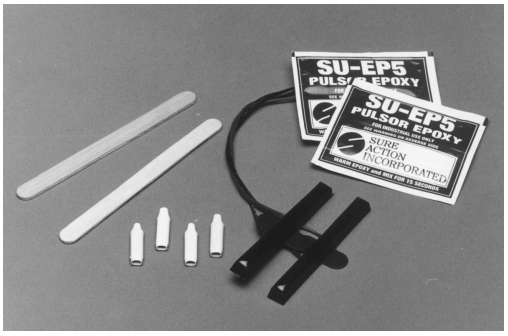
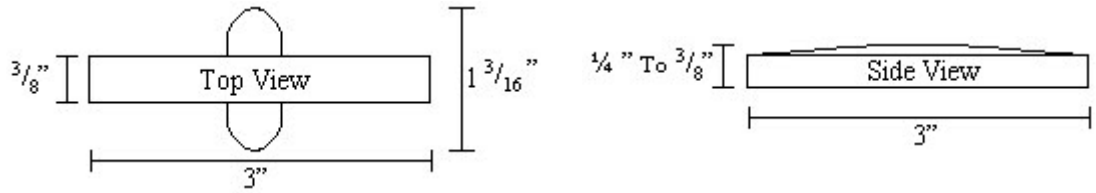
THE PULSOR

Now offering three levels of sensitivity for the structures of the next millenium.
Older practices of cutting or drilling are no longer required.



SU-STDP (Standard Pulsor) (Blue x2) (Δ4-6 Ω)
SU-ENHP (Enhanced Pulsor) (Orange x2) (Δ14-16 Ω)
SU-HPP (High Performance Pulsor) (White x2) (Δ30-35 Ω)
All sensors average 1000Ω ± 30%
(Δ values are based on a 16" Long 2" x 8" cypress beam)

Dimensions



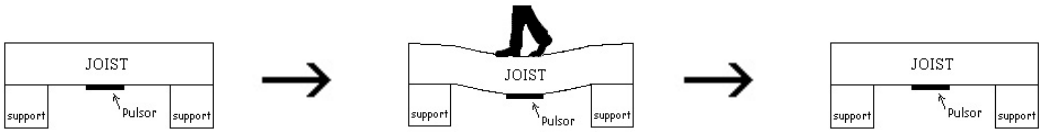
Pulsors are environmentally sealed and utilize 24 gauge marine grade wire

The Pulsor stress sensor is the easiest sensor to install most of the time. Austin Stack, Vice President of Sure Action, installed 6,000 sensors between 1975 and 1986 when he owned a security company and central station. The smallest system consisted of only two pulsors. The largest utilized hundreds of Pulsors buried in a roof.

This manual draws upon "hands-on" installation tips and techniques to explain how Pulsors are installed. It also contains the experience of others to offer ideas about how and where the Pulsor can be used.

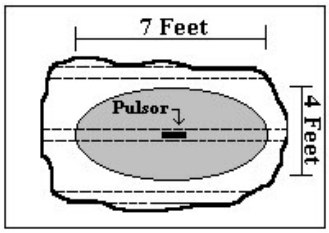
The Pulsor

The Pulsor is the most stable and versatile motion detector available anywhere. Decade for decade, indoors and outdoors, the Pulsor will outlast and outperform any other motion detector. The Pulsor is a motion sensing device that senses the physical flexing of whatever material it is epoxied to. When a person walks across the floor, the floor, and its supports, will bow downward as pressure is applied. They will then return to normal as the person steps off the beam. The Pulsor senses this flex (*downward <u>and</u> upward*). A processor analyzes this change and responds by activating a Form "C" relay.



Pulsors are environmentally sealed and utilize 24 gauge marine grade wire so they can be mounted indoors or outdoors. They will not respond to vibration, shock, 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. The sensitivity of the Pulsor is fully adjustable from the processor.

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. The version of Pulsor used may slightly vary the size of the oval.



Versatility

<u>Security</u> (The SU-STDP or SU-ENHP will cover most security applications)

The Pulsor has been used in a wide variety of security applications both indoors and outdoors. The Pulsor is the ideal solution for residential systems with pets up to sixty pounds (60 lbs.) as well as applications without pets. Commercial buildings are another popular location for the Pulsor. Though residential and commercial building are the most common applications, the Pulsor has been used for security in numerous other areas.

- ***** Steel fire escapes
- ***** Cockpits of airplanes
- ***** Chain link fence posts
- ***** Display platforms in museums
- ***** Under window sills
- ***** Steel catwalks in Open Pit mining operations
- ***** Roller-coaster frames to initiate automated sequences
- ***** Tractor trailer beds to detect unauthorized entry
- ***** Picture frames to detect removal
- ***** Inside doors jams (anti-pry protection)

<u>Home Automation</u> (The SU-ENHP or SU-HPP will cover most home automation applications)

The Home automation industry is increasingly incorporating security functions into total home control. The Pulsor is being used more and more in this capacity to provide general motion detection and for localized spot protection. Currently, turning on lighting is probably the most common application, but is certainly not the only use for the Pulsor. The applications are virtually endless. What can <u>you</u> do with the activation of a Form "C" relay? Some popular locations are:

- ***** Top and bottom of stairs
- ***** In front of closet doors
- ***** Water activation in showers
- ***** Camera/VCR activation
- ***** His and Her sides of the bed
- ***** Outdoor decks for lighting and annunciation
- ***** Fan activation in restrooms
- ***** Activation of heating/cooling systems

<u>Marine</u> (The SU-MGPKIT or SU-ENHM will cover most marine applications)

Another growing area is the marine industry. People are becoming more security conscious about their boats. The Pulsor is increasingly being used on Yachts and mega-yachts of 100 feet and up. Vessels such as these have a 24-hour crew so the Pulsor is used for restricted access and camera activation. Smaller crafts utilize the Pulsors (SU-MGPKIT) as they are incorporated into Sure Actions MG2000 Security System for boats.

The Basics

STEP 1: Determine the location for the sensors.
STEP 2: Determine what sensors (level of sensitivity) should be used and how to install the sensor.
STEP 3: Mix warmed epoxy and mount sensors.
STEP 4: Take the resistance readings of the sensors.
STEP 5: Balance the system.
STEP 6: Wire Pulsors to control panel.

Basic Installation Strategy

STEP 1: Determines the location for the sensors.

Look at each Pulsor as a miniature landmine detecting motion on an area of the floor through which a person will pass.

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 a person is likely to investigate are ideal traps. Make allowances for pets if there are any (See Pets & Pulsors). For second-floor installations, Smoke detectors or heat detectors provide good cover for a Pulsor.

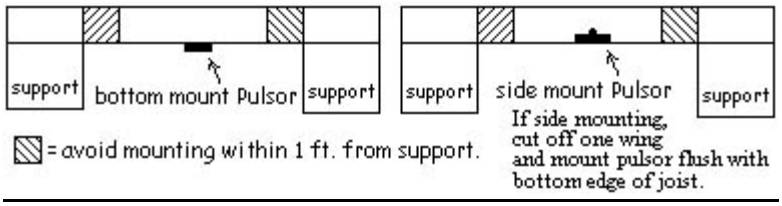
Home Automation

The Pulsor is often used for "spot" detection. Light activation occurs from stepping on a sensor when climbing out of either side of the bed, standing in front of the closet (allows for the door to remain open and have no effect on the lights), and stepping on the first stair of a staircase. Pulsors are also placed under showers for water activation, and under toilets for fan activation. "Whole House" applications may moderate environmental conditions based on motion in a specific room or area.

Marine

The Pulsors are commonly placed in areas such as under or on the ladder leading to the fly bridge, in the cockpit where the electronic equipment is located, in front of the cabin door, and on the gunnels.

STEP 2: Determine what sensor should be used and how sensors need to be installed on joists.



Bottom Mount (Most Sensitive : All Construction)- 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)- Side mount refers to mounting the Pulsors by epoxying them to the side of the joist. **Remove one wing from the sensor and place the Pulsor on the side of the beam FLUSH with the bottom edge.** The most common reason for side mounting is if the area the Pulsor is located must be drywalled. **Thoroughly test sensors BEFORE area is drywalled.** For TGI trusses, top mount as shown on last page of this manual.

- **REMEMBER** – *On any single zone, when mounting multiple sensors in different flex conditions, you can now adjust the sensitivity of all sensors* ***proportionately*** simply *by selecting the correct sensor for each condition.*

STEP 3: Mix epoxy and mount sensors.

1. Before opening epoxy package, hold it in your hand and place it against a light bulb. When the packet feels warm, place it in your pant's pocket.
2. When you are ready to mount sensors, mix the entire package 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.

   Important: 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. **Let the epoxy harden for a minimum of 4 hours before setting the sensitivity for final operation.** People can walk on the floor during this cure time. It will not effect the sensor. (**Please note**: Epoxy hardens for up to 24 hours after it is mounted. After 4 hours, however, it will be hard enough for you to test the sensors. Ambient temperature can effect cure time)

6. While the epoxy hardens, run wire for the job, mount control panel, keypads and any other sensors being used in the job.

STEP 4: Take the resistance readings of the sensors.

IMPORTANT: After the epoxy has cured for 4 hours and before wiring the sensors to the processor, take the resistance readings of the sensors, record them and leave the readings in the alarm panel. These readings are important for circuit balancing and troubleshooting.

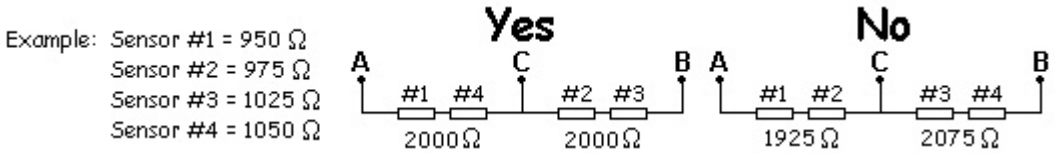
STEP 5: Balance the system.

- It is important for the **resistance** on the input circuit to be kept balanced. If you are using two 4000 Series Pulsors per zone, **always** balance the input. To do this, you want to have a Pulsor and 1kΩ resistor on each side of terminal "C".

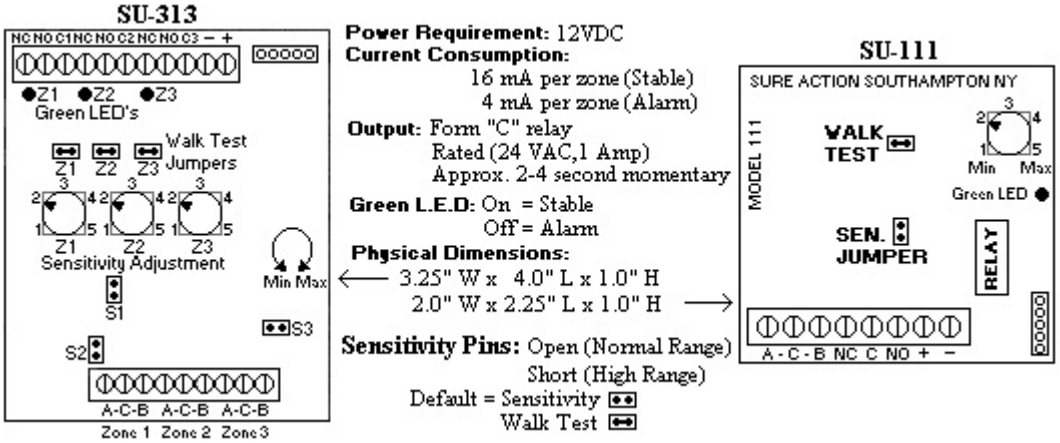
RULE #1 - To balance the system, take readings of all the Pulsors being wired into a zone. Take the Pulsor with the highest reading and the Pulsor with the lowest reading and wire them in series between the "A" & "C" terminals. Then take the remaining two Pulsors and wire them in series between "C" & "B".

RULE #2 - After wiring the Pulsors based on RULE #1, read the voltage on screw terminal "C" in relation to ground, swap the wires on the "A" & "B" terminals and read the voltage again. Use whichever of the two readings comes closest to 2.1 VDC.

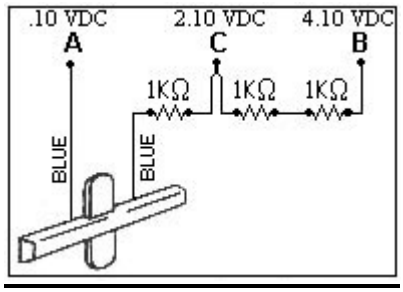
NOTE - The final voltage at screw terminal "C" must be as close to 2.1 VDC as possible.



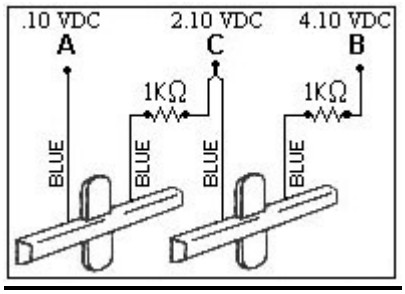
STEP 6: Wire Pulsors to processor and control panel.



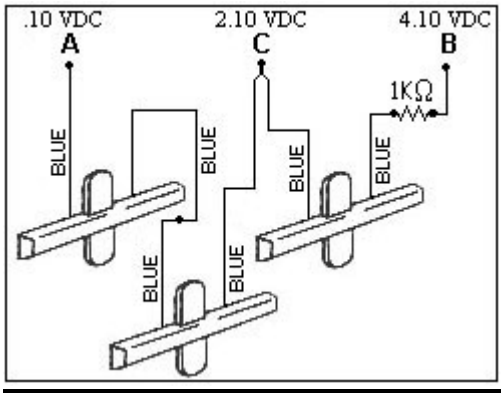
(1 sensor)



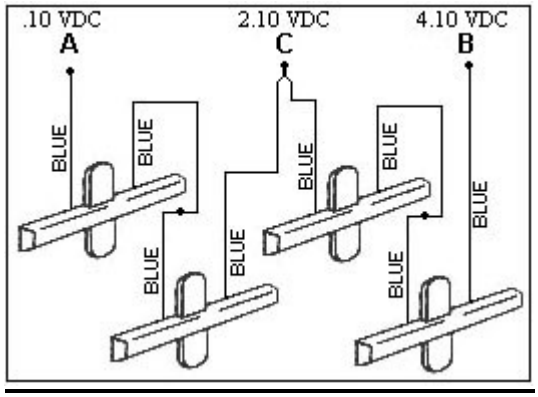
(2 sensors)



(3 sensors)



(4 sensors)



Check Pulsor Sensitivity and Coverage

- If you have 2"x8" floor joists, set the sensitivity adjustment on the processor at 2 or a little above 2.
- If you have 2"x12" or 12" or 14" TGIs, set adjustment at 3.
- If you have 16" TGIs, set adjustment at 3 1/2".

❑ Walk test the system. Walk around the areas where the sensors are mounted to see if you have adequate coverage. Increase or decrease the sensitivity if necessary.

NOTE - If you perform the walk test before the 4 hour minimum cure time, please remember that the Pulsor's sensitivity will continue to increase a little for the next 20 hours as the epoxy becomes harder. Even if you do not have quite enough sensitivity when you test the Pulsors after 4 hours, be conservative with the adjustments.

Pets and Pulsors

The Pulsor stress sensor is the easiest way to protect a home with free roaming pets. The Pulsor virtually eliminates false alarms.

❑ ***CATS***. Keep the sensors away from tables and high furnishings such as refrigerators where a cat may jump and land hard on the floor.

❑ ***DOGS***. Keep sensors away from the front and back doors as well as all sliding doors. Also keep sensors away from the base of staircases.

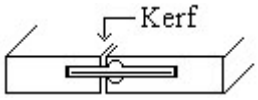
❑ ***DOGS - 20 to 65 Pounds***. Keep the sensor away from the center of floor joists and set the adjustment so that the dog is not detected.

- ***ACTUAL SYSTEM***. One 85-lb. dog, one 55-lb. dog and five cats. The system was installed in 1994 and the system has not falsed once.
  - Austin Stack, Vice President of Sure Action, personally installed the system as a result of a challenge.
  - The building had four staircases. Austin installed a Pulsor on the bottom of the third riser from the top on each staircase. He also installed five additional sensors throughout the building, all mounted 3 ft. from the end of the joist.
  - The sensors on the staircases were wired into one zone of an SU-313 processor and the rest of the sensors were divided between the other two zones of the processor.
  - Austin adjusted the sensitivity 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

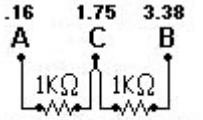
- If you do not have enough sensitivity.
  - ✓ If epoxy has only cured for 4 hours, remember that the sensitivity will increase for the next 20 hours.
  - ✓ Check the epoxy. The epoxy should be glass hard. You should not be able to make any marks in it using a fingernail or a screwdriver. If the epoxy is soft after it has been mounted for 24 hours, remove the Pulsor and re-epoxy.
  - ✓ Pulsors have been pre-stressed. Pulsors were not mounted properly during installation.Remount Pulsor.
  - ✓ The flooring is very stiff. You may need to upgrade the version of the sensor used. Though kerfing is no longer required, there may be times it will help (see below). However, with Sure Action's current capabilities, the SU-HPP Pulsor, mounted in the center of a 30"long 5" x 10" Steel I-Beam, required only light pressure with your knuckle.
  - ✓ Flooring material is not secured to joist. Put shims between the joist and the flooring.
  - ✓ The joist is cracked, has end rot or is floating. Remove sensor and move it to a different joist.
  - ✓ The system is not balanced. See balancing section.

- **Kerfing after Pulsors have been mounted**. Kerfing is now optional because of the different versions of Pulsors. However, if you do not have enough sensitivity and upgrading the Pulsor is not possible, kerfing is still an option if the Pulsor is bottom mounted. Drill 3/8" hole perpendicular to the sensor. You will need to drill at the bottom edge of the wood with the drill lined up with the edge of the Pulsor wing. You will need cut through the joist but you do not want to cut the sensor**. <u>Do not</u> drill the hole at the center of the Pulsor** since this could eventually destroy the sensor's crystal.



Place kerf next to Pulsor wing at the bottom edge of joist. Do not cut Pulsor.

- If you do not have a green light (LED).
  - ✓ Check Pulsor for open or short circuit. Take the resistance reading of the Pulsor. Resistance reading should be between 700 and 1300 ohms.
  - ✓ Check to see of processor has 12 VDC.
  - ✓ System may be out of balance. Check voltages on terminals "A", "C" and "B". (See balancing section.)
  - ✓ Check processor. Substitute two 1KΩ resistors for Pulsors at the screw terminals. Put one 1KΩ resistor between A & C resistor and one 1KΩ between C & B. Turn the sensitivity adjustment to 3. Wet fingers and rub across the resistor. The green LED should turn off & on.



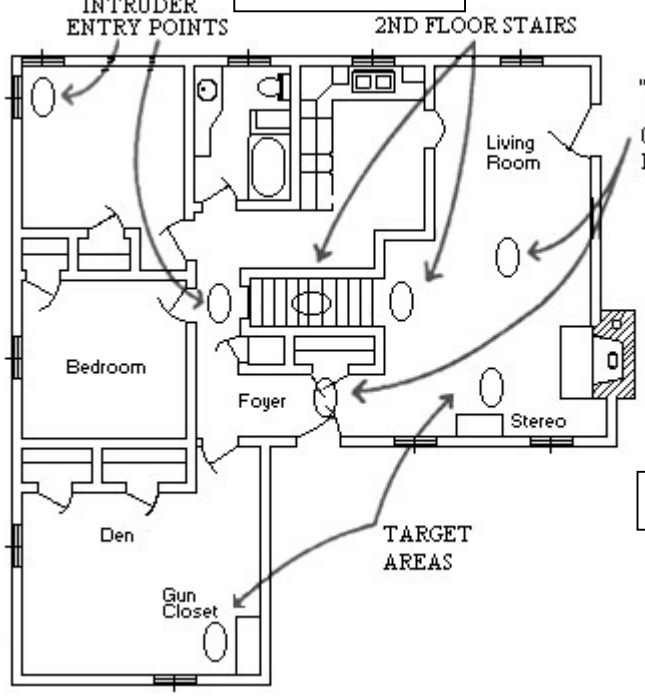
These DC voltages are in relation to Neg. of power

- If the system is falsing.
  - ✓ System is not balanced properly. (See Step 5)
  - ✓ Sensitivity adjustment is too high.
  - ✓ Joist is cracked or has end rot. Move sensor to another joist.
  - ✓ Soft epoxy bond. The epoxy should be glass hard. You should not be able to make any marks in it using a fingernail or a screwdriver. If the epoxy is soft after it has been mounted for 24 hours, remove the Pulsor and re-epoxy.

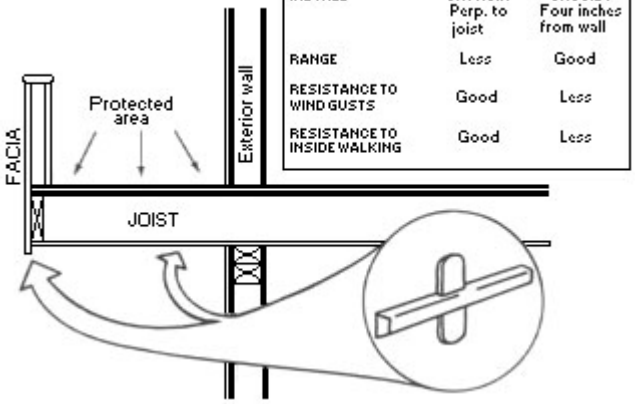
- ✓ Staple in wire run.
- ✓ Pulsor is placed too close to a heavy, slow vibrating appliance such as a clothes dryer.
- ✓ Cantilever effect. Check to see if walking on the outside deck causes a Pulsor inside the house to trigger. The Pulsor may be mounted on a joist that is aligned with a joist on the deck (very rare).
- ✓ Bad Pulsor
  - Compare existing resistance with the original readings on the installation record. If there is more than a 200-Ohm difference, the Pulsor may be suspect. (See Final Test)
  - Record the resistance of the sensor, then jump on the flooring directly above the Pulsor. Take resistance readings again. The resistance should return to within 2-Ohms of your initial reading. If it does not, the Pulsor may be suspect. (See Final Test)

➢ **Final Test:** Any Pulsor that is suspect may be temporarily replaced by a 1 KΩ resistor. If the system stabilizes (no false alarms), replace the Pulsor

Target Locations

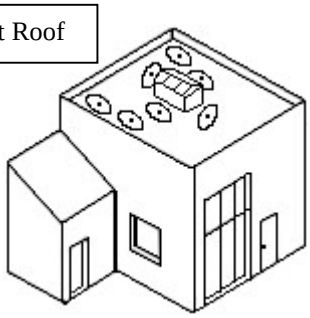


Cantilever Deck

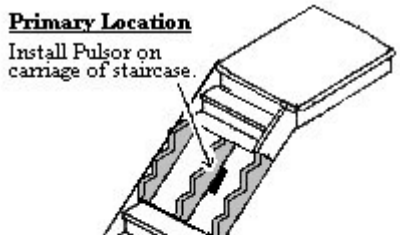


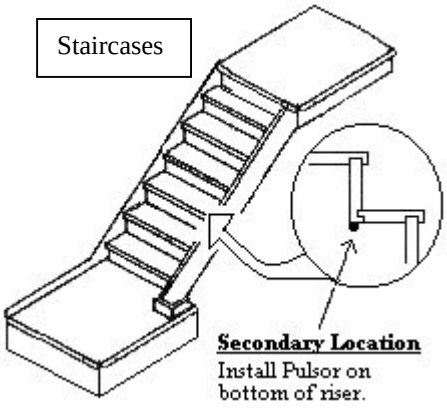
INSTALL	ON FACIA Perp. to joist	ON JOIST Four inches from wall
RANGE	Less	Good
RESISTANCE TO WIND GUSTS	Good	Less
RESISTANCE TO INSIDE WALKING	Good	Less

Flat Roof

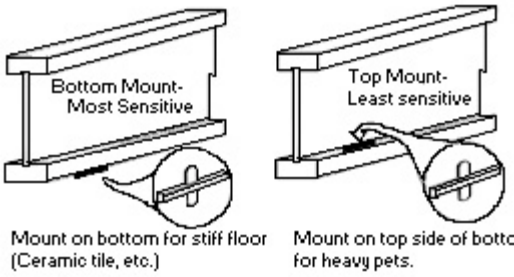


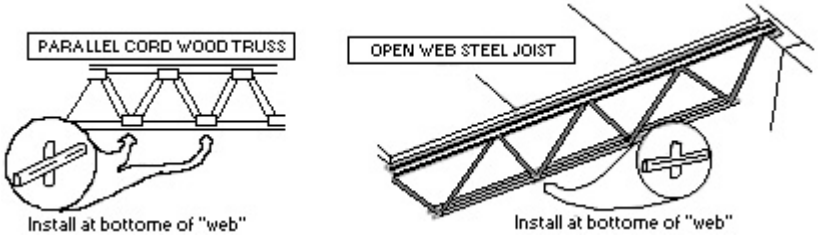
Staircases



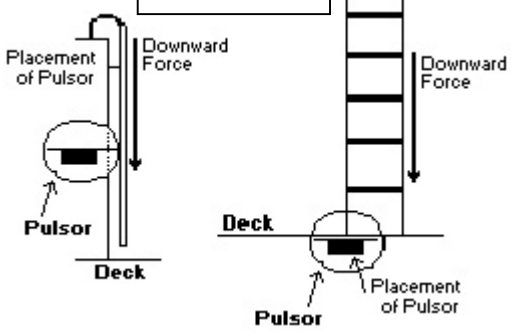


T.G.I (Silent Floor) Truss





Boat ladders



Boat Decking