

FLASH TECHNOLOGY



Vanguard® Red FTS 371

Medium Intensity Red LED Obstruction Lighting System

Reference Manual

Part Number F7913801

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FRONT MATTER

ABSTRACT

This manual contains information and instructions for installing, operating and maintaining the Vanguard Red FTS 371 system components.

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All trademarks and product names mentioned are properties of their respective companies, and are recognized and acknowledged as such by Flash Technology.

APPLICABLE SPECIFICATIONS

The equipment included in this system meets or exceeds FAA AC 150/5345-43J requirements for the FAA Type L-864, L-885, L-810 and L-810(F) obstruction lights. This equipment can accommodate system configurations that meet the FAA AC/7460-1M, FAA AC/7460-1L and FAA AC/7460-1K standards for marker configurations.

The equipment included in this system meets or exceeds requirements for Transport Canada CAR621.19 types CL-864, CL-885 and CL-810.

The equipment included in this system meets or exceeds requirements for ICAO Annex 14 Sixth Edition for Medium-intensity obstacle lights Types B and C, as well as Low-intensity obstacle light Type B.

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

Under normal operating conditions, Flash Technology warrants all controller and LED lighting components for 5 years.

PARTS REPLACEMENT

The use of parts or components in this equipment that are not manufactured or supplied by Flash Technology voids the warranty and invalidates the third party testing laboratory certification that 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.

TABLE OF CONTENTS

Front Matter 2

- Abstract 2
- Copyright 2
- Trademark Acknowledgements 2
- Applicable Specifications 2
- Disclaimer 2
- Warranty 2
- Parts Replacement 2
- Personnel Hazard Warning 3

List of Figures 5

List of Tables 6

Section 1 – Introduction and Specifications..... 7

- System Specifications 7
 - Controller: FTS 371 FTC AC, FTS 371 FTC DC..... 7
 - Flashhead/Beacon: FTS 371 FH AC, FTS 371 FH DC 24V, FTS 371 FH DC 48V 8
 - Markers: MKR 371 / MKR 372 IR Series 8
 - Markers: MKR 371 OL2 / MKR 372 IR OL2 Series..... 9

Section 2 – Outline, Mounting and Installation Instructions 10

- Unpacking..... 10
- Tools..... 10
- Controller Installation and Grounding..... 10
- L-864 Flashhead/Beacon Installation and Grounding 11
- OL2 Installation and Wiring for A0 Towers..... 11
- Marker Installation and Wiring 12
- Lightning Protection..... 12
- System Wiring..... 12
- Securing the Cable (2-3-4 Tape Method)..... 13
- AM “Hot” Tower Wiring 13
- Flashhead/Beacon Wiring..... 13
- Controller Wiring 14
 - Input power connections 14
 - Beacon and Marker Connections..... 14

FTS 371 USER MANUAL

- Dry Contact Monitoring and Photodiode Connections 15
- Installation Checklists 15
- Checkout Procedure 16
- Section 3 – Maintenance Instructions 32
 - Safety 32
 - Maintenance 32
 - Troubleshooting 32
 - Component Removal and Replacement 32
 - FTS 371 FTC Controller 32
 - FTS 371 FH (L-864 LED) 33
- Section 4 - Operating Instructions 34
 - Controller 34
 - Manual Override Option 34
 - Tower Configurations 34
 - Controller Configuration Switch Definitions 35
 - Controller Configuration Jumper Definitions 35
 - Alarm Indicators 36
 - Flashhead/Beacon LED Indicators 36
 - Flashhead/Beacon Switch Definitions 37
 - Major Troubleshooting Symptoms 37
- Section 5 – Customer Support 39
 - Contact Information 39
 - Ordering Parts 39
 - RMA Policy 39

LIST OF FIGURES

- Figure 1 – Controller FTS 371 Poly Enclosure Mounting and Outline 18
- Figure 2 – Marker MKR 371 and MKR 372 series mounting and outline view 19
- Figure 3 – Flashhead/Beacon FTS 371 FH mounting and outline view 20
- Figure 4 – OL2 mounting and outline view 21
- Figure 5 – Photodiode PHD 516 mounting and outline view 22
- Figure 6 – Controller FTS 371 FTC AC Connection Diagram 23
- Figure 7 – Flashhead/Beacon FTS 371 FH AC Connection Diagram 24

FTS 371 USER MANUAL

Figure 8 – FTS 371 AC Typical FAA Type A0 Installation Wiring 25

Figure 9 – FTS 371 AC Typical FAA Type A1 Installation Wiring 26

Figure 10 – FTS 371 Typical A1 Tower View 27

Figure 11 – Controller FTS 371 DC Connection Diagram 28

Figure 12 – Flashhead/Beacon FTS 371 FH DC Connection Diagram 29

Figure 13 – FTS 371 DC Typical FAA Type A0 Installation Wiring 30

Figure 14 – FTS 371 DC Typical FAA Type A1 Installation Wiring 31

LIST OF TABLES

Table 1.1 – System and Component Model Combinations 7

Table 1.2 – Controller Specifications 7

Table 1.3 – Beacon Specifications 8

Table 1.4 – Single Marker Specifications 8

Table 1.5 – OL2 Marker Specifications 9

Table 2.1 – 2-3-4 Tape Method 13

Table 2.2 – System Installation Checklist 15

Table 2.3 – Before Applying Power Checklist 16

Table 4.1 – Controller Configuration Switch Definitions 35

Table 4.3 – Alarms Indicator Names and Descriptions 36

Table 4.4 – Beacon LED Indicators Descriptions 36

Table 4.5 – Beacon Switch Position Descriptions 37

Table 4.6 – Troubleshooting Symptoms and Resolutions 37

SECTION 1 – INTRODUCTION AND SPECIFICATIONS

The Vanguard Red FTS 371 is comprised of

- An FTS 371 FTC (AC or DC) series controller;
- Zero to four MKR 371 L810 / MKR 372 IR series low intensity red LED obstruction lights (marker); and
- Zero to one FTS 371 FH (AC) or zero to one FTS 371 FH (DC 24V, DC 48V) L864 medium intensity red LED obstruction lights (FH/beacon).

System and component model combinations are provided in the table below. All models are available with GPS option.

The FTS 371 FTC AC and DC controllers may be used with incoming power having the negative leg grounded and are available in either polycarbonate enclosure.

The FTS 371 system is designed to meet FAA, ICAO and Transport Canada regulations and to be utilized for their corresponding valid tower lighting configurations.

Table 1.1 – System and Component Model Combinations

System	Controller	Beacon	Markers
FTS 371 AC	FTS 371 FTC AC	FTS 371 FH AC IR (0 to 1)	MKR 371 (0 to 4) MKR 372 IR (0 to 4)
FTS 371 DC 24V	FTS 371 FTC DC	FTS 371 FH DC 24V IR (0 to 1)	MKR 371 (0 to 4) MKR 372 IR (0 to 4)
FTS 371 DC 48V	FTS 371 FTC DC	FTS 371 FH DC 48V IR (0 to 1)	MKR 371 (0 to 4) MKR 372 IR (0 to 4)

SYSTEM SPECIFICATIONS

CONTROLLER: FTS 371 FTC AC, FTS 371 FTC DC

Table 1.2 – Controller Specifications

Parameter	Specification
Physical Dimensions Polycarbonate Enclosure	7.80" x 8.25" x 4.01" (198.12 mm x 209.55 mm x 101.85 mm)
Weight Polycarbonate Enclosure	2.10 lbs. (0.95 kg)
Operating Temperature Range	-40 to +55 degrees Celsius
Input Voltage Range FTS 371 FTC AC FTS 371 FTC DC	100–240 VAC Nominal; 85-265 VAC at 50/60 Hz 12–48 VDC +/- 10% (12VDC for markers only)
Power Consumption FTS 371 FTC AC FTS 371 FTC DC	0.9 Watts 0.8 Watts
Flash Rate Options (Flashes Per Minute)	Steady Burn / 20 / 30 / 40 / 60
Alarm Relay Contact Rating	5 Amp @ 120V AC / 5 Amp @ 24V DC, Isolated contacts
Protection Rating	IP65, NEMA 4X

FLASHHEAD/BEACON: FTS 371 FH AC, FTS 371 FH DC 24V, FTS 371 FH DC 48V

Table 1.3 – Beacon Specifications

Parameter	Specification	
Physical Dimensions	15.75" diameter x 7.5" (400 mm diameter x 190.5 mm)	
Weight	25.6 lbs. (11.7 kg)	
Flash Intensity	FAA Mode: 2000 effective candela +/- 25% ICAO Mode: 2200 effective candela +/- 25%	
Operating Temperature Range	-40 to +55 degrees Celsius	
Input Voltage Range FTS 371 FH AC FTS 371 FH DC 24V FTS 371 FH DC 48V	85-265 VAC at 50/60 Hz 24V +/- 10% (21.6 – 26.4V) 48V +/- 10% (43.2 – 52.8V)	
Power Consumption	Mode	Average Power
	FAA, Efficient, 20 FPM	4.0 Watts
	FAA, Efficient, 30 FPM	5.3 Watts
	ICAO, Efficient, 20 FPM	4.4 Watts
	ICAO, Steady	30 Watts
Beam Spread	Horizontal: 360 deg. / Vertical: 3 deg.	
Aerodynamic Wind Area	99.125 in ²	
Protection Rating	IP65, NEMA 4X	

MARKERS: MKR 371 / MKR 372 IR SERIES

Table 1.4 – Single Marker Specifications

Parameter	Specification	
Physical Dimensions	9.0" x 2.75" x 2.13" (228.6 x 69.9 x 54.1 mm)	
Weight	1.6 lbs. (0.7 kg)	
Intensity (Steady)	32.5 ECD +/- 25%	
Operating Temperature Range	-40 to +55 degrees Celsius	
Power Usage	Marker Type / Mode	Average Power
	MKR 371 L810 / Steady	2.5 Watts
	MKR 371 L810 / Flashing	0.4 Watts
	MKR 372 L810 IR / Steady	6.9 Watts
	MKR 372 L810 IR / Flashing	1.5 Watts
Beam Spread	Horizontal: 360 deg. / Vertical: 10 deg.	
Aerodynamic Wind Area	24.75 in ²	
Protection Rating	IP65, NEMA 4X	

MARKERS: MKR 371 OL2 / MKR 372 IR OL2 SERIES

Table 1.5 – OL2 Marker Specifications

Parameter	Specification	
Physical Dimensions	11.25" x 5.0" x 8.75" (279.4 mm x 127 mm x 222.25 mm); 3/4" NPT Coupling	
Weight	5.40 lbs. (2.45 kg)	
Intensity (Steady)	32.5 ECD +/- 25%	
Operating Temperature Range	-40 to +55 degrees Celsius	
Power Usage	Marker Type / Mode	Average Power
	MKR 371 L810 / Steady	5 Watts
	MKR 371 L810 / Flashing	0.8 Watts
	MKR 372 L810 IR / Steady	13.8 Watts
	MKR 372 L810 IR / Flashing	3 Watts
Beam Spread	Horizontal: 360 deg. / Vertical: 10 deg.	

SECTION 2 – OUTLINE, MOUNTING AND INSTALLATION INSTRUCTIONS

UNPACKING

Inspect shipping cartons for signs of damage before opening. Check package contents against the packing list and inspect each item for visible damage.

Promptly report damage claims to the freight handler.

TOOLS

- 1/8" non-flared flat blade screw driver
- Digital volt-ohm meter
- #2 Phillips® head screwdriver
- Wire strippers
- Level
- Tin Snips
- Mounting hardware for controller (if not provided in the system kit)
- Various drill bits (to create openings in the bottom of the controller for cable runs)

CONTROLLER INSTALLATION AND GROUNDING

Locate the FTS 371 FTC controller in an area that will allow proper access to the enclosure. Ensure the mounting location does not interfere with the quick-release latch that secures the enclosure's door. Release the latch to open the door for internal access.

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 airflow around the controller. Recommended 3-4" of space allowed on each side of the controller. Flash Technology does not furnish mounting hardware unless it is ordered as part of an installation kit.
- Flash Technology recommends using flexible conduit for all cable runs with the exception of the beacon cable and jacketed ground wires.
- Ground the controller using a 10 AWG insulated ground conductor crimped into the supplied Yellow ring terminal. Install the ring terminal at the lower left PCB mounting screw in the controller. Route all ground conductors down and away from the energized equipment and ensure there are no bends less than 8 inches radius. If installed outdoors the system controller should be bonded to the site grounding grid (via exothermic welding). If installed inside a shelter or building route the 10 AWG insulated ground wire to the nearest down-link and attach using a compression fitting (c-tap).

Use the following guidelines for installing the photodiode:

- Locate the photodiode where it has an unobstructed view of the polar sky (north).
- It must not view direct or reflected artificial light.
- Support the photodiode vertically at the top end of a vertical length of rigid conduit to prevent moisture intrusion.
- If possible, mount the photodiode in a location that will allow easy access for future testing.

L-864 FLASHHEAD/BEACON INSTALLATION AND GROUNDING

1. Verify that the mounting surface is free of debris.
2. Align the four mounting holes in the base of the beacon with the holes in the tower or pedestal's mounting plate.
3. Leaving the hardware assemblies loose, secure the beacon with ½-inch stainless steel or galvanized hardware (part # 5991740).
4. With the light engine secured by the two latches on the base, place a level on the beacon's top plate and verify that it is level in two directions. **Note:** Flash Technology's "T"- Level (optional part # 11000013455) has two vials to simplify installation.
5. If the beacon is not level, add stainless steel shim material or washers (stainless steel or galvanized) as necessary to level the beacon.
6. Tighten the hardware once the beacon is level in both directions. Fully tighten the hardware and verify that the beacon is level. If necessary, loosen the mounting hardware and repeat Step 5 until the beacon is level with the hardware fully tightened.
7. Connect a minimum 8 AWG grounding wire to the pre-installed grounding lug on the beacon base exterior. Connect the other end of the wire directly to tower steel, collective buss bar or the customer's preferred location. Use an anti-corrosive agent on all terminal ends.

OL2 INSTALLATION AND WIRING FOR A0 TOWERS

A0 towers use a double L-810 (OL2) as the beacon. Images of the various OL2 styles are shown below.



There are several options in which to mount an OL2.

1. If clean steel is available with no worry of or indication of transmitting issues from other sources, a mounting bracket can be used in combination with a marker cable. Flash Technology provides a bracket (F3877103 Bracket Mounting Kit OL2 Extended) that is screwed into the threaded hole in the bottom of the OL2 and mounted on the base plate at the top of the tower. The mounting bracket is shown below.



The cable is best secured using the 2,3,4 tape method described in "SECURING THE CABLE" section below.

2. If there is no base plate, the OL2 may also be secured to the tower by mounting it on a length of $\frac{3}{4}$ " nipple or conduit and securing to the nipple/conduit to the tower by means of 2 – 3 U-bolts, marker clamps or beam clamps. The cable is then secured using the 2,3,4 tape method.

MARKER INSTALLATION AND WIRING

Installation and wiring instruction concerning MKR 371 DC / MKR 372 DC IR marker fixtures are supplied with the marker kit.

LIGHTNING PROTECTION

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

Confirm the presence of a copper lightning rod. Ensure the rod is approx. 18" away from the L-864 red LED beacon and 36" above the beacon for proper protection.

SYSTEM WIRING

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

Important! 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 diagrams supplied with your equipment.

Flash Technology 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.




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 lighting fixtures and the length of the wire on that run.

After the beacon wiring has been terminated to the beacon base ensure all cord grips are fully tightened and both latches are secured to prevent moisture intrusion.

SECURING THE CABLE (2-3-4 TAPE METHOD)

Flash Technology provides the material for securing the beacon cable to a skeletal structure with the following technique. **NOTE!** Always adhere to local electrical codes that could supersede this technique.

Table 2.1 – 2-3-4 Tape Method

Step 1	Step 2	Step 3
		
<p>Run the cable along 1 of the tower legs. Wrap 2 full turns of 2-inch Scotchrap™ #50 tape (or the equivalent) around the cable and tower leg.</p>	<p>Wrap 3 full turns of 1-inch Scotchrap Filament #890 tape over the Scotchrap #50 tape.</p>	<p>Wrap 4 full turns of 2-inch Scotchrap #50 tape over the Scotchrap Filament #890 tape.</p>

NOTE! Ensure there is at least a 4-5 foot (1.5 meters) separation between taping sections per NEC.

FLANGE STRESS RELIEF

Secure the cable above and below each flange approximately 6 inches by performing steps 1 through 3. Allow a 1-inch to 3-inch separation from the flange and the cable.

AM “HOT” TOWER WIRING

On AM “hot” towers, wire the beacon, markers and controller as described in this section except for the following: On the cable between the controller and beacon, do not connect the ground conductor in the controller or the beacon.

FLASHHEAD/BEACON WIRING

For AC powered systems, see beacon wiring in [Figure 6](#) (page 24) and typical installation diagrams in [Figure 7](#) (page 25) and [Figure 8](#) (page 26). In the beacon, connect the black wire to PCB terminal L1 and white wire to L2/N. Connect the green ground wire directly to the beacon base using the screw with integrated star washer located near the cable entry point.

For DC powered systems, see beacon wiring in [Figure 11](#) (page 29) and typical installation diagrams in [Figure 12](#) (page 30) and [Figure 13](#) (page 31). In the beacon, connect the red wire to PCB terminal DC+ and black wire to DC-. Connect the blue ground wire directly to the beacon base using the ground terminal installed in the beacon base located near the cable entry point.

CONTROLLER WIRING

For AC powered systems, see controller wiring in [Figure 5](#) (page 23) and typical installation diagrams in [Figure 7](#) (page 25) and [Figure 8](#) (page 26).

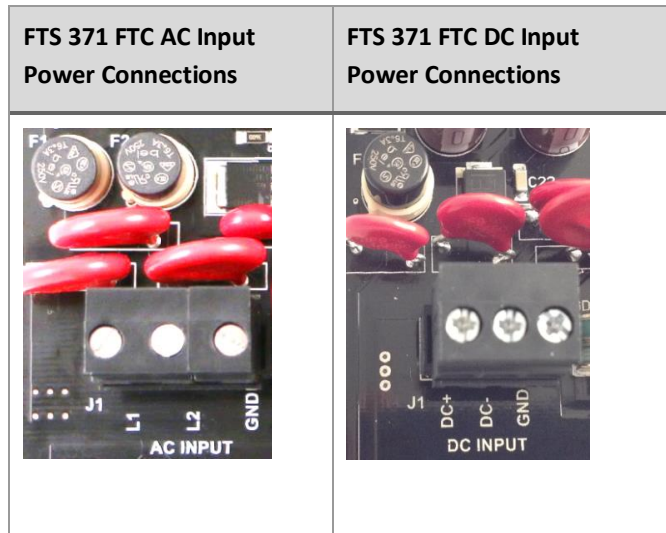
For DC powered systems, see controller wiring in [Figure 10](#) (page 28) and typical installation diagrams in [Figure 12](#) (page 30) and [Figure 13](#) (page 31).

INPUT POWER CONNECTIONS

Input power will be applied to J1.

AC powered systems are not sensitive to input power phase and have an operational voltage range of 85-265 VAC, 50/60 Hz with no modification necessary to the input power module. The replaceable input power fuses are located at F1 and F2. To remove a fuse, disconnect power then pull the fuse straight out.

On DC systems, observe polarity of input voltage (connect + to DC+ and – to DC-). There is only one replaceable input power fuse located at F1. To remove the fuse, disconnect power then pull the fuse straight out.



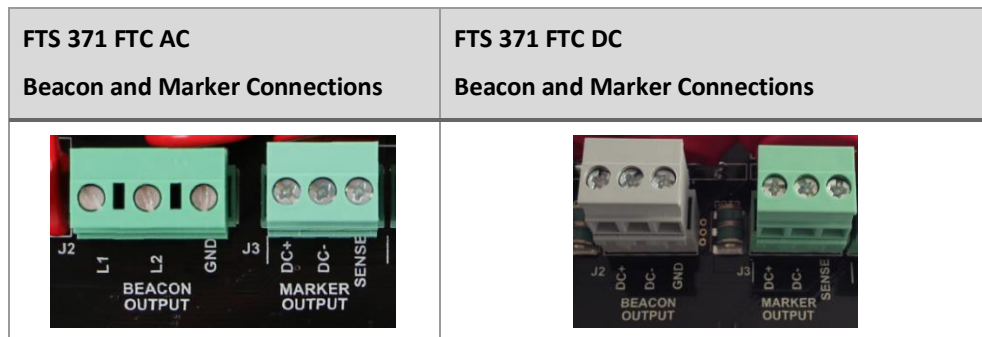
BEACON AND MARKER CONNECTIONS

For AC powered systems, one FTS 371 FH AC IR beacon may be connected. Connect the black wire to J2 terminal L1, white wire to L2 and green wire to GND.

For DC powered systems, one FTS 371 FH DC IR beacon may be connected. Connect the red wire to J2 terminal DC+, black wire to DC- and blue wire to GND.

Up to four of the MKR 372 DC IR or MKR 371 series marker lights may be powered from the MARKER OUTPUT at J3. Connect the red wire to DC+, black wire to DC- and WHT/BLU wire to SENSE. The marker cable shield wire (non-insulated) should be connected to GND at J2, BEACON OUTPUT.

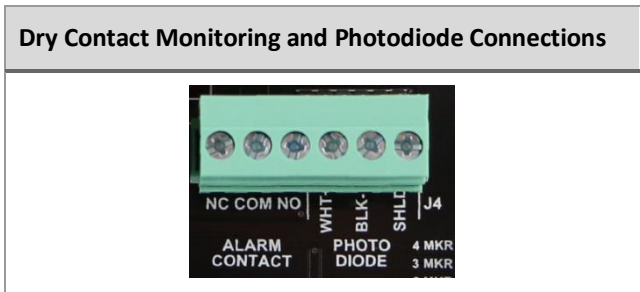
Note: The beacons or markers are powered if wired to the connectors. Alarming is configured by the Configuration Switches and Jumpers.



DRY CONTACT MONITORING AND PHOTODIODE CONNECTIONS

Find the dry contact monitoring connection on J4. The FTS 371 controller provides one alarm point available for external monitoring.

The photodiode (PHD 516) will connect to the far right of J5. If necessary, prepare the photodiode cable by stripping jacket and removing foil shield from black, clear and drain wires. Connect the wires to matching labels on the PCB for proper operation (Clear to WHT, Black to BLK and drain wire to SHLD).



INSTALLATION CHECKLISTS

Table 2.2 – System Installation Checklist

<input type="checkbox"/>	All equipment has been pre-inspected for damage.
<input type="checkbox"/>	All received equipment has been verified against the packing list to ensure completeness.
<input type="checkbox"/>	Site installation drawings have been consulted for placement, mounting, and wiring details.
<input type="checkbox"/>	A power disconnect switch or a circuit breaker has been provided.
<input type="checkbox"/>	A lightning protect system is in place.
<input type="checkbox"/>	Junction boxes have been ensured to drain condensation properly.
<input type="checkbox"/>	Controller has been mounted and positioned to allow adequate clearance to open the cover.
<input type="checkbox"/>	Controller has been mounted upright.
<input type="checkbox"/>	All screws within the internal controller hardware are tight.
<input type="checkbox"/>	No holes have been punched or drilled on the top of the controller enclosure.
<input type="checkbox"/>	The photodiode has been located where it has an unobstructed view of the polar sky (north).
<input type="checkbox"/>	Photodiode is located where it will not view direct or reflected artificial light.
<input type="checkbox"/>	Photodiode is supported directly by electrical conduit or mounted on the optional Antenna Mounting Bracket (Kit PN 1905355).
<input type="checkbox"/>	Photodiode is not mounted underneath the controller where it could be shadowed.
<input type="checkbox"/>	Photodiode installation is water tight.
<input type="checkbox"/>	AM Towers Only: If the AM tower is “hot,” do NOT connect the ground wires to the beacon power connector or the controller beacon power connector.

Table 2.3 – Before Applying Power Checklist

<input type="checkbox"/>	Examine installation drawings.
<input type="checkbox"/>	Verify incoming service voltage is the value stated on the ID plate.
<input type="checkbox"/>	Ensure the unit is wired according to the included instructions.
<input type="checkbox"/>	Check all electrical connections for tightness.
<input type="checkbox"/>	Check all terminal strip connections for tightness.
<input type="checkbox"/>	If external alarm detection circuit responds to closed contacts, ensure they are wired to the proper contacts that close on alarm.
<input type="checkbox"/>	If external alarm detection circuit responds to open contacts, ensure they are wired to the proper contacts that open on alarm.
<input type="checkbox"/>	Verify alarm wiring has been protected by using shielded wires. Also verify proper grounding of the shield wire, and that the wires are ran through conduit.
<input type="checkbox"/>	Ensure the white wire of the photodiode is connected to J4 terminal labeled WHT+ and the black wire is connected to J4 terminal labeled BLK-.

CHECKOUT PROCEDURE

LIGHTING INSPECTION

To perform a lighting inspection (LI) you will be required to physically remove the connectors labeled J2 (beacon output) and J3 (marker output). By removing these connectors, the voltage supply to the structure lights is interrupted and the required alarm will generate. The following inspection will only test devices that the controller is configured for.

Note! To ensure system damage does not occur it is extremely important to remove power from the lighting controller before removing the connectors and before reinserting the connectors to PCB1.

LIGHTING INSPECTION PROCEDURE

1. Power the 371 controller OFF. Ensure all LEDs are no longer illuminated and that no voltage is present on J1 (input power).
2. Remove J2 - beacon output (if no beacons are installed, skip steps 2-7).
3. Power the controller ON and place the system into night mode by covering the photodiode.
4. Once the alarm is active the “BEACON ALARM” LED will be illuminated.



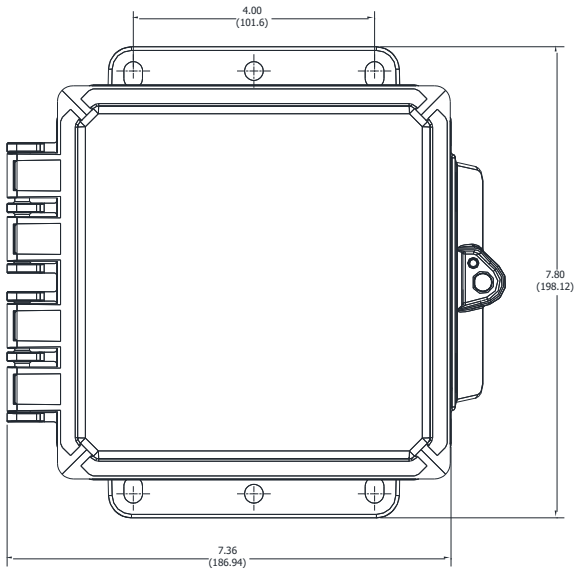
5. To restore (clear) the alarm simply power the controller off (see step 1) and reinsert J2 to PCB1.
6. Power the 371 controller ON and verify the “BEACON ALARM” LED is no longer illuminated.
7. Once the alarm has restored, power the controller OFF.
8. Remove J3 – marker output (if no markers are installed, skip steps 9 and 10).
9. Power the controller ON and place the system into night mode by covering the photodiode.
10. Once the alarm is active the “MARKER ALARM” LED will be illuminated.



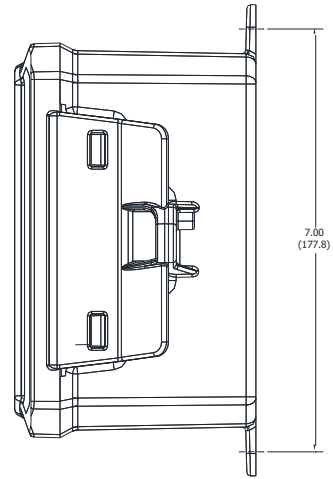
11. To restore (clear) the alarm simply power the controller off (see step 1) and reinsert J3 to PCB1.
12. Power the 371 controller ON and verify the “MARKER ALARM” LED is no longer illuminated.
13. Ensure no alarm LEDs are illuminated, and remove the photodiode cover.
14. **TEST COMPLETE!**

TESTING THE PHOTODIODE

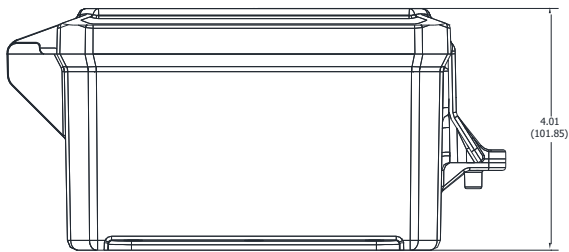
1. Set the MODE switch to AUTO. This ensures that the system is now under photodiode control.
2. Cover the photodiode to block it from all light and wait up to 60 seconds.
 - a. Verify that the system is now in NIGHT mode via the “STATUS” LEDs.
 - b. The beacon or marker(s) connected to the controller should be on and operating as programmed.
3. Uncover the photodiode to allow light to strike it, or shine a light on it. With no alarms or errors:
 - a. Verify that the system is now in DAY mode via the “STATUS” LEDs.
 - b. The beacon(s)/marker(s) connected to the controller should turn off.



FRONT VIEW



RIGHT SIDE VIEW



BOTTOM VIEW

Figure 1 – Controller FTS 371 Poly Enclosure Mounting and Outline

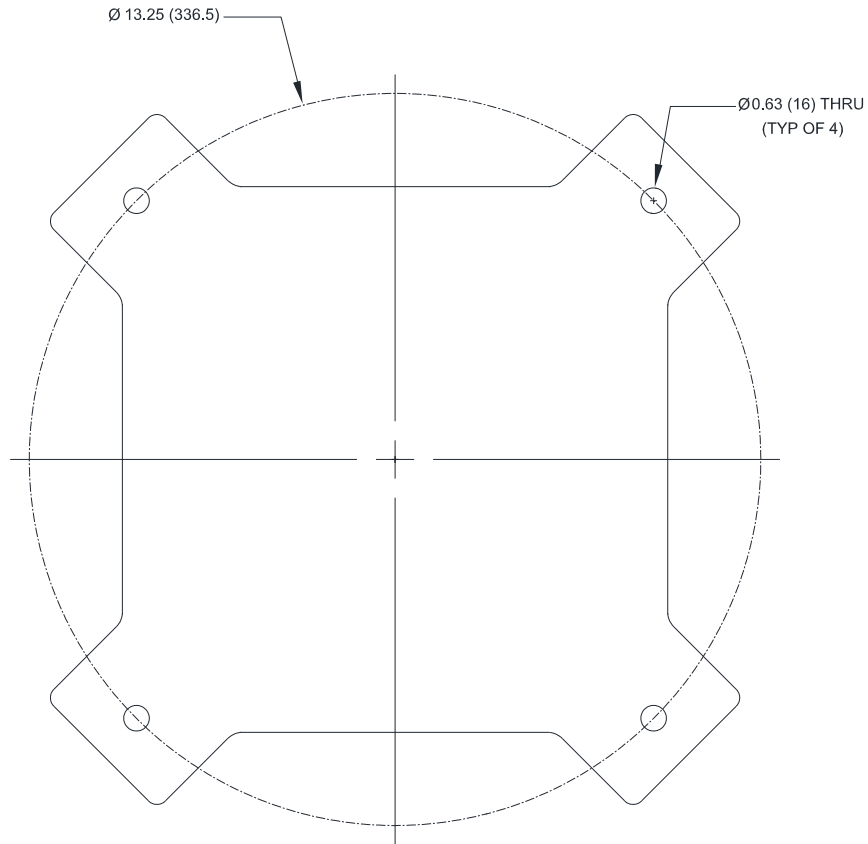
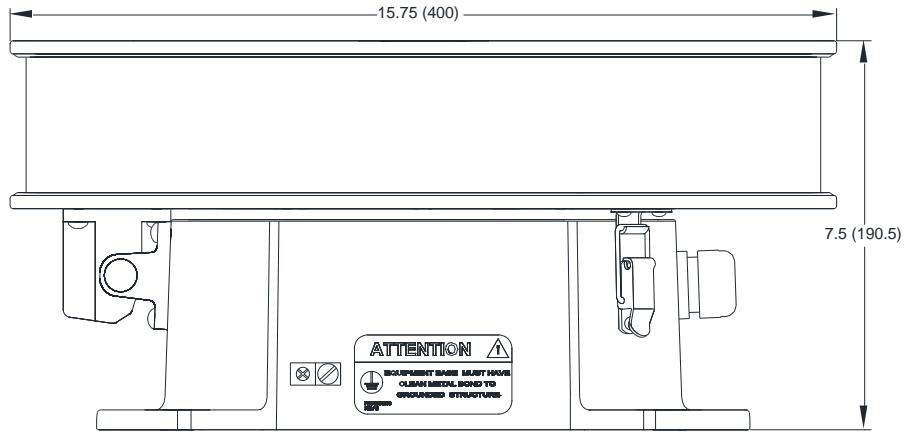


Figure 3 – Flashhead/Beacon FTS 371 FH mounting and outline view

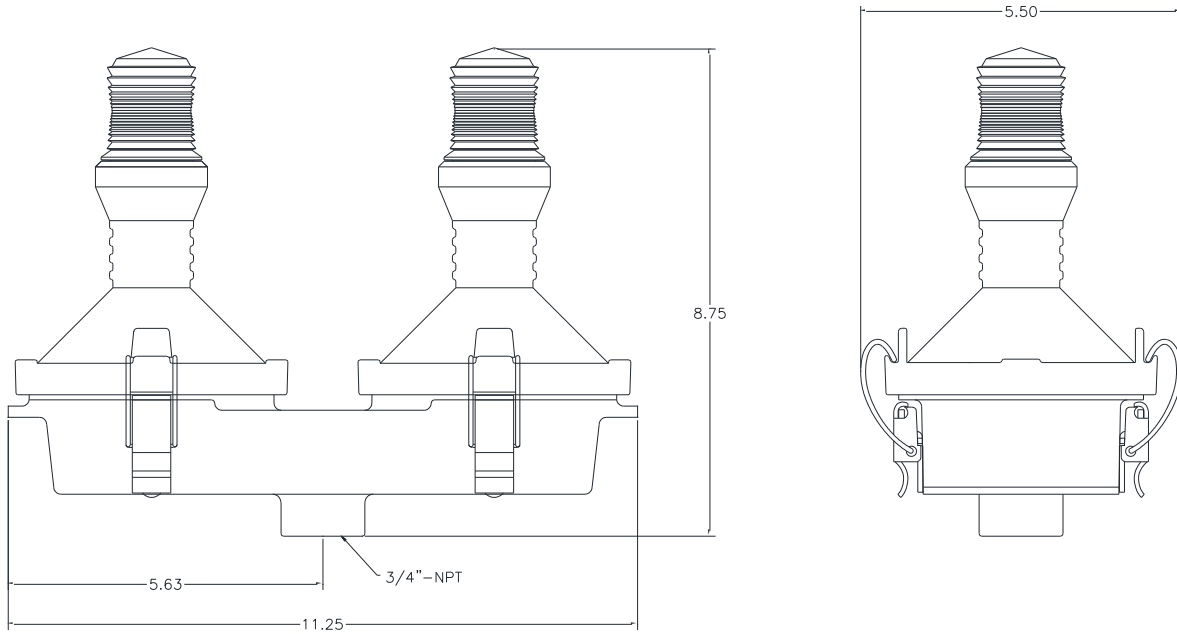


Figure 4 – OL2 mounting and outline view

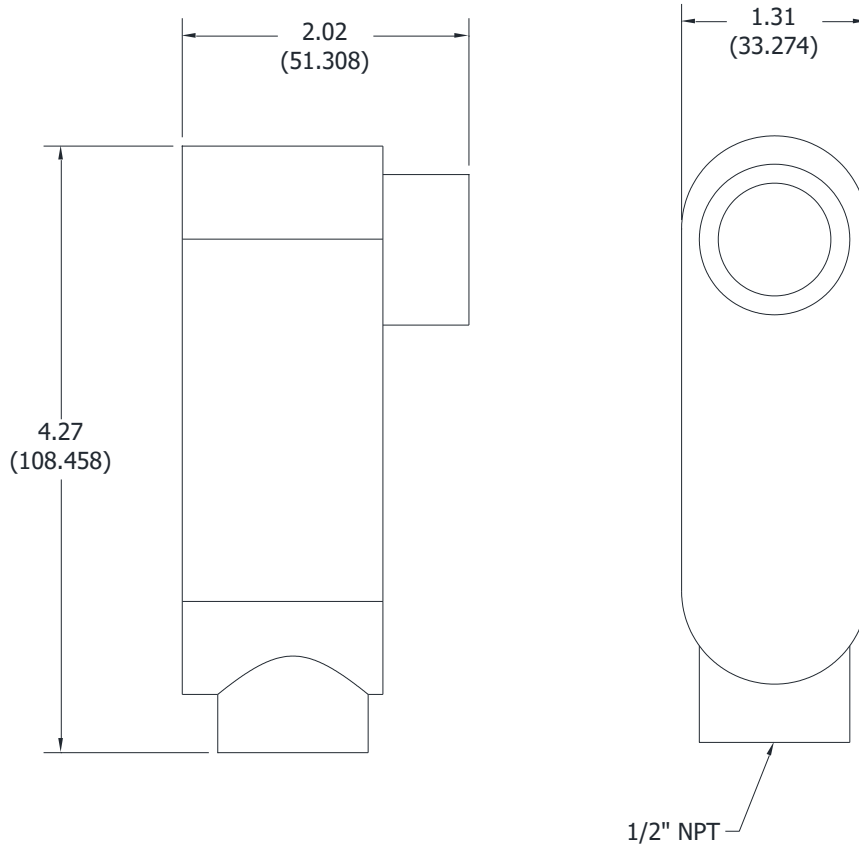


Figure 5 – Photodiode PHD 516 mounting and outline view

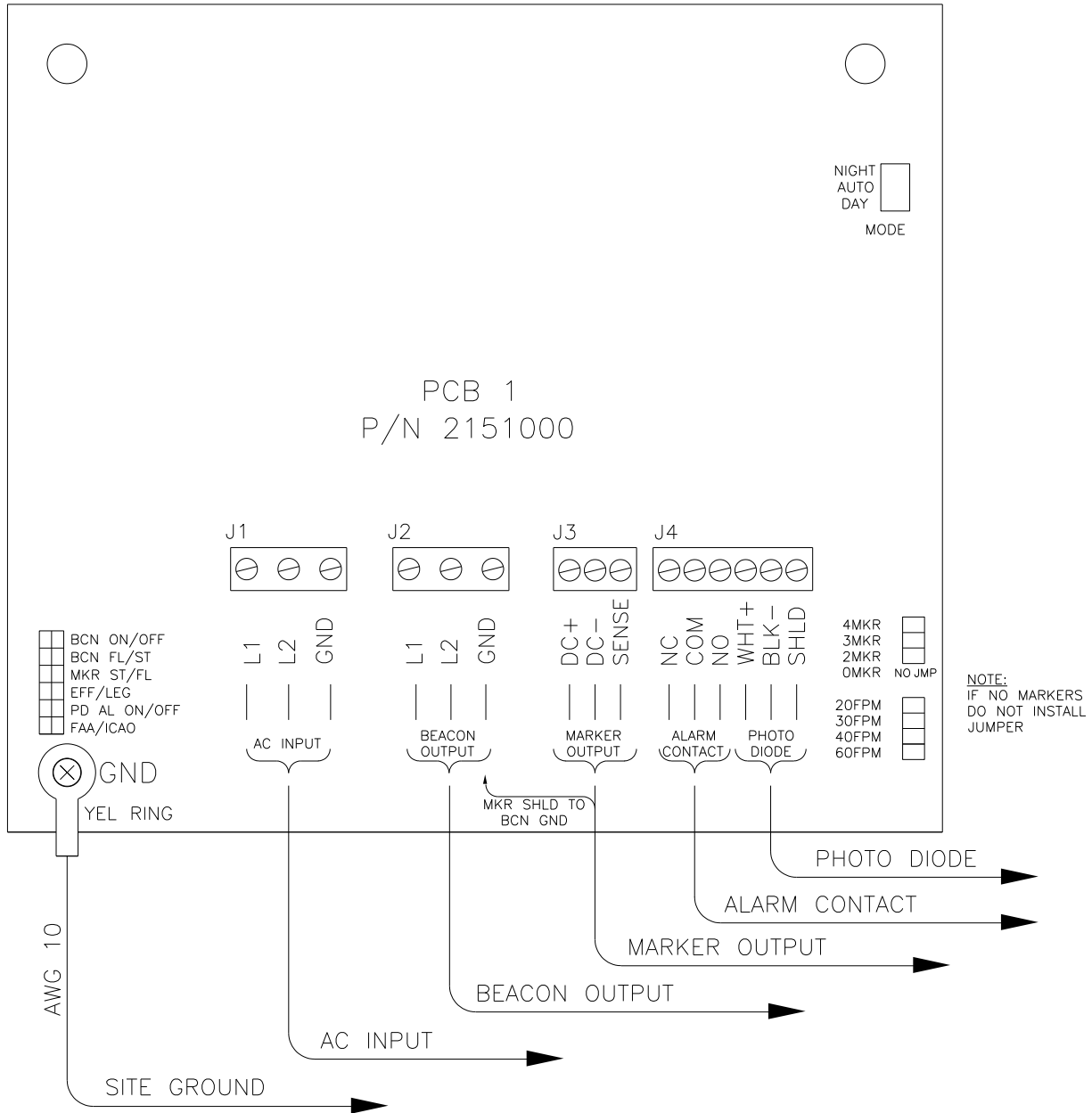


Figure 6 – Controller FTS 371 FTC AC Connection Diagram

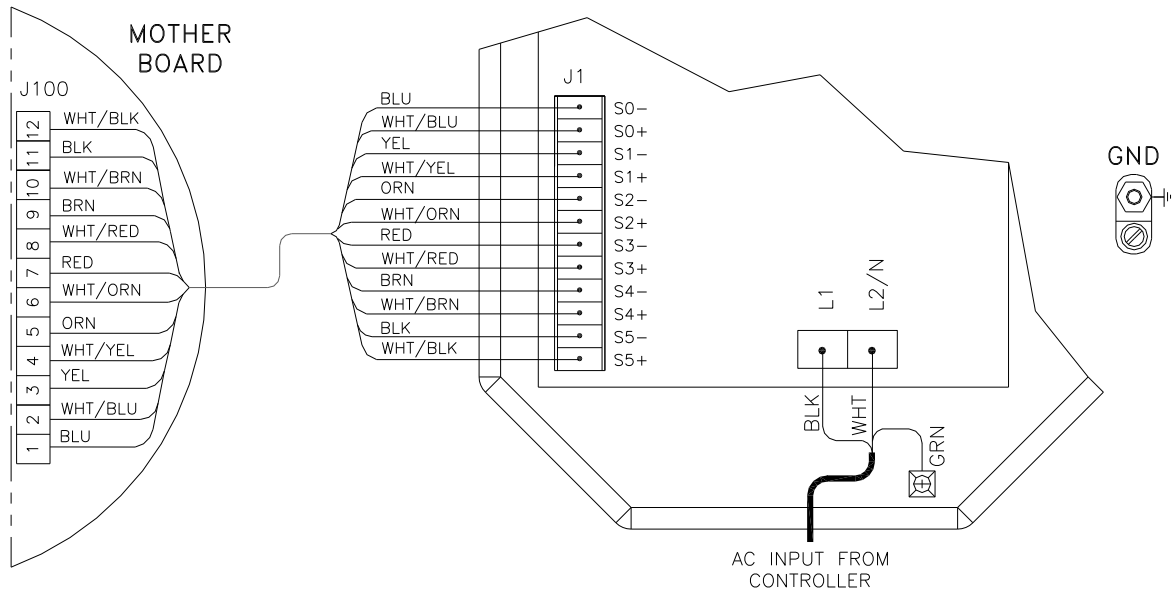
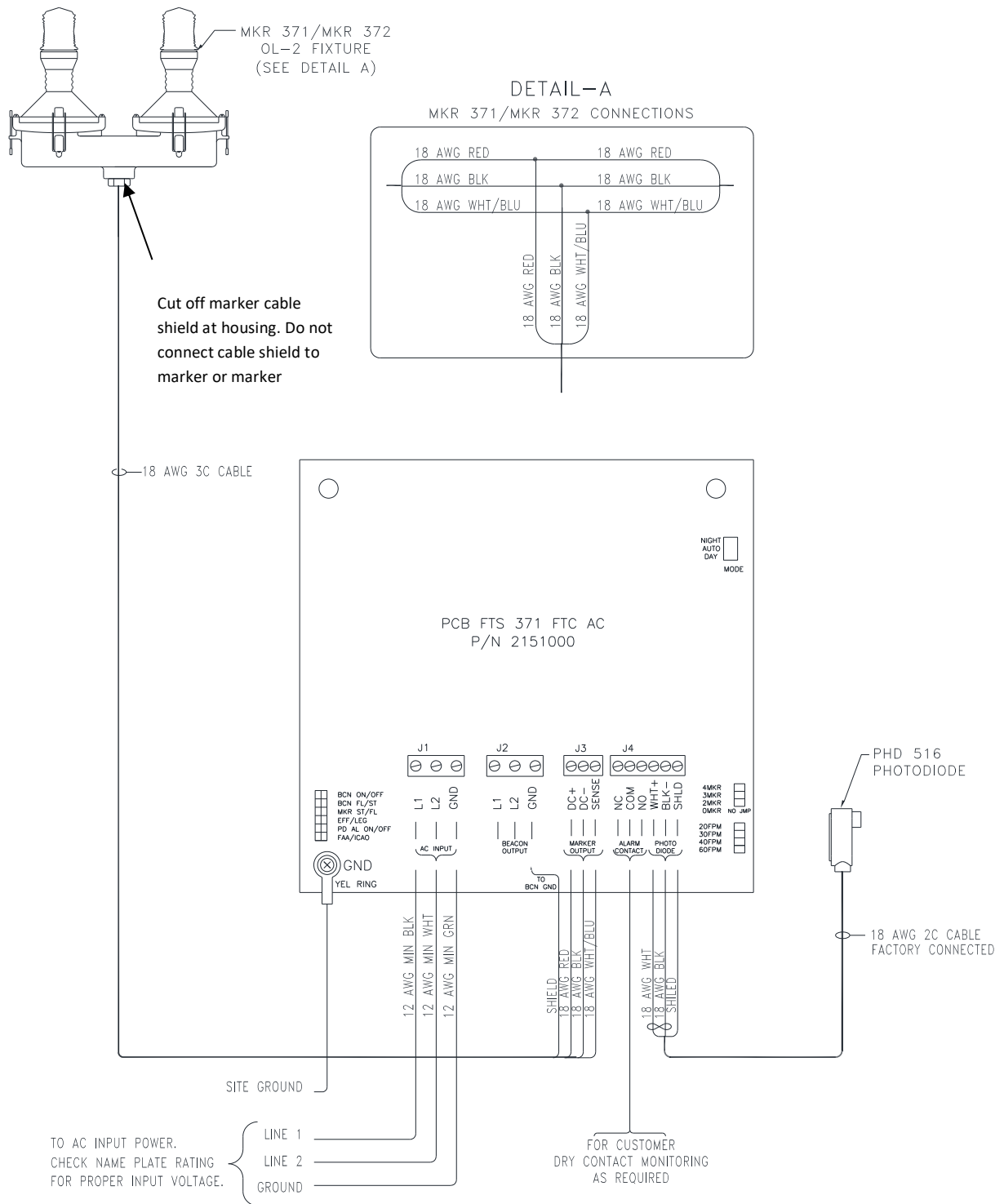


Figure 7 – Flashhead/Beacon FTS 371 FH AC Connection Diagram



NOTE: ONLY SYSTEMS USING MKR 372 ARE CERTIFIED UNDER FAA AC 150/5345-43J

Figure 8 – FTS 371 AC Typical FAA Type A0 Installation Wiring

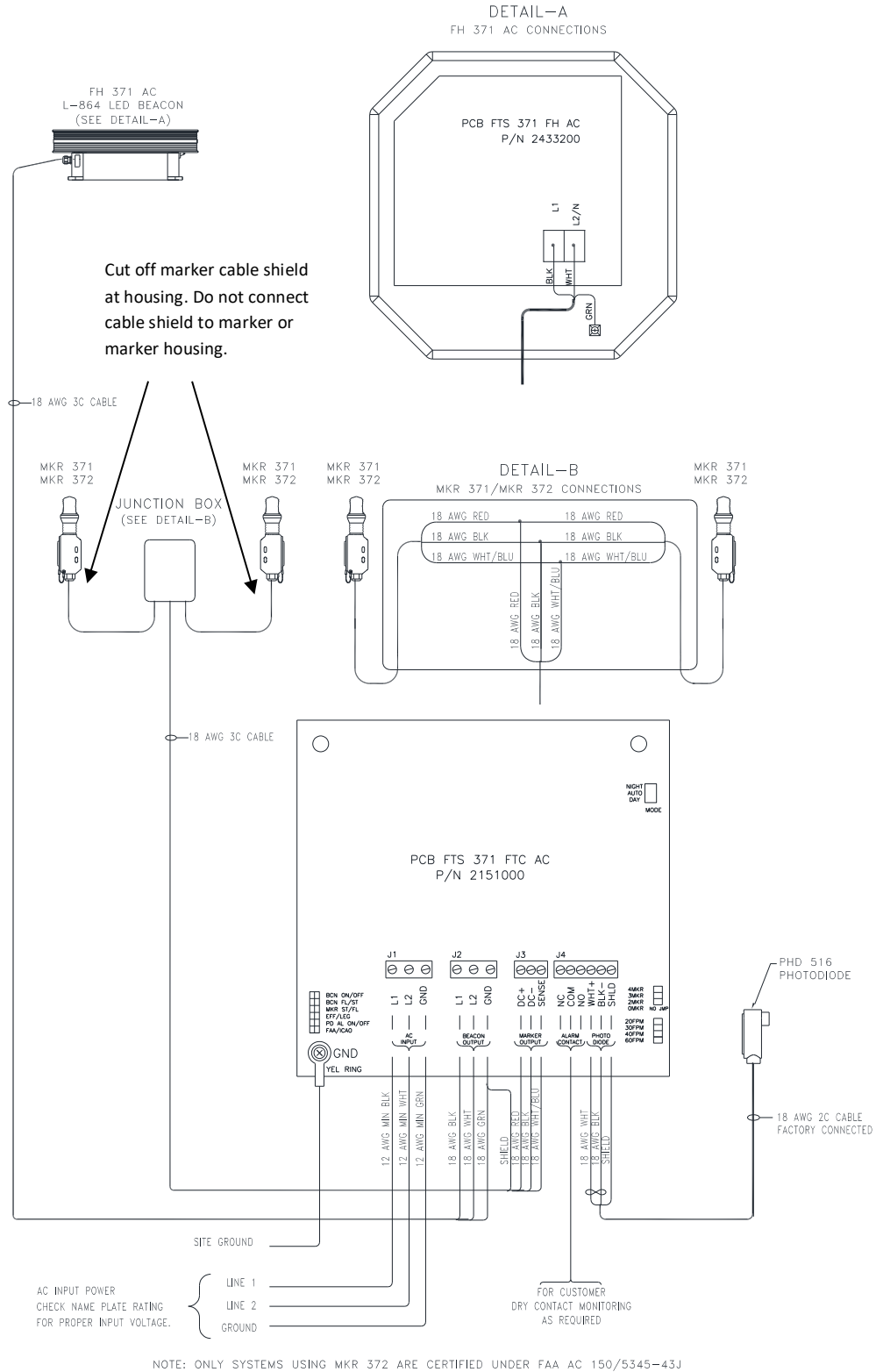
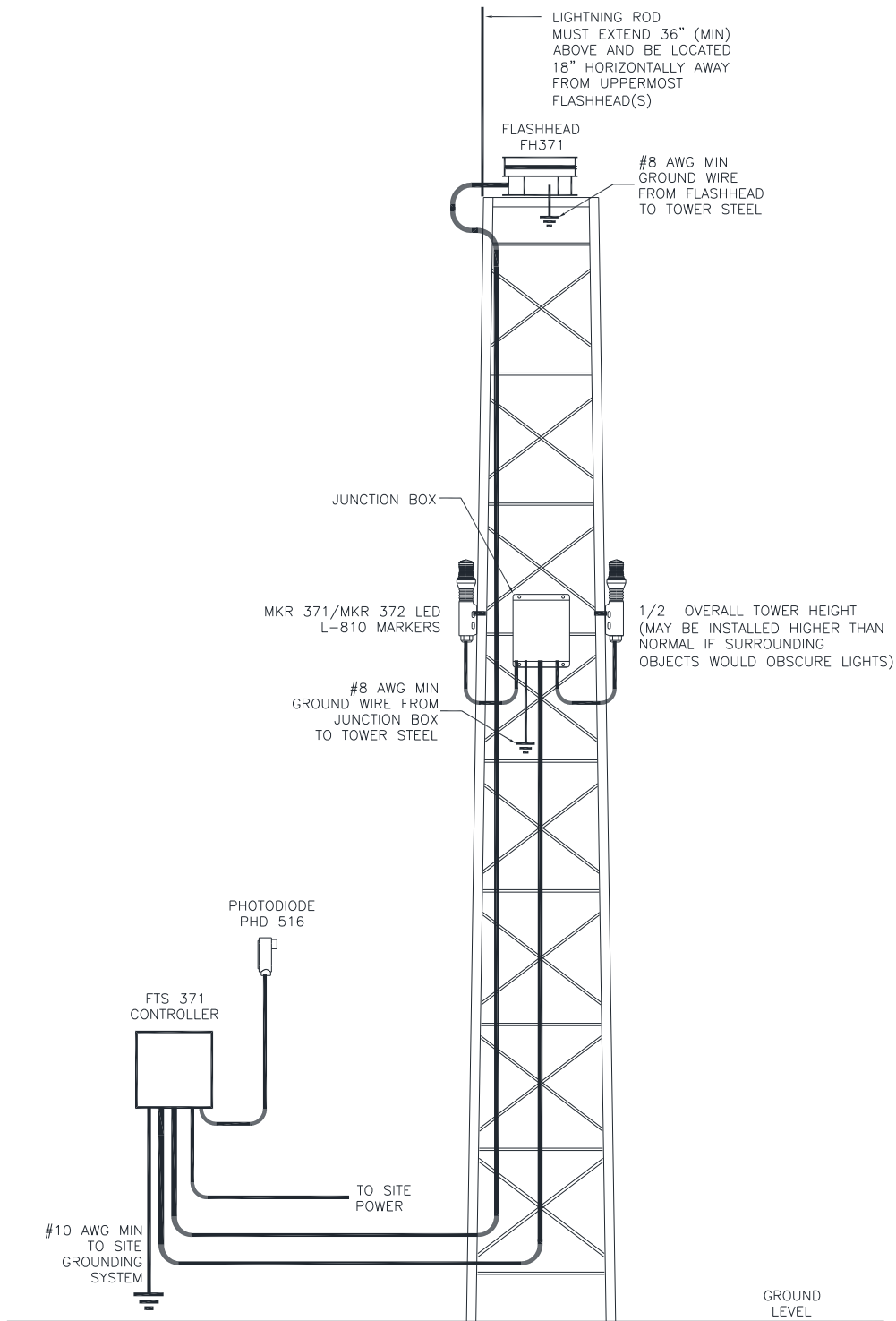


Figure 9 – FTS 371 AC Typical FAA Type A1 Installation Wiring



NOTE: ONLY SYSTEMS USING MKR 372 ARE CERTIFIED UNDER FAA AC 150/5345-43J

Figure 10 – FTS 371 Typical A1 Tower View

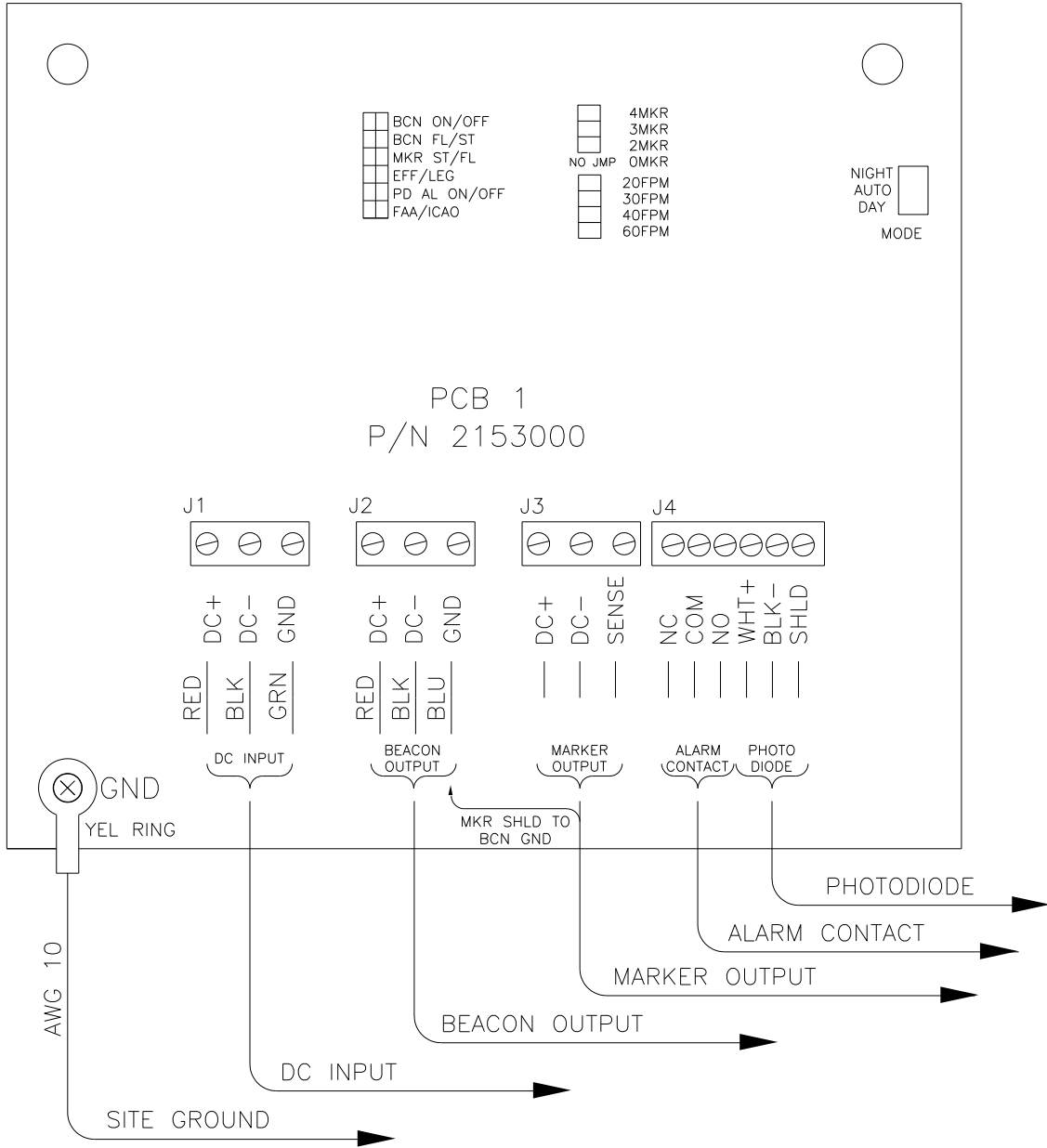


Figure 11 – Controller FTS 371 DC Connection Diagram

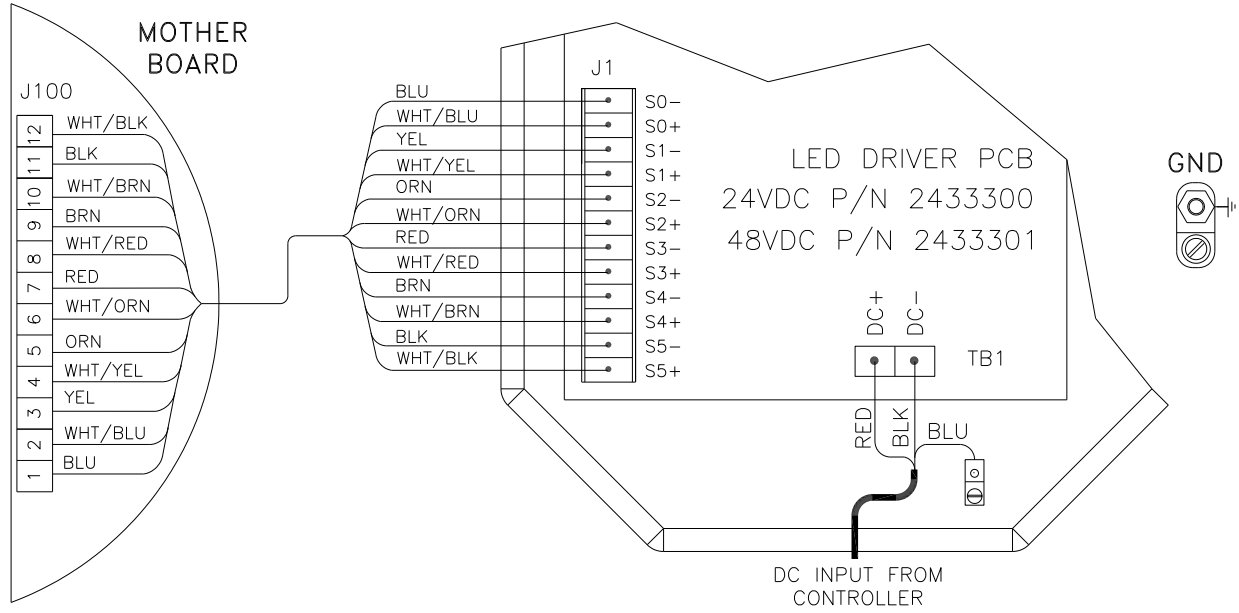


Figure 12 – Flashhead/Beacon FTS 371 FH DC Connection Diagram

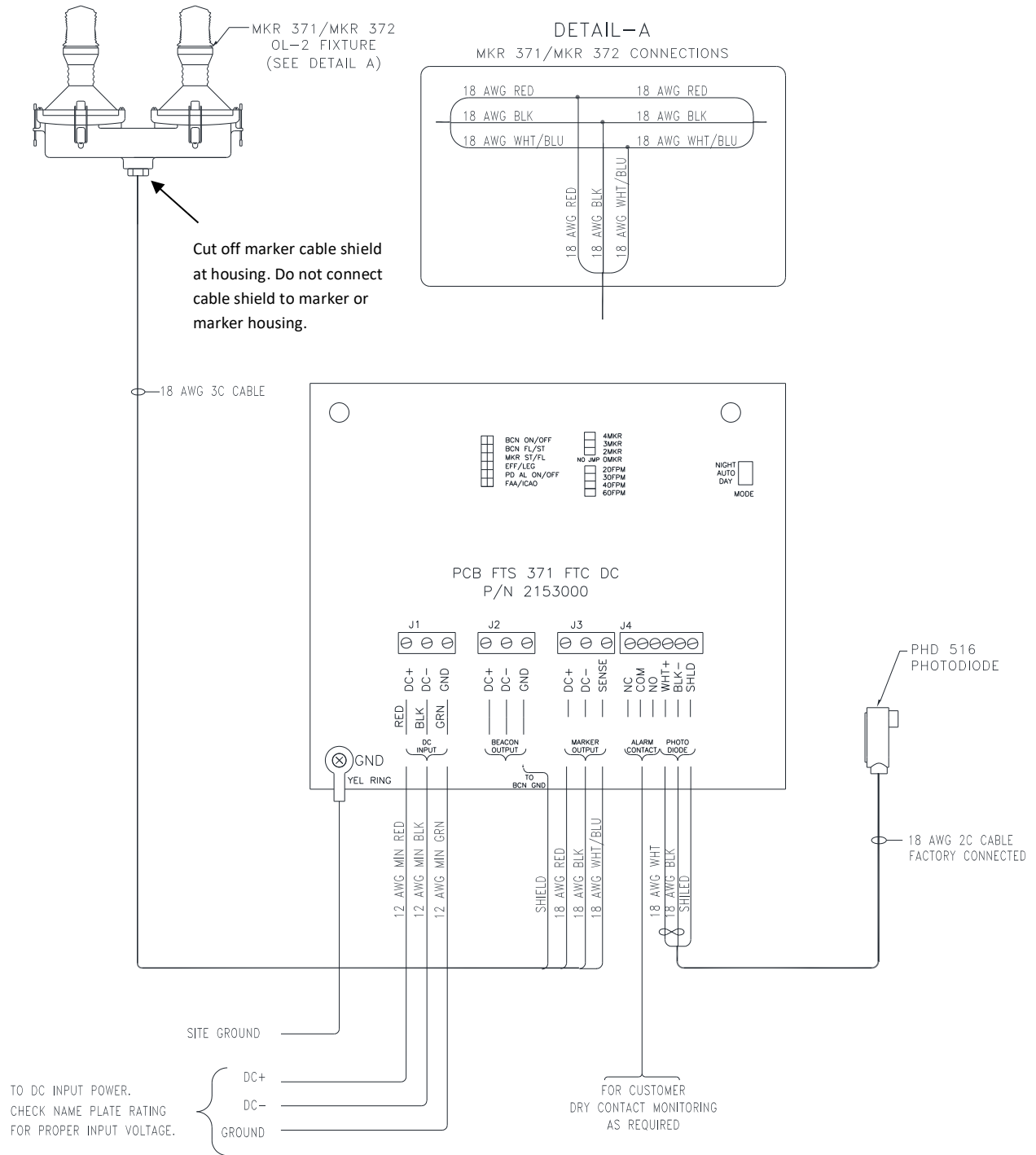


Figure 13 – FTS 371 DC Typical FAA Type A0 Installation Wiring

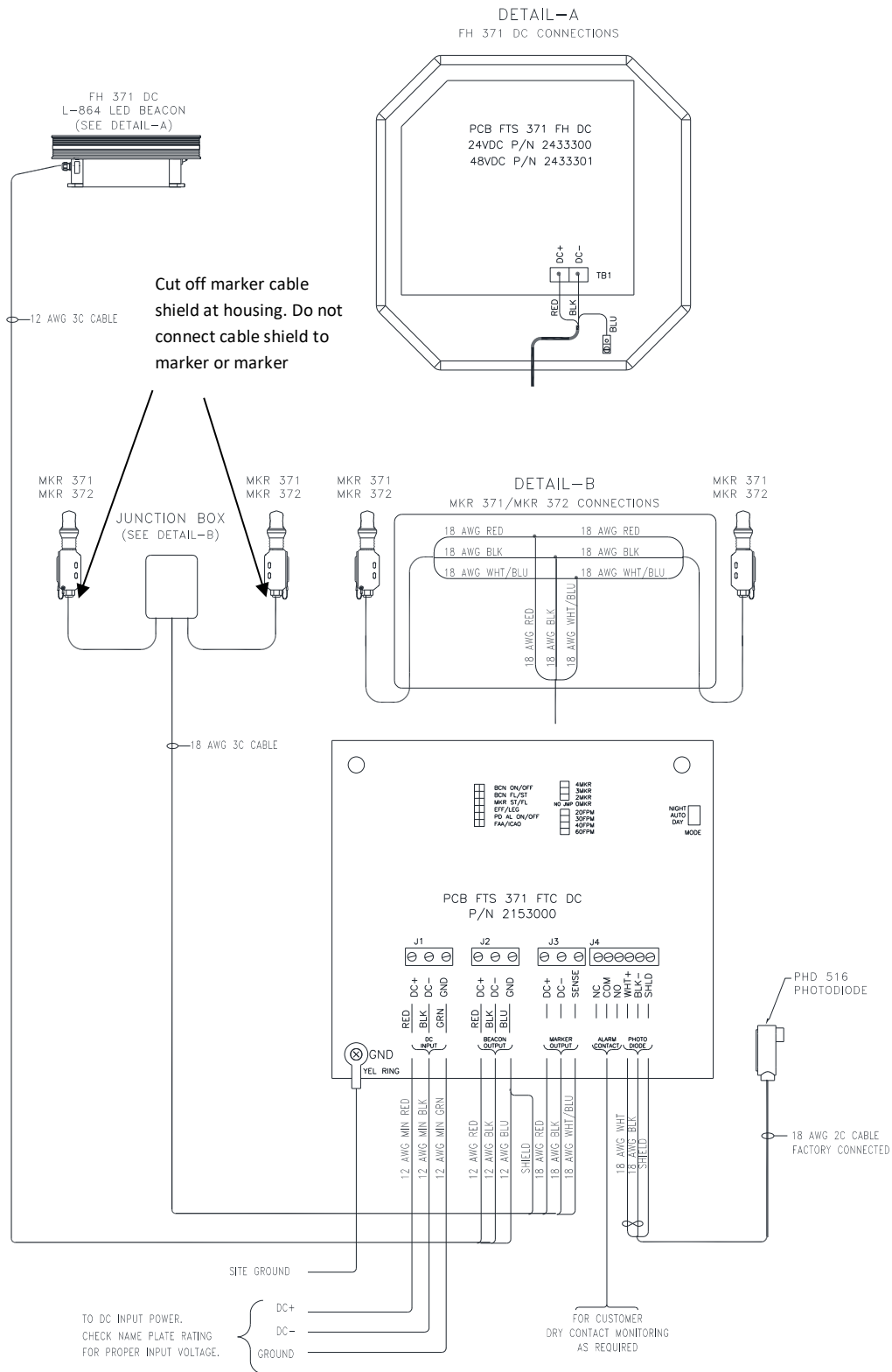


Figure 14 – FTS 371 DC Typical FAA Type A1 Installation Wiring

SECTION 3 – MAINTENANCE INSTRUCTIONS

SAFETY

Warning! Read the [Personal Hazard Warning](#) now (Page 3). Disconnect primary power before opening enclosures. Work safely, as follows:

1. Remove rings and watches before opening the equipment.
2. Shut off the equipment and wait one minute before proceeding.
3. Remove the component or connect the test instruments.
4. Replace the component.
5. Turn on the power and test the system.
6. Turn off the power and disconnect the test equipment.

MAINTENANCE

Keep the circuit boards 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 4.5 – Troubleshooting](#) (page 37) contains information to help locate the cause of a problem.

COMPONENT REMOVAL AND REPLACEMENT

Note the wiring connections and wire colors when you remove wires from their connections. Replace them exactly as they were.

FTS 371 FTC CONTROLLER

PCB1 (2151000 FTS 371 FTC AC) (2153000 FTS 371 FTC DC)

Remove: Unplug wire connectors at positions J1, J2, J3 and J4. Remove four Phillips-head screws located at the corners of PCB1 along with the grounding conductor ring lug at lower left screw. Lift the board out of the enclosure.

Replace: Reverse the removal procedure. Be sure to reconnect the Grounding conductor ring lug at lower left screw. Be sure to make the switch settings and jumper locations on the newly installed PCB match the removed PCB.

FTS 371 FH (L-864 LED)

LIGHT ENGINE (1370040)

Remove: The light engine “saucer” is designed to be replaced as a single assembly and is identical for the AC and DC flashheads (FTS 371 FH AC, FTS 371 FH DC 24V, FTS 371 FH DC 48V)). Unfasten the two latches on the front of the beacon’s base. Lift the light engine assembly to expose the wiring harness. Disconnect the light engine from PCB1 by removing the connector at J1. Disconnect the ground wire that is attached to the light engine. Lower the light engine to the closed position. Pull on the ring attached to the hinge pin and remove the hinge pin. Lift the light engine assembly to remove it from the base.

Replace: Reinstall in reverse order.

LED DRIVER PCB (2433200 FTS 371 FH AC)(2433300 FTS 371 FH DC 24V)(2433301 FTS 371 FH DC 48V)

Remove: Unfasten the two latches on the front of the beacon’s base. Lift the light engine assembly to expose the driver PCB. Disconnect the wires at PCB connector TB1. Unplug the connector at 12 position connector J1. Remove the screws that attach the PCB to the base. Remove the PCB from the base.

Replace: Reinstall in reverse order. Be sure to reconnect cable ground conductor to PCB or flashhead base connection point.

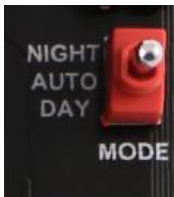
SECTION 4 - OPERATING INSTRUCTIONS

CONTROLLER

The controller begins programmed operation as soon as power is applied. The controller is shipped preconfigured for your application. It is also field customizable.

MANUAL OVERRIDE OPTION

The unit's operation can be controlled manually by toggling the manual MODE switch. Push the switch up for night mode and down for day mode. The unit will stay in the selected mode for up to 30 minutes if the switch is not returned to the AUTO position. The corresponding mode LED (DAY MODE or NIGHT MODE) will blink during a mode override. When the switch is in the center position the controller's mode will be determined by the connected photodiode's reading of ambient lighting.



TOWER CONFIGURATIONS

The configuration switch bank offers the ability to program the controller for a variety of installation situations. The system will come pre-programmed from the factory, but if reprogramming is desired use the following table to ensure proper operation.



CONTROLLER CONFIGURATION SWITCH DEFINITIONS

Table 4.1 – Controller Configuration Switch Definitions

Switch Label	Switch Position	
	Left	Right
BCN ON OFF (beacon alarm on/off)	A BEACON ALARM will be generated if a beacon is not connected and working properly. Beacon(s) are powered if wired to J2.	No BEACON ALARM will be generated.
BCN FL ST	Beacon is set to flash	Beacon is set to steady burn
MKR ST FL	Markers are set to steady burn	Markers are set to flashing
EFF LEG	Shorter flash duration that uses less energy	Longer flash duration to resemble an incandescent flash
PD AL ON OFF	19 hour mode change alarm “ON” (photodiode)	(19) hour mode change alarm “OFF” (Photodiode)
FAA ICAO	Domestic air navigation standards	International air navigation standards

CONTROLLER CONFIGURATION JUMPER DEFINITIONS

Table 4.2 – Controller Configuration Jumper Definitions

Switch Label	Jumper Position	
	Open (Not covering both pins)	Closed (Covering both pins)
4 MKR	No selection	Number of markers is (4)
3 MKR	No selection	Number of markers is (3)
2 MKR	No selection	Number of markers is (2)
0 MKR	No selection	Number of markers is (0)
20 FPM *	No selection	Sets system for 20 flashes per minute
30 FPM *	No selection	Sets system for 30 flashes per minute
40 FPM *	No selection	Sets system for 40 flashes per minute
60 FPM *	No selection	Sets system for 60 flashes per minute

* Only one flash rate selection may be made at a time. If more than one is selected, a “CONFIG ERROR” will be indicated and 30 FPM will be the result.

ALARM INDICATORS

Table 4.3 – Alarms Indicator Names and Descriptions

Alarm Indicator Name	Description	Resolution
BEACON ALARM	The controller has detected that the beacon output circuit is not drawing the proper amount of current for the selected configuration. If the controller’s configuration matches the actual setup of the system, then this alarm indicates that one or more connected FTS 371 FH beacons have failed.	<ol style="list-style-type: none"> 1. Confirm that the controller is properly configured 2. Replace the failed beacon(s)
MARKER ALARM	The controller detects fewer operating markers than its configuration. If the controller’s configuration (MARKER #) matches the actual setup of the system, then this alarm indicates that one or more of the connected MKR 371 / MKR 372 IR lights have failed.	<ol style="list-style-type: none"> 1. Confirm that the MARKER # configuration dial is set to the actual number of connected markers 2. Replace the failed marker lights
PHOTODIODE	The controller has detected the absence of a mode change in the last 19 hours. This could indicate the failure of the photodiode.	<ol style="list-style-type: none"> 1. Visually confirm that the photodiode is properly connected 2. Perform the Checkout Procedure (page 16). 3. If the alarm persists, replace the photodiode 4. If the alarm persists replace PCB1
CONFIG ERROR	The controller has identified that the current configuration settings are invalid.	<ol style="list-style-type: none"> 1. Confirm that the configurations settings are correct and valid.

FLASHHEAD/BEACON LED INDICATORS

Indicator LEDs on the PCB provide status information helpful in troubleshooting.



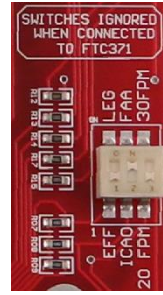
Table 4.4 – Beacon LED Indicators Descriptions

LED	Indication
Power	Steady on to indicate the board’s 5V power supply is on.
AC Sense	On when AC/DC source power is applied to the Beacon. When powered by FTS 371 controller, this LED will flash corresponding to the on/off pulsing power from the controller that communicates flash type and specification.
Flash	On when the LED strings are On.
Fault	On when a fault is detected on either beacon LED string. Turns on and off each flash cycle. When 4 consecutive flash cycle faults are detected, the beacon LED strings turn off until the next day to night transition or after removal of applied power for more than 30 seconds.
ICAO	On when the board is running in ICAO mode. Off in FAA mode.

FTS 371 USER MANUAL

Flashhead/Beacon Switch Bank

When the FTS 371 FH is not connected to an FTS 371 FTC controller, the switch bank will be used to program the beacon for a variety of installation situations. *However when an FTS 371 controller is connected, the flash head switch bank settings will be ignored.*



FLASHHEAD/BEACON SWITCH DEFINITIONS

(When an FTS 371 FTC controller is not connected.)

Table 4.5 – Beacon Switch Position Descriptions

Flash Head Mode	Switch Position	
	Left	Right
EFF / LEG	EFF - shorter flash duration that uses less energy	LEG - longer flash duration to resemble an incandescent flash
ICAO / FAA	ICAO - international air navigation standards	FAA - domestic air navigation standards
20 FPM / 30 FPM	20FPM - 20 flashes per minute	30FPM - 30 flashes per minute
STEADY	N/A	LEG and 30FPM - When LEG and 30FPM are moved to the right (ON) position, the flash head LEDs will be on steady.

MAJOR TROUBLESHOOTING SYMPTOMS

Table 4.6 – Troubleshooting Symptoms and Resolutions

Symptom	Possible Cause in order of Likelihood
All lights fail	<ol style="list-style-type: none"> 1. Main power failure 2. External circuit breaker 3. Blown fuse on the controller's PCB1 4. PCB1 Failure
Single light fails	<ol style="list-style-type: none"> 1. Wiring to beacon is open or short 2. Individual lighting fixture has failed
Erratic operation	<ol style="list-style-type: none"> 1. Loose connections 2. PCB1 Failure
Beacon/marker alarm	<ol style="list-style-type: none"> 1. Normal if a light fixture is out 2. PCB1 is configured incorrectly for the connected lighting equipment

FTS 371 USER MANUAL

False alarm	<ol style="list-style-type: none">1. Check for correct alarm connections: normally open (NO) contacts close on alarm, normally closed (NC) contacts open on alarm2. PCB1 failure
Lights do not flash	<ol style="list-style-type: none">1. Confirm that the BCN and/or MKR flash configuration settings are set to FL (flashing) and not ST (steady)2. PCB1 failure
Lights operate continuously	<ol style="list-style-type: none">1. A photodiode is not connected at J4 terminals WHT+ and BLK-.2. The photodiode has failed3. PCB1 Failure
Beacon/marker alarm will not reset	<ol style="list-style-type: none">1. Alarm can only be reset by a mode transition controlled by the photodiode2. Check the photodiode connections

SECTION 5 – CUSTOMER SUPPORT

CONTACT INFORMATION

Customer Service: 1-800-821-5825

Telephone: (615) 503-2000

Fax: (615) 261-2600

Website: flashtechnology.com

Shipping Address:

Flash Technology
 332 Nichol Mill Lane
 Franklin, TN 37067

ORDERING PARTS

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

Table 5.1 – Replacement Parts

System Component	Item	Description	Part Number
FTS 371 FTC AC	Controller (PCB1)	PCB FTS 371 FTC AC	2151000T
FTS 371 FTC DC	Controller (PCB1)	PCB FTS 371 FTC DC	2153000T
FTS 371 FTC (AC or DC)	PCB1: F1/F2	Fuse, 6.3A	11000016125
FTS 371 FH (AC or DC)	Light Engine	FH 370/371 IR Light Engine Assembly	1370040
FTS 371 FH AC	LED Driver (PCB1)	PCB FTS 371 FH AC	2433200T
FTS 371 FH DC 24V	LED Driver (PCB1)	PCB FTS 371 FH DC 24V IR	2433300T
FTS 371 FH DC 48V	LED Driver (PCB1)	PCB FTS 371 FH DC 48V IR	2433301T
System	Photodiode	PHD 516, SHIELDED	1855516

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 Technical Support at 1-800-821-5825, option 9. Tech Support is available 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. Complete the online form at flashtechnology.com/rma-request-form

FTS 371 USER MANUAL

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.