FLASH TECHNOLOGY

VANGUARD®
FTS 370i-2 IR LED Integrated Beacon

Red LED Obstruction Lighting System
Reference Manual
Part Number F7913703

SERIAL NUMBER

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Front Matter

Abstract

This manual contains information and instructions for installing, operating and maintaining the FTS 370i-2 IR LED Integrated Beacons.

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Applicable Specifications

The FTS 370i-2 IR beacon meets or exceeds requirements for an FAA Type L-864 beacon. Additionally, the FTS 370i-2 IR beacon meets or exceeds requirements for an ICAO Annex 14, Volume 1, 8th Edition Low Intensity Type B Obstacle Light.

Disclaimer

While every effort has been made to ensure that the information in this manual is complete, accurate and up-to-date, Flash Technology 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 reserves the right to revise this manual without obligation to notify any person or organization of the revision.

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

Warranty

Flash Technology warrants all components, under normal operating conditions, for 5 years.

Parts Replacement

The use of parts or components, in this equipment, not manufactured or supplied by Flash Technology voids the warranty and invalidates the third party testing laboratory certification which ensures compliance with FAA Advisory Circulars 150/5345-43J, 150/5345-53D, and Engineering Brief No. 67D. The certification is valid as long as the system is maintained in accordance with FAA guidelines (FR doc. 04-13718 filed 6-16-04).

Personnel Hazard Warning

Dangerous Voltages

Dangerous line voltages reside in certain locations in this equipment. Also, this equipment may generate dangerous voltages. Although Flash Technology 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.

Do Not Depend on Interlocks

Never depend on interlocks alone to remove unsafe voltages. Always check circuits with a voltmeter after turning the circuit breakers off. Under no circumstances remove or alter the wiring or interlock switches.

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Section 1 - Overview

The FTS 370i-2 IR (Infrared) LED Integrated FAA L-864 Flashing Red Beacon with Radar Compatible Interface as shown in Figure 1-1, (hereafter referred to as the beacon) is pre-wired with a power & alarm cable and operates from 120-240VAC 50/60 Hz. The only required customer connection is the AC line; as the beacon incorporates an integrated controller which flashes the beacon at night. The unit is equipped with an alarm contact and auxiliary control input for connection to a radar system interface. The fail-safe design of the interface allows for operation of the beacon if the radar system control wiring is interrupted. Also incorporated into the controller is a GPS receiver and antenna, which allows synchronization to other beacons with no additional wiring. The beacon consists of 24 high-performance LEDs that provide the FAA required light output while consuming 99% less electrical power than an incandescent fixture.

The beacon incorporates 6 infrared LEDs. The addition of IR ensures visibility of the obstruction to pilots aided by night vision goggles (NVG). The combination of standard Red (620nm) LEDs and IR (850nm) LEDs ensures maximum visibility to pilots in all circumstances.

The FTS 370i-2 IR beacon also provide ICAO Medium-intensity, Type B Obstacle Light (Red) compliance.

The beacon is designed for the lighting of wind turbines, towers, flare stacks, chimneys, offshore oil platforms, petrochemical facilities and other obstructions to aerial navigation, as specified by the FAA, FCC, ICAO and Transport Canada.

This manual provides guidance and recommendations for the installation, inspection, and testing of the beacon assembly. Please read this document in its entirety before installing the beacon.

1.1 Specifications

Type	FTS 370i-2: FAA L-864 Red Obstruction Light FTS 370i-2: ICAO Medium-intensity, Type B Obstacle Light		
Flash Rate	20/30/40 flashes per minute (FPM) (User Configurable)		
Intensity	$2,000 \pm 25\%$ ECD		
AC Voltage	120 – 240V AC 50/60 Hz		
Night Power Consumption		Flash rate (200ms flash duration)	
		20 FPM	30 FPM	40 FPM
	FTS 370i-2 IR *	7 Watts	10 Watts	13 Watts
Operating Temperature	-40°F to +131°F (-40°C to +55°C)		
Aux Input Control Voltage	5 – 30 Volts AC/DC		
Height / Width	8.69" x 15.75" (220.7mm x 400 mm)		
Bolt Hold Down	Standard 13.25" (336.5 mm)		
Weight	26.3 lbs. (11.93 kg); With 50ft cable: 32.3 lbs. (14.7 kg)		

* Power Consumption is 2 Watts in standby.

1.1.1 Regulatory Compliance and Certifications

- ETL Certified to Federal Aviation Administration (FAA): AC No. (150/5345-43J). FAA Engineering Brief No. 67D
- Compliant to Canadian Aviation Regulations (CAR's): Standard 621
- Compliant to International Civil Aviation Organization (ICAO), Aerodromes, Annex 14, Volume 1, Eighth Edition, dated July 2018

1.2 Beacon Component Identification

Figure 1-1 – Beacon - External View

GPS Antenna
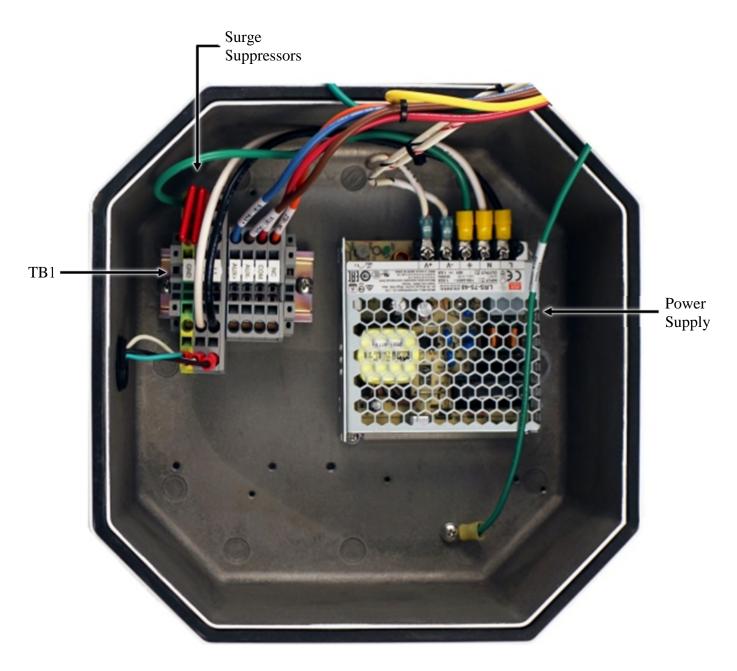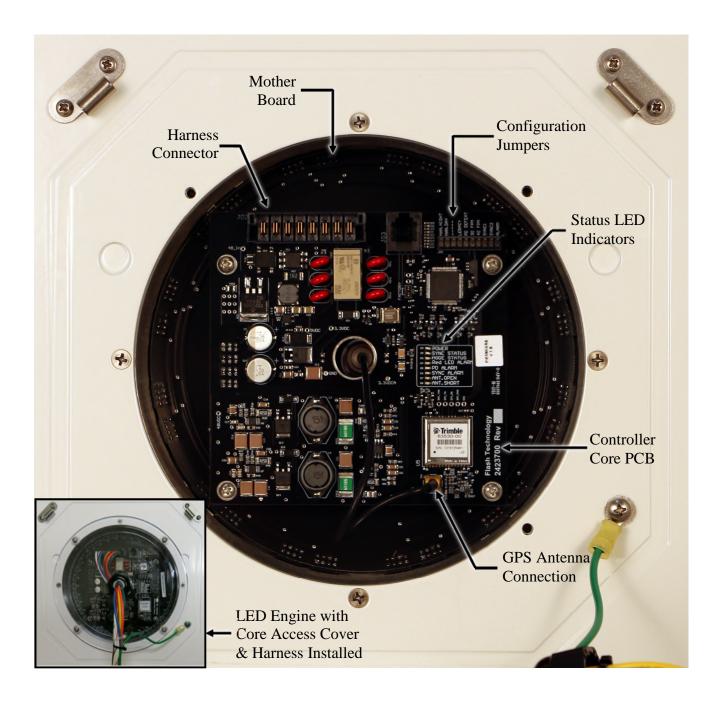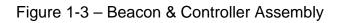
Light Collector
(Photodiode)

Fresnel Lens
&
LED Engine
Assembly

Ground Lug

Base Assembly

ATTENTION

Surge
Suppressors

TB1

Power
Supply

Figure 1-2 – Beacon Base Assembly

Note: FTS 370i-2 shown.

Figure 1-3 – Beacon & Controller Assembly

Section 2 – Installation – Mounting, Wiring, and Checkout

Warning

Read the warning on page ix now. Remove power from all wiring and circuitry before installing or performing work on the beacon. It is the responsibility of the installer to comply with all applicable electrical codes.

Important!
For proper operation and optimal protection from Lightning and EMI, ensure that the base is electrically bonded to the site grounding system using 8 AWG wire minimum connected to the supplied external ground lug.

Flash Technology recommends the installation of one or more lightning rods near the beacon. The copper lightning rod(s) should be located approximately 18 inches away from and extend a minimum of three feet above the height of the beacon.

Installation Procedure:

1. Mount the beacon (Section 2.1)
2. Wire the beacon power (Section 2.2)
3. Verify operation (Section 2.3)
4. Wire the beacon monitoring connections (Section 2.2)
5. Confirm monitoring status by disconnecting power to the beacon. This should create an alarm.

After all steps are completed successfully, the installation is complete.

2.1 Mounting the Beacon

Flash Technology recommends the installation of one or more lightning rods near the beacon. The copper lightning rod(s) should be located approximately 18 inches away from and extend a minimum of three feet above the height of the beacon.

The beacon should be positioned so that the light collector for the photodiode has an unobstructed view of the polar sky. Also, it must not view direct or reflected artificial light. The GPS antenna located on top of the beacon must have an unobstructed view of the sky for proper reception and synchronization.

The beacon is mounted to the tower pedestal or optional mounting bracket[1] utilizing supplied hardware. Four mounting holes are provided on the beacon base (Figure 2-1). These mounting holes will align with most tower pedestals. The beacon should be installed level to maintain light output in accordance with FAA/ICAO requirements.

_____

1. An optional mounting bracket is available to accommodate various installation configurations and to facilitate leveling the beacon. See Section 5.5 for ordering information.

15.75 (400)

8.69 (220.7)

ATTENTION ⚠
EQUIPMENT BASE MUST HAVE
CLEAN METAL BOND TO
GROUNDED STRUCTURE

Ø13.25 (336.5)

Ø0.63 (16) THRU
(TYP OF 4)

Note: All dimensions are in inches (millimeters).

Figure 2-1 – Flashhead Dimensions & Mounting Outline

2.2 Wiring the Beacon

The beacon is supplied with a 50-foot length of power & alarm cable pre-wired to the internal electronics to facilitate installation (see Table 2-1). The only connections required are power (120-240 VAC, 50/60 Hz) and ground. The ground wire must be connected for proper operation and protection of the beacon.

Optional dry contact monitoring connections permit monitoring of beacon operation. The contact is closed when the beacon is operating normally and no fault is detected.

The Auxiliary Control Input allows an external device, such as a radar system, to inhibit the flashing of the beacon (see Table 2-2). The acceptable input voltage range for the Control Input is 5 – 30 Volts AC/DC. The optional 10 conductor cable is required to utilize this feature.

Table 2-1 – Standard Power & Alarm Connections

	Wire Color	Function	FTB 370i-2 Beacon Internal Connections	External Connections
5 Conductor Cable	Black	Input Power	TB1 - L1	(120 VAC) - Line (240 VAC) - L1
	White	Input Power	TB1 - L2	(120 VAC) - Neutral (240 VAC) – L2
	Green	Ground	TB1 - GND	Ground
	Red	Alarm Contact	TB1 - COM	Alarm Input[1]
	Orange	Alarm Contact	TB1- NC	Alarm Input[1]

Table 2-2 – Power, Alarm & Radar Interface Connections

	Wire Color	Function	FTB 370i-2 Beacon Internal Connections	External Connections
10 Conductor Cable (Optional)	Black	Input Power	TB1 - L1	(120 VAC) - Line (240 VAC) - L1
	White	Input Power	TB1 - L2	(120 VAC) - Neutral (240 VAC) – L2
	Green	Ground	TB1 - GND	Ground
	Red	Alarm Contact	TB1 - COM	Alarm Input[1]
	Orange	Alarm Contact	TB1- NC	Alarm Input[1]
	Brown	Auxiliary Control Input	TB1 – AUX -	Control Output[2]
	Blue	Auxiliary Control Input	TB1 - AUX +	Control Output[2]
	Violet	Ground	Chassis GND	Ground
	Yellow	Ground	Chassis GND	Ground
	Gray	Ground	Chassis GND	Ground
	Drain	Ground	Chassis GND	Ground

1. Refer to the monitoring system manufacturer's installation manual for connection locations.

2. Refer to the radar system manufacturer's installation manual for connection locations.

2.3 Verifying Operation

Apply power to the beacon and verify operation as indicated by the beacon and Status Indicator LEDs.

> Note: See Section 3.1 for a description each Status Indicator LED,

2.3.1 Power up

When powered up, all indicator LEDs are turned on for 10 seconds providing easy verification of operation. The beacon will begin flashing and will turn off after 40 seconds if the photodiode detects sufficient light. Otherwise, the beacon will remain on until the ambient light rises to a sufficient level.

2.3.2 Synchronization

For synchronization to occur, the GPS antenna (located on top of the beacon) must have an unobstructed view of the sky. As much as 15 minutes may be required for the beacon to achieve a GPS signal lock. Following power up, the Sync Alarm and Sync Status LEDs will turn off. Once a GPS signal lock is achieved, the Sync Status LED will turn on. This is the normal operating condition.

> Note: After one hour of operation, the Sync Alarm will turn on if a GPS signal lock has not been achieved. The alarm will turn off once a GPS signal is locked. Refer to Section 5 if the Sync Alarm remains on for more than 15 minutes.

Section 3 - Operation

3.1 Status Indicator LEDs

Status indicator LEDs are located on the Controller Core PCB inside the beacon. A description of each is provided below. See Section 2.3 for additional information regarding the Status Indicator LEDs.

Figure 3-1 – Status Indicator LEDs

Table 3-1 – Status Indicator LEDs

LED	Description	Function
D9	Power	Input power is present.
D2	Sync Status	Off during power up. Turns on after a GPS signal lock is achieved. Off when Sync alarm is present.
D3	Mode Status	Blinks in synchronization with the beacon flash.
D4	Red LED Alarm	Output from the beacon is below the minimum regulatory allowance.
D21	IR LED Alarm	Output from the IR LEDs has diminished by more than 25% of nominal.
D5	PD Alarm	More than 19 hours have passed since the unit transitioned modes via the photodiode.
D6	Sync Alarm	More than one hour has passed since the unit received a GPS Sync signal or an antenna fault is present.
D7	Ant. Open	The GPS antenna is disconnected or has failed. Sync Alarm will accompany the Ant. Open alarm.
D8	Ant. Short	The GPS antenna is shorted. Sync Alarm will accompany the Ant. Short alarm.

3.2 Configuration Jumpers

Configuration jumpers are located on the Controller Core PCB inside the beacon. A description of each is provided below. To configure a particular option, move the spare jumper shunt to the specified location.
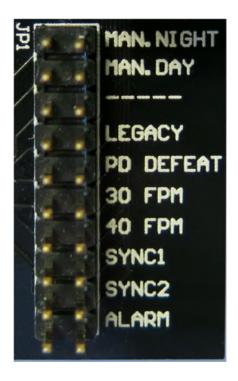

Figure 3-2 – Configuration Jumpers

Table 3-2 – Configuration Jumpers

Jumper	Description	Function
JP1[1]	MAN. NIGHT	Forces the beacon into Manual Night mode for 30 minutes.
JP2[1]	MAN. DAY	Forces the beacon into Manual Day mode for 30 minutes.
JP3	-----	Spare Jumper
JP4	LEGACY	Unit operates at ½ duty cycle.
JP5	PD DEFEAT	The PD Alarm is disabled when the PD Defeat jumper is installed.
JP6[2]	30 FPM	Thirty (30) flashes per minute.
JP7[2]	40 FPM	Forty (40) flashes per minute.
JP8	SYNC1	(Lighting Equipment by others) Closed: Orga Sync (Open SYNC 2)
JP9	SYNC2	(Lighting Equipment by others) Closed: Unimar Sync (Open SYNC 1)
JP10	ALARM	(Jumper Installed) Reduces LED output below minimum regulatory specification to test the system alarm circuitry.

1. To activate mode override, the jumper must be installed while power is applied to the beacon. The jumper has no effect if it is installed when the beacon is powered down.

2. Default flash rate is twenty (20) flashes per minute with no jumper installed on JP6 or JP7.

Section 4 - Beacon Operation

4.1 System Overview

The beacon wiring diagrams are shown in Figures 4-1 and 4-2. The standard five conductor power & alarm cable, shown in figure 4-1, provides connection of the AC line (3 wires) and alarm monitoring connections (2 wires). The optional ten-conductor cable, shown in Figure 4-2, provides the same connections and adds connections for the auxiliary control input (2 wires). The remaining 3 conductors and drain wire are connected to chassis ground.

The AC line may be 120-240VAC 50/60Hz. The dry contact alarm connections are closed when the beacon is operating normally and no fault is detected. The voltage range for auxiliary control input is 5 – 30 Volts AC/DC. The beacon flash will be inhibited when voltage within the specified range is applied to the terminals labeled AUX + and AUX -.

The Controller Core PCB (370i-2 IR 2423800) senses ambient light focused by the light collector onto the photodiodes and at night flashes the LED beacon. A GPS antenna and integrated receiver permit synchronization to other beacons. The Controller Core PCB detects alarm conditions including beacon failure, photodiode alarm, and synchronization fault. A clear polycarbonate cover provides access to view the status and alarm LEDs to permit easy determination of proper operation and fault diagnosis.

The LED Engine assembly contains high-performance LEDs, which illuminate when powered by the Controller Core PCB. The complete assembly (370i-2 IR 1370480) is easily replaced when field service is required.

The Power Supply (5150501) and the Surge Suppressors (11000016050) are located in the base of the beacon. The power supply generates the proper DC current to the Controller Core PCB when AC line voltage is applied at its input. The surge suppressors, wired in line with and directly across the AC Line, provide protection from incoming lightning and transient voltage induced surges.
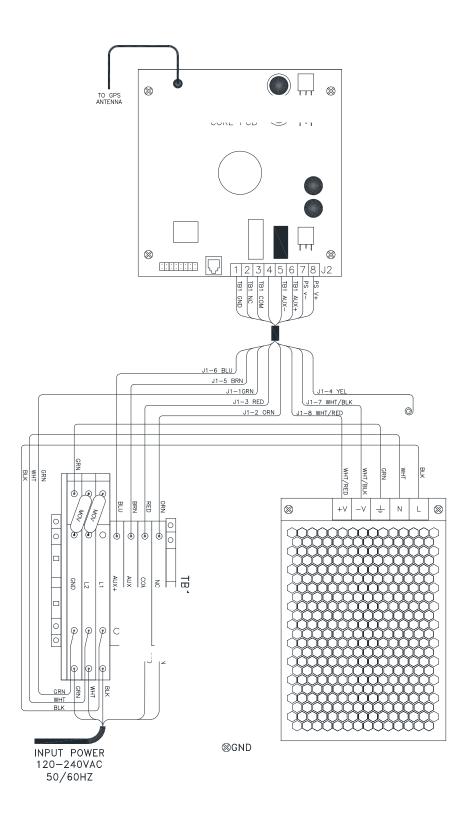
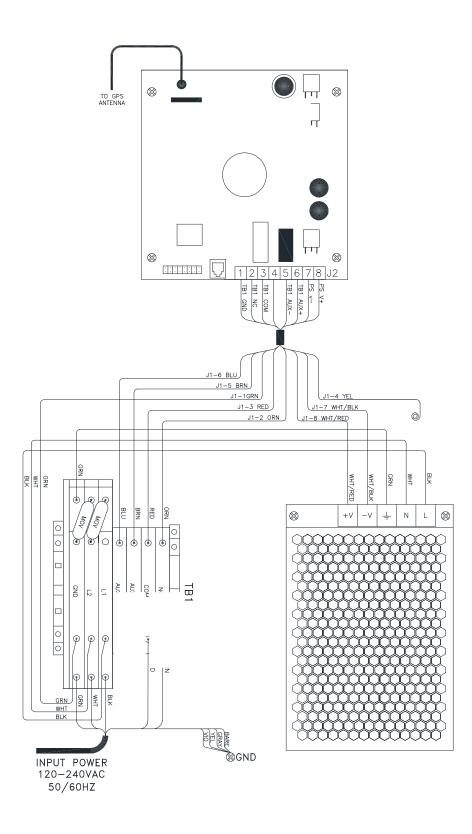Figure 4-1 – Beacon Wiring Diagram (Standard)

Figure 4-2 – Beacon Wiring Diagram (10 Conductor Option)

Section 5 - Maintenance and Troubleshooting

5.1 Maintenance

No regularly scheduled maintenance is required for the beacon.

- Flash Technology warranties the light output of the beacon to meet or exceed FAA/ICAO requirements for a 5 year period. LED module replacement after 5 years is recommended to ensure FAA/ICAO compliance. See Section 5.3.3.

- Periodically check the GPS antenna for tightness.

- Periodic cleaning of the lens is recommended with soapy water or any acrylic cleaning solution. No other cleaning solutions are recommended. Abrasive compounds will scratch the lens.

- Optional mounting brackets should be checked periodically for tightness.

5.2 Troubleshooting

Follow the troubleshooting steps in the tables below as applicable. Beacon repair procedures are provided in Section 5.3.

Table 5-1 – Troubleshooting - Beacon is in alarm

Step	Check/Test/Action		Action
1.a	Is beacon flashing at night?	Yes	Go to Step 1.b
		No	Go to Step 2.a
1.b	Is beacon flashing in sync with other FTS 370i-2 beacons? Check beacon SYNC Status and SYNC Alarm LEDs.	Yes	Go to Step 1.c
		No	Go to Step 3
1.c	Is beacon PD Alarm LED on? Does beacon flash in daytime?	Yes	Go to Step 4
		No	Review sections 2.1, 3.1 and 3.2 to verify system operation.

Table 5-2 – Troubleshooting - Beacon does not flash at night

Step	Check/Test/Action		Action
2.a	Is AC power applied? Measure at TB1 terminals L1 & L2.	Yes	Go to Step 2.b
		No	Correct problem.
2.b	Is beacon PWR Status LED on?	Yes	Go to Step 2.c
		No	Replace the Power Supply (See Section 5.3.2)
2.c	*Proceed to Step 2.d if there are no wires connected at AUX+ and AUX-.* Disconnect the wires connected to AUX+ and AUX-. Did normal operation resume?	Yes	Check operation/status of the external control device.
		No	Go to Step 2.d.
2.d	Is beacon MODE Status LED flashing?	Yes	Go to Step 2.e
		No	Replace Controller Core PCB (See Section 5.3.1)
2.e	Is beacon LED Alarm LED on?	Yes	Replace LED module (See Section 5.3.5)
		No	Replace Controller Core PCB (See Section 5.3.1)

Table 5-3 – Troubleshooting - Beacon flashes but not in sync

Step	Check/Test/Action		Action
3	Does GPS antenna (located in top of beacon) have an unobstructed view of sky? See Section 2.1	Yes	Go to Step 3.b
		No	Correct problem
3.b	Is the <u>ANT. OPEN</u> LED on?	Yes	Check the GPS antenna connection on the Controller Core PCB. Replace the GPS antenna if the connection is not at fault. (See Section 5.3.3)
		No	Go to Step 3.c
3.c	Is the <u>ANT. SHORT</u> LED on?	Yes	Replace the GPS antenna. (See Section 5.3.1)
		No	Replace the Controller Core PCB (See Section 5.3.3)

Table 5-4 – Troubleshooting - Beacon flashes in daytime

Step	Check/Test/Action		Action
4	Is the light collector (located on top of beacon) obstructed? Check for any foreign matter on top of beacon.	Yes	Correct problem
		No	Replace Controller Core PCB See Section 5.3.1

5.3 Beacon Repair Procedures

Warning

Read the Personnel Hazard Warning on page ix now. Remove power from all wiring and circuitry before installing or performing work on the beacon. It is the responsibility of the installer to comply with all applicable electrical codes.

Note: While performing the following steps, check for any loose connections and other damaged components.

5.3.1 Replace the Controller Core PCB

FTS 370i-2 IR Part Number: 2423800.   See Figure 5-1 for component location.

Controller Core PCB Removal

Unfasten the two latches on the front of the base assembly. Lift the LED module to expose the Core Access Cover. Remove the four screws securing the cover and gently pull on the body of the cable grip to remove the cover. Press the latches located on each side of the harness connector and pull to remove it from J1 on the Controller Core PCB.   Disconnect the GPS antenna cable from the Controller Core PCB. Remove the four screws securing the Controller Core PCB and pull the board to release it from the mother board.

Controller Core PCB Replacement

Carefully align the connector on the back of the Controller Core PCB with the connector on the mother board. Gently push the board from the sides into the connection on the mother board. Continue installation in the reverse order of the removal process. Apply power to the beacon and verify that it operates correctly. If not, recheck all connections.

5.3.2 Replace the Power Supply

Part Number: 5150501. See Figure 5-2 for component location.

Power Supply Removal

Unfasten the two latches on the front of the base assembly. Lift the LED module to expose the power supply. Remove the black, white and green wires from the input power connections to the power supply. Remove the white/black and white/red wires from the output power connections of the power supply. Remove the four screws that attach the power supply to the base.

Power Supply Reinstall

Place the power supply in the base observing the correct orientation of the terminal blocks and secure with the four mounting screws. Attach the white/red wire to the output terminal labeled "V+". Attach the white/black wire to the output terminal labeled "V-". Attach the green wire to the terminal labeled " ⏚ ". Attach the white wire to the terminal labeled "N". Attach the black wire to the terminal labeled "L". Apply power to the beacon and verify that it operates correctly. If not, recheck all connections.

5.3.3 Replace the GPS Antenna and Cable

Part Number: 6903294. See Figure 1-1 for component location.

GPS Antenna Removal

Unfasten the two latches on the front of the base assembly. Lift the LED module to expose the Core Access Cover. Remove the four screws securing the cover and gently pull on the body of the cable grip to remove the cover. Disconnect the GPS antenna cable from the Controller Core PCB. Locate the GPS antenna on top of the beacon. Unscrew the GPS antenna from the light collector. Pull up gently on the antenna to expose the antenna cable and connector.

GPS Antenna Reinstall

Install the black seal on the base of the replacement antenna and attach the antenna cable. Guide the antenna cable back into the beacon through the light collector. Screw the antenna into the light collector until the seal is firmly against the light collector. Continue installation in the reverse order of the removal process. Apply power to the beacon and verify that it operates correctly. If not, recheck all connections.

5.3.4 Replace the Surge Suppressors

Part Number: 11000016050. See Figure 5-2 for component location.

Surge Suppressor Assembly Removal

Unfasten the two latches on the front of the base assembly. Lift the LED module to expose the surge suppressors. Insert flat blade screwdrivers into the corresponding terminal block slots to release the surge suppressor leads from the terminal block assembly.

Surge Suppressor Reinstall

Insert flat blade screwdrivers into the corresponding terminal block slots. Insert the surge suppressor leads into the terminal block and remove the screwdrivers. Verify that the surge suppressors are firmly inserted into the terminal block. Lower the LED module to the closed position and secure both latches on the base assembly. Apply power to the beacon and verify that it operates correctly. If not, recheck all connections.

5.3.5 Replace the LED Engine Assembly

FTS 370i-2 IR Part Number: 1370480.   See Figure 1-1 for component location.

LED Engine Assembly Removal

Unfasten the two latches on the front of the base assembly. Lift the LED module to expose the Core Access Cover. Remove the four screws securing the cover and gently pull on the body of the cable grip to remove the cover. Press the latches located on each side of the harness connector and pull to remove it from J1 on the Controller Core PCB.   Remove the green ground wire attached to the LED engine assembly. While securely grasping the LED engine assembly with one hand, locate the ring on the hinge pin and pull to remove the pin. Lift the LED engine assembly to remove it from the hinge.

LED Engine Assembly Replacement

Insert the LED engine assembly hinge into the base hinge and reinstall the hinge pin. Continue installation in the reverse order of the removal process. Apply power to the beacon and verify that it operates correctly. If not, recheck all connections.
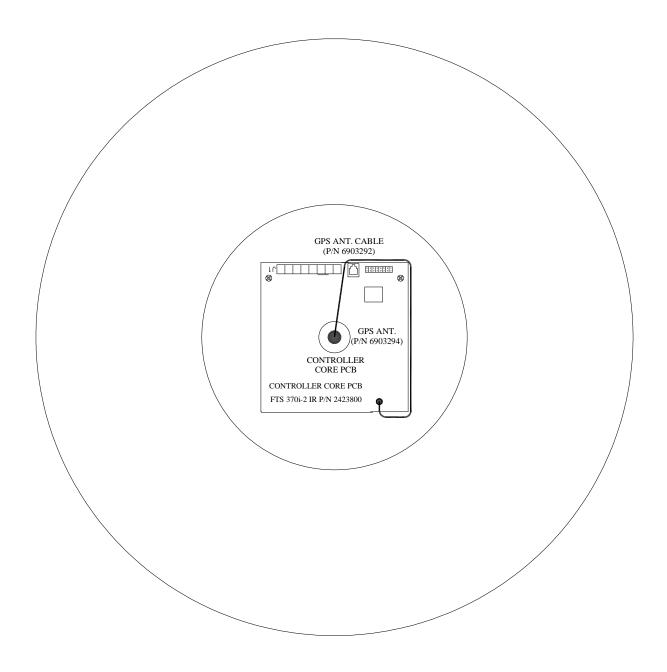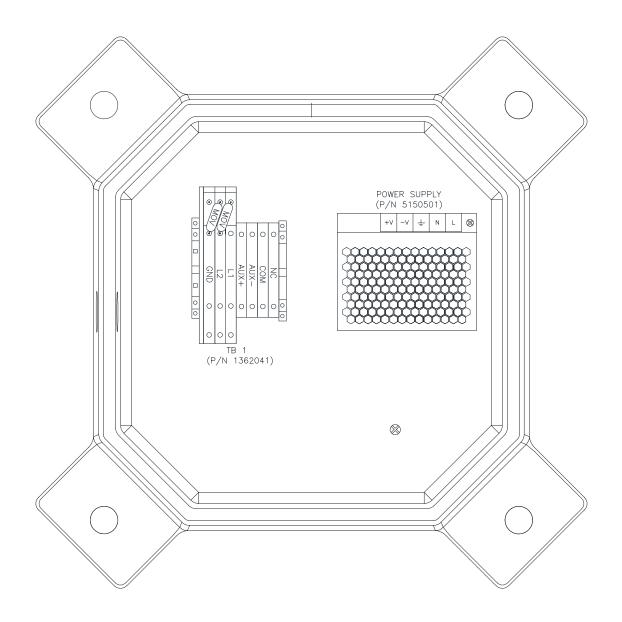
Figure 5-1 – Beacon Component Locations

Figure 5-2 – Base Component Locations

5.4 Customer Service

Customer Service: (800) 821-5825

Telephone: (615) 261-2000

Facsimile: (615) 261-2600

Shipping Address:

> Flash Technology
> 332 Nichol Mill Lane
> Franklin, TN 37067

5.5 Ordering Parts

To order spare, replacement or optional parts contact Parts Department at 1-800-821-5825.

Table 5-5 – Optional Parts

Description	Part Number
Mounting Bracket Assembly Universal	3991210
Mounting Bracket Assembly (GE)	3991220
Mounting Bracket Assembly Standard	3991240

Table 5-6 – Spare/Replacement Parts

Description	Part Number
LIGHT ENGINE (REPLACEMENT)	1370480
GPS Antenna with Gasket	6903294
GPS Antenna Cable	6903292
PCB CORE CONTROLLER	2423800
Wiring Harness	4842101
Power Supply	5150501
MOV Surge Suppressors	11000016050
Terminal Block Assembly (TB1)	1362041

RMA POLICY

If any system or part(s) purchased from Flash Technology needs to be returned for any reason (subject to the warranty policy), please see the current RMA policy available online at: flashtechnology.com/rma

To initiate an RMA, call the Flash Technology NOC to receive technical assistance (800-821-5825 Option 9, M-F, 7 a.m. to 7 p.m. CT).

Emailing a completed RMA request form to FlashSupport@spx.com can also start the process on sites not requiring detailed troubleshooting. The form can be filled out online at: http://flashtechnology.com/rma-request-form/

NOTE: An RMA number must be requested from Flash Technology prior to return of any product. No returned product will be processed without an RMA number. Failure to follow the below procedure may result in additional charges and delays. Any product received without an RMA number is subject to return back to the sender. All RMA numbers are valid for 30 days.