

**Project:** Dual technology microwave / p.i.r motion detector.  
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**Sponsor:** Visonic L.T.D  
**Year:** 2000/2001

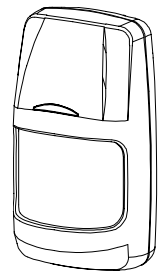
## **Introduction**

Development of motion detector with two technologies of motion detection: any object ( including human body ) emits infra red radiation depending on the object temperature. We can sense this radiation with special pyro-electric sensor ( P.I.R ) from a distance.

Using the “Doppler effect “ by which a moving object in a microwave field changes the doppler frequency, we build a receiver / transmitter microwave unit, transmit a signal receive a signal and compare them . The P.I.R and MW technologies, when combined in a single detector, complement each other to assure the most reliable detection and immunity to false alarms.

## **FEATURES**

- Cylindrical optics improves detection and false alarm immunity.
- Programmable motion event counter (1or2 events).
- Simple-to-use, two-position vertical adjustment
- TEST input to enable/disable the walk test LED remotely (per new European standard)
- Open collector trouble output
- Anti-masking protection
- White light protection.
- DRO-stabilized MW microstrip technology.
- **MW Motion Simulator** simulates the effect of a human body moving in the MW field (for MW self-test - patent pending).
- Range control for adjusting the MW coverage
- **True Motion Recognition™ (TMR)** algorithm (patented) distinguishes between the true motion of a human body and other disturbances, which invariably cause false alarms.
- Sealed chamber protects the pyroelectric element from insects.
- PIR self-test by applying a short heat pulse.
- Free terminal for connecting an E.O.L. resistor



*Figure 1. General View*

## Specifications

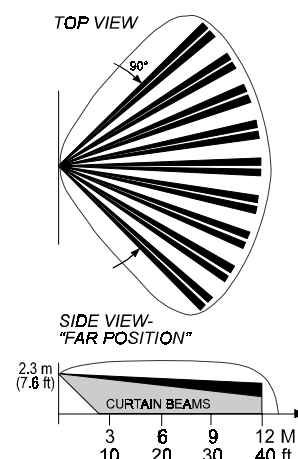
**Input Voltage:** 9 to 16 VDC

**Current Drain :**About 28 mA at 12 VDC

**Detector :**Low noise dual-element pyroelectric Sensor

**Tripping Indication :**LED flashes green for up to 5 seconds

**Motion Event Verification Counter :**Selectable, 1 or 2 events



**Figure 2.** Coverage Pattern

### **Lens Data:**

**No. of Beams:** 36 in two layers (curtain beams in bottom layer)

**Max. Coverage:** 15 x 15 m / 90° field of view

**Vertical Adjustment :**FAR and NEAR, by sliding the circuit board along a two-position scale.

### MW SECTION

**Oscillator :**Microstrip DRO-stabilized Doppler module

**Frequency:**2.45 GHz

**Detection Range :**Adjustable from 20% to 100% (3 m to 15 m)

**Tripping Indication :**LED glows green for up to 5 seconds

### ALARM, TAMPER & TROUBLE DATA

**Alarm Indication :**LED glows red for 1.3 to 5 seconds if both detectors trip

**Relay Contacts :**N.C., rated at 0.1 A resistive / 30 VDC; 18 Ω resistor in series with contacts

**Alarm Duration:** 1.3 to 5 seconds

**Tamper Switch:** N.C., rated at 50 mA resistive / 30 VDC

**Trouble Output :**Open collector, 100 mA max., with 18Ω resistor in series .

**Masking Detection Delay :**About 60 seconds

**Trouble/ Masking Indication :**LED alternately flashes green and red and TRB output pulls LOW until the detector is reset.

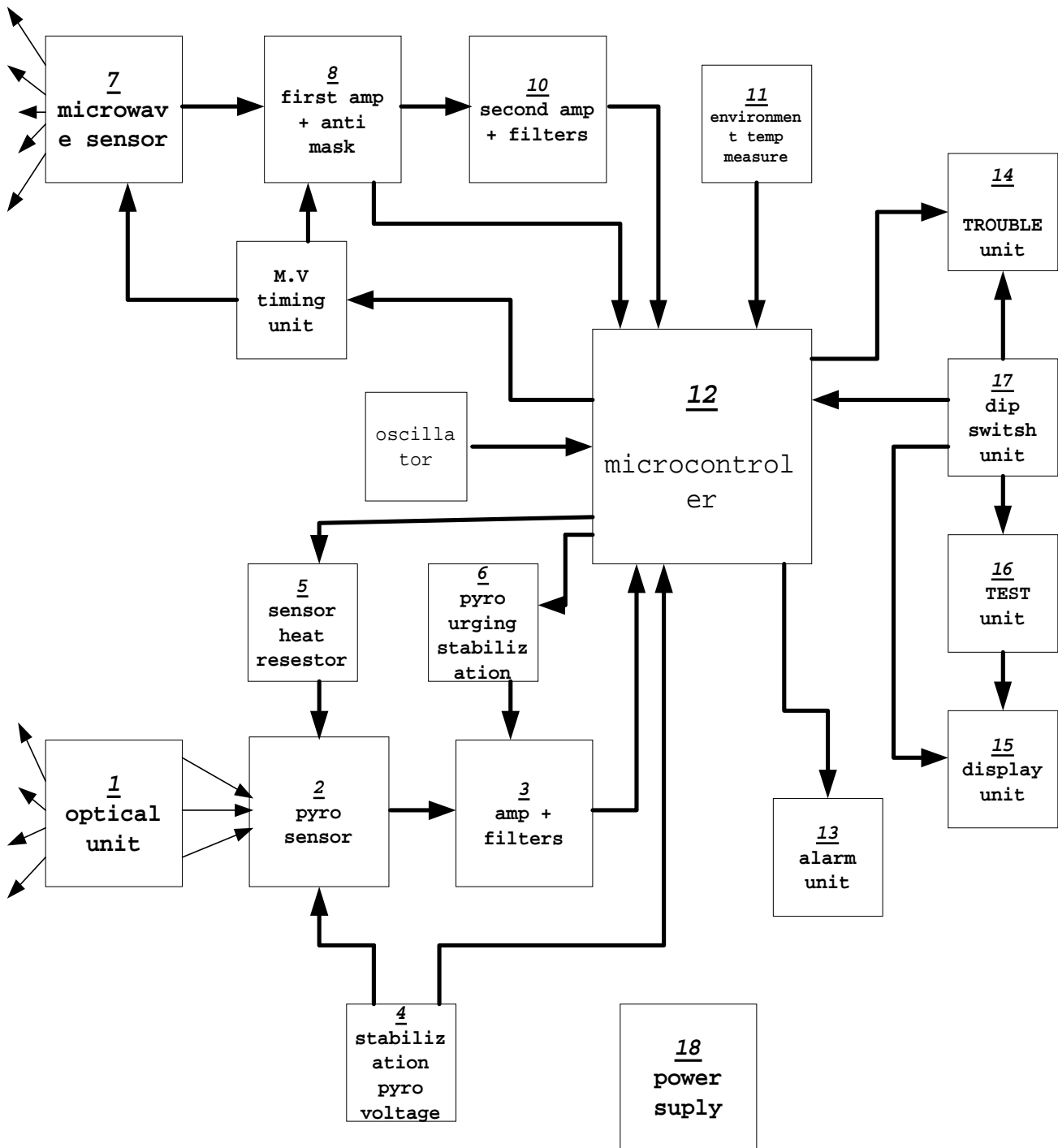
### ENVIRONMENTAL

**RFI Protection:** 30< V/m up to 1000 MHz.

**Operating Temperatures:** -10 °C to 50°C (14°F to 122°F)

**Storage Temperatures:** -20 °C to 60°C (-4°F to 140°F)

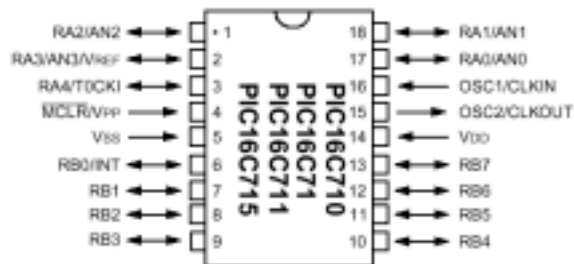
## General Description



**Block diagram**

The detector is microcomputer controlled that receive signals from the P.I.R unit and the MW unit, and with a special algorithm process the signals to determine the motion detection. In addition there is an algorithm that perform a self-testing based on a simulation of human body movement to assure that the detector operates properly, and if not a trouble alert is initiated.

The microcomputer in use is pic16lc711 from Microchip ,8 bit CMOS microcontroller with A/D converter,8 levels of stack, 1K of program memory, 13 I/O pins , 4 interrupt sources.



Pin diagram

Each sensor output goes to amplifier unit to fit is low signal to the microcontroller . The microcontroller control all the units in the detector . We can see that in the block diagram .



*detector*