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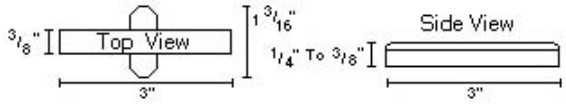
The Pulsor



Wire leads: ENHP+ (4 Inch Brown 22 AWM)
HPP+ (4 Inch White 22 AWM)

Average 1000 Ohms +/- 30%

ENHP+ (Pkg. 1 Enhanced Pulsor) **ENHP6+** (Pkg. 6 Enhanced Pulsors) **ENHP12+** (Pkg. 12 Enhanced Pulsors)
HPP+ (Pkg. 1 High Performance Pulsor) **HPP6+** (Pkg. 6 High Performance Pulsors) **HPP12+** (Pkg.12 High Performance Pulsors)

The Pulsor is the most stable and versatile motion detector available anywhere. The Pulsor is completely invisible because it is epoxied to the bottom edge of the support joist where it can not be seen. It is effective on both steel and wooden structures. Environmentally sealed and utilizing 22-gauge marine grade wire leads, Pulsors are ideal for both indoor and outdoor applications. They will not respond to vibration, shock, snow loads, building settling, airborne items or environmental conditions (Including pets up to sixty pounds). They sense only the unique flexing of the floor caused by a person's movement. Sensitivity of the Pulsor is fully adjustable from the processor. Year after year, indoors and outdoors, the Pulsor will outperform any other motion detector.

Security

The Pulsor is used indoors and outdoors for security and early-warning applications. The Pulsor is the ideal solution for residential systems with pets up to sixty pounds (60 lbs.), as well as applications without pets. Roofs of commerical buidings are also excellent locations for the Pulsor. Though residential and commercial buildings are the most common applications, Pulsors are used for security in many other areas.

* Steel Fire Escapes
* Cockpits of Airplanes
* Chain Link Fence Posts
* Display Platforms in Museums
* Steel Catwalks in Open Pit Mining Operations
* Roller-Coaster Frames to Initiate Automated Sequences
* Tractor Trailer Beds to Detect Unauthorized Entry
* Under Window Sills

Home Automation

The Home Automation industry uses Pulsors for activation of different utilities based upon where a person may be standing. Light activation is the most common application.

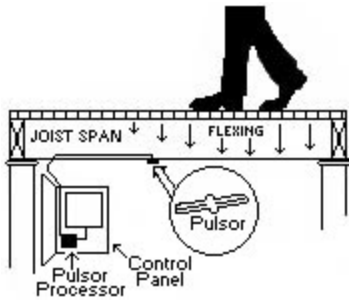
* Top and Bottom of Stairs
* In Front of Closet Doors
* Water Activation in Showers
* Camera/VCR Activation
* His and Her Sides of the Bed (for low level night lighting)
* Outdoor Decks for Lighting and Annunciation
* Fan Activation in Restrooms
* Activation of Heating/Cooling Systems

Marine

People are becoming more security conscious about their boats and docking areas. Interest in marine applications should be directed to www.marineguard.net.

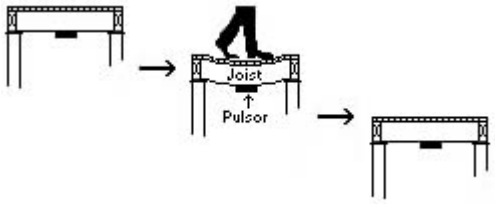
* Docking areas and Walkways
* Personal Pleasure Crafts
* Yachts (120+ feet)

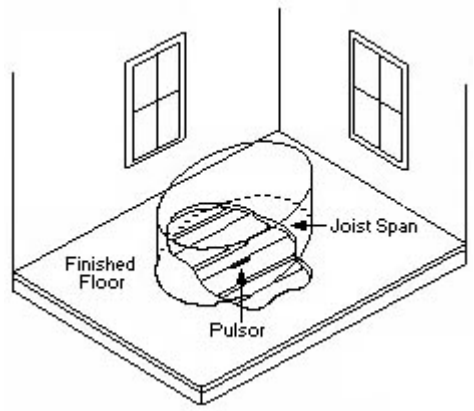
The Pulsor



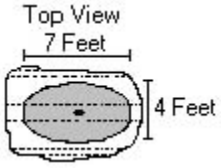
The Pulsor is a highly versatile motion sensing device that senses the physical flexing of whatever material it is epoxied to. Pulsors are environmentally sealed and utilize 22-gauge marine grade wire leads so they can be mounted both indoors and outdoors. They will not respond to shock, vibration, snow loads, building settling, airborne items or environmental conditions (including pets up to 60 pounds). They sense only the unique flexing of the floor caused by a person's movement.

When a person walks across the floor, the floor and its supports bow downward as pressure is applied. They then return to normal as the person walks away from the targeted joist. The Pulsor senses this flex (downward and upward). A processor analyzes this change and responds by activating a Form "C" relay. Sensitivity of the Pulsor is fully adjustable at the processor.

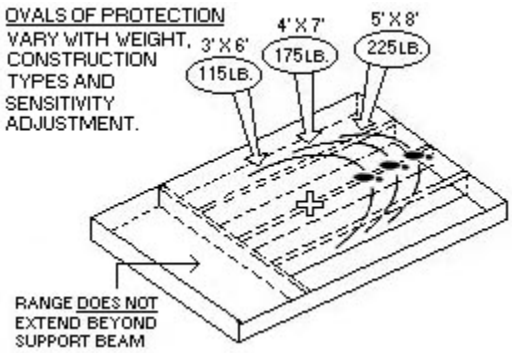




The Pulsor, stable and versatile, is also completely invisible. Mounted to the support joist *underneath* the floor, Pulsors can not be seen by intruders and do not have to be fitted to decor.

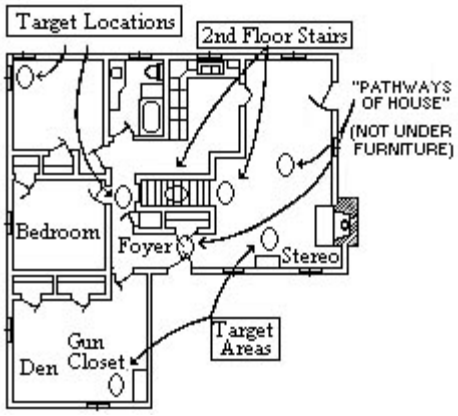


Consider each Pulsor as a landmine protecting an area of the floor through which a person is most likely to pass. The average area of detection will be an oval seven feet (7') along the joist and four feet (4') across the joist. This oval will vary with different types of construction and the location in which the Pulsor is mounted.



Locations

STEP 1: Determine where to locate ovals of detection..



Consider each Pulsor like a miniature landmine detecting motion on an area of the floor over which a person will pass.

For Security

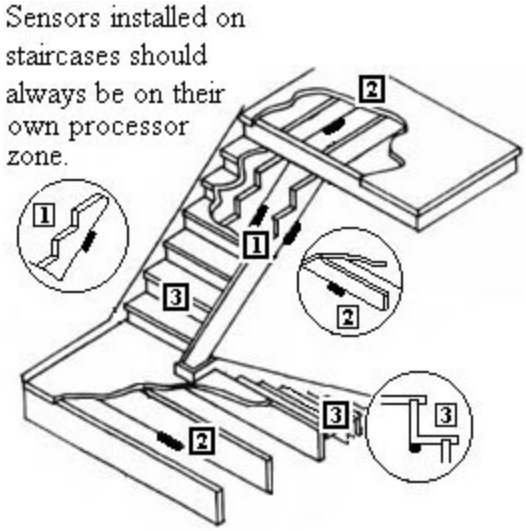
You do not need every inch of a building or roof covered. You just need coverage in strategic places. Hallways, staircases, spots containing valuable items and other specific areas that a person is likely to investigate are ideal traps. For second-floor installations, smoke detectors or heat detectors provide good cover for a Pulsor while retaining accessibility. Make allowances for pets if there are any.

* Cats: Keep sensors away from tables and tall furnishings where a cat may jump down and land directly on the pulsor.
* Dogs (up to 20 lbs): Keep sensors offset from such doors where the animal can jump up and down on the sensor (main doors and sliding glass doors).
*Dogs (up to 60 lbs.): Offset sensors from bases of stairways. Avoid placing sensors in the center of long joist spans favoring areas two to four (2-4) feet from a support. Generally, when planning the system, it is good practice to add extra sensors. For heavier animals a lower sensitivity setting and smaller oval of detection is preferred. The smaller detection area is supplemented by additional capture areas.

For Home Automation

The Pulsor is often used for "spot" detection to initiate various functions. Some examples include:

* A sensor on each side of the bed can activate low level lighting if someone gets up during the night.
* A sensor in front of a closet door can turn on the interior lights. This allows for the closet door to remain open yet the light will still turn off.
* Pulsors may be placed under showers for water activation, and under toilets for fan activation.
* "Whole House" applications may moderate environmental conditions based on motion in specific rooms or areas.



***** Staircases are ideal for both security applications and home automation.**

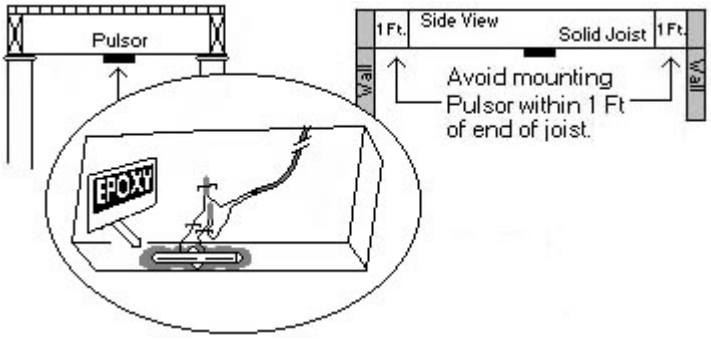
Location 1: (**Carriage**): Install 1/3 up (or down) on bottom of carriage. Side mount if to be drywalled.
Location 2: (**Landings**): Install on bottom of joist. Side mount if to be drywalled.
Location 3: (**Steps**): Primarily used for lighting control. Install on bottom of step at the back. Locate the sensor in the middle. Cut off one wing so sensor will mount flush along the back edge. If there is a middle carriage, mount sensor in the middle of the outside half. One side will be more sensitive than the other. The cantilever effect is usually enough to cover across the staircase. If sensitivity on one half can not be made sufficient, install a second sensor in the center of that half. Thus two sensors may be necessary.

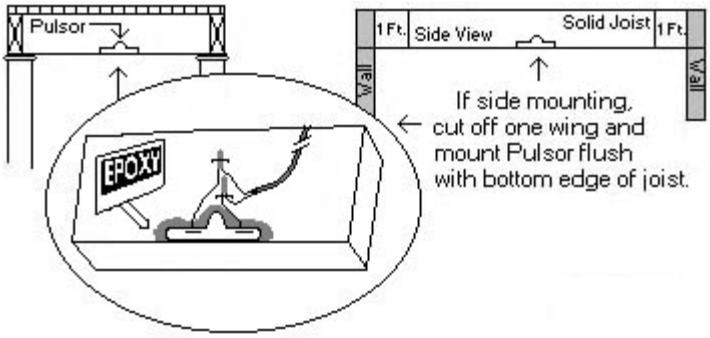
Placement

STEP 2: Determine how sensors should be mounted to structure.

Bottom Mount (Most Sensitive: All joist systems)

Bottom mount refers to mounting the Pulsors by epoxying them to the bottom edge of the joist. The bottom edge is the most sensitive location and is always the preferred location.

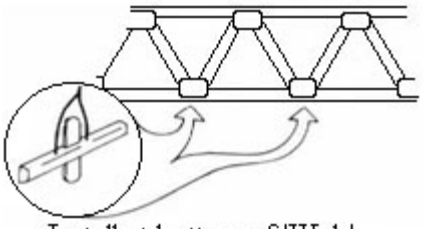




Side Mount (Less Sensitive: Solid joists only)

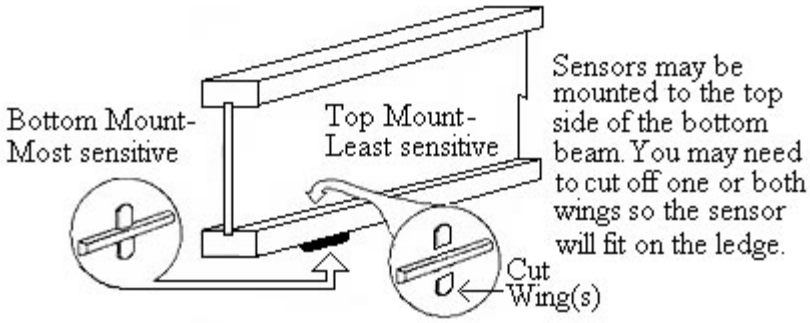
Side mount refers to mounting the Pulsors by epoxying them to the side of the joist. Remove one wing from the Pulsor and mount it on the side of the beam FLUSH with the bottom edge. The most common reason for side mounting is if the Pulsor's location must be drywalled. **Thoroughly test sensors BEFORE area is drywalled.** Side mount sensors for weaker structures with heavy animals.

PARALLEL CORD WOOD TRUSS

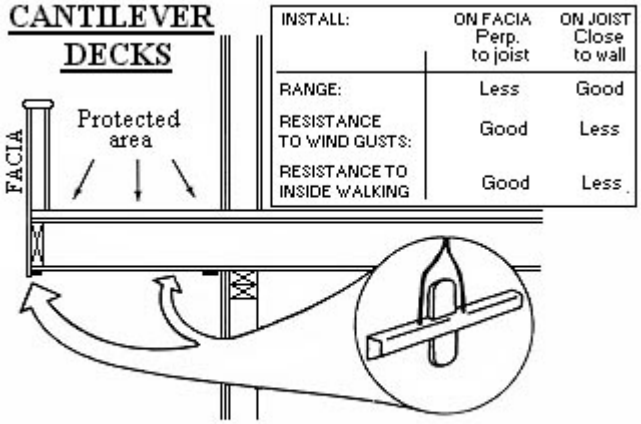


Install at bottom of 'Web'

T.G.I (SILENT FLOOR)



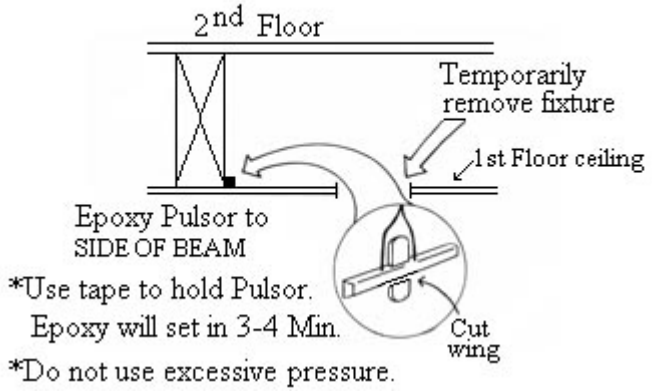
CANTILEVER DECKS



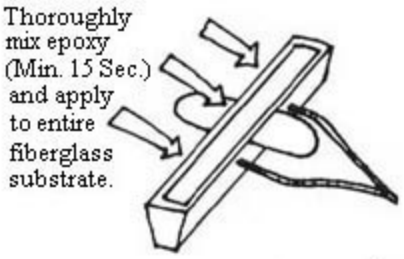
INSTALL:	ON FACIA Perp. to joist	ON JOIST Close to wall
RANGE:	Less	Good
RESISTANCE TO WIND GUSTS:	Good	Less
RESISTANCE TO INSIDE WALKING	Good	Less

cantilever decks that are free form (no facia) must have Pulsors installed on the joist. These are more resistant to inside walking problem than boxed decks.

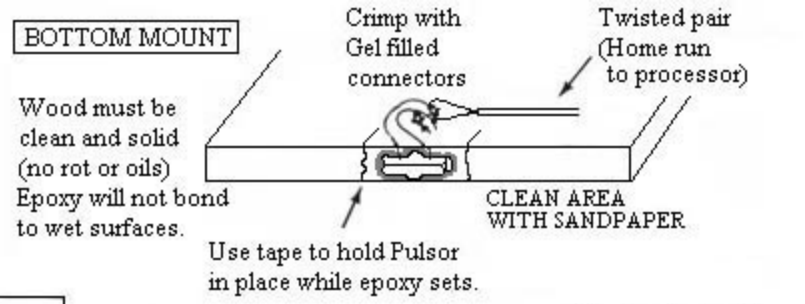
RECESSED LIGHTING ACCESS

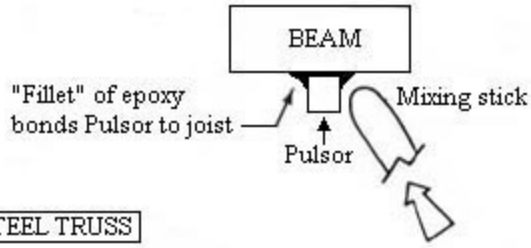


Mounting

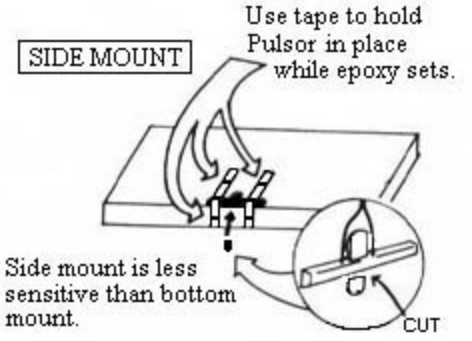


BOTTOM MOUNT

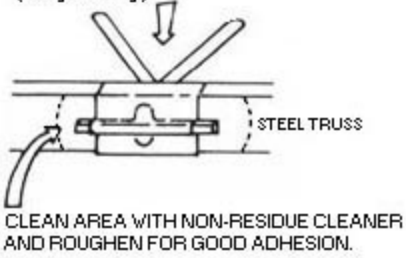




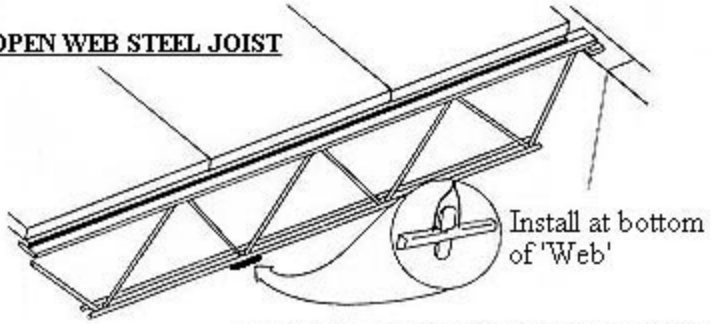
SIDE MOUNT



STEEL TRUSS



OPEN WEB STEEL JOIST



FLAT ROOFS

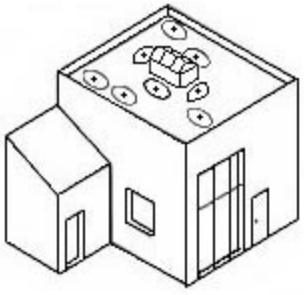
DO: Consider oval of protection same as floor (4' x 7' typical)

DO: Protect points of access

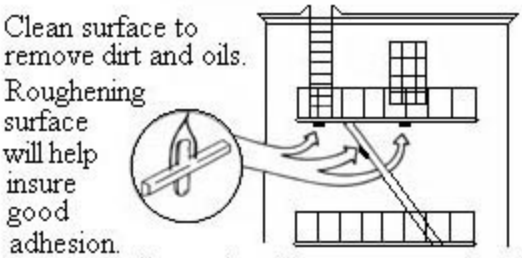
DO: Protect entry ponts (i.e. skylight)

DO: Consider small number of extra Pulsors for spot protection

DO: Use multiple zones so that adjacent Pulsors are on differ zones.

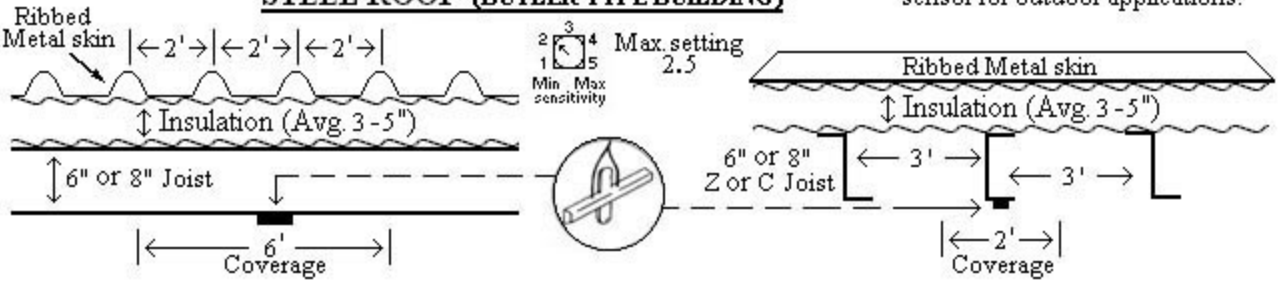


OUTDOOR STEEL FIRE ESCAPES



*Remember - Use an even number of sensor for outdoor applications.

STEEL ROOF (BUTLER TYPE BUILDING)



VIEW LOOKING ALONG JOIST

VIEW LOOKING ACROSS JOIST

*** **DO NOT CLAMP SENSOR TOO TIGHTLY.** EPOXY WILL FILL THE GAP. ***

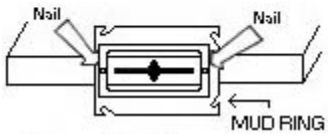
Use an even number of sensors for outdoor applications and roof applications

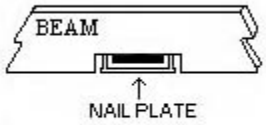
Mounting Tips and Hints

NAIL PLATE AND MUD RINGS

Drywall may be installed over (use magnet if relocation is necessary).

1. Install Pulsor.
2. Nail mud ring lightly for temporary hold.
3. After drywall is intalled, remove nails and cover with blank plate

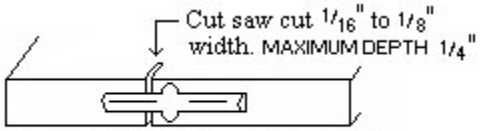




1. Notch beam 1/2" x 3"
2. Install Pulsor
3. Cover with nail plate. (hammer lightly - DO NOT JAM PULSOR

Placement:

Since Pulsors are mounted to joists, often this means that the sensor location will be drywalled If the Pulsor is to be installed on the side of the joist, you may wish to kerf. A kerf is a cut that creates a mechanical amplifier for beam flexing (It can increase sensitivity up to one hundred percent on bottom mounts). This procedure may be done with <u>solid joists only</u>. and is generally needed only on large lumbers with rigid floors. <u>DO NOT</u> cut wood trusses or engineered wood beams!! (Call technical support for assistance). Another way of increasing senitivity under any condition is to use the HPP+ (High Performance Pulsor). Enhanced and High Performance Pulsor <u>can</u> be mixed on the same processor zone.



Install Pulsor on bottom or side of joist with the wing 1/2" away fom cut.

Locations:

*For outdoor applications and roof applications, use an even number of sensors per zone.
*Always mount to bottom of joist for outdoor applications.
*Staircases should always be on their own processor zone.
*Do not mix indoor and outdoor sensors on the same zone.
*Do not place sensor under furniture.

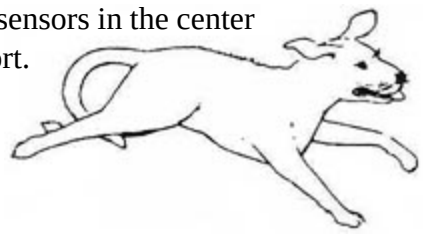
Mounting:

* *Mount Pulsors first.* This gives the epoxy time to cure before walk-testing. The epoxy will cure for 4 hours at 77 degrees F. or up to 24 hours at 32 degrees F. The epoxy must be warm when mixed. The range of each Pulsor increases until epoxy is fully cured.
* Do not staple Pulsor to joist. Lightly touch to joist and use tape to secure while the epoxy sets.
* Pulsors must be mounted directly to joist beneath the area to be protected.
* Make sure the surface is solid, clean, and dry.
* If side mounting, cut off one wing and mount flush with the bottom edge of joist.

Pets:

Make allowances for pets if there are any. Animals can exert several times their weight when moving. Small dogs and cats can roam freely. Have larger pets run and jump in protected area during walk-testing. Make adjustments if necessary. The larger the pet the smaller the ovals of protection. Larger pets may require additional sensors.

* <u>Cats</u>: Keep sensors away from tables and tall furnishings where a cat may jump down and land directly on the pulsor.
* <u>Dogs</u> (up to 20 lbs): Keep sensors offset from such doors where the animal can jump up and down on the sensor (main doors and sliding glass doors).
* <u>Dogs</u> (up to 60 lbs.): Offset sensors from bases of stairways. Avoid placing sensors in the center of long joist spans favoring areas two to four (2-4) feet from a support. Generally, when planning the system, it is good practice to add extra sensors. For heavier animals a lower sensitivity setting and smaller oval of detection is preferred. The smaller detection area is supplemented by additional capture areas.



Mounting and Wiring

STEP 3: Mix warmed epoxy and mount sensors.

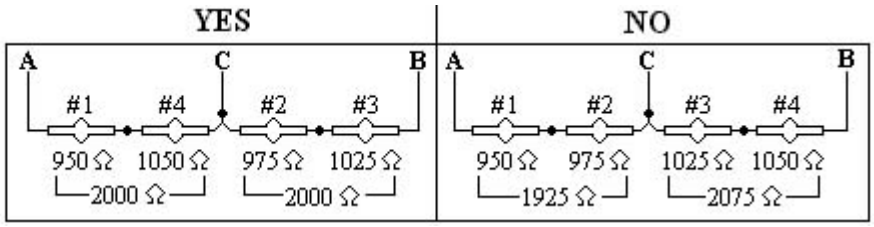
1. Make sure epoxy is warm. Cold epoxy will not mix well.
2. When you are ready to mount sensors, mix both halves of epoxy to a slow count of 15.
3. Place all the epoxy on a sensor. It is important to use 1 package of epoxy per sensor.
4. Touch Pulsor to the joist with as little pressure as possible. Use electrical tape or 3" packing tape to hold the sensor to joist. Do not staple sensor to joist or use a lot of pressure. This can pre-stress the sensor causing decreased sensitivity.
5. Complete the rest of the installation while the epoxy cures.

STEP 4: Balance system and wire Pulsors to processor.

The 111 Processor can take 1-4 Pulsors. The 313 Processor can take 1-12 Pulsors (4 per zone). Each sensor is home-run back to the processor. When wiring to the processor, balance each zone. After epoxy has cured for a two hour minimum, take the resistance reading of each sensor (These readings should be recorded and left in the panel). The Pulsors with the highest and lowest readings are wired in "Series" between Terminal A and Terminal C. The remaining two Pulsors will be wired in "Series" between Terminal C and Terminal B.

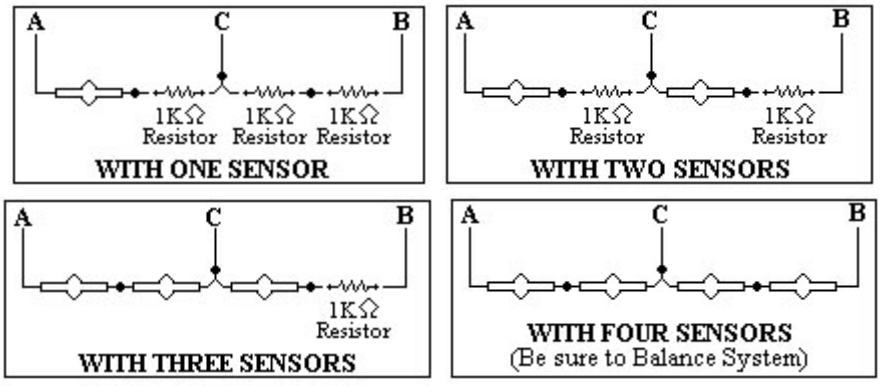
***Balancing**

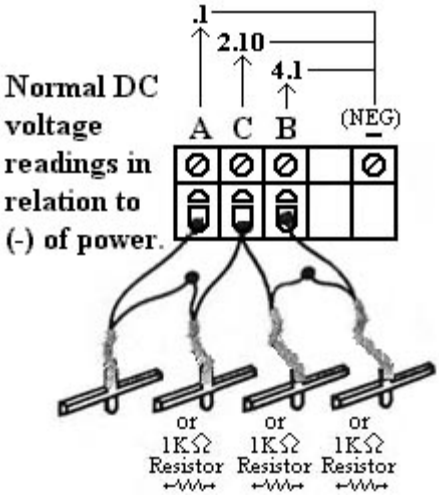
Example: Pulsor 1 = 950 Ω
Pulsor 2 = 975 Ω
Pulsor 3 = 1025 Ω
Pulsor 4 = 1050 Ω
Avg. 1000 Ω ±30%



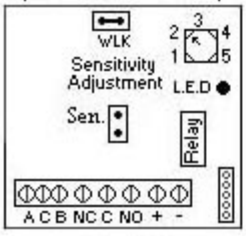
Pulsor Configuration

When installing two sensors, wire one sensor on each half of the circuit.



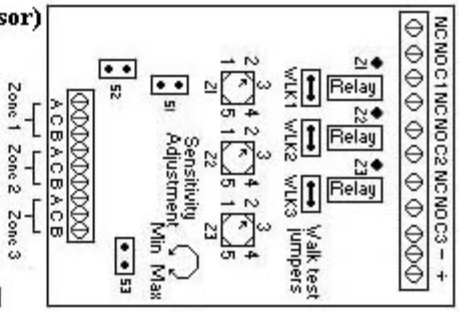


111
(1 Zone Processor)



Power Requirement: 12 VDC
Current Consumption: 16 mA Stable per zone
4 mA Alarm
Output: Form "C" relay (24 VAC, 1A)
Approx. 4 second momentary
Green L.E.D.: On = Stable // Off = Alarm
Physical Dimensions: **111** 2" W x 2.25" L x 1" H
313 3.25" W x 4" L x 1" H
Sensitivity Jumpers: Open = Normal Range
Short = High Range
Default: Sensitivity (Open) WLK (Shorted)

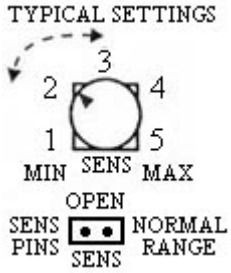
313
(3 Zone Processor)

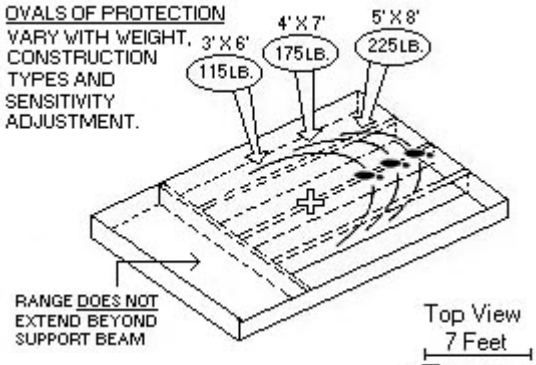


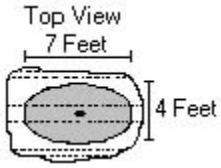
Walk-Testing

STEP 5: Check Pulsor Sensitivity and Coverage after minimum 4 hour cure time.

* If 2” x 8” floor joists start your sensitivity setting at “2”
* If 2” x 10”, 12”, 14” floor joists start your sensitivity setting at “2 1/2”
* If 2” x 16” TGI’s start your sensitivity setting at “3”







* Call for technical assistance before using sensitivity jumper on wood structures.

Walk-test the system. Walk-testing must be performed at each Pulsor location. Its purpose is to demonstrate that each Pulsor has enough sensitivity to protect its targeted area. Generally, an oval of protection (4’ x 7”) centered around the Pulsor is a typical stable configuration. Increase or decrease the sensitivity as necessary.

ACTUAL SYSTEM

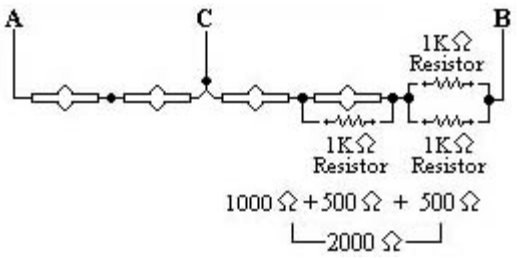
One 85 Lb. dog, one 55 Lb. dog, and five cats. The system was installed in 1994 and has not falsed once.

* This system was personally installed by Sure Action’s owner as the result of a challenge.
* The building had 4 staircases. A Pulsor was installed on the bottom of the third riser from the top on each staricase. He also installed five additional sensors throughout the building, all mounted 3 ft. rom the end of the joist.
* The sensors on the staircases were wired into one zone of a 313 processor and the rest of the sensors were divided between the other two zones of the processor.
* The sensitivity was adjusted so that the Pulsors would not detect the dogs. As a result, each sensor provided a 3-foot circle of detection.
* The job required 9 sensors. If there had not been any animals, the job would have used 6 sensors.

Troubleshooting

**** If one sensor has too much sensitivity ****

If one sensor on a zone has much more sensitivity than the others, it is possible to decrease the sensitivity of an individual Pulsor. Place a 1K ohm resistor in parallel with the Pulsor. This will drop the resistance for that half of the circuit by 500 ohms. Series in the additional 500 ohms on that half of the circuit



Troubleshooting

**** If you do not have enough sensitivity ****

Soft Epoxy - Check the epoxy. The epoxy should be solid and hard. You should not be able to leave a dent in it with a fingernail or screwdriver.

Solution*:* If the epoxy is soft after 24 hours remove the Pulsor and re-epoxy. .

Pre-stressed Sensors - When mounting the sensor you should apply a thick layer of epoxy to the substrate of the sensor and lightly touch the sensor to the joist. Use tape to gently hold the sensor in place while the epoxy sets. **Do not** to clamp the sensor to the joist. **Do not** squeeze out all the epoxy. **Do not** use staples to mount the sensors.

Solution: Remove sensor and re-epoxy.

Flooring Conditions - A). The flooring is extremely rigid.

Solution: - Upgrade the sensor to the HPP (High Performance Pulsor).

- Kerf the joist (Solid joists only) *See *Kerfin*g.

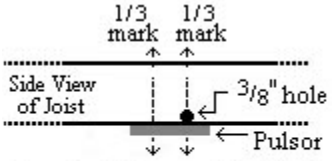
B). The flooring material is not secured to the joist (floating).

Solution: Place shims between the joist and the flooring.

C). The joist is cracked or has end-rot *(Usually only an issue in older buildings*).

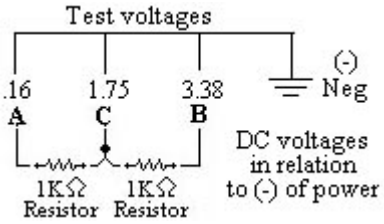
Solution: Move the sensor to a different joist.

Kerfing: Kerfing is optional because of the different versions of Pulsors. It is not required. However, if you do not have enough sensitivity and upgrading the sensor is not possible, kerfing is still a way to increase sensitivity by focusing flex conditions. To perform this procedure after the sensor is installed the sensor must be mounted on the bottom of a solid wood joist. The epoxy must have a minimum of four hour cure time. For help with TGI's (Silent Floors / Manufactured Beams) please call 1-800-648-4301 for technical assistance. Divide the sensor in thirds and make your drill hole at either one the the third marks.Drill a 3/8" hole perpendicular to the sensor (across the joist). Drill the hold so that it breaks the bottom edge of the joist directly above the sensor. The drill bit may knick the epoxy.



Place kerf at one of the third marks.The hole should break the bottom edge of joist.

**** If you do not have a Green light (L.E.D) on the processor ****



- Check Pulsor for open or short circuit. Take the resistance reading of the Pulsor. The resistance reading should be between 700 and 1300 Ohms.
- Check to see if processor has power (12VDC).
- System may be imbalanced. Check voltage Terminals "C" in relation to (-)power. Reading should be close to 2.10 VDC.
- Check processor. Substitute two 1K Ohm resistors for Pulsors at screw terminals. Place a resistor between Terms. A & C and other between Terms. C & B. Within 45 seconds the green L.E.D should come on steady. Turn sensitivity adjustment to 3. Wet finger and rub across resistors. The green L.E.D should go out for about 3-4 seconds and then come back on. Check Term. C for 1.75 VDC.

**** If the system is falsing ****

- System is not properly balanced.
- Sensitivity adjustment is too high.
- Joist is cracked or has end rot. Move sensor to another joist.
- Soft epoxy bond.
- Staple in wire run.
- Pulsor is placed too close to a heavy, slow vibrating appliance such as a washing maching or AC unit.
- Cantiliver effect. Check to see if walking on the outside deck causes a Pulsor inside house to trigger. (very rare occurance)
- Bad Pulsor

* Compare current resistance with the original reading. If there is more than a 200 Ohm difference the Pulsor may be suspect.

* Record the resistance reading. Jump on the floor directly above the sensor then take the resistance reading again. The resistance should return to within 3-4 Ohms of initial reading. If it does not the Pulsor may be suspect.

FINAL TEST - Any Pulsor that is suspect may be temporarily replaced with a 1K Ohm resistor. If the system stabilizes replace the Pulsor.