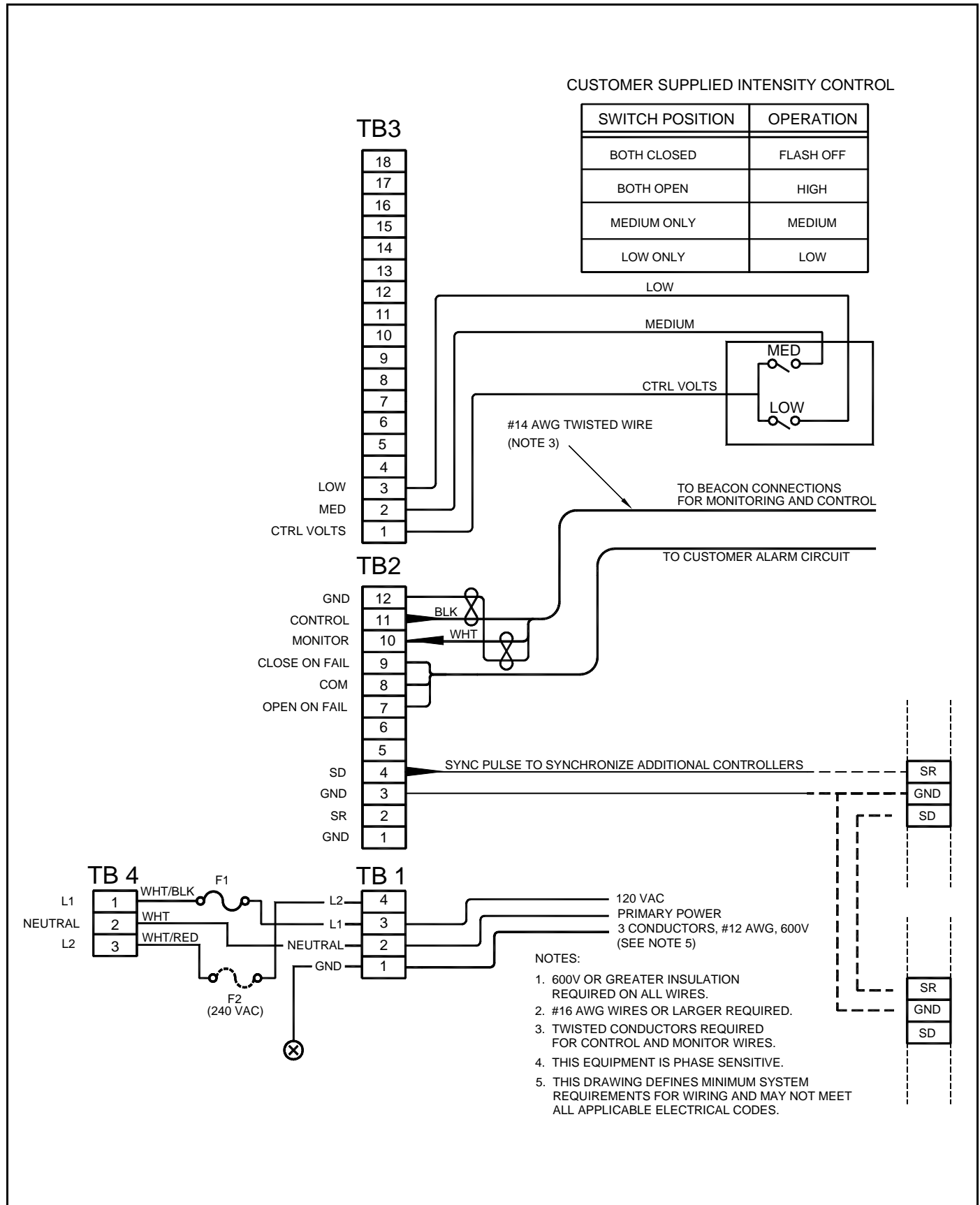


**Figure 2-1** FTC 183-1R System Controller Mounting and Outline



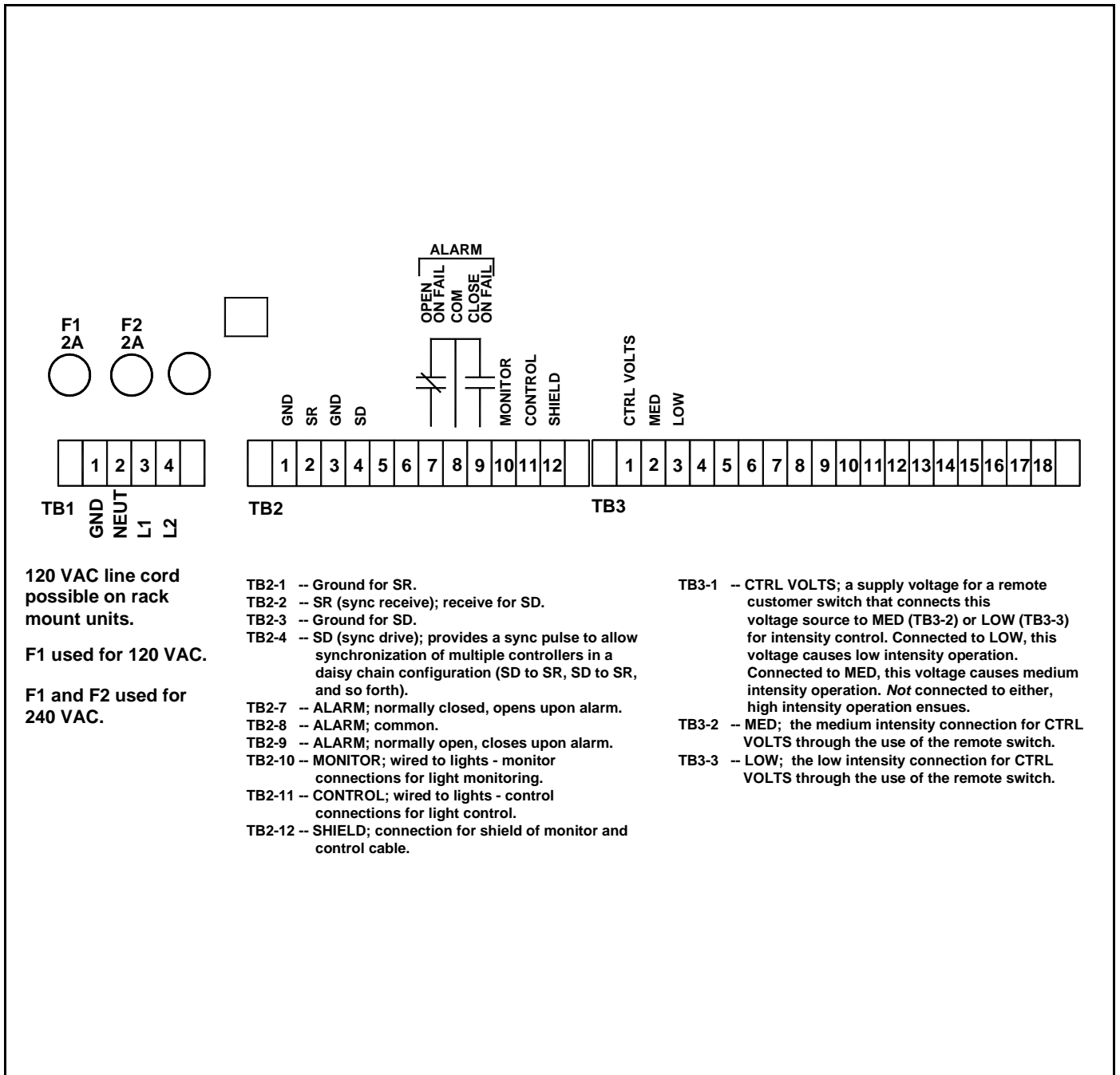
183-1wmo

**Figure 2-2 FTC 183-1W System Controller Mounting and Outline**



183INSTWRG

**Figure 2-3 FTC 183-1 Controller Typical Installation Wiring**



bckpnlcnts

Figure 2-4 FTC 183-1 Panel Connections

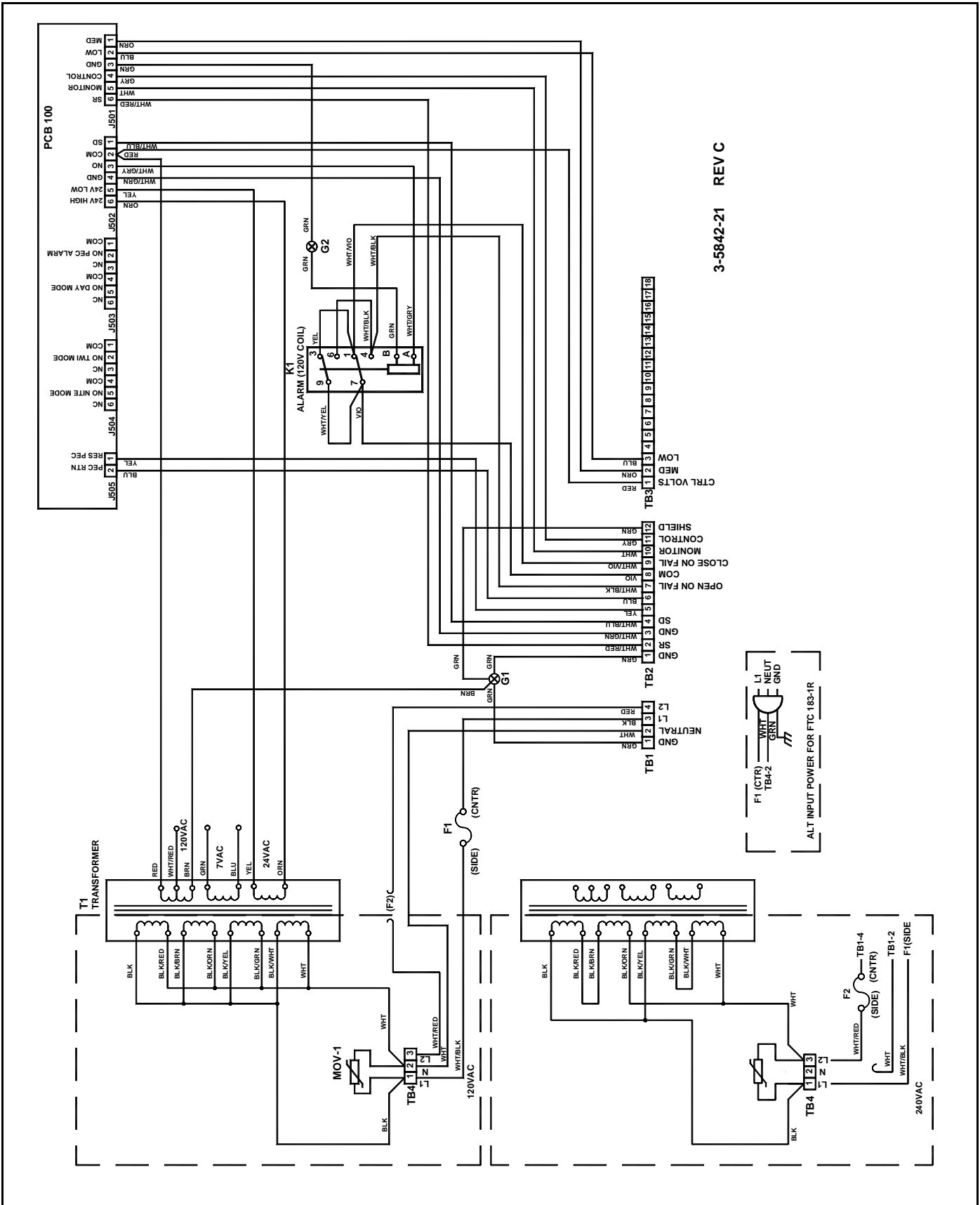


Figure 2-5 FTC 183-1 Controller Internal Wiring

# Section 3 — Maintenance and Troubleshooting

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## Maintenance

No scheduled maintenance is required for this equipment although the circuit boards should be kept free of accumulated dust. Brush and vacuum as necessary.

### NOTE

Do not use compressed air for cleaning this equipment.

Clean the fingers of the printed circuit board connectors when necessary — use only a contact cleaner recommended for electronic circuit components. Do not polish with any kind of abrasive material.

## 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. Many symptoms of abnormal operation observed at the controller may originate at some other part of the system.

*Table 3-1* and *Table 3-2* contain information to help locate the cause of a problem. *Table 3-1* is a list of symptoms, which might be observed if a malfunction occurs. In *Table 3-2*, these symptoms are related to possible causes.

### Failing to Switch State in Remote Mode

Switch the CONTROL switch through the manual modes and see if the lights follow the intensity indicated by the switch position. If they do, the trouble is likely the remote control switch oper-

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

### Erratic or Confused Light Operation

Nearby radio transmitters or radar may cause radio frequency interference on control and monitor lines or within the lights or controller. Also, check power line phasing on 3-phase power systems. The controller and lights should be on the same phase.

Try swapping the PCB100 Control Board with a board known to be in good condition. *Ensure that the switches on both boards are set the same before you swap them.*

### Lights

If all lights are not flashing, check the COMM. cable to that light. Lights require a command to flash. Check that the switches on the PCB100 board conform to the setup of the system lights.

### LED Displays

Look at and analyze the LED displays on the front panel. LEDs indicate manual operating modes when you use the CONTROL switch. Red LEDs in the LIGHT POSITION window indicate failed lights.

The DISPLAY switch on PCB100 shows previously failed lights in the LIGHT POSITION window. The CLEAR switch on PCB100 resets these stored failures.

See *Table 1-3*. See also subsection *Front Panel Switches and Indicators (LEDs)* on Page 1-1 and subsection *Light Position LED Display* on Page 1-2.

**Table 3-1 Major Troubleshooting Symptoms**

Code	Observed Symptom
A	Controller inoperative; no LEDs are lit
B	Failure in AUTO mode (remote intensity control): Stays in same mode or always high intensity
C	One LED indicator RED
D	One LED indicator RED, but cycles BLK to RED repetitively
E	Lights OK, but all LEDs are RED
F	All LEDs cycle BLK to RED repetitively
G	Lights bright in NITE mode, weak in DAY mode
H	LEDs do not respond at all
I	No lights flash

**Table 3-2 Symptoms Versus Possible Causes**

Component or Condition	Symptoms from Table 3-1									
	A	B	C	D	E	F	G	H	I	
Line fuse F1, line power, or transformer T1	X									
Remote intensity control switch or Mode Selector Switch on FTC 183-1; wiring for remote control switch		X								
Light not flashing <sup>1</sup>			X							
Light flashing out of sync <sup>1</sup>				X						
Control signal line open										X
Control signal line shorted										X
Monitor signal line open						X				
Monitor signal line shorted						X				
PCB100		X	X	X	X	X	X	X		
PCB200									X	
Incorrect power line phase							X			

1. Consult troubleshooting section in the FTS System manual for the Lights.

## Component Removal and Replacement

The following procedures explain how to remove and re-install selected components that may require procedures that are not self-evident. Refer to *Figure 4-1*.

### Safety

For all service that requires removal or replacement, **turn off the power or remove the fuses**.

### Rack Mount Access

1. Slide the unit out of the rack.
2. Remove the two top access covers on the chassis for access to the inside components.

### Wall Mount Access

1. Swing open the cabinet cover.
2. Remove the large top panel that supports the PCB200 display panel board for access to the inside components.

### Control Board Assembly — PCB100

#### Removal

1. Use either of the previous subsections *Rack Mount Access* or *Wall Mount Access* as required.
2. Disconnect the green connectors from PCB100. Use a side-to-side motion to ease their removal.
3. Loosen, but do not remove, the two slotted screws holding down the circuit board.
4. Disengage this circuit board from the display panel board cable connector and lift it away when the screw heads clear the keyhole slots.

#### Replacement

1. Reverse the removal procedure. Ensure that PCB100 is fully engaged with display panel board cable connector.

## Display Panel Board Assembly — PCB200

### *Removal*

1. Use either of the previous subsections *Rack Mount Access* or *Wall Mount Access* as required.
2. Unplug the display panel board cable.
3. From the front, remove the hex nuts from the switches. Use a nut driver. Take care to prevent scratching the paint while removing the nuts.
4. Behind the front panel, remove the four screws holding the display panel board to the front panel.

### *Replacement*

1. Reverse the removal procedure.

## Fail Relay — K1

### *Removal*

1. Use either of the previous subsections *Rack Mount Access* or *Wall Mount Access* as required.
2. On the main chassis, disconnect the harness at the relay. These harness wires unplug individually.
3. For the rack-mounted unit, remove the Phillips-head screw holding the relay to the main chassis.

4. For the wall-mounted unit, remove the four nuts that hold the chassis to the base of the cabinet. Support the chassis and remove the screw on the side of the chassis that holds the relay.

### *Replacement*

Reverse the removal procedure.

## Transformer — T1

### *Removal*

1. Use either of the previous subsections *Rack Mount Access* or *Wall Mount Access* as required.
2. Remove the transformer wires from the terminals of green plug J502 on the PCB100 board.
3. Remove the 5/16-inch hex nuts from the two mounting screws.

### *Replacement*

Reverse the removal procedure. Refer to the internal wiring in *Figure 2-5*. Follow the color code exactly.

## Storage

No special considerations are required for long-term storage of the controller. Circuit boards, when not installed in the equipment, should be kept in antistatic bags or containers.

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# Section 4 — Major Replaceable Parts

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## Ordering Parts

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

## Major Replaceable Parts

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

## Returning Equipment

To return equipment to FTCA, contact Customer Service at 1-800-821-5825 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 FTC 183-1 Controller in a strong double corrugated carton.

Pad the FTC 183-1 so that corners cannot penetrate the box during shipment. Box the FTC 183-1 using a double thickness cardboard container and adequate padding. Do not drop. Use appropriate warning labels on the outside of the container.

## Customer Service

Customer Service	1-800-821-5825
FTCA Telephone	(615) 261-2000
Facsimile	(615) 261-2600

Shipping Address:

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

**Table 4-1 Major Replaceable Parts**

Item	Description	Part Number
F1	Fuse, Power, MDL, 2A	4900342 <sup>‡</sup>
K1	Relay, Alarm	4900501
PCB100	Control Board	2471912
PCB200	Panel Board	2472001
T1	Transformer 120V Transformer 240V	8590701 8611201
TB1	Terminal Strip, 4 Position	4902073
TB2	Terminal Strip, 12 Position	4902074
TB3	Terminal Strip, 18 Position	4901930
TB4	Terminal Strip, 3 Position	4902155
VR1	Varistor, 120 VAC	6901079 <sup>‡</sup>

<sup>‡</sup> Recommended as a spare part.

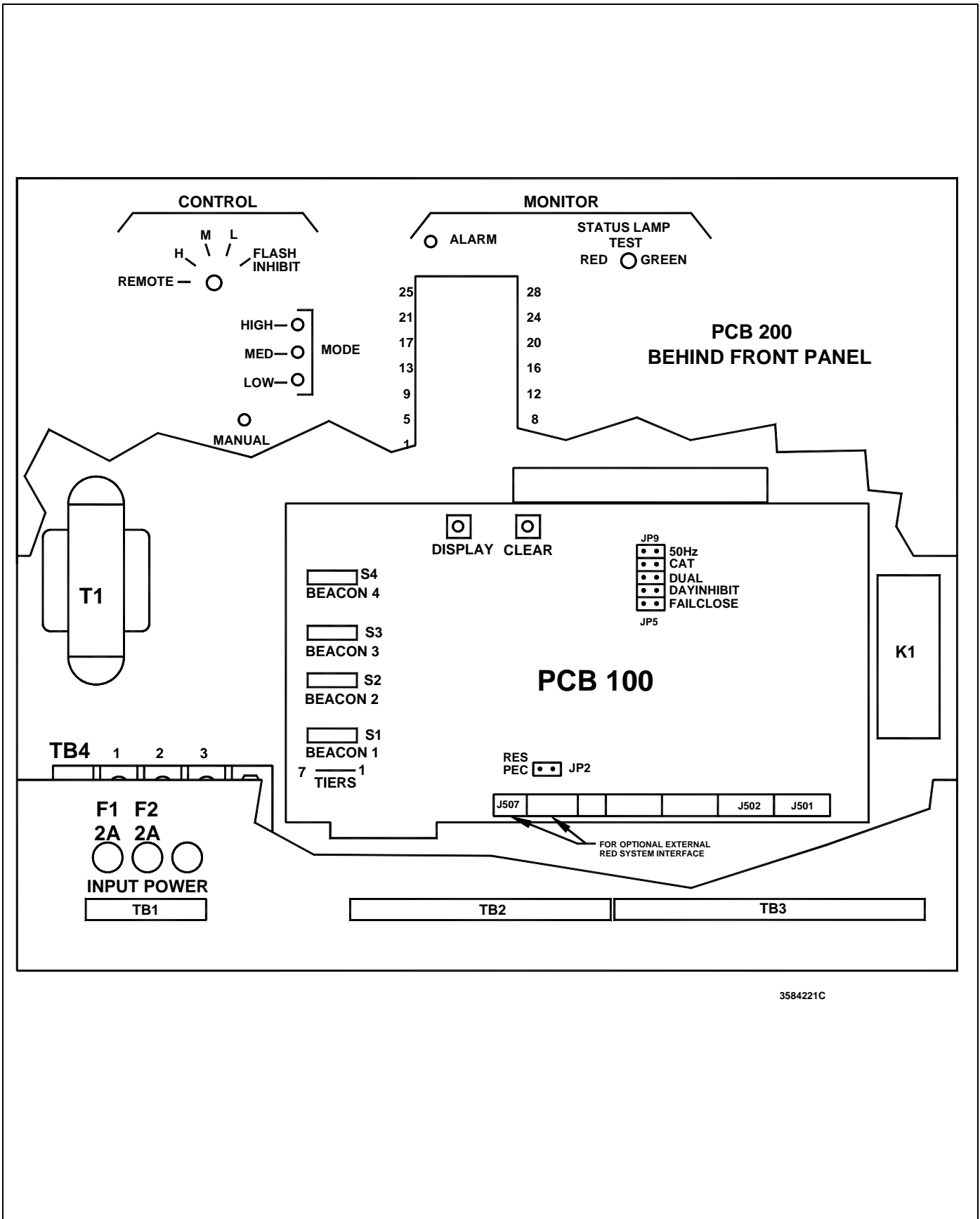


Figure 4-1 FTC 183-1 System Controller Component Locations

# INDEX

## A

### Access

- rack mount 3-2
- wall mount 3-2

## C

### Checklist, installation 2-2

### Checkout 1-3

### Component removal and replacement 3-2

### Connections to panel 2-5

### Control board

- jumpers 1-3
- layout of components 1-4
- PCB100 removal and replacement 3-2
- switch 1-2
- switches 1-2

### Controller

- introduction 1-1
- parts
  - location 4-2

### Controls

- front panel 1-1, 1-5
  - control switch 1-1

### Customer service 4-1

## D

### Display panel board

- PCB200
  - removal and replacement 3-3

### Display, light position 1-2

## E

### Equipment

- returning 4-1
- storage 3-3

## F

### Fail relay K1

- removal and replacement 3-3

### Front panel

- controls 1-1, 1-5
  - control switch 1-1
- indicators 1-1
- LED indicator 1-2

## I

### Indicator

- front panel 1-1
- LED
  - front panel 1-2

### Installation 2-1

### checklist 2-2

### wiring

- connections 2-4

### Internal wiring 2-6

## J

### Jumpers 1-3

## K

### K1, removal and replacement 3-3

## L

### LEDs

#### display

- front panel
  - light position 1-2
  - troubleshooting aid 3-1

#### front panel 1-1

### Light

- confused operation 3-1
- flashing errors 3-1
- position
  - LED display 1-2

### Lightning protection 2-1

### Location 2-1

## M

### Maintenance 3-1

### Mounting 2-2

### Mounting and outline 2-2

## O

### Operation

- confused lights 3-1
- introduction 1-1
- manual 1-3
- normal 1-3

### Ordering parts 4-1

## P

### Panel board, PCB200, removal and replacement 3-3

### Panel connections 2-5

### Parts

- controller
  - location 4-2
- major replaceable 4-1
- ordering 4-1

### PCB100, removal and replacement 3-2

### PCB200, removal and replacement 3-3

### Placement for RFI 2-2

### Programming 1-2

### Programming switch 1-5

## **R**

Rack mount access 3-2  
Radio frequency interference, *See* RFI  
Removal 3-2  
Repackaging for shipment 4-1  
Replaceable parts 4-1  
Replacement 3-2  
Returning equipment 4-1  
RFI 2-2

## **S**

Safety 3-2  
Shipment, repackaging 4-1  
Specifications 1-1  
State switching failure 3-1  
Storage equipment 3-3  
Switch 1-2  
    control board 1-2  
    PCB100  
    programming 1-5  
    programming 1-5

Symptoms and causes 3-2  
System wiring, general 2-1

## **T**

T1, removal and replacement 3-3  
Tools 2-2  
    needed 2-2  
Transformer T1, removal and replacement 3-3  
Troubleshooting 3-1  
    lights 3-1  
    symptoms 3-2  
    symptoms and causes 3-2  
Troubleshooting, aid  
    LED display 3-1

## **W**

Wall mount access 3-2  
Wiring  
    connections 2-4  
    general system 2-1  
    internal 2-6

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