PERIMETER PRODUCTS inc.
1130 Terra Bella Ave.
Mountain View, CA 94043
Telephone (415) 966-8550
Fax (415) 966-8517

INSTALLATION AND OPERATING INSTRUCTIONS
MICROWAVE PROTECTION SYSTEM
MPS-4100

June 1996

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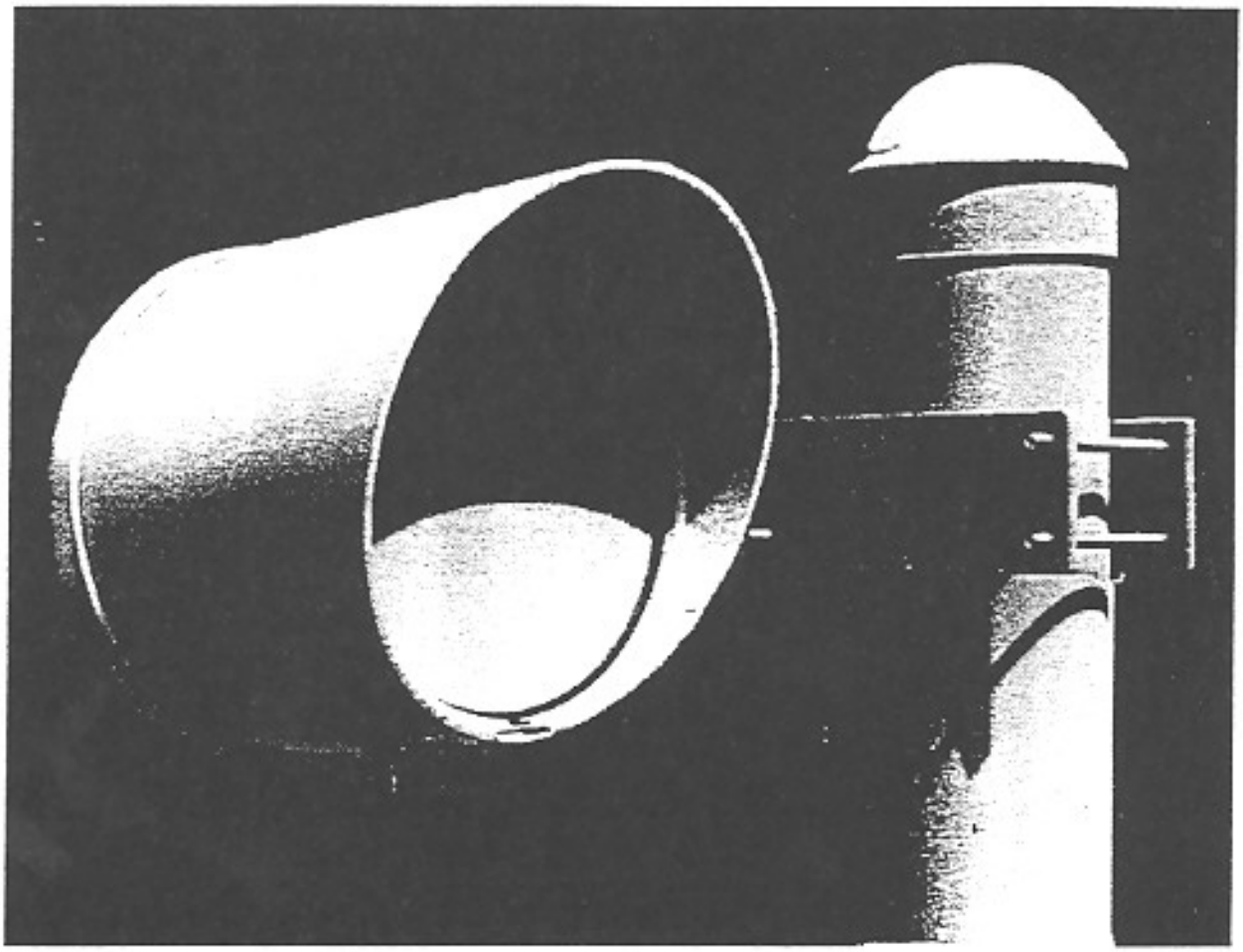

MPS-4100 Microwave Unit

PPi MODEL MPS-4100 MICROWAVE PROTECTION SYSTEM

INTRODUCTION

Model MPS-4100 Microwave Protection System is designed for exterior perimeter intrusion detection applications. The MPS-4100 detects movement within a microwave field between the Transmitter and Receiver, and initiates an Alarm to alert responding personnel.

GENERAL DESCRIPTION

The MPS-4100 bi-static microwave system consists of one Model MPS-4100 Transmitter and one Model MPS-4100 Receiver. The Transmitter is powered by a Gallium Arsenide Field-Effects Transistor (GaAS FET) that radiates amplitude modulated X-band energy at 10.525 GHz which travels to the Receiver. The received energy is amplified and processed. Thus, a microwave energy field is established between the Transmitter and Receiver. When an intruder enters the microwave field, the received energy is changed, and an Alarm occurs. Operation of Model MPS-4100 is illustrated in Figure 1.

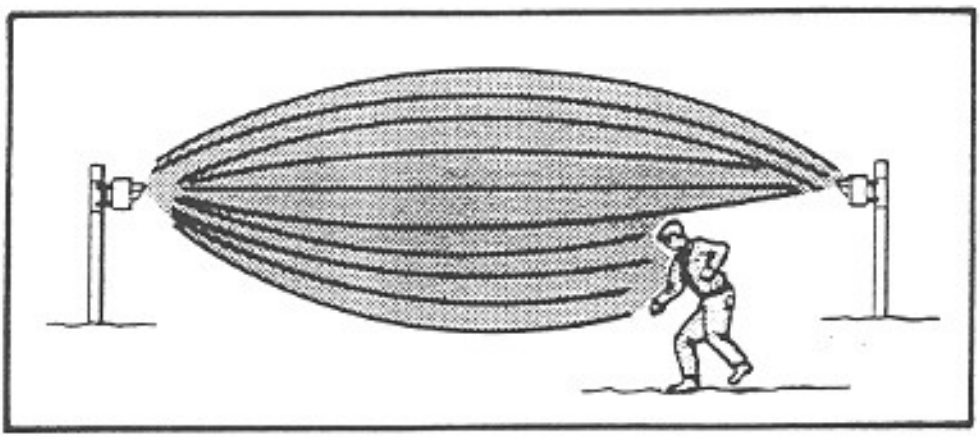

Figure 1. Operation of MPS-4100

The following describes the features of the MPS-4100:

Antenna Pattern

The pattern of the microwave field is established by a Linear Array antenna element housed within the Transmitter and Receiver. The maximum coverage range is 600 feet. The pattern width is adjustable to meet a variety of application requirements.

Operating Frequencies

Six selectable operating frequencies allow multiple sets of MPS-4100 to be used in either stacked or linear configuration.

Built-in AGC

The received Audio signal is amplified by an automatic gain control (AGC) preamplifier enabling the preamplifier output to be held to a constant level, regardless of Transmitter-Receiver distance (distance must be within maximum distance of Figure 2). The Preamplifier output is applied to a phase-locked loop (PLL) detector which operates as a narrow bandpass filter at one of the modulation frequencies. The Receive frequency is selected to match the modulation frequency of the Transmitter, while rejecting spurious signals and other Transmitters.

PLL Circuit

The PLL detector output is a voltage level which is held constant under normal conditions by the slow-acting AGC loop. Rapidly changing signal strength caused by a target moving into the microwave beam is not affected by the AGC loop and causes an AC signal to appear at the PLL detector output. The signal is amplified, filtered and compared with upper and lower Alarm threshold voltages. Whenever a signal exceeds either threshold voltage, an Alarm is generated. The gain of the signal amplifier may be adjusted with a "Sensitivity" potentiometer on the circuit board.. The Signal bandwidth, affecting the Model MPS-4100 response to fast moving targets, may be set to "Fast" or "Slow" with a PCB jumper.

Alarm Output

Two Alarm output formats are available to signal an Alarm or Tamper condition, Standard or Multiplex. The output type is selected via switches on the Receiver.

The Standard format provides a Form C relay output for Alarm or Tamper. Alarm output relays are energized on power-up and drop into Alarm condition upon loss of DC power. The Alarm relay hold-in time is adjustable from .5 to 30 seconds. Tamper output is available on both the Receiver and Transmitter.

The Multiplex format uses our unique CEnDe data communications protocol to communicate to the MX-1000 Command and Control Center over a 2 wire data bus. A transponder card plugs into a socket on the Receiver circuit board.

Alignment

Accurate alignment of the Transmitter and Receiver to establish the strongest signal is accomplished with the help of a series of LED's on the Receiver circuit board that indicate when optimum alignment has been achieved. A 600 ohm impedance Audio jack and voltage output are also available for headset or voltmeter verification of alignment.

Audio Output

The MPS-4000 Receiver has a built-in output that can be used to evaluate signal variations in the detection path. A tone is generated to correspond with objects moving within the protected area and varies in frequency and amplitude. During quiescent operation, a low, steady tone is generated, but a louder, higher pitch tone will occur as an intruder moves within the protected area.

The audio is very useful in locating false alarms generated by moving objects within the detection path (i.e., bushes, weeds, etc.).

TRANSMITTER

The model MPS-4100 Transmitter consists of two major subassemblies: The Antenna Assembly and Transmitter Circuit Board.

The Anntena Assembly is a flat plane, or Linear Array antenna with a GaAs FET Oscillator that generates the X band microwave energy mounted on the rear side. The Antenna directs the microwave energy toward the Receiver. The Antenna Assembly attaches to the Transmitter Circuit Board assembly by means of stand-off screws so that the two form one removable assembly.

The Transmitter Circuit Board contains the modulator circuit to drive the oscillator. One of six modulation frequencies can be selected via a 6 position dip switch located on this board.

The Transmitter contains a Tamper switch with form C output that signals when the outer cover on the rear of the housing has been removed.The switch is a 2 position plunger with a pull-out position for servicing the unit.

An optional method for Tamper detection has been incorporated into the Transmitter that requires no Tamper circuit wires. With this option selected, the power to the Transmitter is interrupted whenever the enclosure cover is removed. This shuts off the transmission of microwave energy, resulting in an Alarm signal at the Receiver.

RECEIVER

The model MPS-4100 Receiver consists of two major subassemblies: The Antenna Assembly and the Receiver Circuit Board. The Antenna Assembly is a flat plane or Linear Array antenna, with a Schottkey Diode Detector mounted to the rear side. The antenna captures the microwave energy from the Transmitter. The Schottkey Diode Detector converts the modulated X band energy into an Audio frequency signal for processing by the Receiver Circuit Board. The Antenna Assembly attaches to the Receiver Circuit Board by means of stand-off screws so that the two form one removable assembly.

The Receiver Circuit Board contains the processing circuitry that generates an Alarm when sufficient changes in the microwave signal are detected. The modulation frequency is set to match that of the Transmitter via two sets of jumpers. The gain of the signal amplifier may be adjusted with a "Sensitivity" potentiometer on the Receiver Circuit Board. This adjustment also determines the width of the pattern by effectively ignoring weaker changes in the microwave signal that fall below the sensitivity threshold. The higher the sensitivity setting, the lower the signal change required to generate an Alarm, the further out from the center of the field the change can be detected. The signal bandwidth, affecting the response to fast moving targets, may by set to "Fast" or "Slow" via a jumper on the Receiver Circuit Board. The Alarm output time can be adjusted from .5 to 30 seconds via a potentiometer.

The Receiver Circuit Board contains three indicator LED's for Alarm, Wrong Channel, and Jam. The alarm LED indicates an Alarm condition. The Wrong Channel LED indicates that the modulation frequency of the Receiver does not match that of the Transmitter. The Jam LED indicates that the Receiver is picking up two microwave signals of the same modulation frequency, indicating cross interference between two microwave units. A Jam condition may be programmed to trigger an Alarm output via a switch on the Receiver.

The Receiver Circuit Board contains a slot to plug in a multiplex communications transponder to communicate with the MX-1000 Command and Control Center via a 2 wire data bus. The Receiver also contains a built-in preamp that feeds Audio signal to the MX-1000 for Audio assessment of activity within the microwave field.

Several operating parameters are selectable via jumpers and switches on the Receiver Circuit Board.

A series of LED's on the Receiver Circuit Board indicate the alignment level. A voltage output is also available for voltmeter verification, as well as an Audio output to a headphone jack.

COVERAGE PATTERN

Typical maximum width protection pattern of Model MPS-4100 is 50 feet for a mounting height of 2.5 feet. (.76M) above smooth earth. Maximum width occurs when Transmitter-Receiver distance is maximum and Receiver "sensitivity" is set to maximum. The pattern width varies depending on the distance covered, the mounting height, and the sensitivity setting. Actual patterns will vary depending on the site topography and surface conditions. Generally, lower mounting heights or a rougher surface will increase pattern width.

The vertical protection pattern will also depend on the protection distance, mounting height, and the sensitivity setting. The pattern height above the centerline will be approximately one half of the pattern width. The protection pattern below centerline will tend to fill the area between beam centerline and the ground, except for a "dead zone" immediately in front of the Transmitter and Receiver, which will be described next.

The antenna creates a microwave energy pattern at an approximate 13 degree angle. This means that the pattern development is not immediate, resulting in a "dead zone" in front of the Transmitter and Receiver, in which it is possible to crawl under the pattern undetected See Figure 2A. For this reason it is necessary to overlap or "offset" Transmitters and Receivers to cover this dead zone. Figures 2B and C show the amount of offset at corners and midpoints required to ensure complete pattern development based on the mounting height and the sensitivity setting. Protection against prone "commando" style crawl may require additional offset and/or special site preparation.

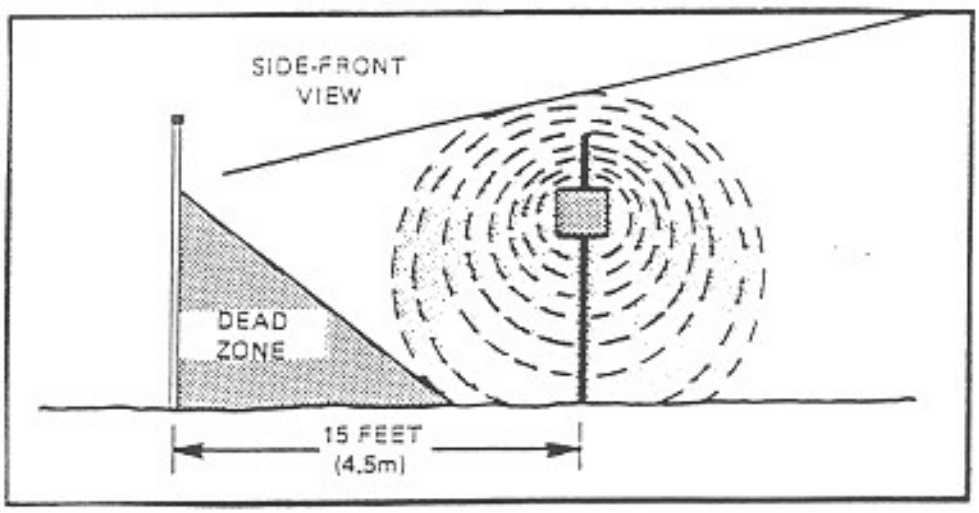

Figure 2A. Side Front View - Dead Zone

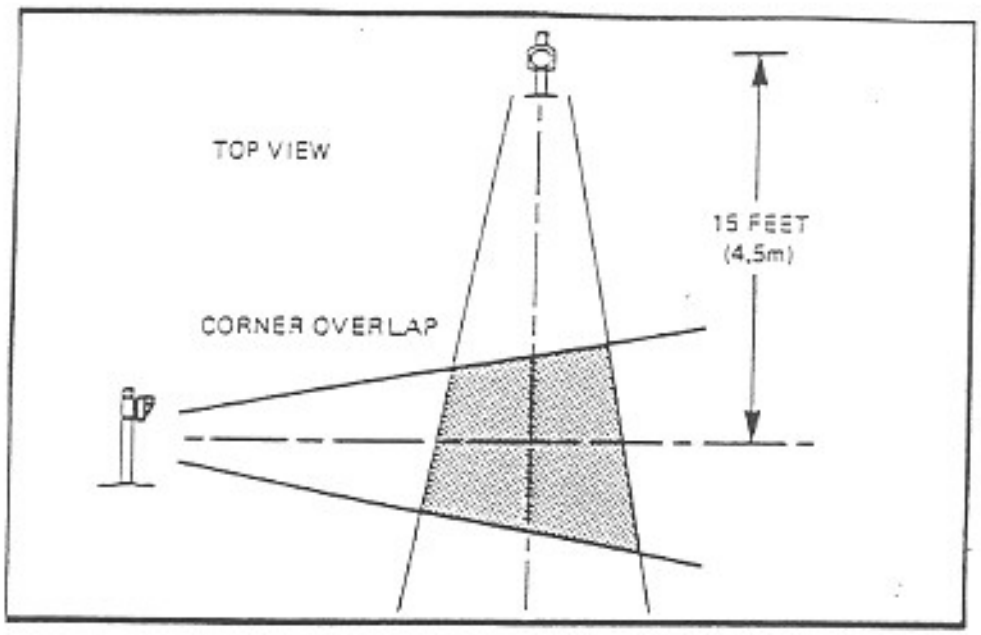

Figure 2B. Top View - Corner Overlap

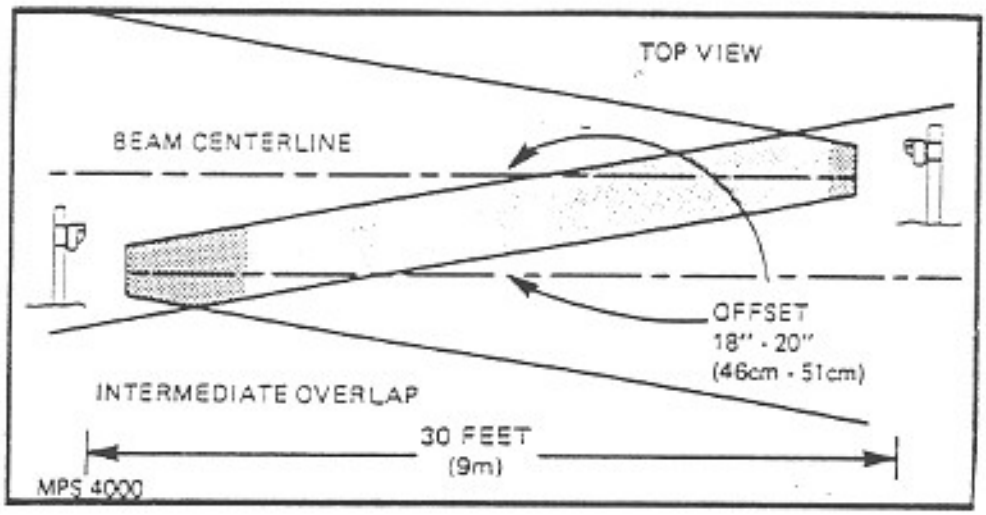

Figure 2C. Top View - Intermediate Overlap

INSTALLATION

Installation should begin with a survey of the area to be covered to ensure that it meets the following site requirements:

A. Required area

1. The length of each zone must be established first.
2. The width of the zone will be determined by the amount of open space to the left and the right of the Transmitter and Receiver heads. Generally, there should be a clear open space that exceeds one half the pattern width on each side.
3. The area to be protected should be free of trees, shrubs, bushes, obstacles such as utility boxes, structures, and water puddles. See figure 3.

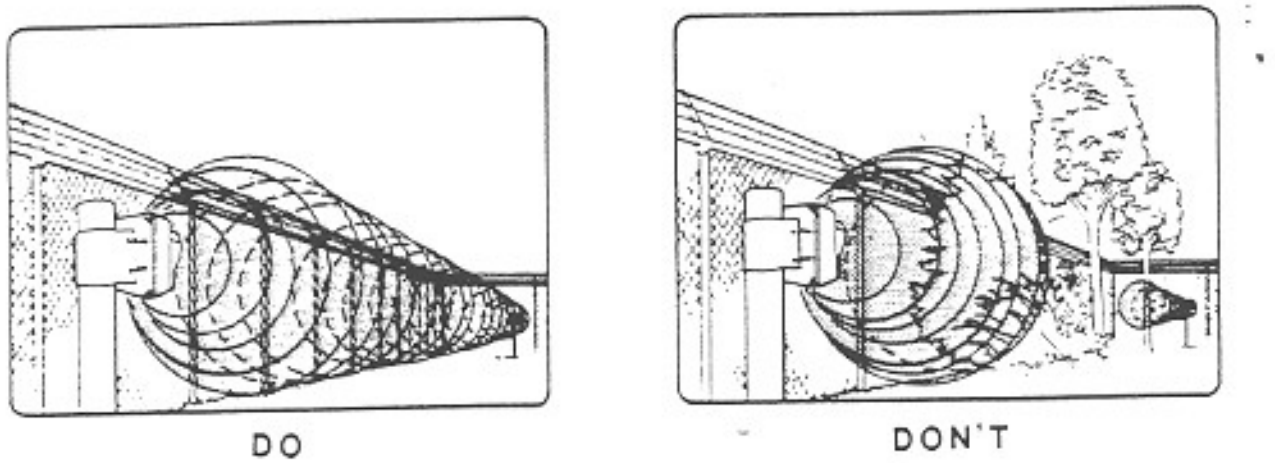

Figure 3. Required Clearance Area

B. Terrain

1. The terrain should be flat, with less than 6 inches deviation in elevation between the Transmitter and Receiver.
2. Any ditches or low spots greater than 6 inches must be filled in to prevent blind spots that would allow crossing under the microwave pattern undetected.
3. Objects buried in the ground should be buried flat, with no protruding edges that can reflect or block the microwave signal.
4. The ideal ground cover should be river rock or gravel, with a unit diameter of less than 1.25 inches.
5. Asphalt paved, cemented, dirt, or clay/dirt surfaces are also acceptable, providing that water is not allowed to accumulate or run across the area under rainy conditions. The movement of water can cause changes in the microwave signal which may be interpreted as an intruder moving through the pattern.
6. If the surface is grass, it must be kept cut to a maximum of three inches in height.
7. Never install the MPS-4100 over open water or where standing puddles will form.
8. Avoid elevations, unless the terrain is groomed flat, with adequate drainage so water cannot flow downhill.

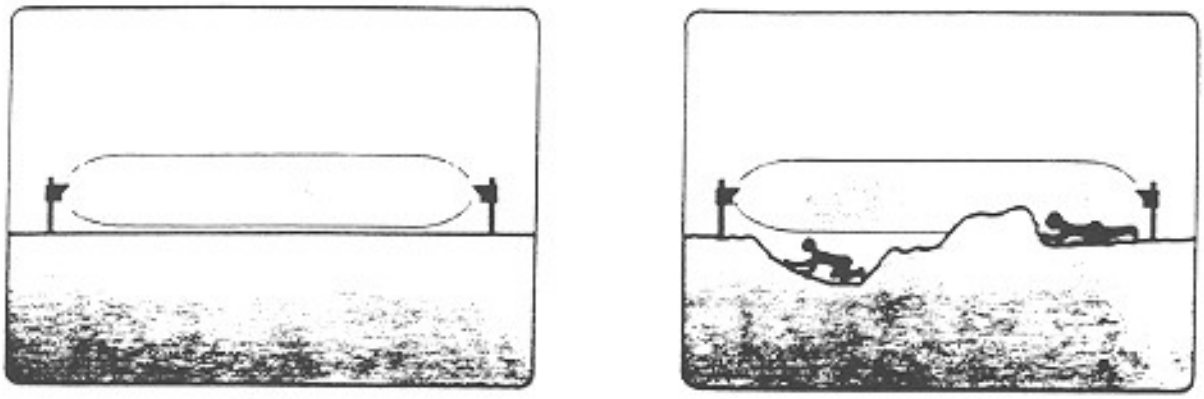

Figure 4. Terrain

C. Microwave Signal Considerations

1. Microwave signals can pass through common construction materials such as glass, plaster and drywall. Microwave signals will reflect off of solid objects and metallic surfaces.
2. Microwave signals will pass through standard chain link fences if the beam axis is at right angles to the fence. The more the fence deviates from being at right angles to the beam, the less signal penetration, and the more reflection.
3. Microwave signals that detect a moving or "flexing" fence, or other large metallic objects, can generate false Alarms. The large size of a metallic object can cause a small amount of motion to appear as a large moving object.
4. When planning to install microwave detectors outside, remember that microwave signals can penetrate exterior walls, detecting the motion of individuals inside of a building, as well as water flowing through room and plumbing drains, thereby generating false Alarms.
5. Additional sources of potential false Alarms are: moving machinery parts, as well as the vibrations caused by machinery, large vehicles such as trucks, buses and aircraft. Electrical and radio equipment such as transformers, fluorescent or "high mast" lighting, radio and cellular Transmitters and repeaters that generate Radio Frequency Interference and Electro Magnetic Interference, and electrical conditions such as lightning, large voltage fluctuations or loss of power.

D. Locating Equipment

1. Choose the location of Transmitters and Receivers that will provide optimum detection, and be free from false Alarms.
2. Always locate Model MPS-4100 within a fenced in or controlled access area to prevent unwanted Alarms from random foot traffic, vehicles, or large animals.
3. Locate units a minimum of 6 to 10 feet away from any fence or wall to eliminate the possibility of jumping over the detection pattern. See Figure 5.

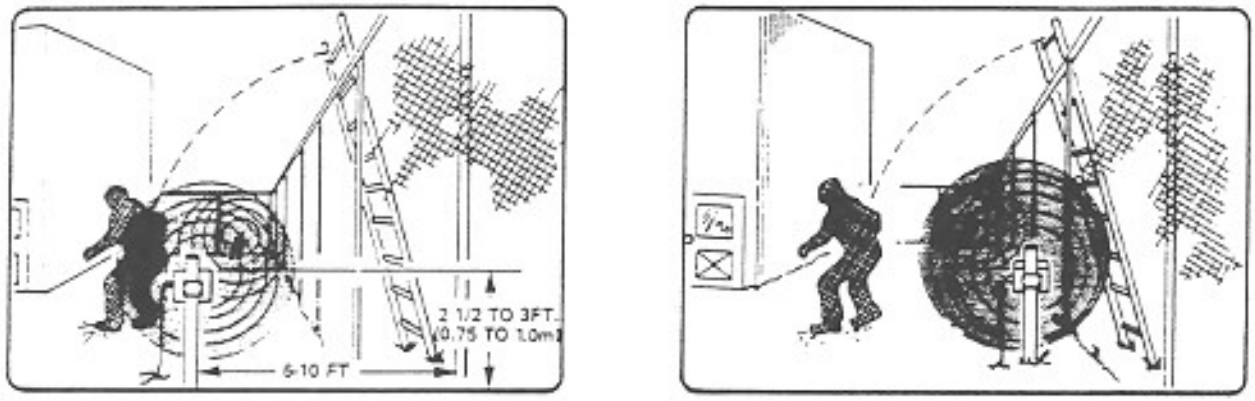

Figure 5. Optimum Security

4. Units should be located where they will be protected from accidental damage as well as Tampering. If units must be installed near roadways or where they will be vulnerable to vehicle traffic, installing devices such as bumper posts can provide additional protection.See Figure 6.

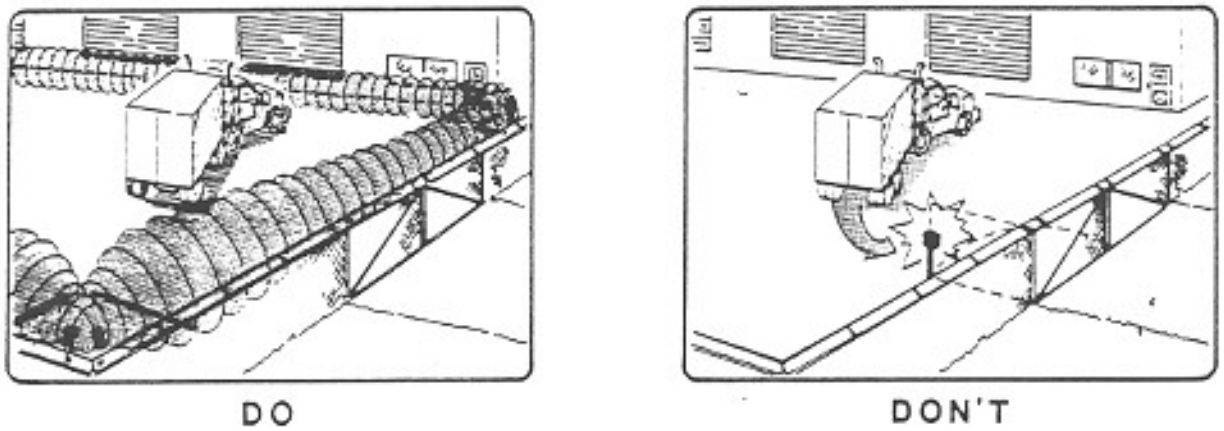

Figure 6. Physical Protection

5. Always place two Transmitters or Receivers at corners and intermediate points of linear zones requiring two or more microwaves. This eliminates the possibility of a Transmitter overpowering a Receiver located in the same corner, which could interfere with the proper operation of that microwave pair. Refer to Figure 7.
6. For maximum security, offset Transmitters and Receivers at intersecting points to prevent dead spots. A 15 foot (4.6M) offset is recommended at corners, and a 30 foot offset at intermediate points where 2 sets of microwaves are installed in a linear configuration. Additionally, the units should be installed 18-20 inches of off center at intermediate points.

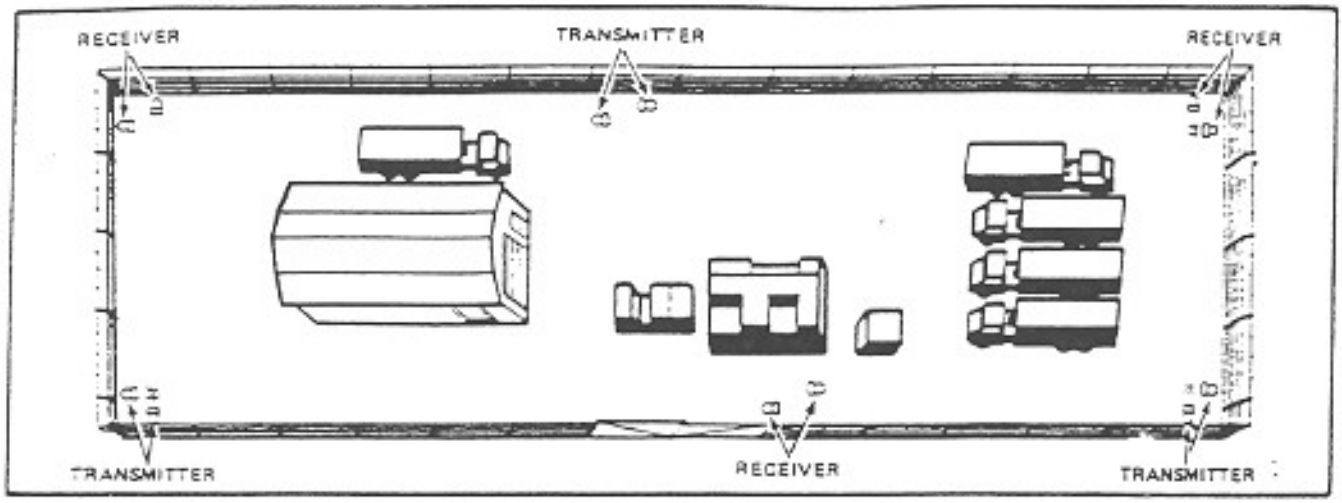

Figure 7. Perimeter Layout

E. Mounting

The following assumes that all posts have been installed, conduit run with junction boxes to each post, and wire pulled through the conduit into each junction box.

Mounting posts should be 4 inch OD pipe fixed in a concrete footing, with enough post above ground to allow 8 inches of vertical adjustment from the initial mounting height, and a minimum of 3 feet (1 meter) below ground. For colder climates the depth should be at least 6 inches below the frost line.

Wire size for power should be sufficient to minimize voltage drop between the power supply and the units. Refer to the chart in figure 9 for recommended wire size based on the load requirements and the length of each wire run.

For data loop wire installation, use the recommended interconnect wiring listed in the MX installation manual. The cable should be 3 pair, individually shielded, twisted, with overall foil and braided shield in a high density polyethylene (HDPE) outer jacketing.

NOTE: Wire must be rated for outdoor direct burial use in wet conditions.

1. Mount Transmitter and Receiver to a 4 inch OD pipe using the pole mount attachment.

2. Attach 3/4 inch flex conduit between the junction box at the base of the post and the conduit connector on the rear cover of the microwave unit.

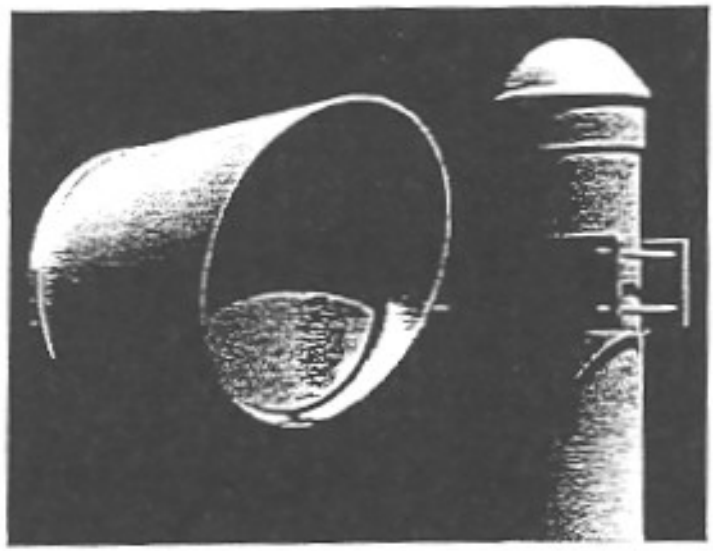

Figure 8 MPS-4100 Pole Mount

WIRE GUAGE (SOLID COPPER PAIR)	VOLTAGE DROP PER 500 FT. (150m) TRANSMITTER OR RECEIVER	VOLTAGE DROP PER 500 FT. (150m) TRANSMITTER AND RECEIVER
#18 AWG. (1.05mm Dia)	.2V	.4V
#20 AWG. (0.82mm Dia)	.3V	.6V
#22 AWG. (0.66mm Dia)	.5V	1.0V
#24 AWG. (0.54mm Dia)	.8V	1.6V
#26 AWG. (0.41mm Dia)	1.2V	2.4V

Figure 9. Voltage Drop vs. Wire Gauge

F. WIRING

There are two methods of wiring the MPS-4100 depending on the type of system being installed the Standard method, and the Multiplex method.

The Standard method provides relay outputs for Alarm and Tamper. The relay outputs can be taken to an Alarm control input.

The Multiplex method connects the MPS-4100 directly into the MX-1000 multiplex data loop. In this format, a second MPS-4100 Transmitter and Receiver can be wired into the "host" Receiver, the Receiver chosen for direct connection to the data loop. Power feeds from the "host" Receiver to the "slave" Receiver and Transmitter, while Alarm and Tamper signals are fed into the "host" Receiver. This configuration allows two sets of MPS-4100's to share one transponder communication card, reporting as 2 zones.

For convenience, all connectors disconnect from the circuit board for convenient wiring and for fast replacement of parts if future servicing is necessary.

CAUTION: DO NOT APPLY POWER UNTIL ALL WIRE CONNECTIONS HAVE BEEN MADE.

Standard method wiring:

Transmitter:

1. Remove the cover of the Transmitter to access the wiring terminals.

2. Connect power wires to TB1-1(+) & 2(-). **Observe polarity**. Power may come from a power supply, or from the Receiver via TB2-1(+) & 2(-).

3. Connect Tamper wires to TB1-3 & 4, NO or NC, switch selectable via switch S1. For NO, set switch 1 to ON, for NC, set switch 2 to ON. An optional 3k ohm EOLR can be added in-line with the NC output via S1. To select, set switch 3 to ON.

4. Tamper output may be wired to the control system, or to the Transmitter Tamper input on the Receiver, terminals TB2-3 & 4 (NC, 3K Ohm input only).

Receiver:

1. If Audio output to external amplifier is used, connect Audio wires to TB1-1(+) & 2(-).

2. Connect power wires to TB1-3(+) & 4(-). **Observe polarity.**

3. Connect Tamper wires to TB1-7 & 8. Select NO or NC via jumper JP3. Optional 3k EOLR in line with the NC output is selectable via jumper JP4.

4. Connect Alarm wires to TB1-9 & 10. Select NO or NC via jumper JP5. Optional 3k EOLR in line with the NC output is selectable via jumper JP6.

5. Connect Transmitter output power wires to TB2-1(+) & 2(-).

6. Connect Transmitter NC Tamper input wires to TB2-3 & 4. This input requires a 3k ohm EOLR. Turn S1 switch 3 to ON at the Transmitter.

Wiring to MX-1000 data loop.

Transmitter:

1. Connect power wires to TB1-1(+) & 2(-). **Observe polarity**. Power may be supplied from a power supply, or from the Receiver auxiliary power terminals on TB2.

2. Connect Tamper wires to TB1-3 & 4. Select NC via S1 switch 2. Select 3k ohm EOLR via switch 3. The Tamper circuit connects to TB2 on the Receiver.

Receiver:

The Receiver has 3 terminal boards, TB1, TB2, and TB3 that will be used when wiring to the MX multiplex data communications loop. One Receiver must be selected as the "host" for up to two sets of MPS-4100. A second MPS-4100 unit wires into the host Receiver as a "slave", allowing 2 sets to share one multiplex communications transponder thereby maximizing the capability of the MX control data loop. The host Receiver will be wired slightly different than the slave Receiver. The slave Transmitter wires into the slave Receiver just as the host Transmitter does to the host Receiver. Refer to above instructions for wiring the slave Transmitter.

Host Receiver:

1. Connect the Audio pair from the 3 pair shielded data communications cable to TB1-1(+) & 2(-). See note below regarding shield terminations.

2. Connect the power wires to TB1-3(+) & 4(-). **Observe Polarity**.

3. Wire the data loop pair from the 3 pair cable to the data input terminals TB1-5(+) & 6(-). See note below regarding shield terminations.

4. Power for the slave MPS-4100 and host Transmitter may be wired into TB2-1 & 2.

5. Connect the Tamper wires from the host Transmitter to TB2-3 & 4 (NC, 3k input only).

6. Plug the communications transponder into the pin connector. Be sure the address has been set.

Note: There are no terminals for the individual-pair shields, or the overall shield. If one data cable is wired into the microwave enclosure (ie end of data looop), all shields should be clipped and taped off. If there is an incoming and outgoing, data cable, carefully splice each individual incoming and outgoing shield and tape off. The overall shield must be spliced and taped as well. **DO NOT ALLOW THE INDIVIDUAL PAIR SHIELDS TO TOUCH EACH OTHER**

The "slave" Receiver inputs for Alarm, Tamper, Self-Test and Audio all wire to TB3 on the host Receiver as follows:

7. Connect the Audio pair to TB3-1(+) & 2 (-).

8. Connect the Self-Test high (+) output to TB3-3.

9. Connect the Tamper input to TB3-4.

10. Connect the Alarm input to TB3-5.

11. Connect the common for Self-test, Tamper and Alarm to TB3-6.

Slave Receiver Connections:

All connections from the slave Receiver to the host can be made via a 3 pair cable as follows:

1. Apply power to TB1-3(+) & 4(-). **Observe polarity.**

2. Wire Self-Test to TB1-5(+) & 6(-).*

3. Connect Tamper wires to TB1-7 & 8.* Select NC, 3K ohm EOLR output via JP3 & 4.

4. Connect Alarm wires to TB1-9 & 10.* Select NC, 3k ohm EOLR output via JP5 & 6.

5. Connect Audio output to the slave output terminals TB3-1(+) & 2(-). **Do not use the TB1 Audio terminals for a slave Receiver.**

*Self-Test, Tamper, and Alarm Return are commoned together on one wire.

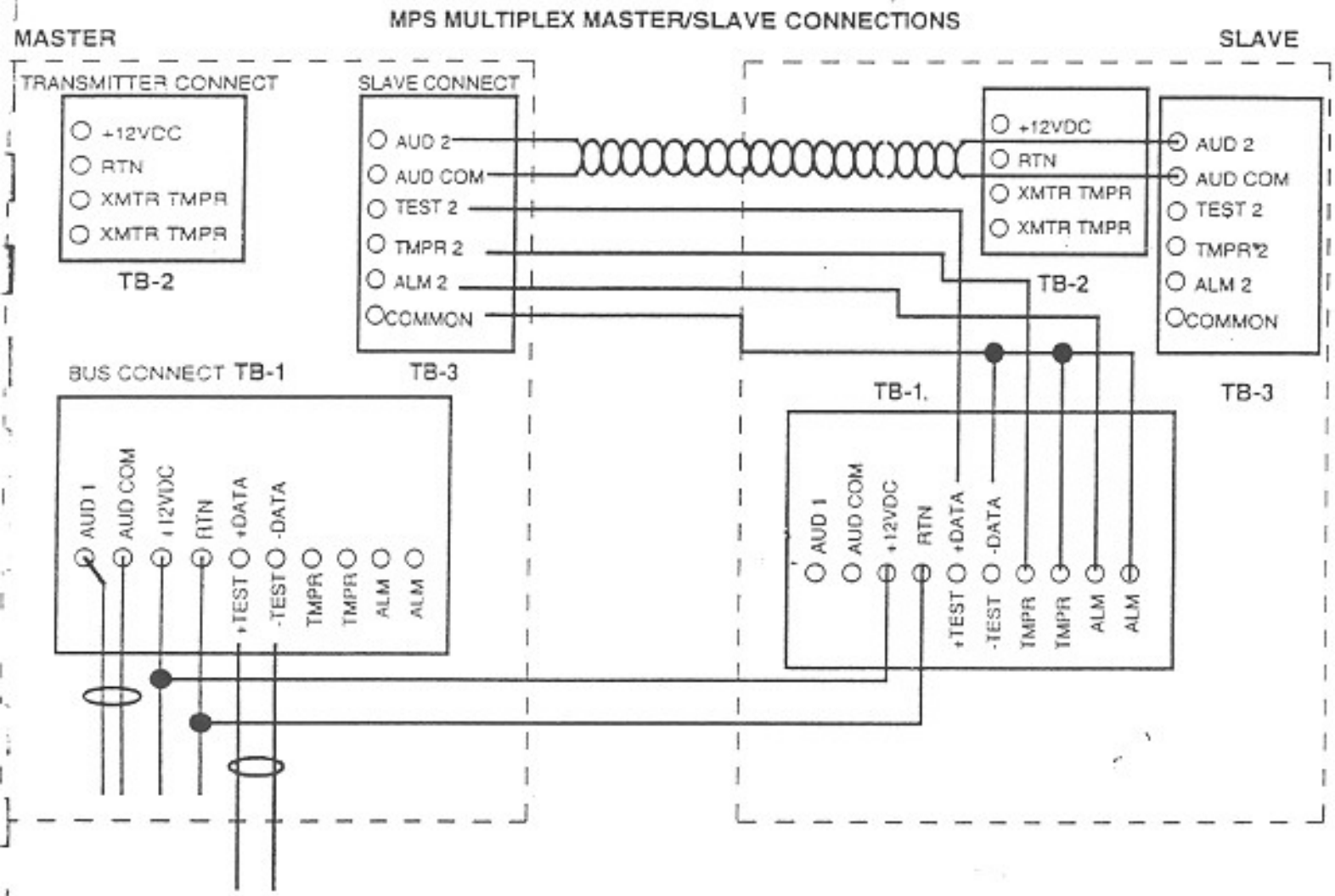

Figure 10. MPS Mutliplex Master/Slave Connections

G. Setting switches to configure the MPS-4100

The Transmitter contains two 6-position dipswitches, S1 and S3. The Receiver contains two 6-position dipswitches, S1 and S2. After wiring is completed, configure the MPS-4100 by setting the appropriate dipswitches as follows:

Transmitter:

S1
1 - ON enables Modulation Frequency 1. OFF disables
2 - ON enables Modulation Frequency 2. OFF disables.
3 - ON enables Modulation Frequency 3. OFF disables.
4 - ON enables Modulation Frequency 4. OFF disables.
5 - ON enables Modulation Frequency 5. OFF disables.
6 - ON enables Modulation Frequency 6. OFF disables.

S3
1 - ON selects NO Tamper output. OFF disables output.
2 - ON selects NC Tamper output. OFF disables output.
3 - ON adds 3k Ohm EOLR in-line with NC output. OFF shunts EOLR.
4 - ON enables relay output on Tamper. OFF disables relay output.
5 - ON enables Auto Shut-Off power interrupt on Tamper. OFF disables.
6 - ON enables Auto Shut-Off power interrupt on Tamper. OFF disables.

Receiver:

S1
1 - ON connects MPS-4100 to MX data loop. OFF for Standard operation.
2 - ON enables Self-Test in Standard mode. OFF disables.
3 - ON connects MPS-4100 to MX data loop. OFF for Standard operation.
4 - ON enables Self-Test in Standard mode. OFF disables.
5 - ON connects Tamper to MX data loop. OFF for Standard output.
6 - ON connects Tamper to MX data loop. OFF for Standard output.

S2
1 - ON enables Audio. OFF disables.
2 - ON enables Audio output via slave terminals. OFF for normal output via TB1.
3 - ON enables Alarm output on Jam condition. OFF no Alarm on Jam.
4 - ON supplies power to all internal LED's. OFF shuts off power to LED's.
5 - ON supplies power to Alarm relay. OFF disables Alarm relay.
6 - Not Used.

JP1		JP2		
	R41		R40	Enables Modulation Frequency 1
	R43		R42	Enables Modulation Frequency 2
	R45		R44	Enables Modulation Frequency 3
	R47		R46	Enables Modulation Frequency 4
	R49		R48	Enables Modulation Frequency 5
	R51		R50	Enables Modulation Frequency 6

POWER UP & ALIGNMENT.

Once wiring has been completed and checked for correct terminations, power can be applied and the alignment calibrated. Alignment can be calibrated by observing the Alignment LED's LD2 - LD11 on the Receiver. Circuit Board. An optional DC reading can be obtained by connecting the leads of a voltmeter to TP_(+) and TP_Ground.

A Power Up

1. Turn on power to MPS-4100 at power supply.

2. Check the Power LED on Transmitter.
   a. If it is not illuminated, disconnect power and re-check wiring.

3. Check The LED's on the receiver.
   a. If no LED's are illuminated, disconnect power and re-check wiring.
   b. If the Alarm LED is illuminated, the Transmitter and Receiver need to be aligned.
   c. If the Wrong Channel LED is illuminated, check for correct modulation frequency match with Transmitter. Change the to match Transmitter if required.
   d. If the JAM LED is illuminated, check for possible interference with another MPS-4100 of the same modulation frequency. Change the modulation frequency if necessary.

B Alignment

Alignment is easier, faster, and more accurate if done with 2 persons, one at the Transmitter and the Receiver.

1. Adjust the vertical and horizontal positioning of the Receiver enclosure pivoting the unit up and down, and side to side. . Observe the Alignment LED's LD2 - LD11. The green LED's LD4 -LD11 indicate the acceptable alignment level. The higher the LED number, the better the alignment. When the highest alignment level has been obtained, secure the Receiver in place.

2. Adjust the vertical and horizontal positioning of the Transmitter to see if the alignment can be improved. It is necessary for the person monitoring the LED's at the Receiver to be the "eyes" for the person at the Transmitter, and keep them informed of any improvement or deterioration of the present level as real-time as possible. This may be done via 2-way radios, or hand signals. When finished, secure in place.

3. Make final adjustments at the Receiver to see if the signal can be improved further after the Transmitter has been adjusted. Secure in place.

4. Alignment is complete.

If the adjustment of both the Transmitter and Receiver does not improve the alignment, and the present level is either in the Red, Yellow or lower Green LED's, it may be necessary to move the Receiver, Transmitter, or both, up or down on their mounting pole. Begin at either end, and repeat steps 1-3. Continue with the opposite end until sufficient improvement is made.

Note: Proper alignment is critical to the reliable operation of the MPS-4100. A poorly aligned MPS-4100 can create nuisance alarms. This can reduce the confidence level, and thereby the effectiveness of the system.

C Final Testing and Adjustment.

1. Verify that all indicator LED's are off, and that the Alarm relay is in non-alarm state.

2. Move hands or body in front of the Receiver to test for proper detection. Look for the Alarm LED to illuminate, and listen for the relay to activate. Verify receipt of Alarm at Control Center.

3. Walk along the outside edge of the pattern to determine the pattern width. Remember that pattern width is a function of the Sensitivity control. The higher the sensitivity, the wider the detection pattern will be. Conversely, the lower the sensitivity, the narrower the detection pattern.

4. To increase sensitivity, turn the Sensitivity Pot clockwise. To decrease, turn counter-clockwise.
5. Walk into the microwave field at various points to check for proper detection.

5. Consult the project specifications for additional detection tests and perform as required.

FCC STATEMENT

NOTE: 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 accordance with the instructions, 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 off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION: Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.