

# Intelligent Tower-Lighting Alarm Monitor

## Installation Manual

Model ITLM™

### Overview

The ITLM™ is a tower lighting alarm sensor system that monitors 'Red lighted' towers (towers using incandescent bulbs in red lens housings). It detects 11 different alarm states including predictive failure alarms. The predictive alarms allow you to schedule tower maintenance before the failure actually occurs.

**Alarms are organized into three levels:**

**Day/night** for FCC/FAA required logging  
**Minor** failures requiring maintenance  
**Major** failures requiring FAA notification and maintenance.

The system consists of a 'Sensor' and a 'receiver'. This Sensor can be retro-fitted into the existing tower site's lighting control panel. The 'receiver' normally mounts in the tower building and connects to the 'Sensor' via a custom modular shielded cable. The ITLM™ calibrates itself to your tower's beacon and obstruction bulb sets with a simple push of a button.

### Features

- Auto calibration
- Senses shorted bulbs
- Checks line voltage
- Checks day/night switch
- Returns trouble code
- Provides for fire and two security alarm loops



### Installation

The ITLM™ is intended for installation on single-phase (120V) red lighted towers. Unpacking will reveal a receiver circuit board, a sensor circuit board, and a custom cable. This shielded and weatherproof cable comes cut to length with a core grip already installed onto the sensor end. Its weatherproof and shielded jacket is thick and requires a special ratchet crimp tool to assemble. Pay extra attention to polarity when assembling this cable (there is a definitely a difference between the sensor and receiver end). If your cable is too short or damaged, we strongly recommend exchanging it with a factory assembled one.

**To install, follow the steps below:**

**Important:**

**Installation should be preformed by a qualified electrician only!**

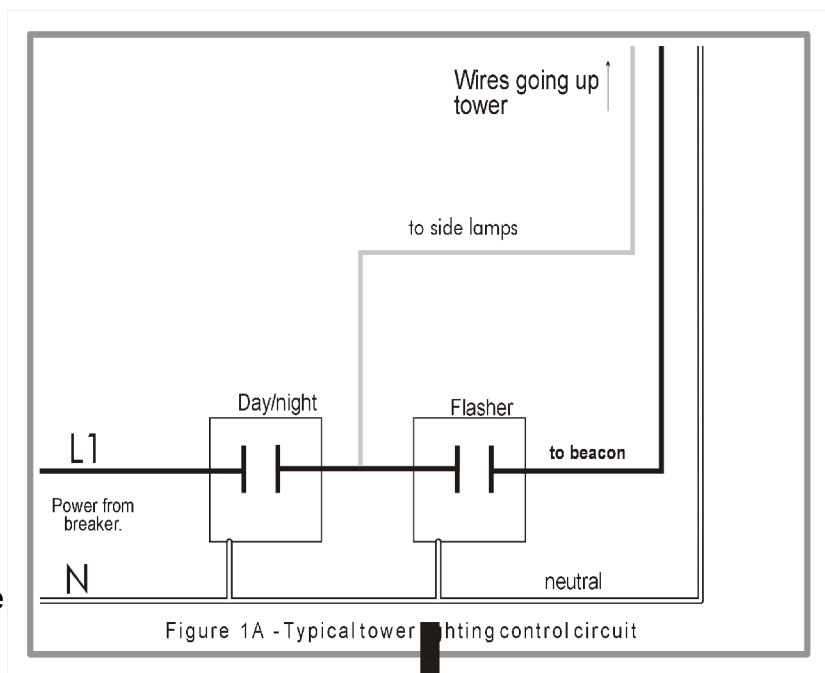
See safety section at end of this manual. Read this installation manual through once before starting the procedures.

### 1. Installing the 'Sensor' circuit board.

First, familiarize yourself with Fig 1A. It shows a typical circuit where the Day/night switch controls L1 (line or hot-side) going to the side (obstruction) lights and the flasher switch. The flasher switch provides the blinking action of the beacon circuit. Neutral provides the return path for the day/night, blinker and lamps.

Now, examine the tower site and identify the lighting control panel; it is usually at the bottom of the tower. First, shut off the power to the tower lights and verify that the power is off. Opening the panel will reveal a feed line from a circuit breaker panel. Identify L1, neutral and ground.

There will also be a conduit or a SO style cable coming down the tower to enter the lighting control panel. This conduit will have three wires for a beacon and side light tower (occasionally there may be a fourth ground wire). One of these three wires is the neutral. The other two wires will be the line side of the beacon and side lights.



Now, determine if there is enough room to mount the Sensor circuit board in the lighting control panel. The beacon and side light wires will thread through the appropriate toroid. Make sure there is adequate clearance for wires and access to terminal block screws. To physically mount the Sensor Circuit board in the lighting control panel, first clean the mounting area with the alcohol wipe provided, then remove the backing from the "sticky feet" and press into place.

## 2. Wiring the Sensor

**Note: All wires should be of the proper gage to comply with the REA electric codes.**

As shown in Fig 1B, connect L1 from the circuit breaker panel, with a black wire of the same gage, to the terminal on the sensor board marked L1.

Next, connect neutral from the circuit breaker panel, with a white wire of the same gage, to the terminal on the sensor board marked N.

Next, identify the side light wire that comes from the tower and temporarily disconnect it.

Thread it through the toroid marked 'Side'. While reconnecting the side wire, add a black wire of the same size, and connect it to the terminal on the 'sensor' board marked 'D/N'.

Now, momentarily disconnect the beacon wire and thread it through the toroid marked 'beacon' and reconnect.

If possible, the modular cable should exit the lighting control panel from the bottom of the box to avoid any possible moisture entry. Plug the modular cable end with the core grip into the Sensor board. Finally, run the other end of the modular cable to the

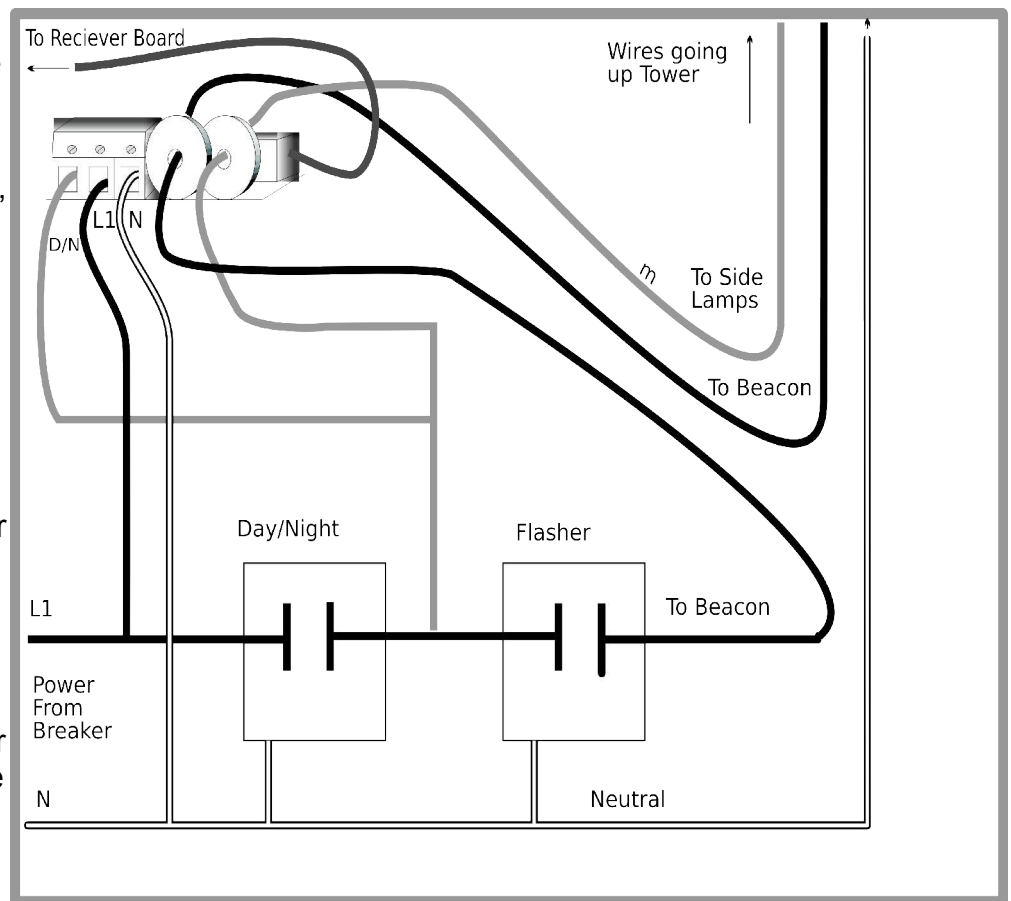


Fig 1B

alarm panel site. Use a wrench to tighten the core grip to insure a good seal. At this point your circuit should look like figure 1B.

### 3. Installing the Receiver Board

First, select a location that has easy access to battery backed up 12Vdc and the entry of the weatherproof cable. There are sticky feet to provide easy mounting of the receiver to any flat surface..

### 4. Connect sensor cable, set jumpers and wire contacts

Connect the Custom Sensor cable to the jack in the lower left-hand corner of the receiver circuit board, this is the jack that DOES NOT have a silver warranty sticker covering it.

The receiver board will have all three jumpers set as on the left side of the receiver board. If your tower does not have Beacon lamps (pairs of 620W or 735W bulbs) remove the shunt across the pins labeled 'BCN'. If your tower does not have a Flasher on the beacon circuit, (it most probably does) then remove the shunt marked 'FSH'. Finally, if your tower does not have side lights remove the shunt located by the label 'SIDE'.

Wire the appropriate terminals from the receiver to your phone dialer, alarm panel or other equipment. The Relay version has relay outputs with separate commons for each output. The OC version (open collector) has pull down outputs that connect to ground in the advent of an alarm. It is not recommended connecting the alarm code outputs on the OC version as the additional information tends to confuse more than help.

### Terminal Block Connections For Relay Version

11	10	9	8	7	6	5	4	3	2	1
12V+	GND	Major NO	Major COM	Major NC	Minor NO	Minor COM	Minor NC	Lights on NO	Lights on Com	Lights on NC

### OC Open Collector Receiver Board Wiring

8	7	6	5	4	3	2	1
12V+	GND	Major	Minor	Day/Night	Alarm code	Alarm code	Alarm code

NOTE: There are 1K alarm circuit terminations on this board - if they are not wanted simply remove the resistor network next to the terminal block at the top of the circuit board.

### 5. Calibration

Restore power to the tower. Verify that all the bulbs on the tower are working with an amp meter or by climbing the tower to see that the bulbs are lit. For the predictive alarms to work properly, the bulbs should be new at the time of calibration.

Cover the day/night detector (with some black tape) to simulate nighttime. The green day/night LED should light. Press the small push button labeled "CALIBRATE" and hold until all of the LED's flash once to indicate that the calibration has finished. If the trouble light is flashing or any other LED besides the green day/night is lit, please refer to the troubleshooting section (Appendix B).

## 6. Verify operation

You will need to wait more than 10 minutes for both the on and off response of the of day/night contact. The other alarm contacts have a one minute on delay. Now, remove the tape on the photo switch.

### Alarms

**Major alarm** indicates that: Power is on AND Beacon is enabled AND two beacon lamps are out. \*

OR Power is off for more than 20 hours.

OR No power is supplied to lighting control panel.

**Minor alarm** indicates that: DC power is below 10V.

OR Power is on AND Side lights are enabled AND One or more side lamps are out. \*

OR Power is on AND Flasher is enabled AND Flasher is on continuously.\*

OR Power is on AND beacon is enabled AND one or more beacon lamps are out.\*

OR Power is on AND current (after voltage correction) in any light circuit is up more than 6.25% (possible shorted bulb).\*

OR The unit has not been calibrated for its first time.

\*(continuously for more than 1 minutes)

**Day/Night** indicates that: Beacon or side lights energized. There is an on and off delay for this output.

The power must be **continuously** on or off for 10 minutes for this output to change state.

### LED indicators

Note There is no delay for LED indicators. During initial power up, LED's flash on and off once. Flashing lights at other times represent a trouble code.

Trouble report LED	
Number of flashes	Meaning
1	Unit needs calibration
2	No day/night for over 20 hours (check photo-switch). Appears with beacon LED lit.
3	High current (shorted bulb) - Look for beacon or side light LED to find out which circuit.
4	DC is below 10 Volts. Check battery.
5	No AC - Check tower lighting circuit breaker
6	Consult factory

## LED indicators

LED	Meaning
Alarm enable	Power is applied between AC 'com' and Obstruction 'hot'. If not on, all alarms are disabled except the 20 hour off alarm and low DC alarm.
Beacon	Beacon is enabled AND power is on AND one or more lights in beacon loop have failed open or hi-current.
Flash	Flash fail is enabled AND beacon remains on 10 Sec AND power is on.
Side	Power is ON AND side lights have been enabled AND one or more side lights have failed open or hi current.

### Trouble Watch Code (zone 4, 5 and 6)

## Trouble codes

Major	Minor	Day/Night	Trouble 3	Trouble 2	Trouble 1	Description
*	?	*	0	0	0	Two beacon lamps out
*	?	0	*	0	0	No day/night for more than 20 hours. (day night switch?)
*	?	0	0	*	0	No L1 power. (Tripped tower circuit-breaker)?
	*	?	0	0	0	No first calibration?
	*	?	*	0	0	Low DC - check battery
?	*	*	0	*	0	One beacon lamp out.
?	*	*	*	*	0	High current on beacon circuit. Possible shorted beacon lamp?
	*	*	0	0	*	Flash failure. Check flasher unit?
	*	*	*	0	*	One or more side lamps out.
?	*	*	0	*	*	High current on side lamp circuit. Possible shorted side lamp.
?	?	?	*	*	*	Reserved

\* = Alarm 0 = clear ? = don't care

## Enable Jumpers

Allows for enabling and disabling various alarms.

Jumper name	on	off
BCN	enables beacon alarms	disables beacon alarms
FSH	enables flash alarm	disables flash alarm
Side	enables obstruction alarms	disables obstruction alarms

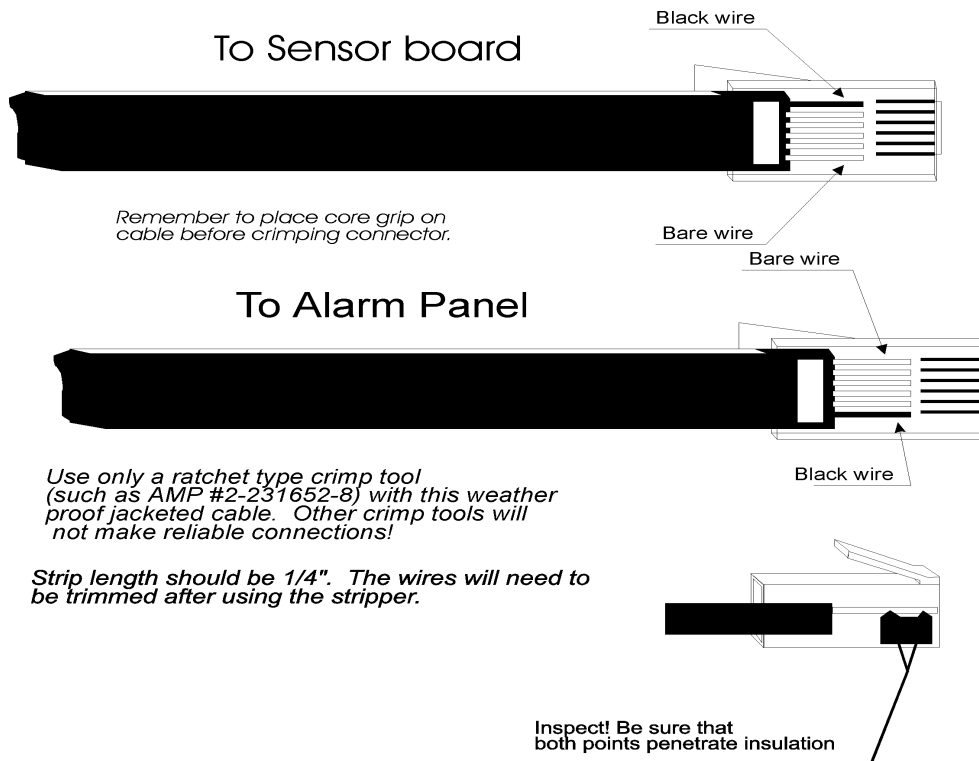
### Predictive alarms

Incandescent lamps sometimes give hints that they are about to fail. Lamps fail in two general ways; they burn out or they short out (and then burn out rapidly). As a bulb ages, the tungsten filament "boils off" atoms and becomes thinner and thinner. This thinning lowers the power consumption until the filament opens. Extreme thinning is reported as a lamp out. If you get such an alarm, you will still see all lamps lit. Recalibrating will cancel the alarm, but if the lamps have been in service for a long time, it would be wise to re-bulb at this time.

When a filament opens, sometimes as it wiggles it can weld itself back together, forming a high current bulb. The lamp will light brightly but for only a short time. We call this a high current failure. Recalibrating will cancel this alarm also, but measure the current to make sure it is in range of the wiring and alarm sensors capabilities.

If a bulb goes beyond the normal operating 'envelope', yet is still working, we call this a 'predictive failure'. This information can allow you to perform re bulbing in good weather. You should always replace such bulbs as soon as possible. Now for the down side. Not every bulb gives a hint that it's about to quit. More often than not, lamps fail suddenly.

### Appendix A - Cable Construction



## Appendix B - Troubleshooting

Symptom	Problem
Beacon LED flashes on and off, there may be intermittent alarms.	Bad flashing unit. Lamps are not turning all the way off. Beacon must have less than 1 Amp during dark part of flash - replace.

### Antenna alarm Specifications ITLM

Reciever	
Power requirement	Batter backed 12Vdc 300mA
Tower calibration	Push button
Relay contact ratings	5A @ 120Vac or 30Vdc Resistive
Size (receiver circuit board)	3.0" x 5.4" x 1.1" deep (including feet)
Indicator LED's	(5) Trouble, Beacon, Flash, Side, Day/night
Tower Sensor	
Beacon thread-through toroid input	30A maximum. Handles up to two pairs of 620-735W bulbs. Wired with 'hot' beacon conductor.
Size (sensor circuit board)	2.1" x 3.6" x 1.75" deep (including feet)
Side thread-through toroid input	15 A maximum. Handles up to 10 100-116W side-lamps (obstruction lamps). Wired with 'hot' side conductor.
Neutral	Connects to white power wire supplied to lighting control panel.
Day/night	Connects to switched side of day /night switch.
L1	Connects to black power wire supplied to lighting control panel. (First side of day/night switch.)

12 Vdc Power should be battery backed up to provide power failure alarms!

## Safety

**Only qualified electricians should attempt this installation. The installer must follow the Rural Electric Code and any local codes or ordinances. Do not work on *any* circuits with the power on. Always double verify that the power is really off. Use only proper tools.**