



# Installation Instructions

## D8670T Microwave/PIR Intrusion Detector with POPIT Interface

### 1.0 Specifications

- **Input Power:** 9 to 15 VDC, 6 mA nominal (35 mA with LED on).
- **Zonex Current Draw:** 500 micro-amps.
- **Standby Power:** There is no internal standby battery. Connect to standby power as a backup in the event primary power fails. Six mA-H required for each hour of standby time needed. *Four hours minimum is required for Underwriters Laboratories' Listed Requirements.*
- **Operating Temperature:** -20° to +120°F (-29° to +49°C). *For U. L. Listed Requirements, the temperature range is +32° to +120°F (0° to +49°C).*
- **Microwave Frequency:** 10.525 Ghz, ±25.000 Mhz.
- **Coverage:**  
 Standard Broad            70 ft. by 70 ft.    (21.4 m by 21.4 m)  
 Long Range (Optional)    100 ft. by 10 ft.    (31 m by 3.1 m)
- **Internal Pointability:** +2° to -10° Vertical, ±10° Horizontal. *Use of the swivel brackets allows for additional pointability.*
- **Tamper Loop:** Tamper condition transmitted through the Zonex Bus when the cover is removed.
- **Options:** TR6000 Test Cord, B335 Low Profile Swivel Mount Bracket, B328 Gimbal Mount Bracket (use of a bracket may reduce range and dead zone areas) and OLR92-3 Long Range Lens.
- **U. S. Patent Numbers:** # 4,660,024, # 4,764,755, #5,083,106, # 5,208,567, # 5,262,783, #5,268,668, #5,302,941, and # 5,450,062. Other patents pending.

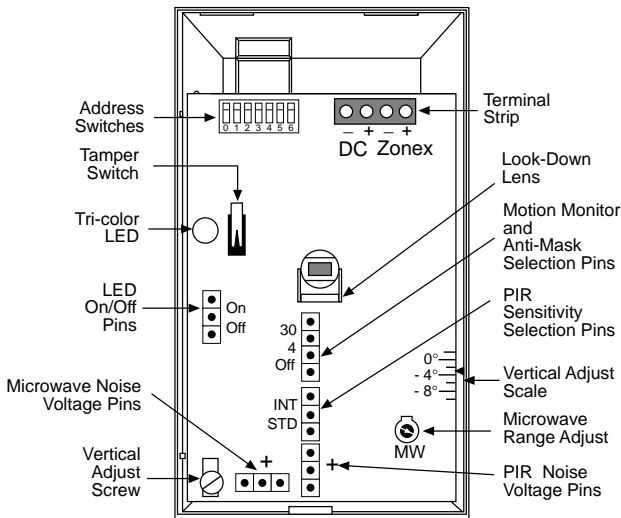


Figure A - Location of major items

### 2.0 Hostile Environments

Never install the detector in an environment that causes a constant alarm in one technology; it should never be left to operate with the tri-color LED in a constant green, yellow, or red condition. This defeats the main intent of dual technology: elimination of random false alarms due to the constant alarming of one technology and not

the other. A detector with one technology in constant alarm, will cause an alarm output whenever the other technology alarms. Good installations start with the LED **OFF** when there is no target motion. **The best installations will have background noise voltages below recommended limits.**

### 3.0 Installation Hints

- Point the unit **AWAY** from outside traffic (e.g. roads, alleys, and parking lots). **Remember:** Microwave energy will pass through glass and most common non-metallic construction walls.
- Point the unit **AWAY** from glass exposed to the outdoors and objects that may change temperature rapidly. **Remember:** The PIR detector will react to objects rapidly changing temperature within its field-of-view.
- For hostile environments caused by nearby outdoor traffic, mount the detector 7 to 8 ft. (2. to 2.5 m) high and aim downward. This will form a short range interior trap pattern while avoiding outdoor traffic. Complete a walk test by walking next to the walls where the outside traffic is nearest the coverage pattern. Observe the microwave background noise levels during this walk test. Make sure a significant increase in voltage does not occur while you are outside the coverage pattern. If the voltage change exceeds 0.75 VDC, reduce the microwave range slightly and walk test again.
- Avoid installations where rotating machines (e.g. ceiling fans) are normally in operation within the coverage pattern.

### 4.0 Multiplex Programming

Program the address DIP switches as described for the control panel you are using.

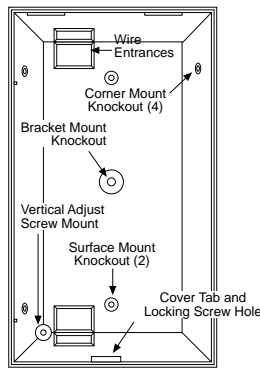
**Note:** When installing the D8670T with a D7212B1, D8112, D9112B1, D9412, or D9112; place switch number "0" in the ON position.

Recommended point type programming:

- D8112 = 6571
- D9112B1/D7212B1 = Point type 2, point response 2, no ring until restored.
- D9412/D9112 = Point type 2, point response E, no ring until restored.

### 5.0 Mounting

- Select a location likely to intercept an intruder moving **across** the coverage pattern. The surface should be solid and vibration free. The mounting height range is 6 to 8 ft. (1.8 to 2.5 m). **The recommended height is 6.5 ft. (2 m).**
- Remove the cover by inserting a thin flathead screwdriver into the locking tab hole at the bottom front of the detector. Pull the cover up and forward.
- Remove the circuit board from the base by loosening the Vertical Adjust Screw and sliding the circuit board down, then out.
- Break away the appropriate wire entrance and mounting holes in the base.
- Using the base as a template, mark the location of the mounting holes on the mounting surface. Pre-start the mounting screws.
- Route wiring as necessary. Route to the rear of the base and through the wire entrance. **Make sure all wiring is unpowered before routing.**



**Figure B - The base**

- Firmly mount the base to the mounting surface.
- Return the circuit board to the base and tighten the Vertical Adjust Screw.
- Place the foam plug (provided) in the wire entrance to eliminate drafts.

**Note:** Can also be mounted to a standard single gang box.

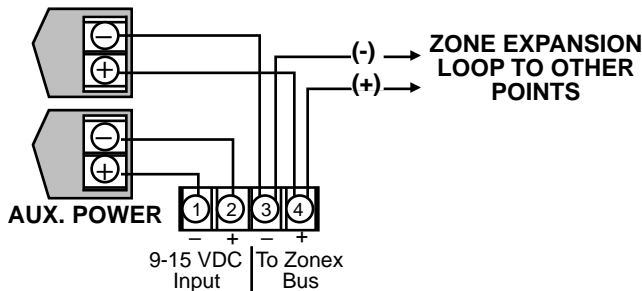
## 6.0 Wiring

**CAUTION:** ONLY APPLY POWER AFTER ALL CONNECTIONS HAVE BEEN MADE AND INSPECTED.

**Note:** Do not coil excess wiring inside unit.

- Wire the terminal strip as shown in Figure C.

### ZONEX LOOP



**Figure C - Wiring diagram**

- **Terminals 1(-) & 2(+):** Power limits are 9 to 15 VDC. Use no smaller than #22 AWG (0.8 mm) wire pair between the unit and the power source.
- **Terminals 3(-) & 4(+):** Connect to the Zonex Bus.

## 7.0 LED Operation

The detector uses a tri-color LED to indicate the various alarm and supervision trouble conditions that may exist. See Figure D.

LED	CAUSE
Steady red	Alarm
Steady yellow	Microwave activation (walk test)
Steady green	PIR activation (walk test)
Flashing red	Warmup calibration period after power-up
Flashing red 2	Motion monitor time-out
Flashing red 3	Anti-Mask detection
Flashing red 4	Microwave or PIR self-test failure

**Figure D - LED operation**

**Note:** Flashing red 2 - 4 = The LED flashes 2-4 times a cycle.

## 8.0 Feature Selection

- **LED On/Off Pins:** The ON position allows operation of the tri-color LED for walk testing as soon as it is enabled. If the tri-color LED indication is not desired after setup and walk tests are completed, place the plug in the OFF position and it will disable after 60 seconds of quiet time. The OFF position does not prevent the LED from indicating supervision trouble conditions.

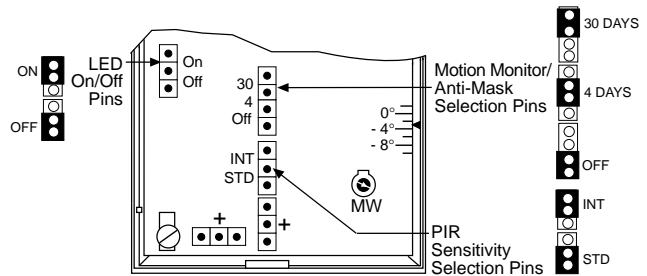
- **PIR Sensitivity Selection Pins:** For selection, place the plug across the pins marked (STD) for Standard or (INT) for Intermediate.

**Standard Sensitivity:** The recommended setting for maximum false alarm immunity. Tolerates environmental extremes on this setting.

**Intermediate Sensitivity:** The recommended setting for any location where an intruder is expected to cover only a small portion of the protected area. Tolerates normal environments on this setting.

- **Motion Monitor/Anti-Mask Pins:** By enabling Motion Monitor and the Anti-Mask feature with the selection pins, a choice of 4 or 30 days may be chosen for Motion Monitor.

If the time period selected has elapsed from the last dual alarm, a supervision trouble condition will be signaled. Refer to the Supervision Features section for more information.



**Figure E - Feature Selection**

## 9.0 Setup and Walk Tests

Choose the proper coverage pattern. If it is necessary to replace the lens, perform the following:

- While viewing the inside of the cover, center the lens window.
- Gently push down and inward on the top ledge of the window frame until the frame comes out of the track. Then push up on the bottom ledge of the frame until it comes out of the track.
- Push the lens out of the tracks from the front.
- Remove the lens from the frame by pulling both locking tabs out of the frame.
- Replace with appropriate lens.

**Install with smooth side of lens facing out, rough side inward, and arrows or cut corners facing up.** Slide the center locking tab of the lens into the frame and wrap the outer locking tabs around the frame. Repeat with other side.

- To replace the window frame, center the window in the cover and slip the bottom of both the frame and lens into the bottom track.
- Carefully push down and forward on the top frame ledge until the frame snaps into the top track. Center the window so the tracks are between the frame stops.
- Select the vertical starting angle from the chart at the top of page 3.

Mounting Height	Standard Broad Lens		Long Range Lens	
	40 ft. (12 m)	70 ft. (21 m)	80 ft. (24 m)	100 ft. (30 m)
6.5 ft. (2 m)	-5°	-3°	-3°	-3°
7.5 ft. (2.3 m)	-7°	-4°	-4°	-3°
8.0 ft. (2.4 m)	-7°	-5°	-4°	-4°

- Loosen the vertical adjust screw and slide the circuit board up or down for the correct vertical angle placement.
- Replace the cover and snap it into place. This will close the tamper switch.
- Wait two minutes minimum, after applying power, to start walk tests.

**Note:** During the warm-up period, the tri-color LED will flash red until the unit has stabilized and has seen no movement for 2 seconds (approximately 1 to 2 minutes). When the tri-color LED stops flashing, the detector is ready to be walk tested.

With no motion in the protection area, the tri-color LED should be Off. If the LED is On, recheck the protection area for disturbances affecting the microwave (yellow) or PIR (green) technologies.

- Place the LED plug in the On position to activate the LED for use while walk testing.

During walk testing, the LED will light for the first technology (microwave or PIR) and then light red to indicate a dual alarm. The LED will not indicate activation of the second technology by lighting its color.

### 9.1 Establishing PIR Coverage

- Turn the Microwave range adjust to minimum.
- Walk test **across** the pattern at its farthest edge, then several times closer to the detector. Start walking from outside of the intended protection area, and observe the tri-color LED. The edge of the pattern is determined by the first green, PIR activation of the LED (or the first red activation if the yellow microwave LED activates first).
- Walk test from the opposite direction to determine both boundaries. The center of the pattern should be aimed toward the center of the intended protection area.
- Slowly bring your arm up and into the pattern to mark the lower boundary on PIR alarm. Perform this task at 10 to 20 ft. (3.1 to 6.1 m) from the unit. Repeat from above for the upper boundary. **The center of the pattern should not be tilted upward.**

If desired coverage can not be achieved, try angling the coverage pattern up or down to assure the pattern is not aimed too high or low. **The angle of the PIR pattern may be vertically positioned between -10° and +2° by loosening the Vertical Adjust screw and sliding the circuit board up or down. Moving the board up will angle the pattern downward. Tighten the screw snug when positioning is completed.**

**Note:** The pattern may also be moved  $\pm 10^\circ$  horizontally by rotating the lens window left or right.

### 9.2 Establishing Microwave Coverage

**Note:** It is important to wait 1 minute after removing/replacing the cover so the microwave portion of the detector can settle, and to wait at least 10 seconds between the following walk testing procedures.

- The tri-color LED should be OFF before walk testing.
- Walk test **across** the pattern at the intended coverage's **farthest** end. Start walking from outside the intended protection area and observe the tri-color LED. The edge of the microwave pattern is determined by the first yellow, microwave activation of the LED (or the first red activation if the green PIR LED activates first).

- If adequate range can not be reached, increase the Microwave Range Adjust **slightly**. Continue walk testing (waiting 1 minute after removing/replacing the cover) and adjusting the range until the farthest edge of desired coverage has been accurately placed.

**Do not adjust the microwave range higher than required. Doing so will enable the detector to catch movement outside of the intended coverage pattern.**

- Walk test the unit from all directions to determine all the detection pattern boundaries.

### 9.3 Establishing Dual Coverage

- The tri-color LED should be OFF before walk testing.
- Walk test the unit from all directions to determine the dual pattern boundaries. A detector alarm is signaled by the first red activation of the tri-color LED after an initial green or yellow activation.

## 10.0 Meter Tests

A 20,000 Ohm/Volt (or greater) digital DC VOM is recommended. Set the meter scale for 5 VDC (Use of the TR6000 is recommended, but is not essential for meter use. Either outside connector pin of the TR6000 may be used for common.).

### 10.1 PIR Meter Readings

- Connect the meter to the PIR Noise Voltage Pins.
- With no target motion in the pattern, read the voltage. The base reference level for PIR background noise is approximately 1.0 VDC. Installations in quiet environments, therefore, should result in a steady meter reading between 0.9 and 1.1 VDC.
- Walk test **across** the farthest edge of the coverage pattern. Make sure the detector's cover is on.

Voltage changes greater than +0.75 VDC from the reference level during walk tests **are desirable**. If changes are less than 0.75 VDC, the detector may fail to respond at this far of a distance if the temperature difference between the intruder and the background is minimal. Try adjusting the unit up and down to maximize the voltage change during walk tests.

- Turn on all heating/cooling sources that will be in operation during times of protection. Stand away from the unit and outside the protection pattern, then monitor background noise for at least 3 minutes.

Readings should not deviate more than 0.15 VDC from the reference level. If they do, eliminate the cause or reposition the pattern (observe readings while turning on and turning off these sources as well as during the three minute interval).

### 10.2 Microwave Meter Readings

- Connect the meter to the Microwave ( $\mu\text{w}$ ) Noise Voltage Pins.
- With no target motion in the pattern, read the voltage. The background noise voltage should be steady, and should not exceed 0.75 VDC. If it does, the cause of the disturbance should be found and eliminated.

**Note:** Remember that microwaves penetrate non-metallic surfaces. Movement on the other side of walls and doors viewed by the detector could cause unexpected background noise readings.

## 11.0 Supervision Features

The supervision features function as follows:

- PIR/Microwave:** If the PIR or microwave subsystems fail, the tri-color LED will flash red 4 times per cycle and a control/zone trouble condition will be signaled. The complete circuit operation of these subsystems is checked approximately every 12 hours. The detector should be replaced if either subsystem fails.

- **Default:** The detector will default to PIR technology protection if the microwave subsystem fails. The PIR signal processing will automatically reset to the Standard setting.
- **Anti-Masking:** When enabled, the detector will indicate an Anti-Mask supervision trouble condition if a microwave reflective material (e.g. metal, most plastics, etc.) is placed within one foot of the detector. The tri-color LED will flash red 3 times per cycle and a control/zone trouble condition will be signaled. This feature can be used to prevent intentional and accidental masking of the detector. It is enabled or disabled using the Motion Monitor and Anti-Mask Pins.

**Note:** The Anti-Masking feature may interpret removal and/or replacement of the cover as an attempt at masking and may signal a supervision trouble condition. If this should occur, reset the detector by removing and then re-applying power. The trouble condition will also be reset by the next dual alarm after a 10 second period of no alarms from either technology.

- **Motion Monitor Supervision:** This feature verifies that each technology has a clear view of the detection area. When selected, a supervision timer is activated which gives the detector the ability to indicate a supervision trouble condition if the time selected has elapsed since the last dual alarm.

If the detector does not see a dual alarm within the selected time period, the tri-color LED will flash red 2 times per cycle and a control/zone trouble condition will be signaled.

- **Input Voltage:** If the input voltage drops below 7.5 VDC, a control/zone trouble condition will be signaled.
- **Trouble Clear:** A dual alarm will reset most supervision trouble conditions. There must be at least 10 seconds of no activity (no alarm) prior to the dual alarm. **Self-Test (PIR or microwave subsystem) failures will not be cleared; the detector must be replaced.**

## 12.0 Other Information

### 12.1 Maintenance

At least once a year, the range and coverage should be verified. To ensure continual daily operation, the end user should be instructed to walk through the far end of the coverage pattern. This ensures an alarm output prior to arming the system.

### 12.2 Pattern Masking

The PIR coverage pattern may be masked using the supplied lens masking kit. Mask by placing the masking label on the inside of the PIR lens. Always walk test after masking to determine the exact coverage pattern.

**Note:** Masking only eliminates the PIR portion of the coverage pattern and has no effect on the microwave pattern.

### 12.3 FCC Compliance Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in strict accordance with the manufacturer's instructions and recommendations, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the receiver.
- Consult the installing company or an experienced radio/TV technician for help.

The booklet "How to Identify and Resolve Radio-TV Interference Problems," prepared by the FCC, may prove helpful. This booklet is available from the U. S. Government Printing Office, Washington, DC 20402. Please specify Stock No. 004-000-00345-4.

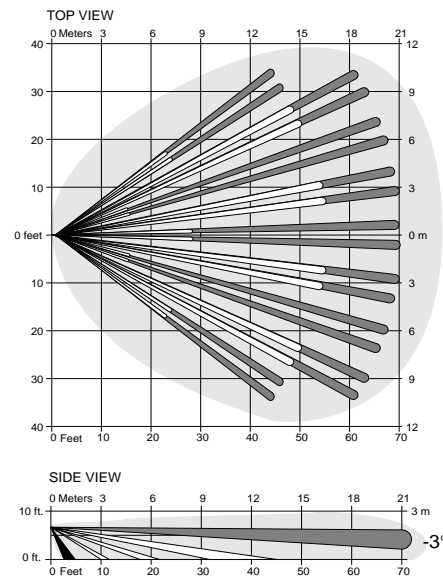
Changes or modifications not expressly approved by Radionics voids the user's authority to operate this equipment.

## 13.0 Coverage Patterns

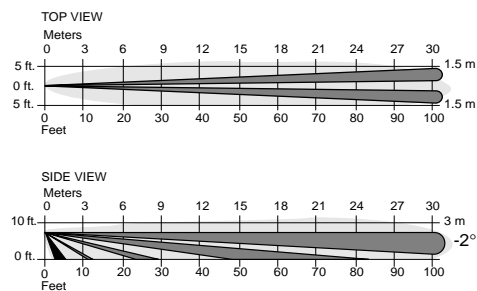
The protected coverage area is where the microwave and PIR patterns overlap.

The Look Down lens is located under the detector. The Look Down finger is shown in black in the pattern drawings below.

### Standard Broad Coverage



### Optional Long Range Coverage



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