ARMY TECHNICAL MANUAL **TM 5-6350-264-14-1**
NAVY PUBLICATION **NAVELEX EE181-AA-INM-020/**
E121J-SIIDS INS
AIR FORCE TECHNICAL ORDER **T.O. 31S9-4-1-201**

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

INSTALLATION, OPERATION, AND CHECKOUT PROCEDURES FOR JOINT-SERVICES INTERIOR INTRUSION DETECTION SYSTEM (J-SIIDS)

This copy is as reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE

19 MAY 1983

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E121J-SIIDS INS
T.O. 31S9-4-1-201
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CHANGE
NO. 1

HEADQUARTERS DEPARTMENTS OF
THE ARMY, NAVY, AND AIR FORCE
WASHINGTON, D.C., 30 January 1987

Operator, Organizational, Direct Support and General Support
Maintenance Manual

Installation, Operation, and Checkout Procedures
For

JOINT-SERVICES INTERIOR INTRUSION
DETECTION SYSTEM (J-SIIDS)

TM 5-6350-264-14-1, 19 May 1983, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
2-1 and 2-2	2-1 and 2-2
2-5 and 2-6	2-5 and 2-6
2-79 and 2-80	2-79 and 2-80

2. Retain this sheet in front of manual for reference purposes.

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DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Operator, Organizational, Direct Support and General Support Maintenance Requirements for Detection System, Joint Service, Interior Intrusion (JSIIDS).

WARNING

NOISE HAZARD

The Audible Alarm presents a noise hazard to personnel In the area. The noise level exceeds the allowable limits for unprotected personnel. Authorized protective equipment must be worn by all personnel in the work area. If the Audible Alarm is installed, It must be disabled BEFORE any troubleshooting procedures are attempted. Disable the alarm by setting the key-operated switch on Control Unit to TEST/RESET position, opening Audible Alarm, removing faceplate, and turning off power switch. After troubleshooting the Audible Alarm must be reactivated. Activate the Alarm by setting the key-operated switch on Control Unit to TEST/RESET position, turn Alarm power switch on, replace faceplate, close and lock Audible Alarm door. Turn key-operated switch on Control Unit to SECURE or ACCESS.

WARNING

RADIATION HAZARD

The Data Transmitter and Data Receiver contain trace amounts of radio-active isotope, Promethium 147. The minute amount of ionizing radiation from Pm 147 is no health hazard when the equipment is installed or in storage; however, If it is necessary to dispose of a Data Receiver or Data Transmitter, the procedures specified in AR755-15 must be observed.

WARNING

HIGH VOLTAGE

High voltage is used in the operation of this equipment. Death on contact may result if personnel fall to observe safety precautions A 115-volt ac potential may cause death under certain conditions; therefore, precautions should be taken at all times. Be careful not to contact connections for 115-volt ac input when installing or repairing this equipment. Never work on electronic equipment unless there is another person nearby who is familiar with the hazards of the equipment and who is competent in administering first aid.

WARNING

HYDROGEN GAS

The Monitor Cabinet contains a rechargeable battery which may generate ignitable amounts of hydrogen gas if certain failures occur. This is a potential safety hazard. Do not smoke when opening the door. After opening, allow the unit to ventilate with the door open for 2 minutes before turning off the Power Switch or performing any other maintenance action. If excessive heat or fumes of any nature are being emitted from the Monitor Cabinet, immediately open the enclosure door and ventilate for 2 minutes before performing any maintenance action.

DEPARTMENT OF THE ARMY TECHNICAL MANUAL **TM 5-6350-264-14-1**
DEPARTMENT OF THE NAVY PUBLICATION **NAVELEX EE181-AA-INM-020/ E121J-SIIDS INS**
DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER **T.O. 31S9-4-1-201**

HEADQUARTERS
DEPARTMENTS OF THE ARMY, NAVY, AND AIR FORCE
WASHINGTON, D.C. **19 May 1983**

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

INSTALLATION, OPERATION, AND CHECKOUT PROCEDURES FOR JOINT-SERVICES INTERIOR INTRUSION DETECTION SYSTEM (J-SIIDS)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. ARMY: Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Troop Support & Aviation Materiel Readiness Command, ATTN: DRSTS-MPSD, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished directly to you. AIR FORCE: Completed AFTO Form 22 (Technical Order Publication Improvement Report and Reply) should be forwarded to: HQ, SA-ALC/MMEDT, Kelly AFB, TX 78241. NAVY: Completed DA Form 2028 (Recommended Changes to Publications and Blank Forms), User Activity Technical Manual Comment Sheet, Feedback Report, or other suitable reporting form should be mailed to: Naval Electronics Systems Command Training and Publications Management Office, ATTN: ELEX, Code 1122, Washington, D.C., 20360.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. SCOPE.
The purpose of this manual is to provide procedures for installation, operation, and maintenance of the Joint-Services Interior Intrusion Detection System (J-SIIDS). Maintenance of individual components is addressed in each individual component technical manual. This manual provides those responsible for the installation and maintenance of J-SIIDS with sufficient information to install components of J-SIIDS and troubleshoot the system after installation. Operating instructions are provided for those responsible for opening and securing the protected area and for those responsible for attending the Monitor Cabinet. For information on the major assemblies of J-SIIDS, refer to the applicable manual listed in appendix A.

1-2. MAINTENANCE FORMS AND RECORDS.
Equipment maintenance forms and procedures for their use are contained in TM 38-750, The Army Maintenance Management System (TAMMS).

1-3. ADMINISTRATIVE STORAGE.
Instructions for administrative storage are contained in TM 740-90-1.

1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.
Instructions for the destruction of Army material to prevent enemy use are contained in TM 750-244-3.

1-5. QUALITY ASSURANCE/QUALITY CONTROL.
There are no Quality Assurance/Quality Control technical manuals applicable to this equipment.

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).
EIR's will be prepared on Standard Form 368 (Quality Deficiency Report). Instructions for preparing EIR's are provided in TM 38-750. EIR's should be mailed directly to Commander, U S. Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MEM, 4300 Goodfellow Blvd., St. Louis, Missouri 63120. A reply will be furnished directly to you.

1-7. EQUIPMENT SERVICEABILITY CRITERIA (ESC).
This equipment is not covered by an ESC.

Section II. DESCRIPTION AND DATA

1-8. PURPOSE AND USE.
The purpose of the J-SIID System is to detect actual and attempted intrusion into protected areas. The J-SIID System is intended primarily for use in arms rooms and other munitions storage areas. The system may be used in other areas requiring protection from either external intrusion or internal (stay-behind) personnel, where the installation environment is similar to that of arms or munitions storage areas.

1-9. DESCRIPTIONS
a. General. The J-SIIDS (figure 1-1) consists of a family of interior intrusion sensors, a duress sensor, a Control Unit (CU), a Monitor Cabinet (MC), Status Monitor Modules (SMM), a Data Transmission System (DTS), and an audible Alarm (AA). The various intrusion sensors detect penetration through boundaries of the protected area, intruder motion in the protected area, or removal of or proximity to a protected item. The duress sensor allows personnel in the protected area to notify individuals at the Monitor Cabinet that assistance is required. The Control Unit supplies primary and emergency power for all sensors, controls the mode of system operation, controls activation of the Audible Alarm, and supplies system alarm and status conditions for transmission

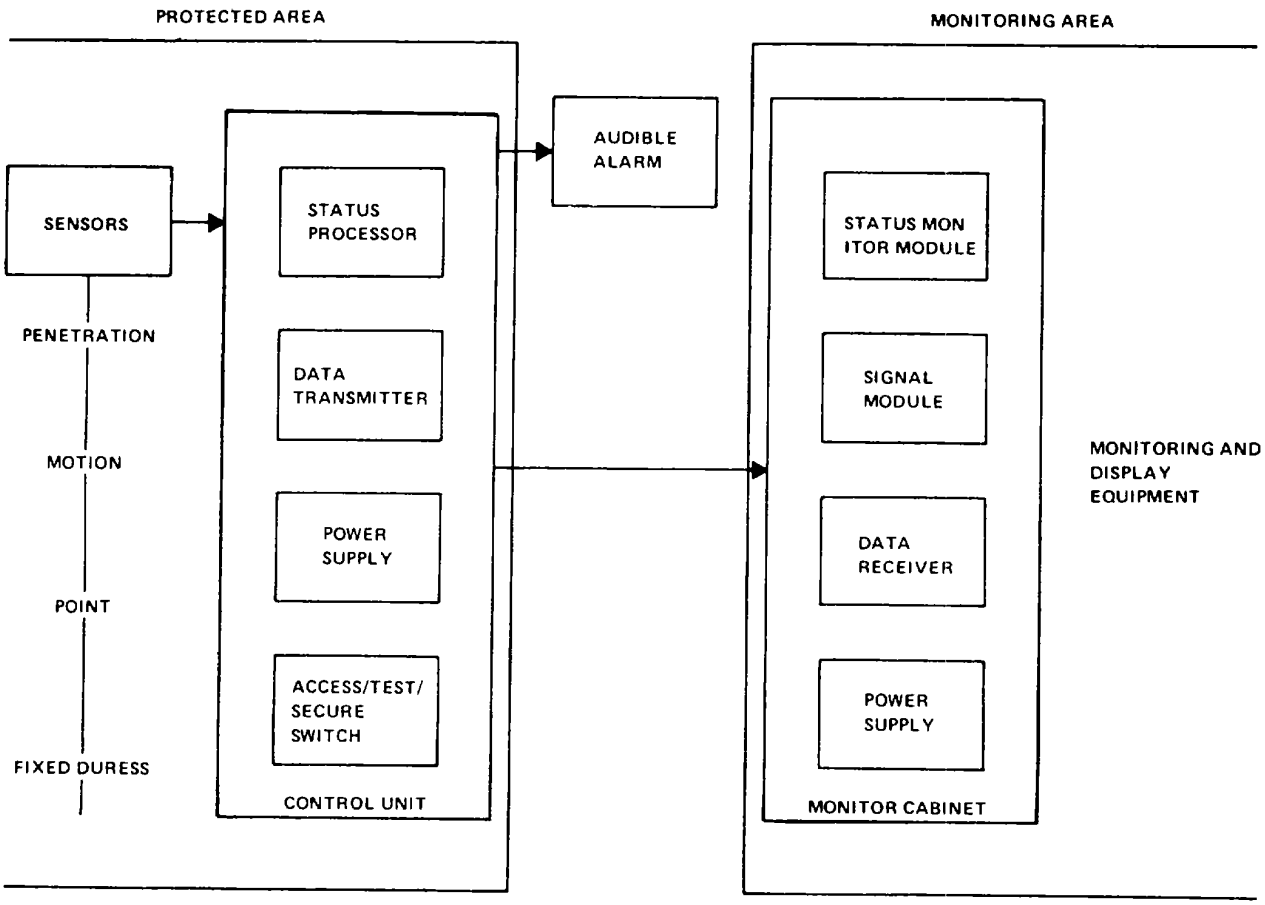


Figure 1-1. Joint-Services Interior Intrusion Detection System Concept Diagram

to the monitor modules. The Audible Alarm, located at the protected area, provides notification to those near the protected area that an intrusion or tamper has occurred. The Audible Alarm does not sound when the duress sensor is activated. The Data Transmission System transmits system alarm and status conditions from the Control Unit to a monitor module in a Monitor Cabinet. The Status Monitor Module displays alarms, mode of system operation, and status of ac power at the protected area. The Monitor Cabinet houses the monitor modules, displays status of Monitor Cabinet ac power, and provides an audible tone indicating any changes in system status. For a system to function; it must include at least one sensor, one Control Unit, and either a Monitor Cabinet with monitor module and/or an Audible Alarm. However, two or more sensors should be used to provide security.

b. System Theory of Operation. The J-SIIDS uses a difference of impedance in the output of the sensors to distinguish between an alarm and a no-alarm condition. Basically, each sensor contains a switch that is closed to present a low impedance (less than 2,000 ohms) output to the CU in a no-alarm condition and is opened to provide a high impedance (over 100,000 ohms) output in an alarm condition. When the necessary requirements to activate a sensor are met, that sensor's output to the CU changes to a high impedance. The CU processes this information and, depending upon the mode of operation, can present this status information to the Monitor Cabinet for display and/or to the AA for an audible indication.

c. Modes of System Operation. There are three modes of system operation as follows:

(1) Secure. The J-SIID System is operated in the secure mode when the protected area is secured. In this mode, all alarms (intrusion, tamper, and duress) are processed and presented to the monitor modules. All alarms except the duress alarm are presented to the Audible Alarm. An adjustable exit time delay is provided to allow authorized personnel to place the system in the secure mode of operation and leave the protected area without sounding the Audible Alarm.

(2) Access. The system is operated in the access mode when the area is open to authorized personnel. In this mode, all intrusion alarms are inhibited from being presented to either the monitor modules or the Audible Alarm. Tamper and duress alarms are presented to the monitor modules, but only tamper alarms are presented to the Audible Alarm. An adjustable entrance time delay is provided to allow authorized personnel to enter the protected area and place the system in the access mode of operation without sounding the Audible Alarm.

(3) Test/Reset. The test/reset mode is used when maintenance is being performed on the system. All alarms are inhibited from the Audible Alarm but are presented to the monitor modules. Upon receipt of an alarm input, an audible signal in the Control Unit is activated for 10 seconds as an aid to the J-SIID System testing. Momentarily placing the system in test/reset mode will reset and silence the Audible Alarm and under certain conditions will reset alarm transmission to the monitor modules.

d. Alarm Display Options. Selectable by choice of Control Unit alarm output wiring options and the selection of latch/non-latch circuitry in the Control Unit, alarm signals may be presented to the monitor modules in any of the following four ways:

(1) Instantaneous Alarm Option. In the secure mode of operation, all alarm inputs to the Control Unit are instantaneously presented at the Control Unit alarm outputs for transmission to a monitor module. The Control Unit will continue to output an alarm for 10 seconds after the alarm input has ceased.

(2) Non-latched Delayed Alarm Option. In the secure mode of operation, all intrusion alarm outputs are delayed for an adjustable interval of 8 ±2 to 90 ±10 seconds This entrance delay permits authorized personnel to enter the protected area and change from secure to access mode without presenting an alarm at the monitor module. An adjustable exit time delay permits personnel to leave the protected area after changing from access to secure mode without presenting an alarm at the monitor module. After expiration of the exit time delay, intrusion alarms to the Control Unit are presented at the unit's output terminals for transmission to the monitor module. The Control Unit will continue to output an alarm for 10 seconds after the alarm input has ceased. Tamper and duress alarm outputs are not affected by the time delays. They are instantaneous.

(3) Latch Delayed Alarm Option. This alarm option is identical to the non-latched delayed alarm option except that alarm outputs to the monitor module are latched. Using this option, the monitor module can be reset only after the test/reset mode has been momentarily selected.

(4) Instantaneous Alarm with Latched Delayed Alarm Option. In the secure mode of operation, intrusion alarm inputs to the Control Unit occurring prior to expiration of the entrance time delay are instantaneously transmitted to the monitor module to which the Control Unit is connected. If the access mode is not selected prior to expiration of the entrance time delay, the Control Unit

will transmit another alarm which will continue until reset by momentarily switching the system to the test/reset mode. After switching to the secure mode, intrusion alarms generated by personnel securing the area will be instantaneously presented at the Control Unit alarm outputs. This alarm output will continue for 10 seconds or until the alarm input has disappeared, provided an alarm input is not present upon expiration of the exit time delay. If an alarm input is still present upon expiration of the exit time delay, the Control Unit will transmit another alarm which will continue until reset. Tamper and duress alarms are transmitted instantaneously.

NOTE

If an Audible Alarm is installed, it will input a tamper alarm to the Control Unit while sounding. This will prevent the alarm output from disappearing after 10 seconds, and thereby cause the Control Unit to output a continuous alarm condition for transmission to the Monitor Module. The Control Unit and the Audible Alarm must then be reset by switching the system to test/reset, thereby silencing the Audible Alarm and allowing the Monitor Module to be reset.

e. Description of System Components. The individual components which are interconnected to form a J-SIIDS are described in the following paragraphs.

(1) Control Unit. The Control Unit (figure 1-2) contains the primary and backup power supply for system operation at the protected area and contains circuitry to recognize and process system status and alarm conditions for transmission to the Audible Alarm and/or Monitor Module. It will accept inputs from one to five intrusion detectors and one duress alarm. Transfer to emergency power supply is automatic and instantaneous if ac power fails. In the event of ac power failure at the Control Unit, ac power to the Audible Alarm will be discontinued The emergency power supply (battery) is on continuous float charge when ac power is present at the Control Unit. The Control Unit houses the Data Transmitter, if used. A momentary action pushbutton switch is provided in the Control Unit to synchronize the Data Transmitter and Data Receiver if a Transmission System is used. A high-security keylock switch is provided on the front of the Control Unit to set the mode of system operation A high-security keylock is provided on the front of the Control Unit door to deter unauthorized opening. When the door is opened, a tamper switch is activated and a tamper alarm is generated. A white light is provided on the front of the Control Unit to indicate the presence of ac power to the unit.

(2) Monitor Cabinet. The Monitor Cabinet is the primary notification device of the J-SIID System. The Monitor Cabinet interfaces with the Control Unit via hardwiring or the Data Transmission System. The Monitor Cabinet houses a Signal Module, which reports the status of the Monitor Cabinet ac power, and gives an audible signal when system status changes, and Status Monitor Modules which report the status of the protected area. The Signal Module ACKNOWLEDGE switch is used to acknowledge interruption of the Monitor Cabinet ac power which is indicated by the flashing of the white lights on the front of the Signal Module. The Monitor Cabinet has self-contained primary and backup power supplies. Transfer to backup power is automatic and instantaneous if ac power fails. The backup power supply (battery) is on continuous float charge when ac power is present at the Monitor Cabinet. The Monitor Cabinet, also houses the Data Receivers which, if used, are plugged into the Status Monitor Modules. Three configurations of Monitor Cabinets are available: a single-zone (figure 1-3) with provisions for one plug-m module, a five-zone (figure 1-4) with provisions for one to five monitor modules, and a twenty-five-zone (figure 1-5) with provisions for one to twenty-five monitor modules.

(3) Status Monitor Module. The Status Monitor Module (figure 1-6) displays system status: Alarm, Secure/Access, and Control Unit AC Power. System status conditions are displayed by means of indicator lights which flash if the status changes. Each status change is accompanied by an audible tone from the Monitor Cabinet Signal Module. A switch (reset/acknowledge) on the front of each monitor module is used to silence the Monitor

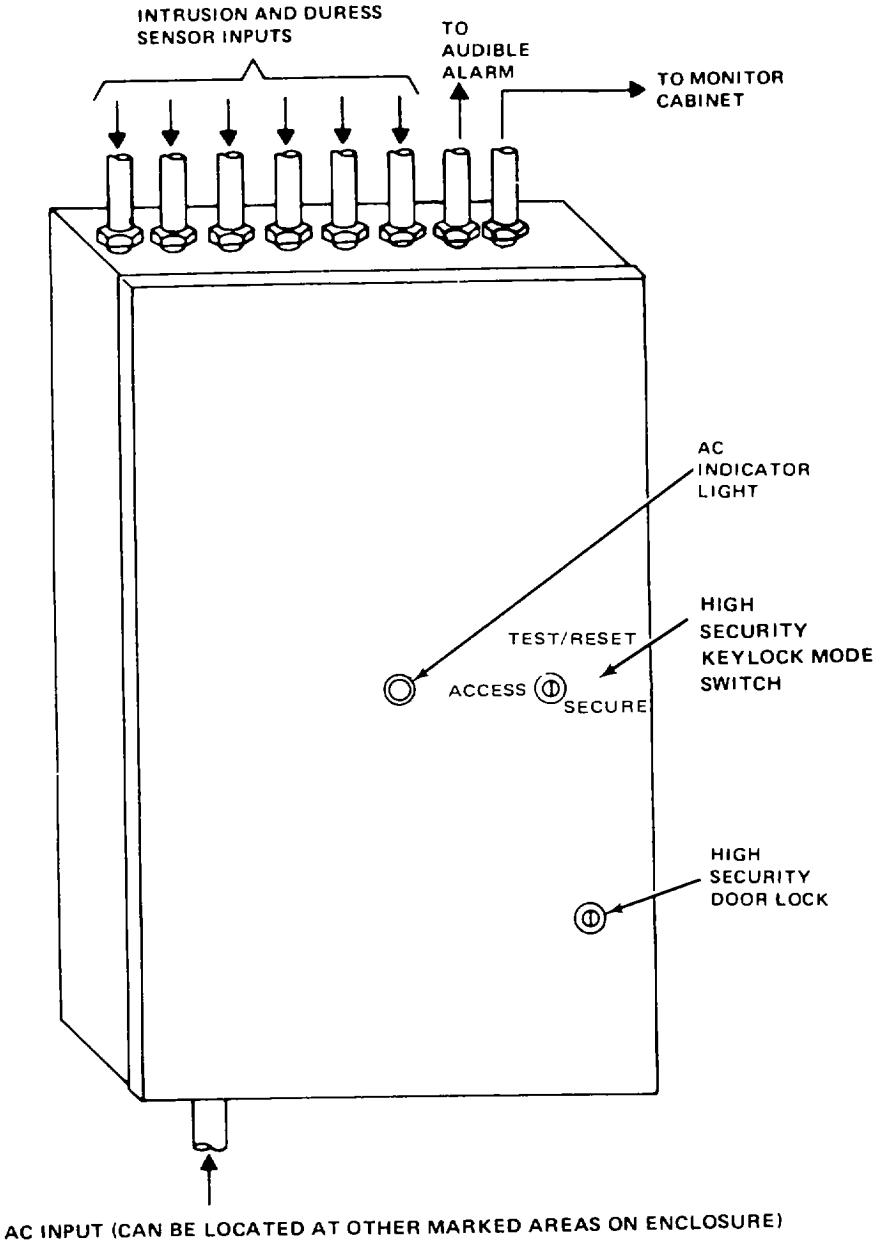


Figure 1-2. Control Unit

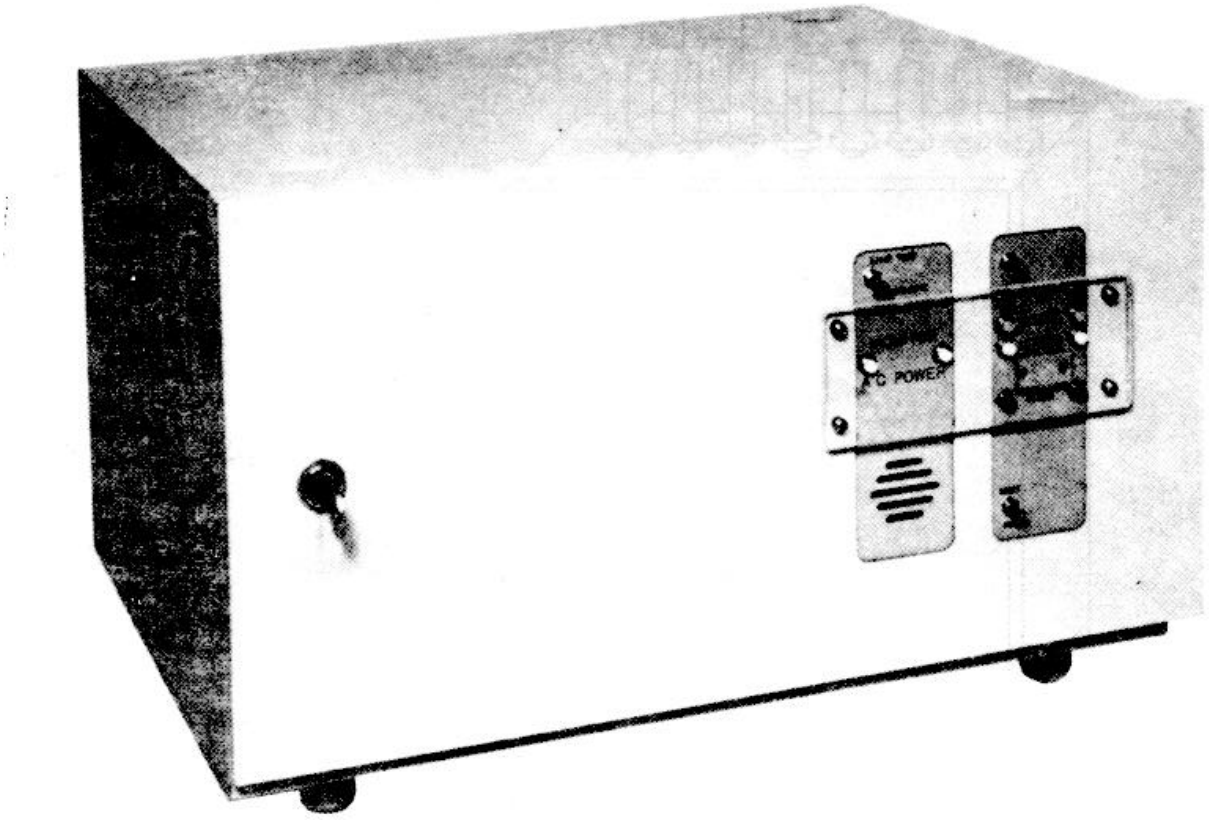


Figure 1-3. Monitor Cabinet (One zone)

Cabinet audible tone and extinguish the flashing indicator lights on the monitor module. The RESET/ACK switch is also used to reset Alarm lights after the alarm input to the monitor module has stopped. A Lamp Test switch on the front of each monitor module is used to test the indicator lights. The indicator lights are color coded as follows:

Green - Secure

Amber - Access

Red - Alarm

White - AC Power

The status Monitor Modules interface with the Monitor Cabinet by means of plug-in connections. The monitor modules have an additional connector for interfacing with the Data Receiver.

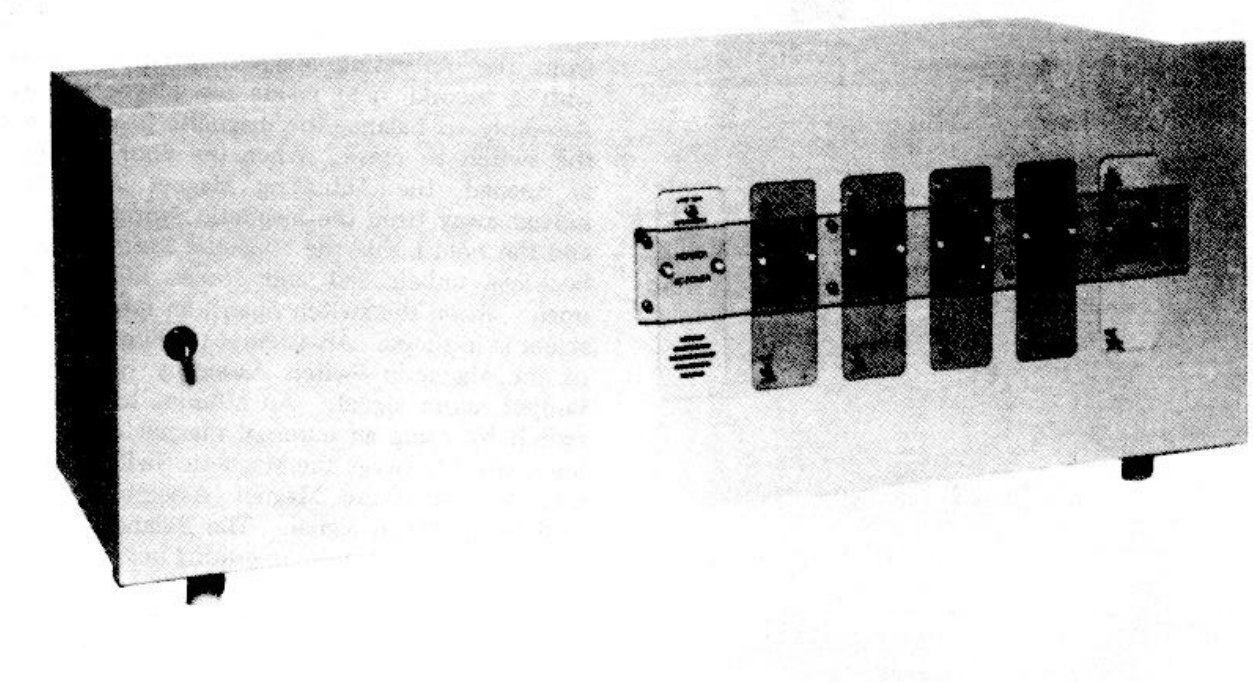


Figure 1-4. Monitor Cabinet (Five-zone)

(4) Data Transmitter and Data Receiver. The Data Transmitter and Data Receiver (figure 1-7) are used to provide secure transmission of system and alarm information between a Control Unit and a monitor module. The Data Transmitter is mounted in the Control Unit and the Data Receiver is connected to a monitor module mounted in the Monitor Cabinet (figure 1-8). The Data Transmitter and Data Receiver will operate over a maximum of 10 miles of 600-ohm, 2-wire, balanced transmission line or over telephone systems using dedicated voice-grade lines. The Data Transmitter continuously transmits the alarm status of the protected area, the status of ac power at the Control Unit, and the system mode of operation. This information is encoded prior to transmission. The Data Receiver decodes this information and presents it to a monitor module for display. Secure signal transmission is achieved through the use of coded sequence generators in the Data Transmitter and Data Receiver.

(5) Audible Alarm. The Audible Alarm (figure 1-9) is used to alert personnel in the vicinity of a protected area to an alarm in that area. Using primary power, the AA will generate an output of approximately 108 dB. It can be heard out-of-doors at distances up to 500 feet (152.4 m). The Audible Alarm interfaces directly with the Control Unit via hardwire connections. Primary ac power and system status to the Audible Alarm is provided through the Control Unit. The alarm contains an emergency power supply (battery) and a battery charger. The emergency power supply can provide the power for an audible alarm at a level of 95 dB for a minimum of 15 minutes. The Audible Alarm is normally mounted on the exterior wall of a building (figure 1-10). Because of its location, the Audible Alarm is relatively vulnerable; therefore complete protection against tampering is provided. Prying the Audible Alarm 1/8 to 1/4 inches (0.3175 to 0.635 cm) away from its mounting surface, opening the outer enclosure door, or short-circuiting the outer enclosure to the inner

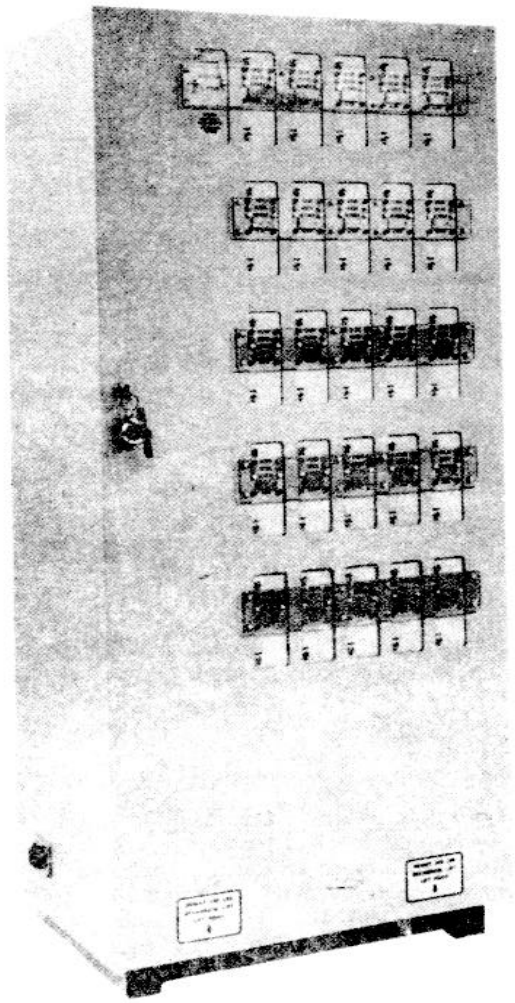


Figure 1-5. Monitor Cabinet (Twenty-five-zone)

enclosure will generate a tamper alarm to the Control Unit and cause the Audible Alarm to sound.

(6) Balanced Magnetic Switch. The Balanced Magnetic Switch (figure 1-11) detects penetration through the boundary of the protected area by detecting the opening of a secured door or window. It consists of a Magnetic Switch Assembly and an Actuating Magnet Assembly. The Magnetic Switch Assembly mounts on the door or window frame, and the Actuating Magnet Assembly mounts on the door or window as shown in figure 1-12. When the door or window is closed, the field from the Actuating Magnet Assembly interacts with a second field inside the Magnetic Switch Assembly to balance the magnetic field and allow the switch to close. When the door or window is opened, the Actuating Magnet Assembly is moved away from the Magnetic Switch Assembly, and the field inside the Magnetic Switch Assembly becomes unbalanced and forces the switch to open. When the switch opens, an intrusion alarm signal is initiated. An attempt to remove the cover of the Magnetic Switch Assembly will initiate a tamper alarm signal. An attempt to disable the switch by using an external magnet or by inserting a shield between the Magnetic Switch Assembly and the Actuating Magnet Assembly also will initiate an alarm signal. The Balanced Magnetic Switch does not require operating power.

(7) Capacitance Proximity Sensor (CPS). The CPS (figure 1-13) is designed to detect intruder penetration through windows, ventilators, and other similar openings and to detect removal or attempted removal of protected items from metal storage containers (figure 1-14). If the sensor is used as a penetration sensor; the window, ventilator, or similar opening must be covered with a metal grill insulated from electrical ground. The grill is not supplied with the sensor and cannot be ordered. The grill must be manufactured locally from such conducting materials as metal fencing or expanded metal. Coaxial cable is supplied with the sensor to connect the grill or protected container to the signal processor. Opening or shorting this cable will initiate a tamper alarm signal. As much as 1,200 square feet (111.48 sq. m) of protected metal surface may be connected to a signal processor. The sensor continuously monitors the net capacitance between the metal and a reference ground. When an intruder closely approaches or touches the protected metal, the capacitance between the metal and ground is changed. This change in capacitance is sensed by the signal processor and an alarm is generated. An attempt to open the cover on the CPS will initiate a tamper alarm signal. The sensor is designed such that slow changes in capacitance, caused by normal changes in environmental conditions, will not cause an alarm to be generated. Operating power is supplied by the Control Unit.

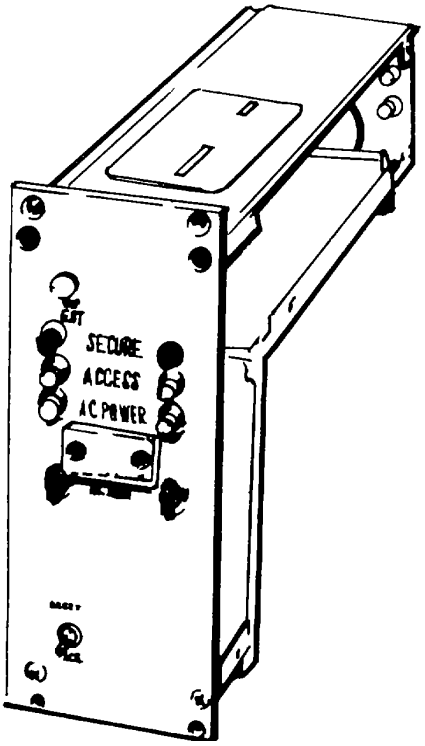
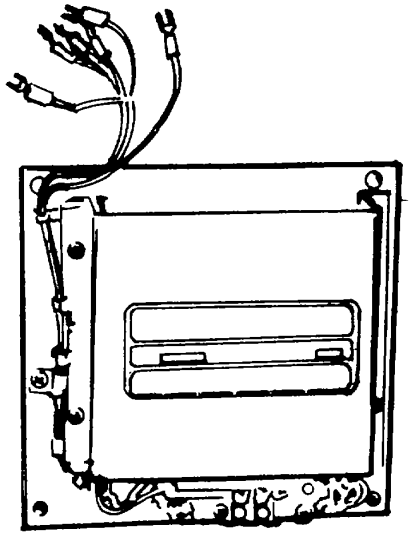


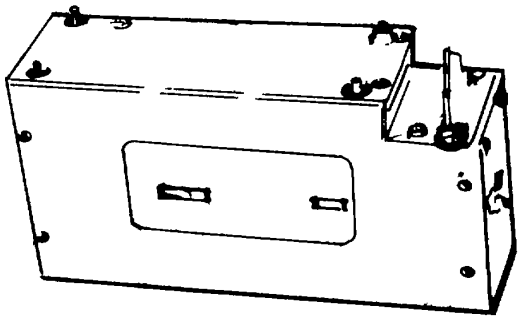
Figure 1-6. Status Monitor Module

(8) Grid Wire Sensor (GWS). The GWS is used to detect forced entry through walls, floors, ceilings, doors, windows, and other barriers. The surface of the barrier is covered by two continuous wires in a 4-inch-square (10.16 cm sq) grid pattern (figure 1-15). Wood panels are then installed over the wire grid to protect the grid from day-to-day abuse and to conceal the grid. The grid wire is terminated in a junction box which has a tamper switch under the cover and a pry-off switch on the back of the box to detect attempts to pry the box off the wall. The terminals in the box are wired to the Control Unit alarm inputs. Penetration of the barrier breaks the wire at one or more points and causes a tamper alarm to be generated. The Grid Wire Sensor does not require power for operation. The Grid Wire Sensor is supplied in a kit (figure 1-16) containing all the material required for installation of the sensor. Each kit has sufficient material to cover an area of approximately 100 square feet (9.29 sq m).

(9) Vibration Sensor (VS). The VS (figure 1-17) will detect actual or attempted penetration through expanded metal cages or room liners and through metal barriers placed over windows and other openings in the protected area (figure 1-18). The sensor detects structurally transmitted vibrations imposed on the metal barrier by actions



TRANSMITTER



RECEIVER

Figure 1-7. Data Transmitter and Data Receiver

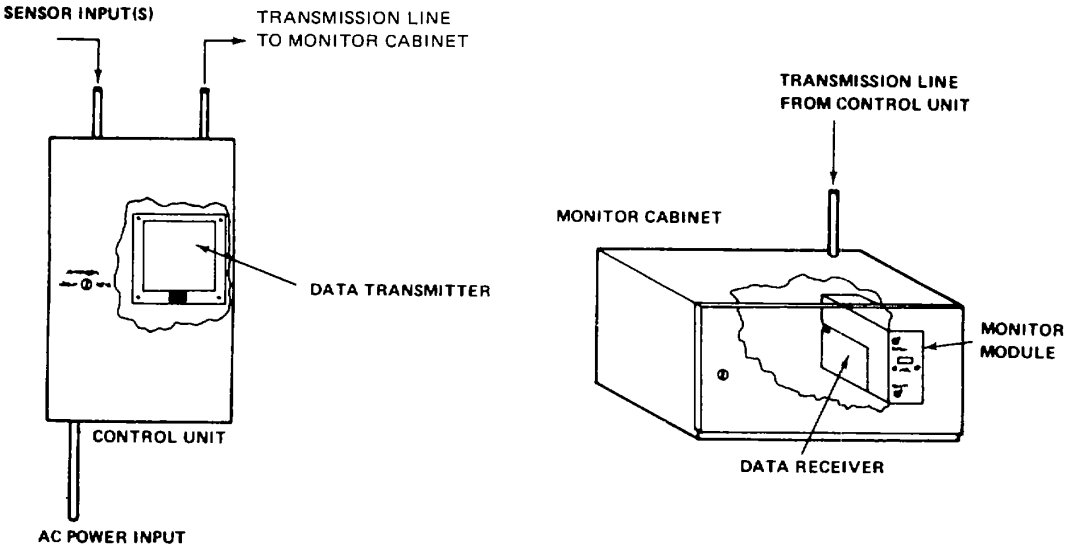


Figure 1-8. Location of Data Transmitter and Data Receiver

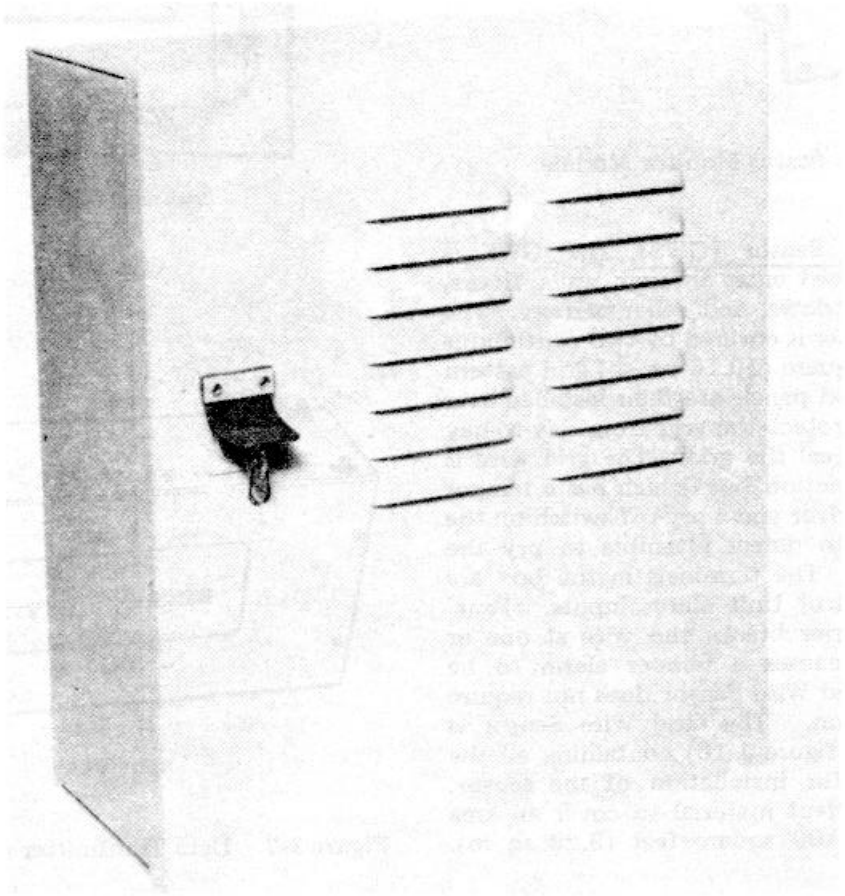


Figure 1-9. Audible Alarm

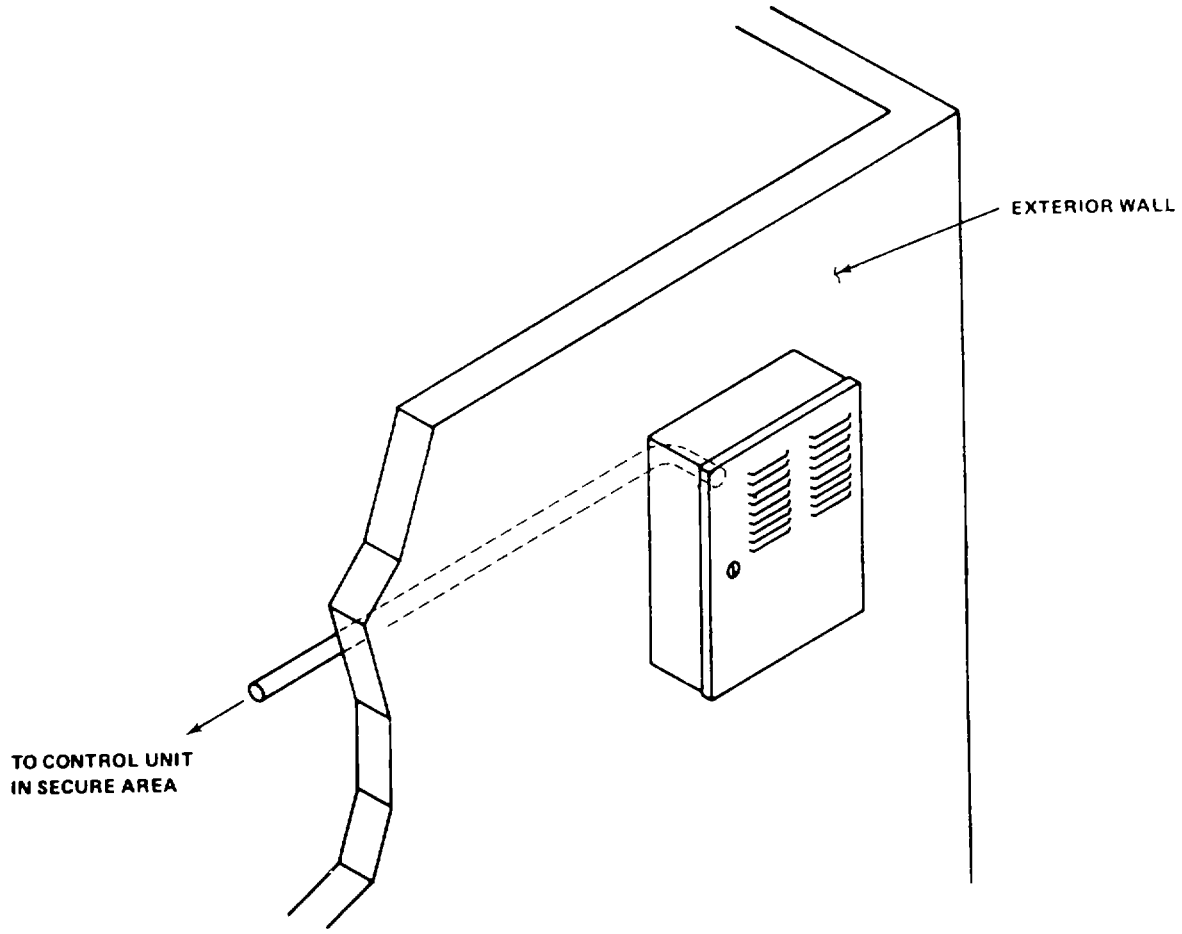


Figure 1-10. Typical Installation of Audible Alarm

such as sawing, drilling, and hammering. The sensor generates an alarm when the energy generated satisfies certain design criteria. The sensor consists of a Vibration Signal Processor and one or more Vibration Signal Detectors. One to twenty detectors can be connected to one signal processor. The detectors will detect vibrations within a radius of 3 feet (91.44 cm) from the detector. An attempt to remove the cover from the processor or detector will militate a tamper alarm signal. Operating power is supplied by the Control Unit.

(10) Passive Ultrasonic Sensor (PUS). The PUS (figure 1-19) will detect actual or attempted penetration through metal and masonry walls, ceilings, and floors. It also detects penetration through windows and vents covered by metal grills, shutters, or bars if these openings are properly sealed against outside sounds. The sensor detects

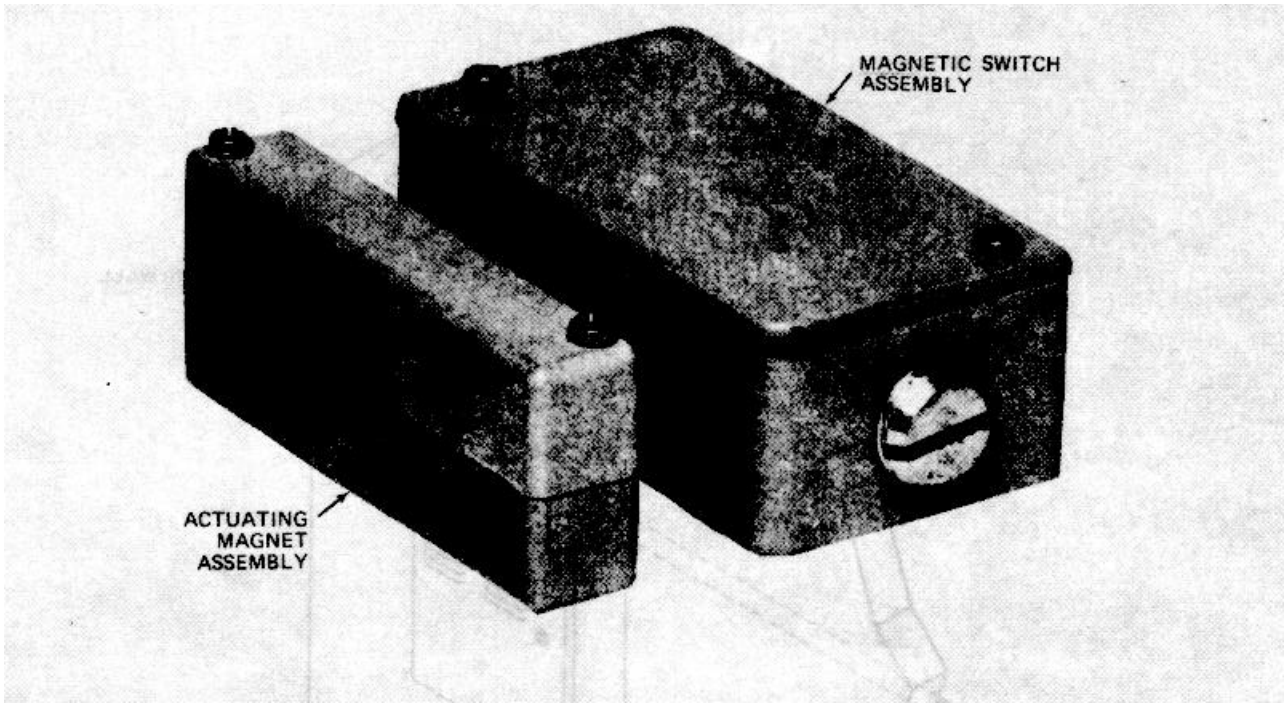


Figure 1-11. Balanced Magnetic Switch

ultrasonic energy that is generated by sawing, hammering, drilling, or burning with a torch. When the ultrasonic energy generated satisfies certain design criteria, the sensor initiates an alarm (figure 1-20). An attempt to remove the cover from the processor or detector will initiate a tamper alarm signal. The sensor consists of a Passive Ultrasonic Signal Processor and one or more Passive Ultrasonic Signal Receivers. One to twenty receivers can be connected to one signal processor to achieve large area coverage. Each receiver will cover an area of 15 by 20 feet. Penetration through a wooden wall, floor, or ceiling may not generate enough ultrasonic energy to initiate an alarm. To protect such an area, the Ultrasonic Motion Sensor may be used as a complement to the Passive Ultrasonic Sensor.

(11) Ultrasonic Motion Sensor (UMS). The UMS (figure 1-21) detects the motion of an intruder inside the protected area. The sensor 1-12 detects the Doppler frequency shift of the reflected ultrasonic signal caused by motion of the intruder. The sensor consists of an Ultrasonic Motion Signal Processor and one to twenty Ultrasonic Motion Signal Transceivers. The transceiver contains a transmitting transducer and a receiving transducer. As shown in figure 1-22, a transmitting transducer radiates an ultrasonic signal which is reflected from the surfaces with the protected room. A receiving transducer receives the reflected signals, and the signal processor compares the reflected signal to the transmitted signal. If no motion exists within the protected room, the received and transmitted signals are at the same frequency Motion, however, causes the received signal to differ in frequency from the transmitted signal. The signal processor detects this frequency change and initiates an alarm signal when certain design criteria have been met. The sensor is designed to recognize and discriminate against air turbulence, blowing curtains, vibrating walls, and similar nuisance alarm creating phenomena. An attempt to remove the cover from the processor

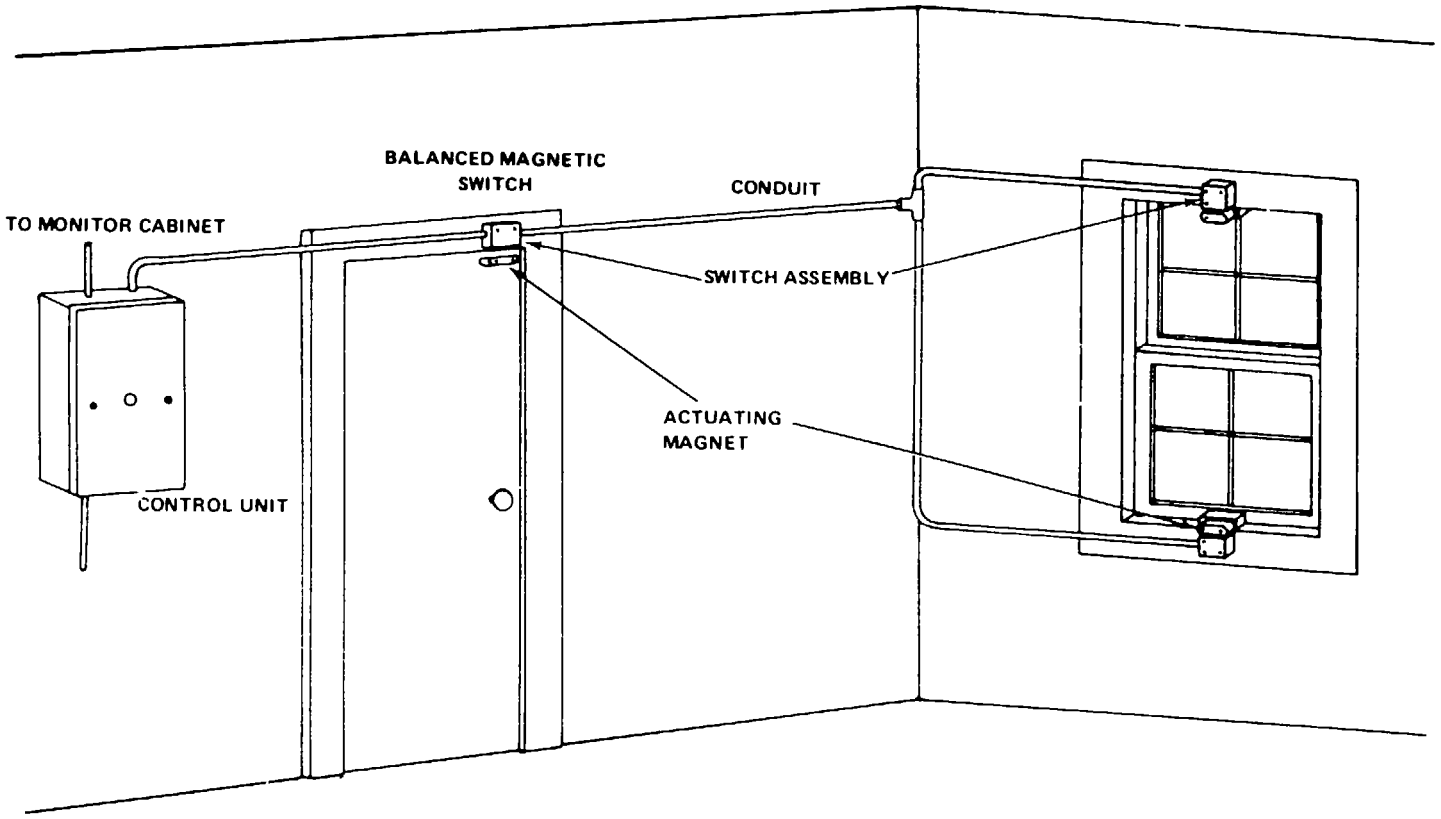


Figure 1-12. Typical Installation of Balanced Magnetic Switches.

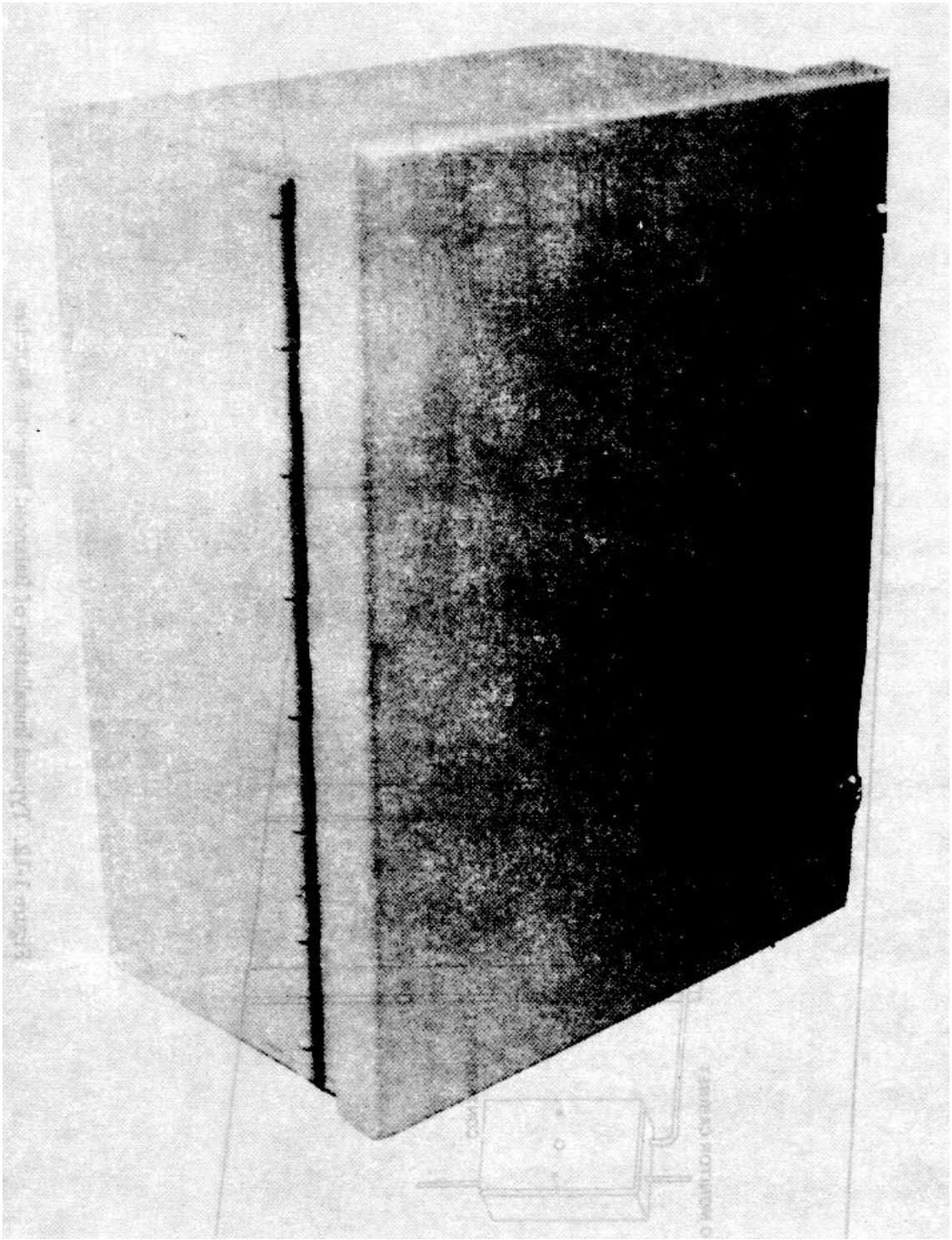


Figure 1-13. Capacitance Proximity Sensor

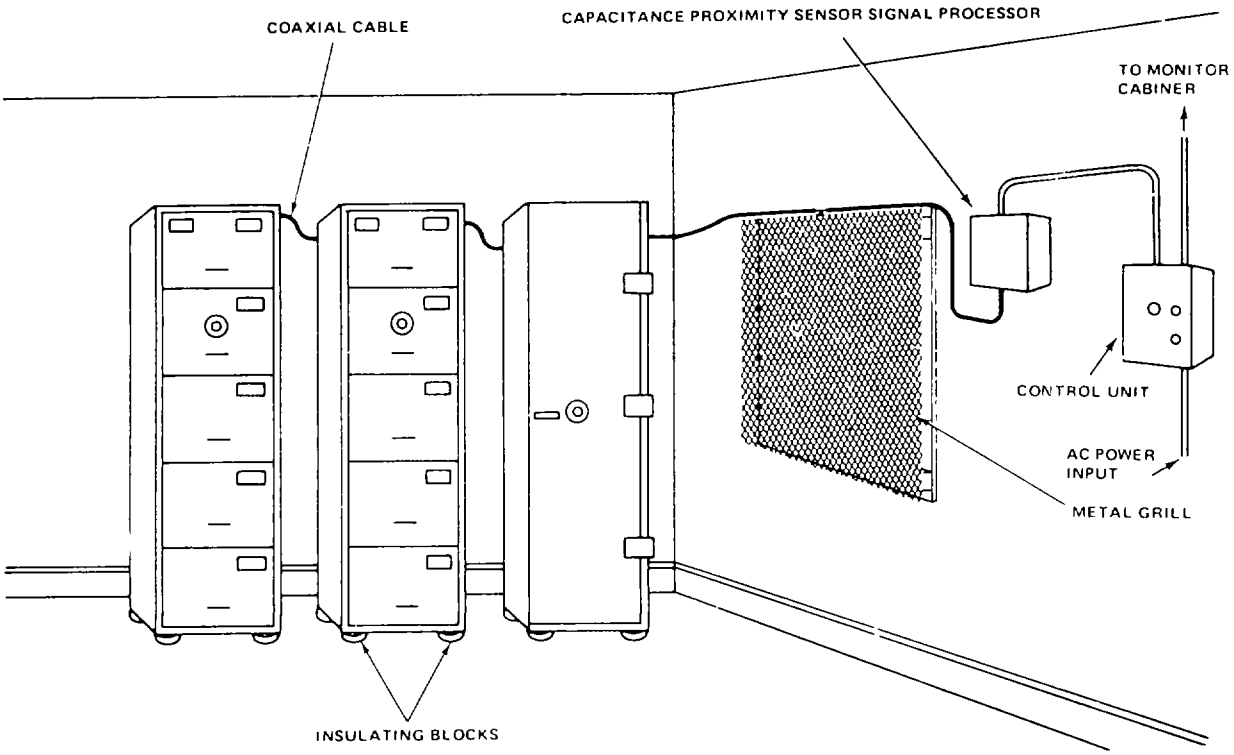


Figure 1-14. Typical Installation of Capacitance Proximity Sensor.

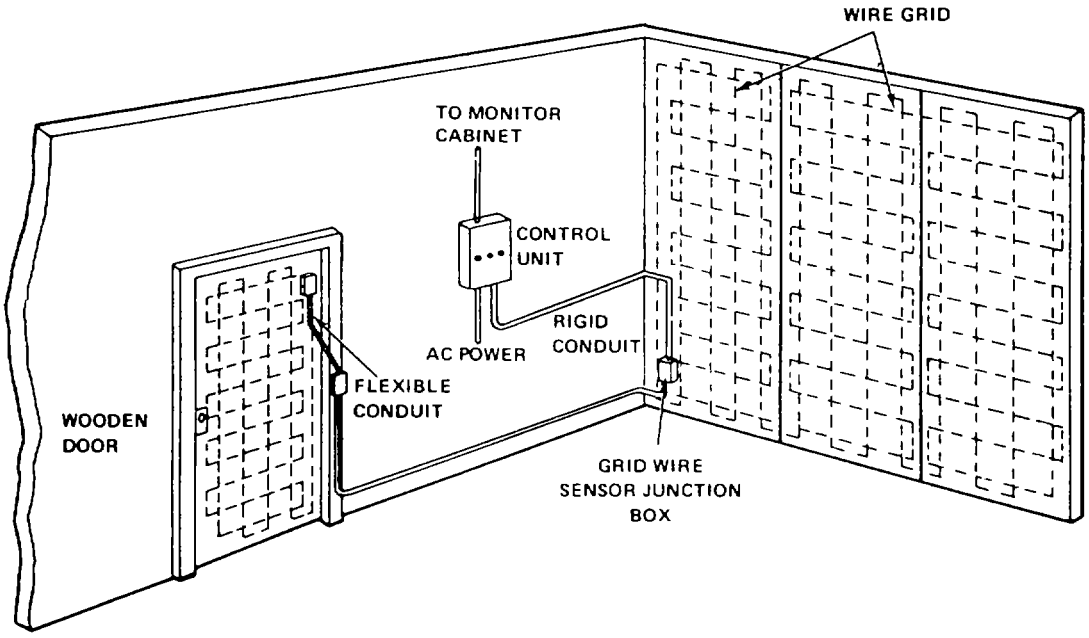


Figure 1-15. Typical Installation of Grid Wire Sensor

or detector will initiate a tamper alarm signal. Operating power is supplied by the Control Unit

(12) Latching Alarm Switch (LAS) The LAS (figure 1-23) is a duress notification device. It is used by personnel to initiate a duress alarm signal manually. It can be mounted to the wall or on the floor (figure 1-24) close to areas where personnel are stationed and can be hand or foot operated. After having been activated, it must be manually reset by removing the cover and activating the reset switch. An attempt to remove the LAS cover will initiate a tamper alarm signal. A light emitting diode located to the left of the switch mechanism Is illuminated when the switch has been activated. Operating power is supplied by the Control Unit.

1-10. TABULATED DATA. Table 1-1 lists applicable performance data for the J-SIID System. Table 1-2 lists items comprised m an operable J-SIID System.

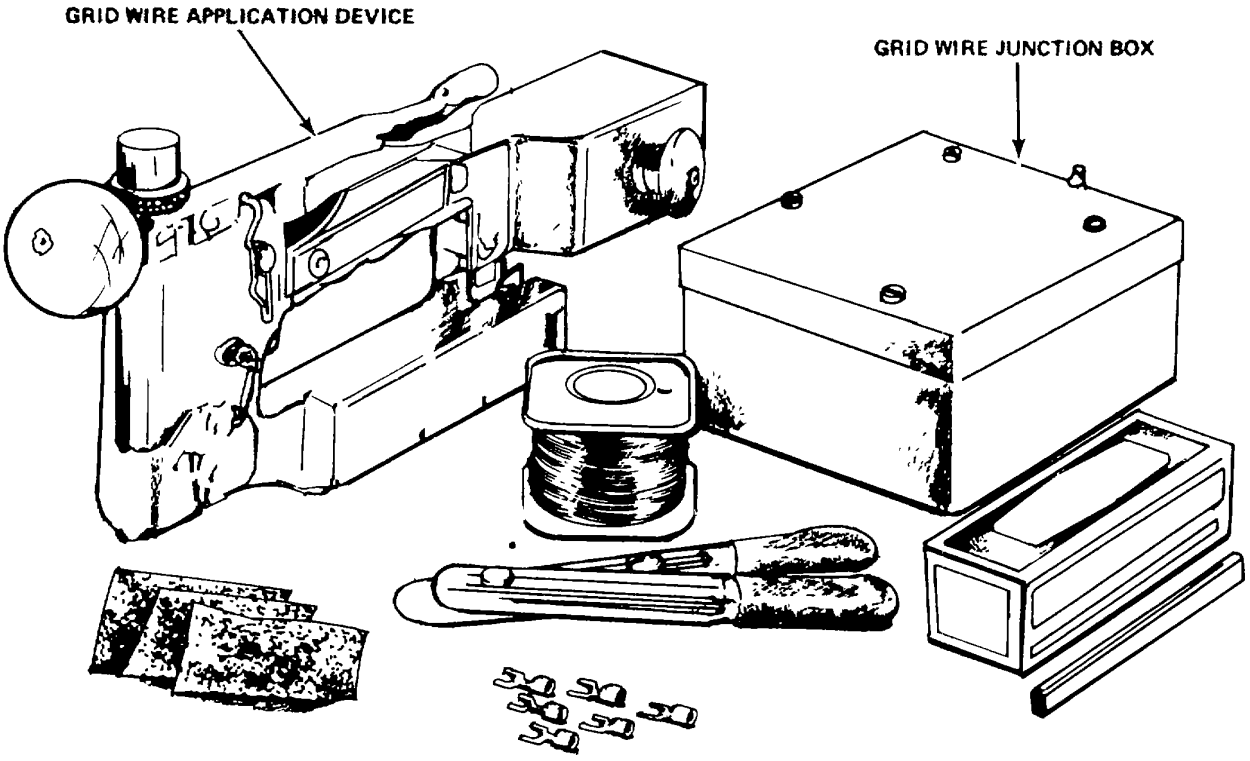
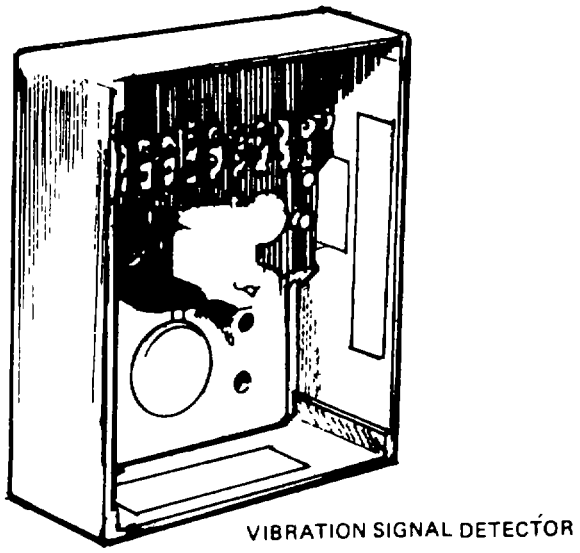


Figure 1-16. Grid Wire Sensor Kit



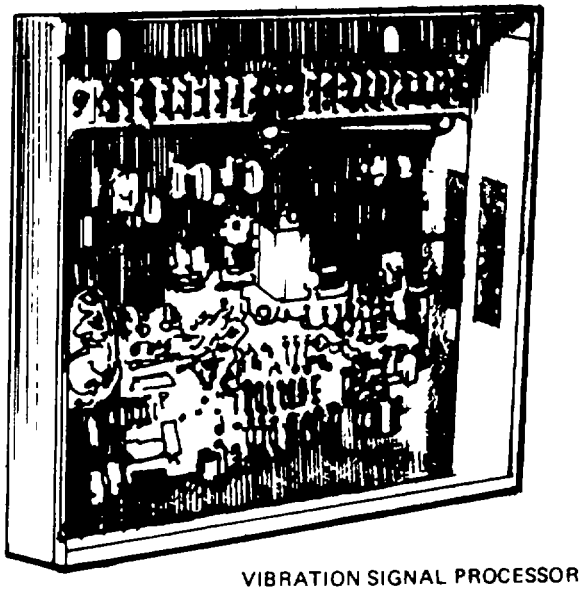


Figure 1-17. Vibration Signal Detector and Vibration Signal Processor

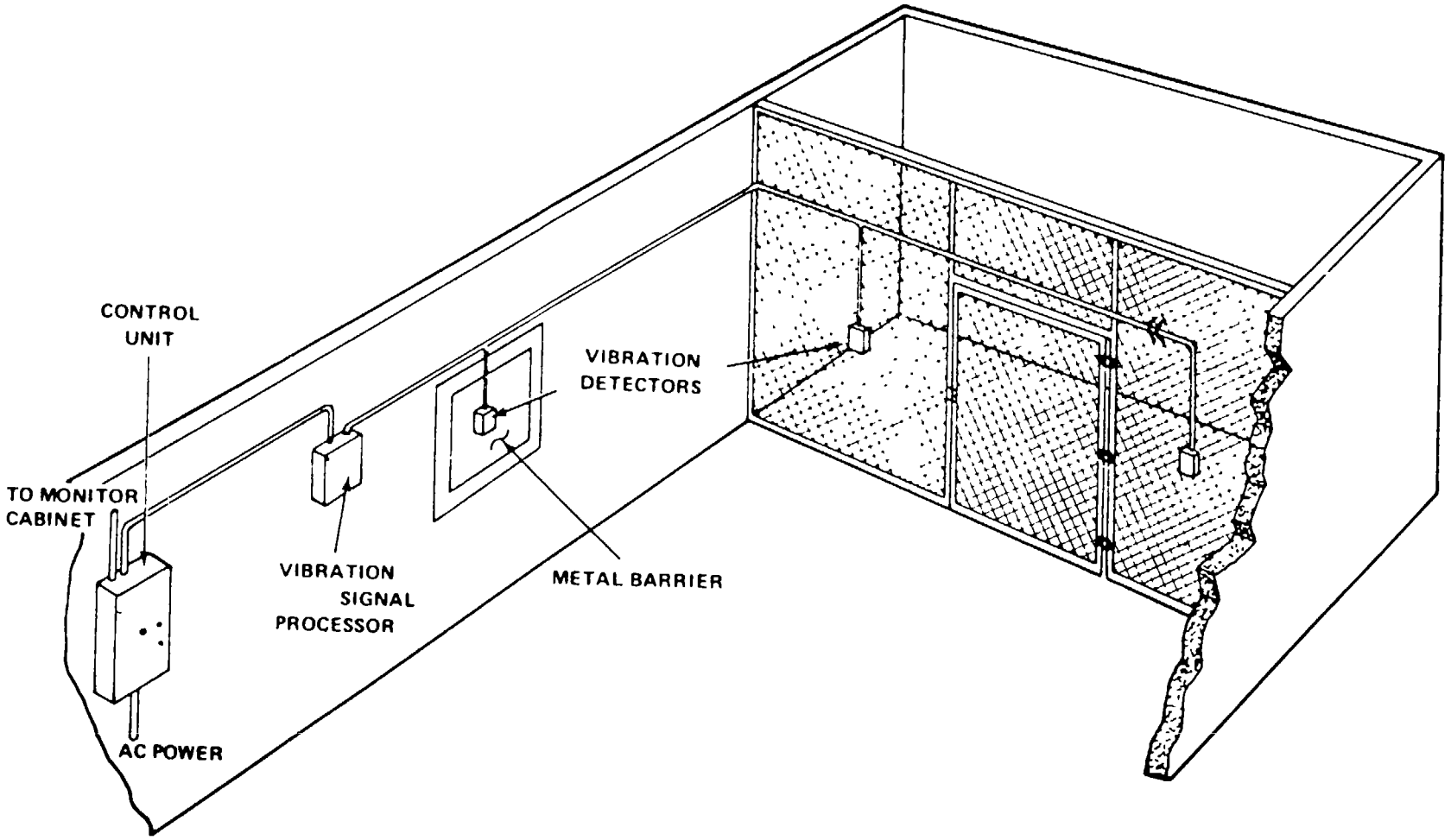


Figure 1-18. Typical Installation of Vibration Sensor

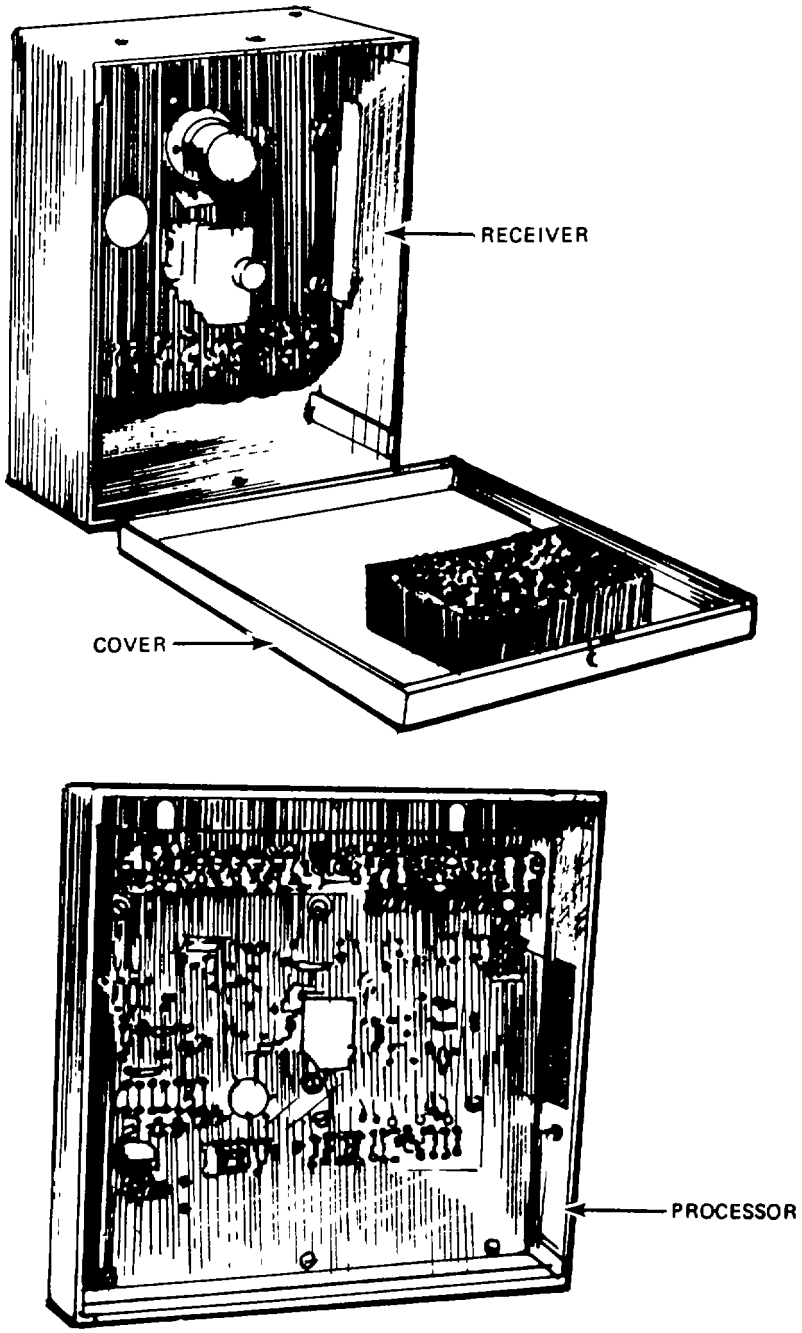


Figure 1-19. Passive Ultrasonic Signal Receiver and Passive Ultrasonic Signal Processor

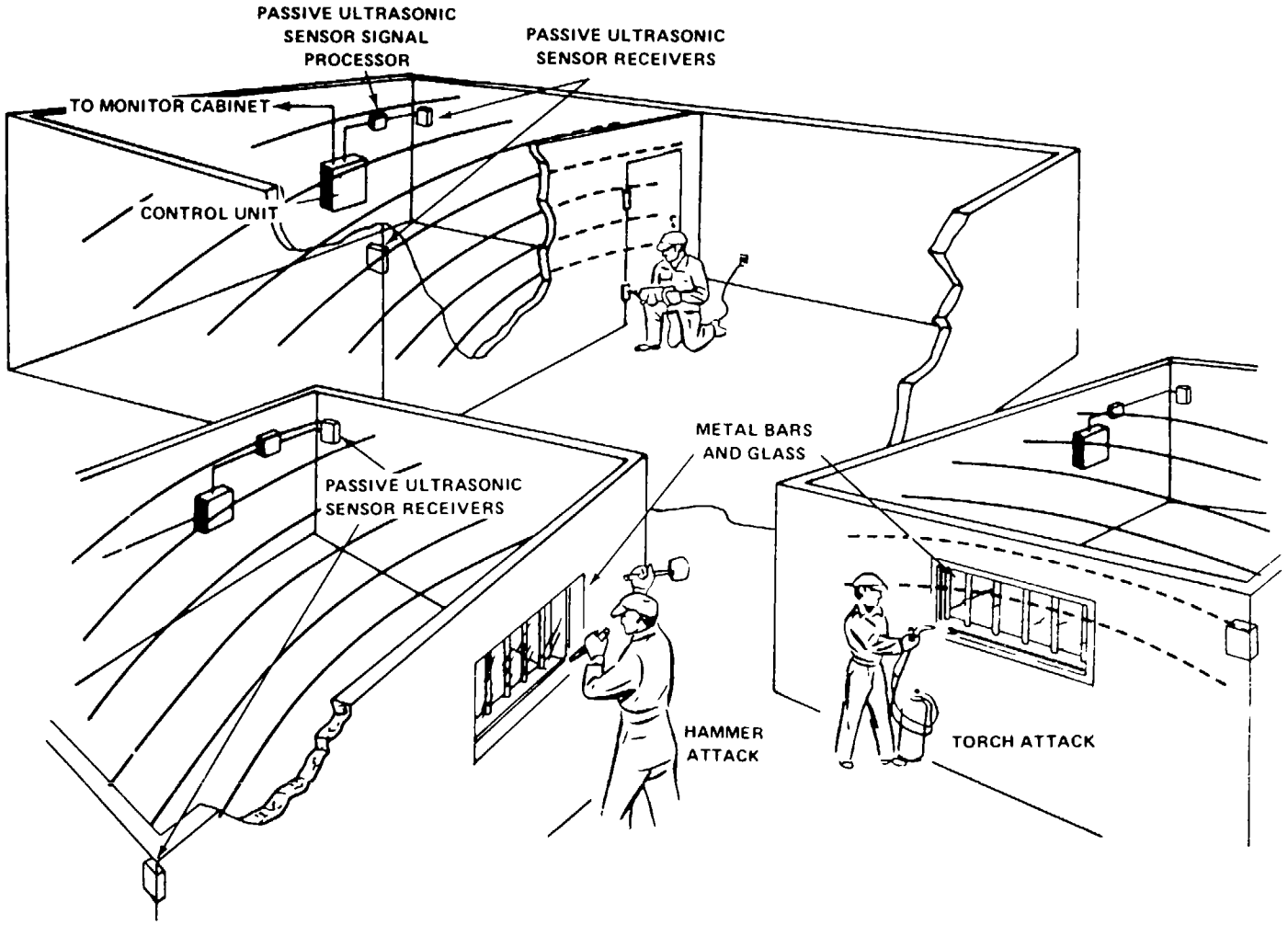
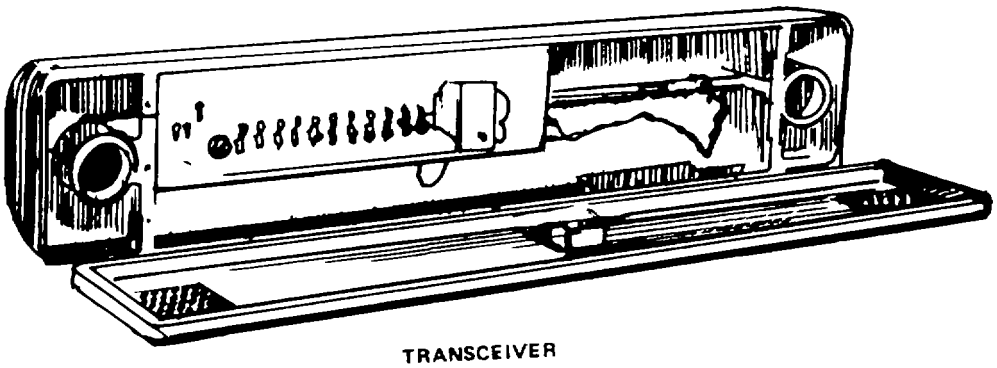
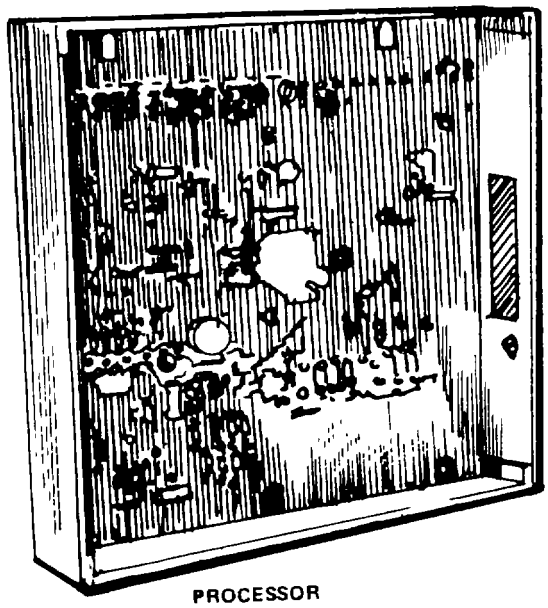


Figure 1-20. Typical Installation of Passive Ultrasonic Sensor



TRANSCEIVER



PROCESSOR

Figure 1-21. Ultrasonic Motion Signal Transceiver and Ultrasonic Motion Signal Processor

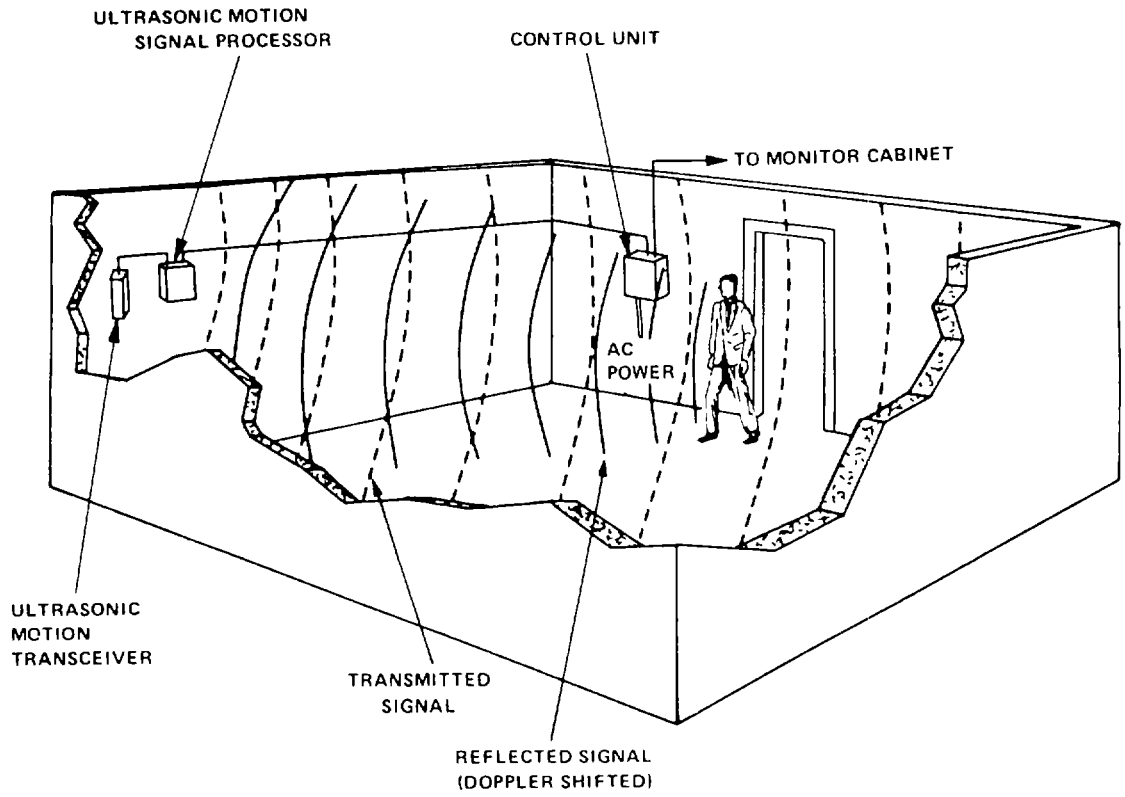


Figure 1-22. Typical Installation of Ultrasonic Motion Sensor

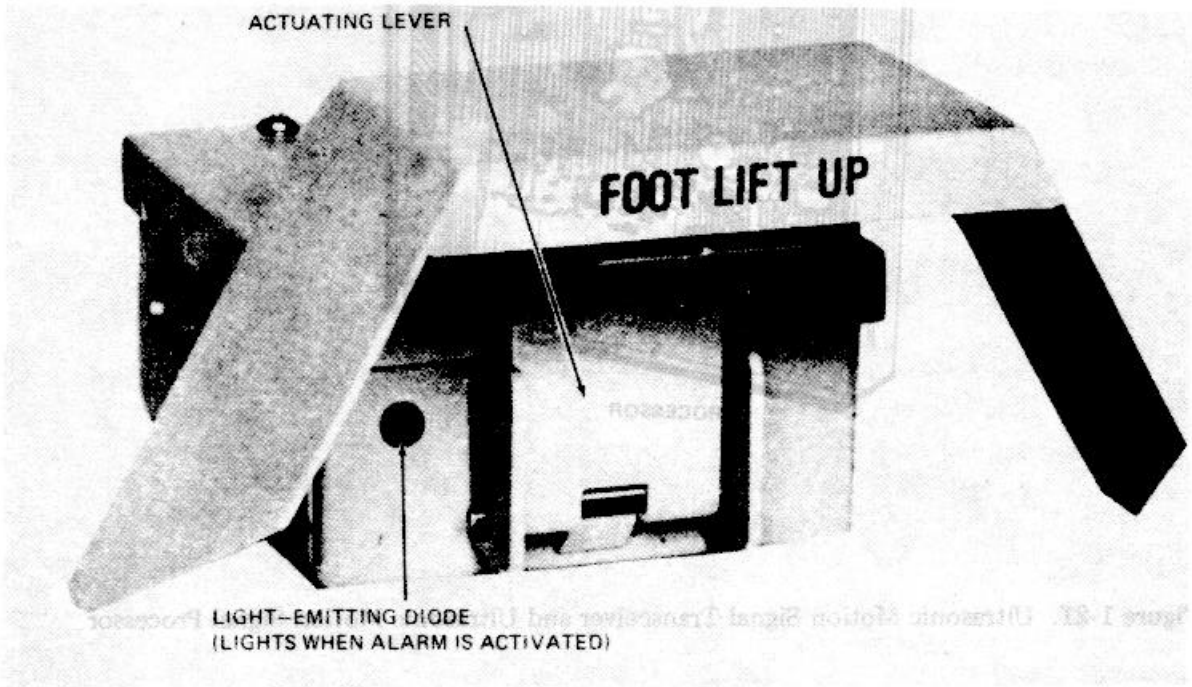


Figure 1-23. Latching Alarm Switch

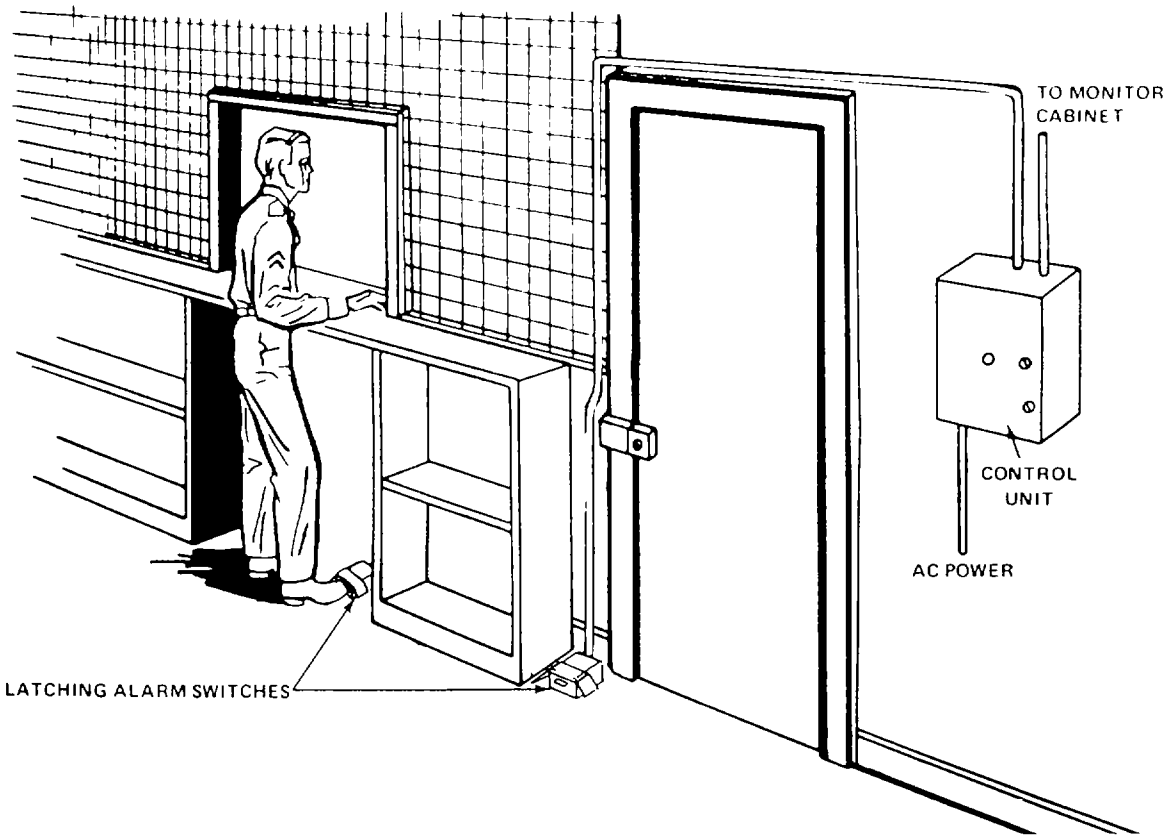


Figure 1-24. Typical Installation of Latching Alarm Switch

Table 1-1. J-SIIDS Performance Data

Item	Characteristic
Degree of protection provided	Protection against semisklled intruders.
Power requirements of:	
a. Protected area	110 to 125 vac, 48 to 62 Hz; Control Unit 0.5 a, Audible Alarm 1.0 a
b. Monitor area	110 to 125 vac, 48 to 62 Hz, Monitor Cabinet (one-zone), Monitor Cabinet (five-zone), Monitor Cabinet (twenty-five-zone)
Operating temperature range	-20 ° F to +150°F (-29°C to +65 ° C)
Maximum power available from Control Unit to sensors	600 ma at 20 vdc
Maximum number of sensors attached to one Control Unit	Limited by power available from Control Unit. (See individual sensor technical manuals for sensor power requirements.)

Table 1-1. J-SIIDS Performance Data-Continued

Item	Characteristic
Maximum transmission line length between Control Unit and Monitor Cabinet using:	
a. Direct wire, five conductor without Data Transmitter and Data Receiver	Determined by wire resistance which must not exceed 2,000 ohms total
b. 600 ohm balanced transmission line, with Data Transmitter and Data Receiver	10 miles (16.0930 km)
c. Dedicated Telephone Company line with Data Transmitter and Receiver	No limit
Detection of intruder motion (if Ultrasonic Motion Sensor is used)	Detection occurs at intruder velocities between 0.4 ft/s (0.12 m) and 20 ft/s (6.1 m/s).
Motion detection area of coverage (if Ultrasonic Motion Sensor is used)	Maximum of 10,000 sq ft (929 sq m) (using one signal processor and 20 transceivers)
Detection of intruder proximity to metal objects (if Capacitance Proximity Sensor is used)	
a. High sensitivity.	
(1) Body	Detection occurs at approximately 4 to 8 in. (10.16 to 20.32 cm) from protected item.
(2) Hand	Detection occurs at approximately 1 to 3 in. (2.54 to 7.62 cm).
(3) Finger	Detection occurs when protected item is touched
b. Low sensitivity	
(1) Body	Detection occurs at approximately 1 to 10 in. (2.54 to 25.4 cm).
(2) Hand, finger, or tool	Detection occurs when protected item is touched.

Table 1-1. J-SIIDS Performance Data-Continued

Item	Characteristic
Proximity detection range	
a Number of file cabinets protected.	
(1) High sensitivity	20 approximately
(2) Low sensitivity	50 approximately
b. Area of coverage.	
(1) High sensitivity	Approximately 400 sq ft (37.16 sq m)
(2) Low sensitivity	Approximately 1200 sq ft (111.48 sq m)
Penetration detection sensitivity (using Grid Wire or Passive Ultrasonic Sensor)	Detects cutting or hammering entrance holes through walls or doors of protected area.
Penetration detection of area coverage (using Grid Wire)	800 sq ft (74.3 sq m) per kilt, maximum 35 kits on one Control Unit input
Penetration detection, area of coverage (using Passive Ultrasonic Sensor)	Protects rooms up to 6000 sq ft (557.4sq m), using 20 signal receivers.
Penetration detection sensitivity (using Vibration Sensor)	Detects cut access holes in metal barriers.
Penetration detection area of coverage (using Vibration Sensor)	Protects up to 1300 sq ft (120.8 sq m) of metal barrier using 20 signal detectors.
Penetration detection sensitivity (using Balanced Magnetic Switch)	Detects opening of doors, windows, drawers, etc. distances between 1/4 inch (0.635 cm) 1-1/4 inch (3.175 cm) (depending upon the switch adjustment).
Penetration detection, area of coverage (using Balanced Magnetic Switch)	One to 35 switches on single Control Unit input
Nuisance alarm rate	Can be made negligible by proper selection, application, and installation of system components.
Probability of Detection	Dependent upon selection of components. Approaches 100% If area is completely protected with penetration sensors, motion sensors, and point sensors

Table 1-2. Items Comprised in Operable System

NSN	ITEM	HEIGHT in. (cm)	WIDTH in. (cm)	DEPTH in. (cm)	WEIGHT lb (kg)
6350-00-228-2735	Control Unit, Alarm Set	22.5 (57.5)	14.625 (37.0)	8.25 (21.0)	38 (17.24)
6350-00-228-2514	Alarm, Audible	19.25 (48.90)	9.5 (24.13)	5.75 (14.605)	29.5 (13.154)
6350-00-228-2690	Cabinet, Monitor (one-zone)	11.3750 (88.8925)	14.1875 (36.0363)	18.9375 (36.0363)	38 (17.24)
6350-00-228-2697	Cabinet, Montir (five-zone)	13.0 (33.020)	13.25 (33.655)	22.625 (85.4075)	29 (29.48)
6350-00-228-2705	Cabinet, Monitor (twenty-five-zone)	59.0 (149.86)	15.75 (40.0)	24.5 (62.23)	200 (90.72)
6350-00-228-2661	Monitor Module, Status	7.0 (17.780)	2.75 (6.985)	10.0 (25.4)	2.0 (0.9072)
6350-00-251-5749	Transmitter, Data	1.20 (3.75)	7.81 (19.5)	7.81 (19.5)	20 oz (0.567)
6350-00-228-2655	Receiver, Data	3.94 (9.9)	2.69 (6.7)	8.0 (20.3)	2.0 (0.9)
6350-00-228-2504	Sensor, Grid Wire	2.68 (6.8)	4.30 (11.0)	5.0 (12.6)	6.7 (3.1)
6350-00-228-2606	Sensor, Capacitance Proximity	8.0 (20.3)	6.0 (15.2)	4.0 (10.2)	5.0 (2.4)
6350-00-228-2609	Mounting Blocks (CPS)	1.0 (2.54)	3.0 (7.62)		
6350-00-228-2521	Detector, Vibration Sensor	4.8 (12.2)	6.0 (15.2)	2.2 (5.6)	2.25 (1.0)
6350-00-228-2524	Processor, Vibration Signal	9.7 (24.6)	10.2 (25.9)	2.2 (5.6)	6.75 (3.1)
6350-00-228-2534	Receiver, Passive Signal Ultrasonic	4.8 (12.2)	6.0 (15.2)	2.1 (5.3)	2.25 (1.0)
6350-00-228-2548	Processor, Passive Signal Ultrasonic	9.7 (24.6)	10.2 (25.9)	2.1 (5.3)	6.75 (3.1)
6350-00-228-2566	Transceiver, Ultrasonic Motion Signal	17.9 (45.5)	3.4 (8.6)	2.2 (5.6)	6.0 (2.7)

Table 1-2. Items Comprised in Operable System

NSN	ITEM	HEIGHT in. (cm)	WIDTH in. (cm)	DEPTH in. (cm)	WEIGHT lb (kg)
6350-00-228-2581	Processor, Ultrasonic Motion Signal	9.7 (24.6)	10.2 (25.9)	2.1 (5.3)	6.5 (2.9)
6350-00-228-2510	Switch, Latching Alarm	3.8125 (9.85)	8.0625		3.0 (1.36)
6350-00-228-2500	Switch, Balanced Magnetic				
	a. Switch assembly	1.68 (4.3)	2.5 (6.4)	4.75 (12.1)	14 oz (0.4)
	b. Magnet	1.74 (4.4)	0.88 (2.2)	4.51 (11.5)	12 oz (0.3)

CHAPTER 2

INSTALLATION

Section I. SYSTEMS PLANNING

2-1. GENERAL. The Control Unit and all sensors are to be installed in the room or building that is to be protected. The Monitor Cabinet shall be installed at a location where duty personnel are present 24 hours a day.

2-2. PLANNING RESPONSIBILITY AND COORDINATION. Security personnel are responsible for the selection and location of components that are to be used in J-SIIDS installation. Security personnel and the installer shall coordinate in the development of the installation plan. This coordination is necessary to ensure that the desired level of security is attained and that the requirements of all applicable engineering standards and codes are met. Where there is a choice m approved installation materials or methods, security personnel shall make the final determination of which material or method is to be used. If a leased telephone line is to be used for data transmission between a J-SIIDS Data Transmitter and Data Receiver, a type 3002 data channel should be used. Arrangements for this leased line should be made well in advance of the planned system installation since dedicated lines are difficult to acquire. The Data Transmitter and Data Receiver are designed to properly interface with telephone system equipment.

Section II. SITE AND SHELTER REQUIREMENTS

2-3. SITE REQUIREMENTS.

a. Power Requirements. The J-SIID System is designed to operate on single-phase, 110- to 125-V, 48-to 62-Hz power. Power to the Control Unit and Monitor Cabinet shall be supplied by dedicated, three wire lines separately fused at the distribution panel. The distribution panel should be located such that it provides for easy access by maintenance personnel but prevents access by non-authorized personnel. Primary power requirements for components are as follows:

Component	Maximum Current Requirements (at 115 vac)
Control	0.5 a
Monitor Cabinet (one-zone)	0.5 a
Monitor Cabinet (five-zone)	1.0 a
Monitor Cabinet (twenty-five-zone)	5.0 a
Audible Alarm	1.0 a

The CU can supply up to 600 ma at 20 vdc to the sensors. During system planning, ensure that this value is not exceeded.The power requirements for the various sensors are as follows:

Sensor	Power Required (ma)
GWS	0
BMS	0
CPS	60
VS	45 max. (35/Processor +10/ Detector, 0.5 each up to 20)
PUS	45 max. (35/Processor +10/ Detector, 0.5 each up to 20)
UMS	85 max. (35/Processor +50/ Transceiver, 2.5 each up to 20)
LAS	20

b. Environment. Environmental conditions such as noise, proximity of transmitter, and structural vibrations affect the operation of some types of sensors. Section IV of this chapter describes means to suppress the effect of certain environmental conditions on particular sensors.

2-4. SHELTER REQUIREMENT.

a. Structure. The physical security of the building or room should be optimized before the equipment is installed. Nonessential doors, windows, and openings should be eliminated by sealing with the same material of which the building or room is constructed. The remaining doors or windows should be inspected for tightness of fit and the condition of hinges, locks, and similar hardware. Deficiencies noted should be corrected by repair or replacement of the defective items.

b. Space. Dimensions required for installed equipment with hinged doors are given in table 2-1.

c. Operating Environment. J-SIIDS equipment is designed to be installed m areas having temperatures between -20°F and +150°F (-29°C and +65° C). With the exception of the Audible Alarm, the equipment is designed for operation indoors, not exposed to weather.

Table 2-1. Free Space (Open-door Dimensions) Required for Maintenance

J-SIID system components	Width in. (cm)	Depth in. (cm)
Control Unit	28.9 (73.4)	21.8 (55.2)
Monitor Cabinet (one-zone)	38.3 (97.3)	31.2 (82.8)
Monitor Cabinet (five-zone)	67.7 (172.0)	45.8 (116.6)
Monitor Cabinet (twenty-five-zone)	49.5 (125.7)	39.0 (99.4)
Capacitance Proximity Sensor	12.5 (31.8)	9.3 (23.8)
Audible Alarm	21.5 (54.6)	13.8 (36.0)

NOTE: J-SIIDS components not listed in this table have covers that are completely removable.

Section III. SERVICE UPON RECEIPT OF MATERIAL

2-5. UNPACKING. There are no special instructions for unpacking equipment from shipping containers. Observe the usual precautions and requirements associated with unpacking and handling electronic and electrical equipment.

2-6. CHECKING UNPACKED EQUIPMENT.

a. Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6.

b. Check the equipment against the packing slip to see if the shipment is complete. Army installations report all discrepancies in accordance with TM 38-750 and TM 38-750-1. Air Force and Navy reporting of discrepancies is handled per local procedures.

Section IV. INSTALLATION INSTRUCTIONS

2-7. RECOMMENDED TOOLS AND TEST EQUIPMENT. Table 2-2 lists the tools and equipment recom-mended to support the J-SIID System.

2-8. ASSEMBLY OF EQUIPMENT. The system components are not shipped completely assembled Batteries for the Control Unit, the Monitor Cabinet, and the Audible Alarm are shipped in separate containers. Installation of these batteries in their components is addressed in the installation instructions for those particular components. Code plugs are shipped separately in matching sets of two, three, four, or five plugs.

2-9. GENERAL INSTALLATION REQUIREMENTS. The installation of components of the J-SIID System shall comply with the current edition of the National Electrical Code, and with the following requirements where applicable.

NOTE

Deburr all holes and remove all metal shavings from enclosures.

Table 2-2. Installation Tools and Equipment

Item	Purpose
Multimeter	Take electrical and resistance measurements
Tool kit, TK 105G NSN 5180-00-610-8177	Electrician's tools
Conduit bending tool	Bend conduit
7/8-inch Greenlee chassis punch (or equivalent)	Cut conduit entry in component enclosures
Pipe dies	Thread ends of conduit
Pipe wrench	Secure conduit joints
Electric drill	Mounting of components
Machine taps	Mounting of components
Support stand (locally fabricated)	Temporary mounting of Signal Receiver and Ultrasonic Motion Signal Transceiver during installation
Chalk line	Installation of grid wire
Crimping tool	Installation of spade terminal lugs
Level	Leveling conduit
Fish tape	Pull wire thru conduit

a. Component Mounting. Wall-mounted components are designed to be held by fasteners that are accessible only through the open door or cover of the component. Most components require the removal of modular panels or assemblies m order to install the fasteners Where removal is required, the modular panels or assemblies should be removed as a unit and should not be disassembled. If a wall does not provide adequate support for direct mounting, a mounting board of 3/4-inch (1.9 cm) exterior grade plywood should be secured to the wall and the component mounted thereon. If not already provided, conduit holes should be cut m the enclosure before it is mounted. The conduit entry holes in enclosures fabricated of sheet metal should be made with a 7/8-inch (2.22 cm) Greenlee chassis punch or an equivalent tool. A holesaw should not be used since it produces a large number of metal shavings which can adversely affect the performance of the equipment.

b. Conduit

(1) All conductors outside component enclosures shall be installed in rigid, heavywall, galvanized, steel conduit conforming to Federal Specification WW-C-581 or intermediate metal conduit in accordance with Article 345 of the National Electrical Code. Conduit outlet boxes, pull boxes, junction boxes, conduit fittings, and similar enclosures shall be cast metal or malleable metal conforming to Federal Specification WW-C-581. Conduit outlet boxes, pull boxes, junction boxes, conduit fittings, and similar enclosures with threaded hubs or bodies shall be cast metal or malleable metal conforming to Federal Specification W-C-586. Electrical metallic tubing (EMT) may be used for the power cable between the Control Unit and its junction box, and between the Monitor Cabinet and its junction box. EMT may also be used for the telephone line inside the protected area if a Data Transmission System is used. Flexible conduit, type EF, extra flexible, galvanized steel covered with a PVC jacket and liquid tight may be used for Grid Wire Sensor connections between door and door frame. For security reasons, EMT and flexible conduit may not be used under any other circumstances. Armored cable or nonmetallic sheathed cable is not permitted. Wires carrying signal circuits shall not be pulled into conduits or placed in raceways, outlet boxes, junction boxes, or similar fittings with other building wiring. Flexible cords and cord connectors shall not be used to supply power to any component of the system.

(2) Minimum size of conduit shall be 1/2-inch (1.27 cm). Connections must be tight, tapered threaded. No threadless fittings or couplings will be used. Conduits shall be supported and secured at intervals of not more than 10 feet (3.1 m). Exposed conduits will have runs installed parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings. Field-made bends and offsets will be made with a standard conduit-bending tool. Changes In direction of runs shall be made with symmetrical bends or cast-metal fittings. Insulating bushings will be installed on the ends of all conduits which are not threaded into cast enclosures. Where conduits enter an enclosure through clearance holes, they shall be fastened with a locknut on each side of the enclosure wall, or with a bushing on the inside and a locknut on the outside of the enclosure wall; the locknuts will be tightened for a solid grounding connection.

(3) Trapped conduits in damp and wet locations will be avoided where possible. If trapped conduits are unavoidable, the ends shall be plugged with an approved room-temperature vulcanizing (RTV) sealing compound after wires are pulled therein. Conduits crossing expansion joints in concrete slabs will be provided with suitable expansion fittings, or other suitable means to compensate for building expansion and contraction. Where

wires or cables are carried on the exterior of building walls, they shall be in rigid steel conduit adequately supported. Conduits installed underground or under slabs on grade shall be protected from corrosion. Preferably, underground conduits shall be factory-coated with thermosetting epoxy or thermoplastic resin conforming to Federal Specification L-P-530. Field-applied coatings shall be with pressure sensitive tape conforming to Federal Specification L-T-75 or Federal Specification L-T-1512. Fieldmade joints, fittings, abrasions, and holidays shall be field-coated with material equivalent with the above materials.

(4) Wooden plugs inserted in concrete or masonry are not to be used as a base for conduit fastenings, nor shall conduits or pipe straps be welded to steel structures. Conduits shall be secured by pipe straps or supported by wall brackets, strap hangers, or ceiling trapeze, fastened by wood screws on wood, toggle bolts on hollow masonry units, expansion bolts on concrete or brick, and machine screws on steel work. Nail-type nylon anchors or threaded studs, driven in by a powder charge and provided with lock washers and nuts, are acceptable in lieu of expansion bolts or machine or wood screws, except that power-driven studs or expansion anchors and bolts are not permitted closer than 12 inches (30.48 cm) to prestressed steel in prestressed concrete work. Nails shall not be used as a means of fastening conduits.

(5) Pull and junction boxes provided to facilitate initial installation of the system shall contain no wiring splices or connections. The covers shall be provided with tamper proof screws (twist off or one way slotted) or secure in by tack welding, brazing.

c. Interior Conductors.

(1) Power conductors for supplying 120-vac power to Monitor Cabinets and Control Units shall be of solid copper not smaller than No. 14 AWG, with moisture resistant rubber insulation Type RW or RH-RW, or moisture-resistant thermoplastic insulation Type TH-W conforming to Federal Specification J-C-30A as applicable.

(2) Unless otherwise specified, low voltage conductors shall be of solid, soft-drawn copper, with moisture-resistant rubber insulation Type RF-2, or thermoplastic insulation Type TR having a nominal thickness of not less than 1/32-inch (0.79375 mm) and conforming to the current edition of the National Electrical Code. Wire connectors of insulating material or solderless pressure connectors, in conformance with Federal Specification W-S-610, shall be used for all connections and properly taped Cables having less than three conductors shall not be smaller than No 14 AWG. Cables having three or more conductors shall not be smaller than No. 22 AWG. Conductors must be installed in accordance with the current edition of the National Electrical Code except that all conductors shall be installed in galvanized, rigid, steel conduit. No 6 (18-22 Ga) crimp-on spade terminal lugs shall be used to make all wire connections to threaded screws on component terminal boards.

d. Grounding. Neutral conductors, conduits, junction boxes, enclosures, cable messengers, and all noncurrent-carrying metallic parts of equipment will be grounded in accordance with Art 250, NFPA 70.

e. Care of Batteries. Batteries used in the J-SIID System are of the gel-cell type and are subject to certain precautions. These batteries may generate ignitable amounts of hydrogen gas; therefore prior to performing any maintenance on, or turning power off at the equipment, a period of 2 minutes for ventilation should be observed. The batteries must never be short-circuited since such an action may cause them to explode. If the batteries are to be placed In storage, they must be fully charged. If stored with only a partial charge, they will rapidly deteriorate. Batteries placed in storage must be recharged every 6 months.

f. Locks and Keys. The J-SIIDS Control Unit, Monitor Cabinet, and Audible Alarm are equipped with high-security locks that provide good resistance to covert entry and bypassing.

(1) Each of the above mentioned components is shipped with two keys and a metal tag imprinted with the key code. The Control Unit has an additional tag and set of keys for the mode selector switch. Taped to the inside of each lockable component is a card bearing the key code and the nomenclature and serial number of the component. Two cards are provided with the Control Unit.

(2) Verify the key code on the metal tag against that on the card and destroy the tag. Indicate on the card the installation location of the component and attach the card to one of the corresponding keys. Safeguard the key and card m a secure storage container.

g. System Wiring Diagram. A system installation wiring diagram shall be drawn for each protected area. If the system includes a Grid Wire Sensor, the system installation wiring diagram shall include the exact location of the individual wires m the wire grid. Refer to this diagram when installing other units to avoid breaking grid wires. The GWS must be installed first because other system components will be installed on the paneling covering the wire grid. The GWS is tested after the Control Unit has been installed. The diagram should indicate which sensors are installed and show colorcoded interconnections between each sensor and the Control Unit. All system options (alarm option, length of time delays, signal transmission option) should be indicated on the diagram. This diagram will serve as an aid to maintenance personnel when the need for troubleshooting arises Installation diagrams shall be protected m accordance with requirements/provisions of applicable security regulations and AR190-11 (Physical Security of Weapons, Ammunition, and Explosives), but as a minimum will be marked "FOR OFFICIAL USE ONLY" and stored inside the Control Unit door.

h. Materials Needed in Installation. With a few specified exceptions, mounting hardware is not provided with J-SIID System components. Check the appropriate installation paragraph for a particular component to determine the mounting hardware and electrical hardware needed for the installation of that component. When the installation of a particular sensor requires fabrication of special hardware, such as capacitance grills, or ultrasonic baffles, instructions for fabrication of these items are given with the installation instructions.

i. Fire-Resistant Materials. All materials used in the installation of the J-SIID System must be fire-resistant. If the protected area or monitoring area is located in such a position within a building where combustion would block an exit route or door, Class A ratings (flame spread rating not over 25 with smoke developed not over 50) must be applied. In all other cases, Class B ratings (flame spread rating not over 75 with smoke developed not over 100) are applicable. (Reference DoD Construction Criteria Manual 7270.1M, 1 Oct 72.)

j. Acoustically Induced Nuisance Alarms. The Vibration Sensor, Passive Ultrasonic Sensor, and Ultrasonic Motion Sensor are susceptible to nuisance alarms caused by acoustic energy produced by bells, sirens, horns, buzzers, etc. in the protected area. Telephone bells in the protected area may be replaced with an audible tone alert device available from the telephone company for persons who are hard of hearing. The tone alert does not produce ultrasonic energy, so it will not generate nuisance alarms.

2-10. SYSTEM OPTIONS.

a. The components of the J-SIID System are designed to give those responsible for the security of the protected area a variety of system installation configurations. The system configuration options are shown in figure 2-1. Three basic system configuration options are offered as follows:

(1) Control Unit reporting to a Monitor Module.
(2) Control Unit reporting to an Audible Alarm.
(3) Control Unit reporting to a Monitor Module and an Audible Alarm.

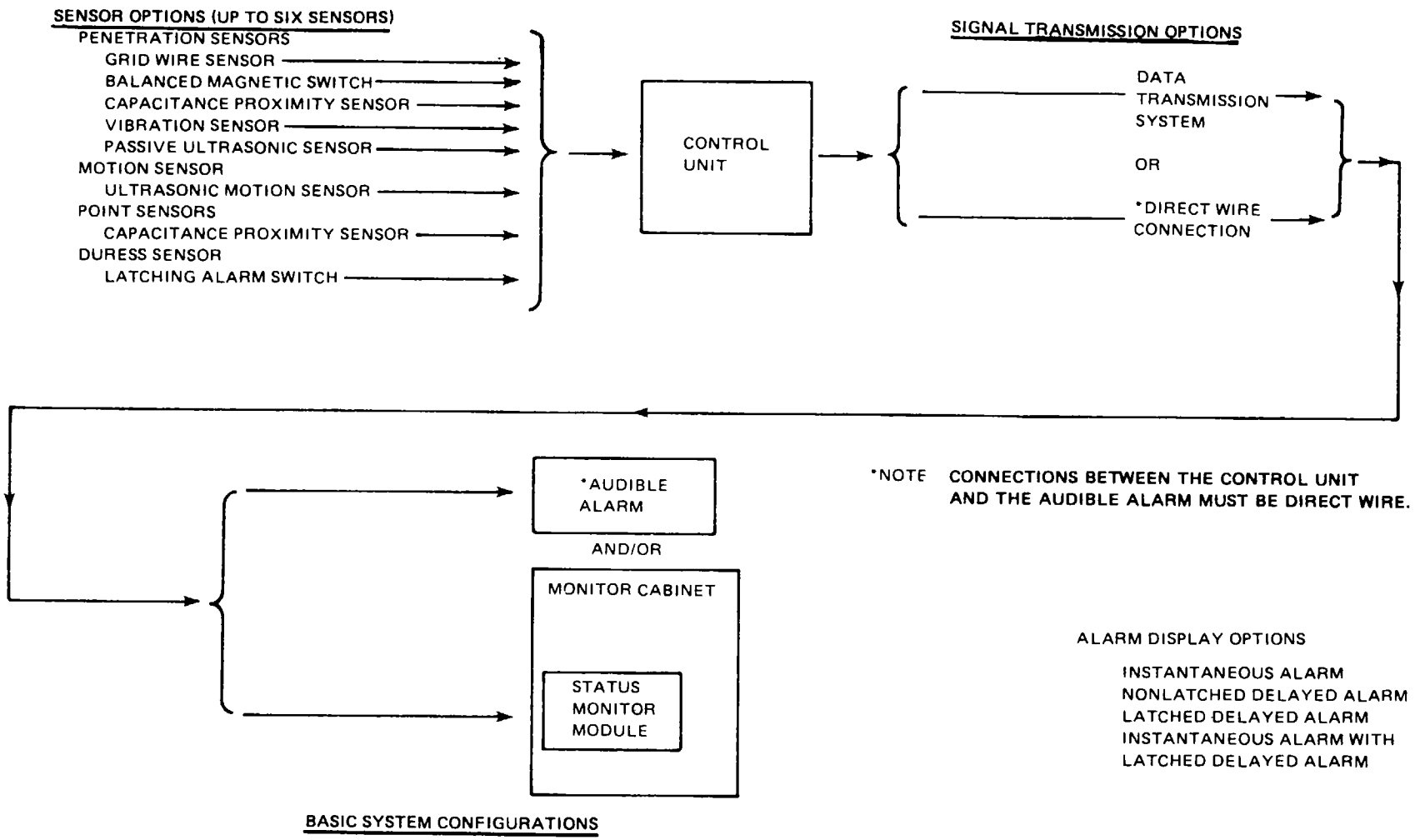


Figure 2-1. System Options

b. Two available methods of signal transmission between the Control Unit and Monitor Module are provided as follows:

(1) Data Transmission System

(2) Direct wire connection.

c. Four alarm display options are provided as follows:

(1) Instantaneous alarm option

(2) Nonlatched delayed alarm option

(3) Latched delayed alarm option.

(4) Instantaneous alarm with latched delayed alarm option.

d. Four categories of sensors are available

(1) Penetration sensors.

(a) Grid Wire Sensor

(b) Balanced Magnetic Switch

(c) Capacitance Proximity Sensor

(d) Vibration Sensor

(e) Passive Ultrasonic Sensor

(2) Motion Sensor. Ultrasonic Motion Sensor.

(3) Point Sensor. Capacitance Proximity Sensor

(4) Duress Sensor. Latching Alarm Switch.

e. The above options are described m detail m Chapter 1, paragraph 1-9 Note that the Capacitance Proximity Sensor may be used as both a penetration sensor and a point sensor. Selection of the above options for each system is the responsibility of those in charge of security of the protected area. Table 2-3 shows the allowable combinations of the above options and states the advantages and disadvantages of each combination Table 2-3 is applicable to both the direct-wire and Data Transmission System options. The disadvantage of the direct-wire option for signal transmission between Control Unit and Monitor Module is the virtual lack of line supervision.

2-11. SEQUENCE OF INSTALLATION.

a. The Control Unit is normally the first system component to be installed, unless the Grid Wire Sensor is used to protect it, then the Control Unit is installed after installation of the Grid Wire Sensor. Upon completion of the Control Unit installation, the Grid Wire Sensor is tested and the rest of the sensors are installed. The Vibration Sensor, Passive Ultrasonic Sensor, and Ultrasonic Motion Sensor are initially installed in a temporary manner without enclosing interconnecting wiring in conduit. After testing of these sensors has been completed, they are permanently installed and interconnecting wiring is enclosed in conduit.

b. If the system includes a Grid Wire Sensor, this component is normally installed before any of the other system components. The reason for this is that other system components will be installed on the paneling covering the wire grid of the Grid Wire Sensor. Before covering the wire grid with paneling, a diagram shall be made showing the exact location of the wire grid runs. This diagram shall be referred to when installing other system components to avoid breaking the wire grid. The Grid Wire Sensor is tested after the Control Unit has been installed.

c. At the monitoring area, the Monitor Cabinet and Monitor Modules are installed. If Data Transmission Systems are to be used, the Data Receivers are installed on their associated Status Monitor Modules before these items are installed in the Monitor Cabinet.

Table 2-3. Advantages and Disadvantages of System Options

Alarm display option used					Status monitor module used?		Audible alarm used?		Advantages of combination	Disadvantage(s) of combination
Instantaneous	Nonlatched delayed	Latched delayed	Instantaneous with latched delayed		Yes	No	Yes	No		
X					X			X	(1) Early notification of alarm. (2) Protection against accidental or intentional leaving of system in access mode when area is secured. (3) Control Unit ac power status is displayed on Monitor Module. (4) Remote notification of alarm.	(1) May be confusing to inexperienced monitor personnel. Alarm indicated whenever protected area is opened or closed, whether authorized or not. (2) Alarm can be reset at Monitor Cabinet without opening protected area.
X					X		X		(1) Early notification of alarm. (2) Protection against accidential or intentional leaving of system in access mode when area is secured. (3) Control Unit ac power status is displayed on Monitor Module. (4) Protected area must be opened to reset Control Unit.	(1) May be confusing to inexperienced monitor personnel. Alarm indicated whenever protected area is opened or closed, whether authorized or not.

Table 2-3. Advantages and Disadvantages of System Options-Continued

Alarm display option used					Status monitor module used?		Audible alarm used?		Advantages of combination	Disadvantage(s) of combination
Instantaneous	Nonlatched delayed	Latched delayed	Instantaneous with latched delayed		Yes	No	Yes	No		
X					X			X	(1) Protection against accidental or intentional leaving of system in access mode when area is secured. (2) Control Unit ac power Status is displayed on Monitor Module. (3) Remote notification of alarm.	(1) Alarm notification is delayed. (2) Alarm can be reset at Monitor Cabinet without opening protected area.
			X		X		X		(1) Protection against accidental or intentional leaving of system in access mode when area is secured. (2) Control Unit ac power status is displayed on Monitor Module. (3) Remote notification of alarm. (4) Protected area must be opened to reset Control Unit.	(1) Alarm notification is delayed.

Table 2-3. Advantages and Disadvantages of System Options-Continued

Alarm display option used					Status monitor module used?		Audible alarm used?	Advantages of combination	Disadvantage(s) of combination
Instantaneous	Nonlatched delayed	Latched delayed	Instantaneous with latched delayed		Yes	No			
			X		X		X	(1) Protection against accidental or intentional leaving of system in access mode when area is secured. (2) Control Unit ac power status is displayed on Monitor Module. (3) Remote notification of alarm. (4) Protected area must be opened to reset Control Unit.	(1) Alarm notification is delayed
			X		X		X	(1) Protection against accidental or intentional leaving of system in access mode when area is secured (2) Control Unit ac power status is displayed on Monitor Module. (3) Remote notification of alarm. (4) Protected area must be opened to reset Control Unit.	(1) Alarm notification is delayed.

Table 2-3. Advantages and Disadvantages of System Options-Continued

Alarm display option used					Status monitor module used?		Audible alarm used?		Advantages of combination	Disadvantage(s) of combination
Instantaneous	Nonlatched delayed	Latched delayed	Instantaneous with latched delayed		Yes	No	Yes	No		
				X	X			X	(1) Protection against accidental or intentional leaving of system in access mode when area is secured. (2) Control Unit ac power status is displayed on Monitor Module. (3) Remote notification of alarm.	(1) Alarm notification is delayed.
						X	X		(1) This option would be used if personnel are not available around the clock to attend a Monitor Cabinet. (2) Protected area must be opened to reset Control Unit.	(1) Alarm notification is delayed (2) No remote notification of alarm is provided (3) No protection against accidental or intentional leaving of system in access mode when area is secured.

d. Next, the transmission lines for the Data Transmission System or the direct-wire transmission lines are installed between the Control Unit and the Monitor Cabinet. Data Transmission Systems are used, the Data Transmitters are now installed in their respective Control Units.

e. If an Audible Alarm is to be used, it is the last component to be installed. The J-SIID System is then ready for an operational test.

2-12. INSTALLATION AND TESTING OF THE GRID WIRE SENSOR.

a. General Installation Requirements. Walls and other barriers of material such as wood and wall board are better suited to the installation of the Grid Wire Sensor than are those of cinder block, concrete, or masonry. The Grid wire Sensor can be installed on cinder, concrete, and masonry surfaces; however, these surfaces must first be covered with plywood or other material to which the grid wire can be stapled. An alternate method is to staple the wire grid to the back side of the panel and then install the panel. With this method, only one layer of panel is required. The roll of grid wire supplied with the kit will cover an area of approximately 100 square feet (9.29 sq m) with parallel runs 4 inches (10.16 cm) apart. The no-alarm input impedance to the CU must be 2,000 ohms or less. Allow 200 ohms for safety factor and assume 30 ohms per spool of wire (25 ohms for wire and 5 ohms for a connection), which gives the maximum area of coverage for any pair of CU input terminals as follows.

$$2{,}000 - 200 \text{ ohms} = \frac{1800 \text{ ohms}}{30 \text{ ohms/spool}}$$

$$= 60 \text{ spools} \times \frac{100 \text{ sq ft}}{\text{spool}}$$

$$= 6{,}000 \text{ sq ft}$$

If more than 6,000 square feet (557.4 sq m) coverage is required, additional CU input terminals must be used.

b. Specific Installation Requirements. The Grind Wire Sensor is supplied in kit form and consists of the following components:

(1) Grid Wire Installation Gun. The installation gun is a staple gun modified to accommodate a wire holder/dispenser. The wire is routed to the proper position for stapling through a wire centering guide The centering guide contains a Teflon bushing to prevent abrasion of the wire as it is pulled through the guide. The guide ensures that the wire is centered under the staple when each staple is set. The wire holder/dispenser attachment also provides a compartment for storing extra staples.

(2) Grid Wire Junction Box. The junction box comprises a steel chassis containing a terminal strip, cover, pry-off tamper switches, and associated wiring and switch mounting hardware.

(3) Grid Wire. The grid wire is No. 26 AWG, enamel-coated, solid copper, with a breaking strength of 7.25 to 8.3 pounds (3.3 to 3.8 kg) tension. It is supplied on rolls that will cover approximately 100 square feet (9.29 sq m).

(4) Associated Hardware. The kit also includes 5,000 staples, solderless crimp lugs, a lug crimping tool, several small pieces of sandpaper, and eight spools of wire totaling 4,800 feet (1463 m).

c. Installation Grid Wire Sensor. The procedures described are for installing the wire grid on a wall, but these steps are easily adapted for installation on a floor or ceiling.

NOTE

Use extreme care to ensure that the wire is not broken or scraped during installation.

(1) Preparation. Load the staple gun with staples. Place six additional strips of staples in the spare staple magazine on the side of the gun. Pull the knob on the left side of the wire holder and put a roll of wire in the wire holder. Turn the roll so the wire may be pulled from the rear of the roll (figure 2-2). Pull out about 1 foot (0.3 m) of

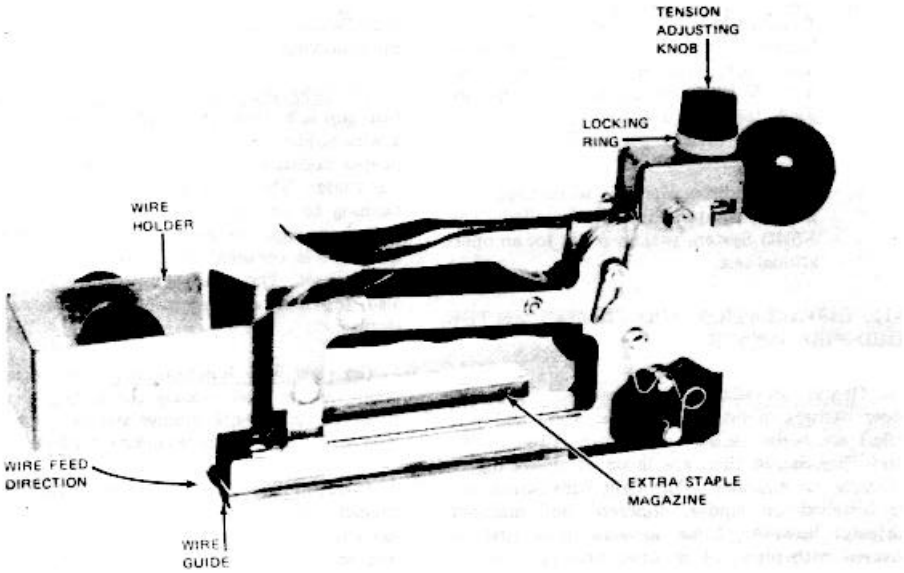


Figure 2-2. Grid Wire Sensor Staple Gun

wire. Feed the end of the wire through the hole in the end of the plastic wire guide nearest the roll of wire (rear of the gun). Pull the wire through the slot in the center of the wire guide and feed the end of the wire through the hole in the front end of the guide. Practice stapling on a sample of the material to which the wire grid will be attached. Adjust the tension adjusting knob until the staples hold the wire securely without crimping or breaking the wire. Tighten the knurled nut on the bottom of the tension of the tension adjusting knob to lock the knob. If the grid wire is broken or a roll runs out, it will be necessary to splice the wire. Fold a small piece of sandpaper in half with the abrasive mside. Place the end of the wire to be spliced inside the folded piece of sandpaper and strip the enamel insulation from the last 2 inches (5.1 cm). In the middle of this stripped section, fold the wire double, and then fold it double again. Insert this folded wire end into a tubular type crimp connector and use the crimping tool to secure the connector to the wire. Repeat these steps for each wire to be spliced. To reload the staple gun; open the spare staple magazine, rotate the gun so the magazine is pointing downward, and remove a strip of staples. Close the magazine and reload the gun. Use care to avoid breaking, crimping, or scraping the wire.

(2) Installation of Wire Grid. In general, set the staples 12 inches (30.5 cm) apart. Make all vertical and all horizontal wire runs 4 inches (10.3 cm) apart (figure 2-3). Hold the gun so wire holder end is away from you and the wire is pulled out of the trailing end of gun. After the first staple has been set, pull the wire out of the staple gun by moving the gun away from the staple. This will ensure proper tension on the wire. To install the grid, pull out about 12 inches (30.5 cm) of wire. Set the first staple as close as possible to the floor and 4 inches (10.3 cm) from the corner of the wall. Move the gun up the wall and set a staple every

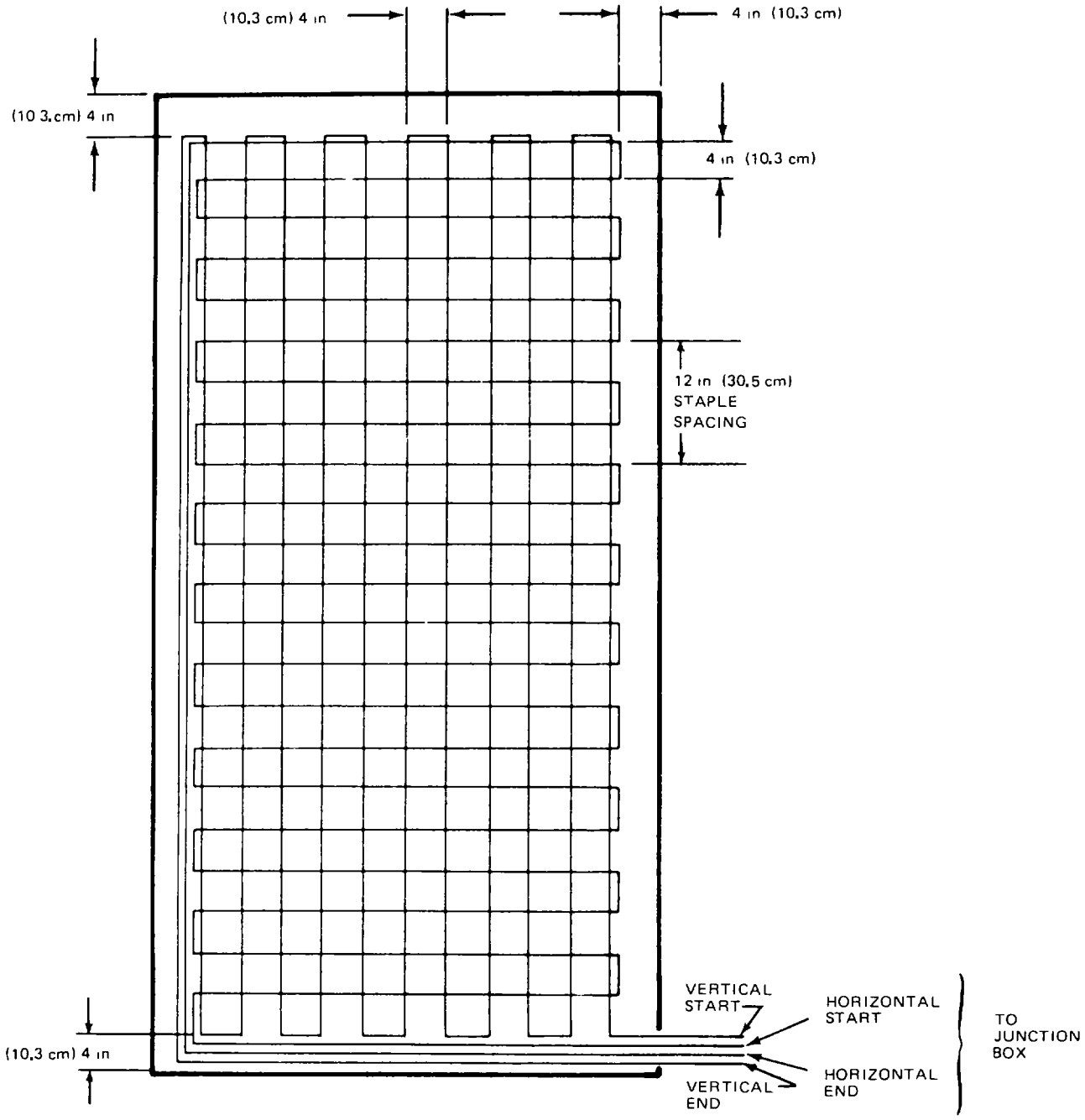


Figure 2-3. Typical Wire Grid Installation

12 inches (30.5 cm) until you reach a point as close as possible to the top of the wall and set the last staple. Move the gun to the side 4 inches (10.3 cm) and set a staple Move the gun down the wall and set a staple every 12 inches (30.5 cm) until you reach a point as close as possible to the floor Move the gun to the side 4 inches (10.3 cm) and set a staple. Continue these steps until the last vertical run has been stapled in place about 4 inches from the side of the wall. Run the wire horizontally to the starting point, set the last staple, pull out about 12 inches (30.5 cm) of wire, and cut it off. Repeat these steps for the horizontal wire runs. After all the horizontal wire runs are stapled in place, ensure that there is about 12 inches (30.5 cm) of wire beyond the first and last staples at the starting point. Tag these four wire ends to indicate whether they are horizontal or vertical Fold a small piece of sandpaper in half with the abrasive inside. Place the end of each wire inside the folded piece of sandpaper and strip the enamel insulation from the last 2 inches (5.1 cm) of the end of each wire. Set multimeter to ohms and connect the leads to each pair (horizontal and vertical) of wires. The meter should indicate 1 ohm or less. Connect the meter leads to one horizontal and one vertical wire. The meter should indicate over 100,000 ohms Repair or replace any wire(s) that gives incorrect indications. Cover the wire grid with fire-resistant paneling. This paneling will protect and conceal the wire grid. Make a diagram of the wire locations before any paneling is installed. Drill a small hole through the paneling where it will be covered by the GWS housing. Pass the four grid wire ends through the hole as the paneling is installed. Remove screws that secure GWS housing cover and remove cover Position housing on wall and mark locations of four mounting screws on wall Remove housing and prepare wall for appropriate mounting screws or other hardware. Use a 7/8-inch (2.22 cm) Greenlee chassis punch (or equivalent) to cut a hole in the GWS housing for conduit connection. Insert the grid wire ends through the grommeted hole in the rear of the housing, and mount the housing on the paneling. Cut all four wires to about 6 inches (15.24 cm) long Strip about 2 inches (5.1 cm) of enamel insulation from ends of wires, fold the section m half and in half again, and crimp a spade lug on each folded wire end. Connect horizontal grid wires to TB1-1 and TB1-2, and vertical grid wires to TB1-3 and TB1-4. Ensure that there is a jumper from TB1-2 to TB1-3, and from TB1-4 to TB1-5 See figure 2-4. If the GWS is used to protect a window, shutter, or skylight; only a horizontal or vertical grid will be used. Only two grid wires will be connected to the junction box as shown m figure 2-5. If more than one junction box is to be used to connect several wire grids together, connect the boxes together as shown in figure 2-4.

NOTE

If shutter is to be permanently closed and secured, treat it as part of the wall and install wire grid m the same manner as the rest of the wall.

(3) Using the GWS to Protect a Shutter. To install wire grid, staple wire to the window frame at the bottom of the shutter Leave a 3-inch (7.62 cm) service loop to allow opening of the shutter and set the next staple in the bottom of the shutter Run a horizontal grid pattern with wires 4 inches (10.3 cm) apart and staples 12 inches (30.5 cm) apart to the top of the shutter. Run a wire horizontally to the hinge side of the shutter. Set a staple, leave a 3-inch (7.62 cm) service loop, and set the next staple in the window frame. Run the wire up above the window frame, set a staple, and run the wire horizontally to the other side of the window frame. Set a staple, run the wire down, level with the top of the shutter, and set a staple. Leave a 3-inch (7.62-cm) service loop and set the next staple m the shutter. Repeat the horizontal grid pattern on this half of the shutter. At the bottom of the shutter, leave a 3-inch service loop and set the next staple in the window frame. Run a horizontal wire back to the starting point. Set a staple, pull out about 12 inches (30.5 cm) of wire, and cut it off. See figure 2-6 for a typical installation. The section of the wire grid on the shutters may be tied into the main grid on the wall by splicing the beginning of the shutter grid wire to the end of the main grid horizontal wire, and connecting the end of the shutter grid wire to the GSW junction box. If the shutter section of the wire grid is to be connected to its own junction box, leave about 12 inches (30.5 cm) of wire beyond the first and last staples so that spade lugs may be crimped to the wire ends and the lugs connected to the horizontal terminals (TB1-1 and TB1-2) in the junction box. Cover each section of the shutter with paneling to conceal and protect the wire grid.

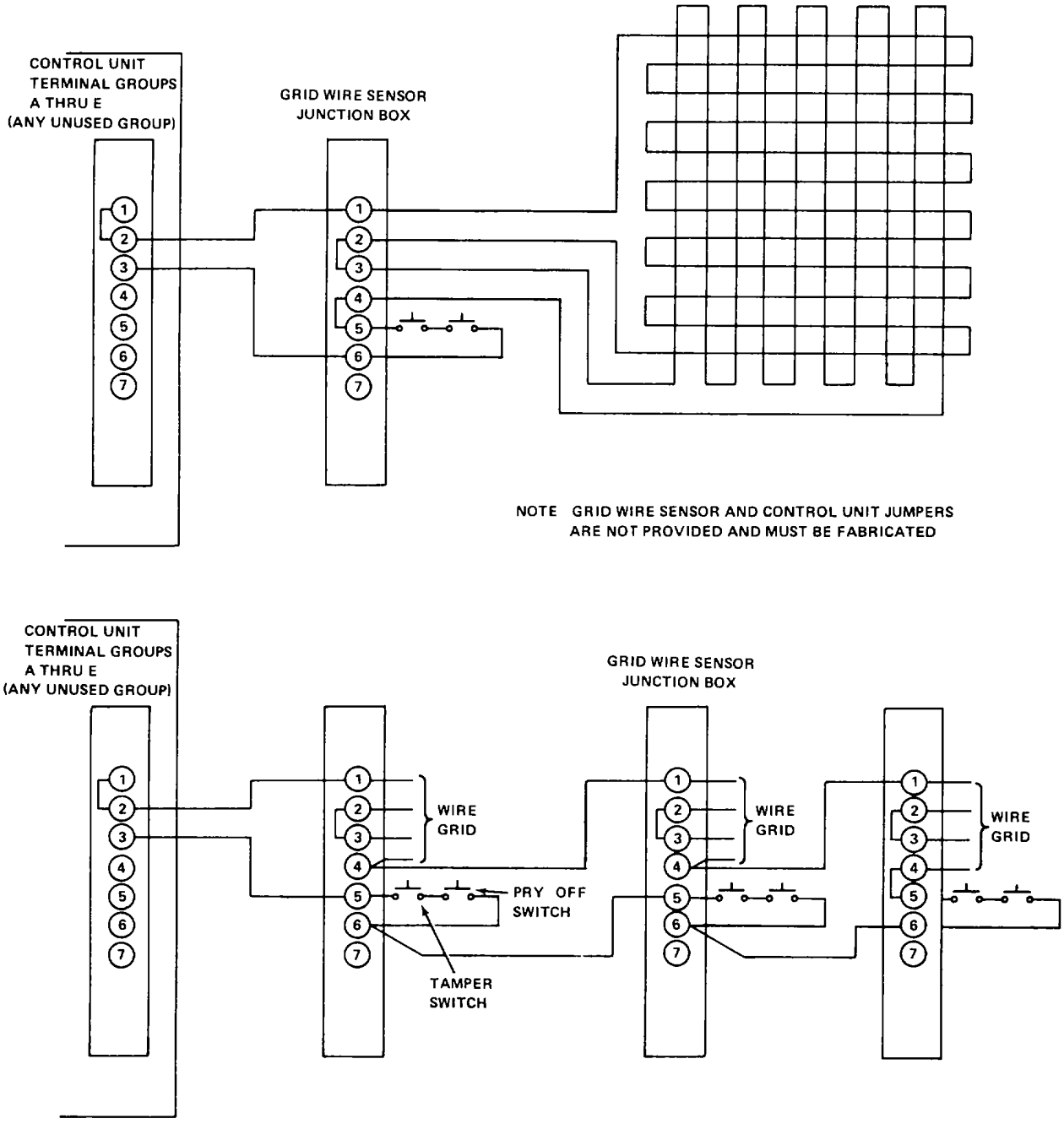


Figure 2-4. Typical Grid Wire Sensor Junction Box Connections

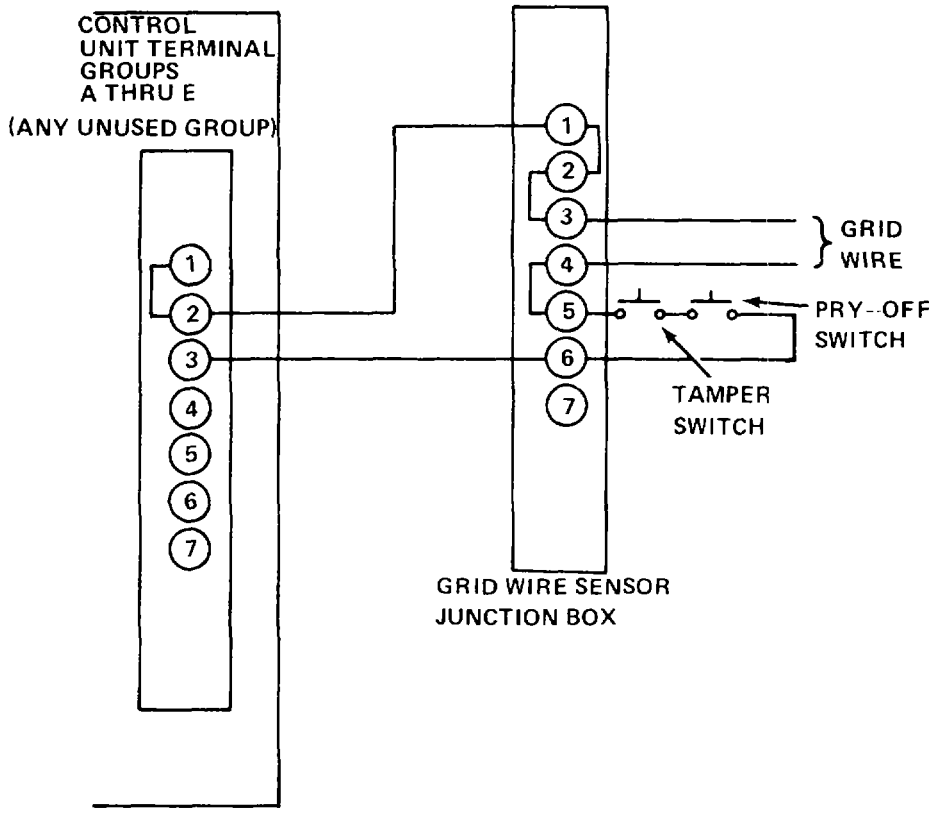


Figure 2-5. Typical Horizontal or Vertical Grid Wire Sensor Junction Box Connections

(4) The GWS May be Used to Protect a Wooden Door. To install wire grid, start at the top or bottom comer on the hinge side of the door. Pull out about 12 inches (30.5 cm) and set the first staple about 4 inches (10.3 cm) from the top or bottom and 4 inches (10.3 cm) from the side of the door. Install vertical and horizontal grids in the same manner as the main wire grid on the wall. Make all wire runs about 4 inches (10.3 cm) apart, and set staples about 12 inches (30.5 cm) apart. Cover the door with a piece of paneling to conceal and protect the wire grid. Pass the four grid wire ends through a hole in the paneling and into a junction box mounted on the paneling. Remove insulation, fold wire ends, crimp spade lugs on junction box, cut a second conduit entrance hole and mount the box on the wall next to the junction box on the door. See figure 2-7 for a typical installation. Connect the two junction boxes with a piece of flexible conduit long enough to provide a service loop so the door may be opened and closed. Run the wires from terminals on TB1 in the junction box on the door, through the

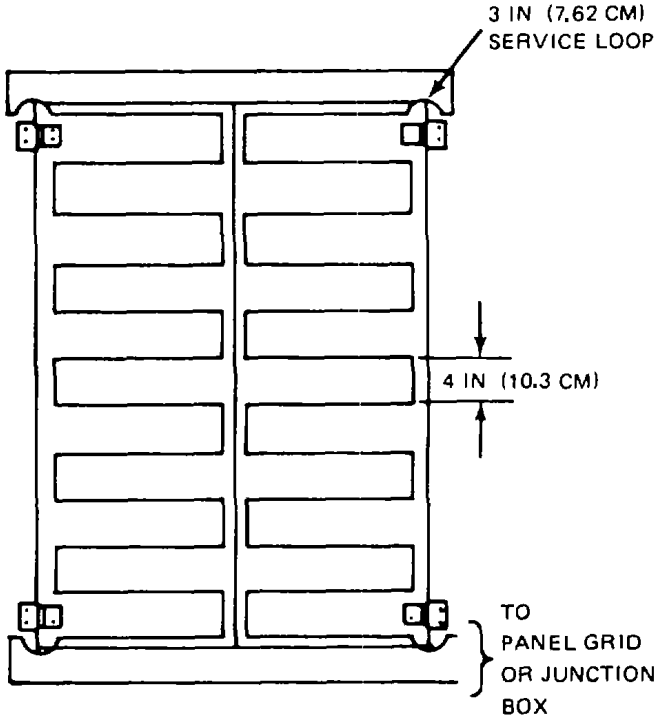


Figure 2-6. Typical Wire Grid Installation on Shutter

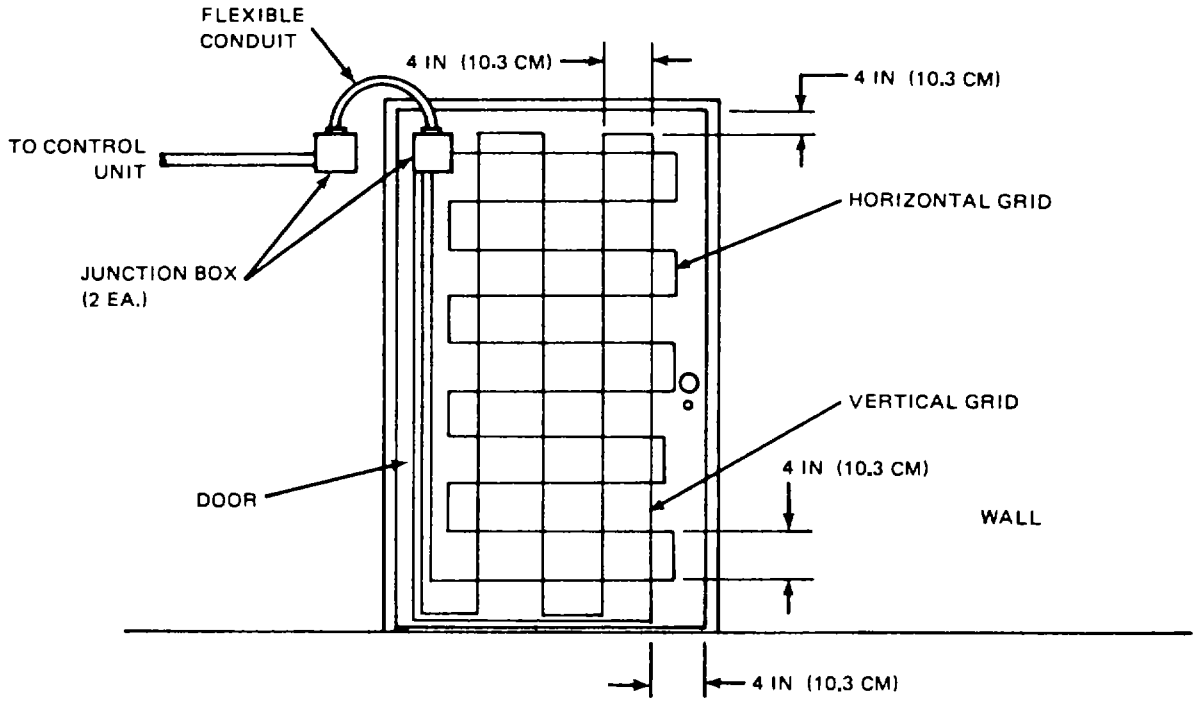


Figure 2-7. Typical Wire Grid Installation on Wooden Door

flexible conduit, to TB1 m the box on the wall, and then to the Control Unit. To eliminate the second junction box, an alternate method of installation may be used. Install the wire grid, protective paneling, and junction box on the door as previously described, but connect the flexible conduit service loop directly to the rigid conduit on the wall with a coupling. See figure 2-8 for a typical installation.

(5) The GWS May be Used to Protect a Window or Skylight. To install wire grid, obtain 1/2inch (5.1 cm) wooden dowels long enough to span the window or skylight. Cut grooves 1/16 inch wide by 1/16 inch deep (0.16 x 0.16 cm) along the length of each dowel. Nail dowels to window or skylight frame in a vertical position, 4 inches (10.16 cm) apart, and with grooves facing inside. Pull out about 12 inches (30.5 cm) of wire and set the first staple. Run grid wire through slats in dowels and staple it every 12 inches (30.5 cm). Run wire horizontally to the starting point, set the last staple, pull out about 12 inches (30.5 cm) of wire, and cut it off. The wire ends may be connected to a junction box or spliced into the main vertical grid wire. See figure 2-9 for a typical installation.

d. Testing the Grid Wire Sensor for Proper Operation. Remove junction box cover. Set multimeter to ohms and insert leads through conduit entrance hole Connect leads to TB1-5 and TB1-6. Put cover in place and hold securely. Meter should indicate 1 ohm or less. Slowly raise cover. When cover is raised 1/8 to 1/4 inch (0.318 to 0.635 cm), meter indication should change to over 100,000 ohms. Remove cover and loosen four mounting screws. Put cover in place and hold securely. Meter should indicate 1 ohm or less. Slowly raise junction box from mounting surface. When box has been raised 1/8 to 1/4 inch (0.318 to 0.635 cm), meter indication should change to over 100,000 ohms. Remove cover, tighten mounting screws, and connect meter leads to TB1-1 and TB1-2. This tests horizontal grid. Meter should indicate 1 ohm or less. Connect meter leads to TB1-3 and TB1-4. This tests vertical grid. Meter should indicate 1 ohm or less.

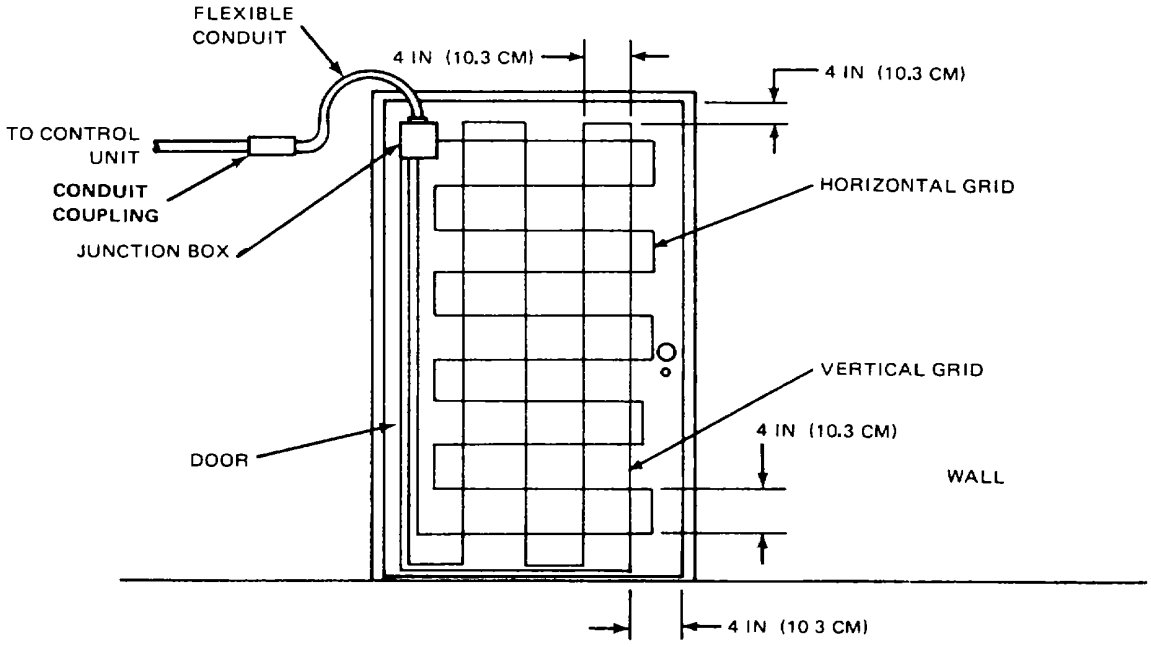


Figure 2-8. Alternate Wire Grid Installation on Wooden Door

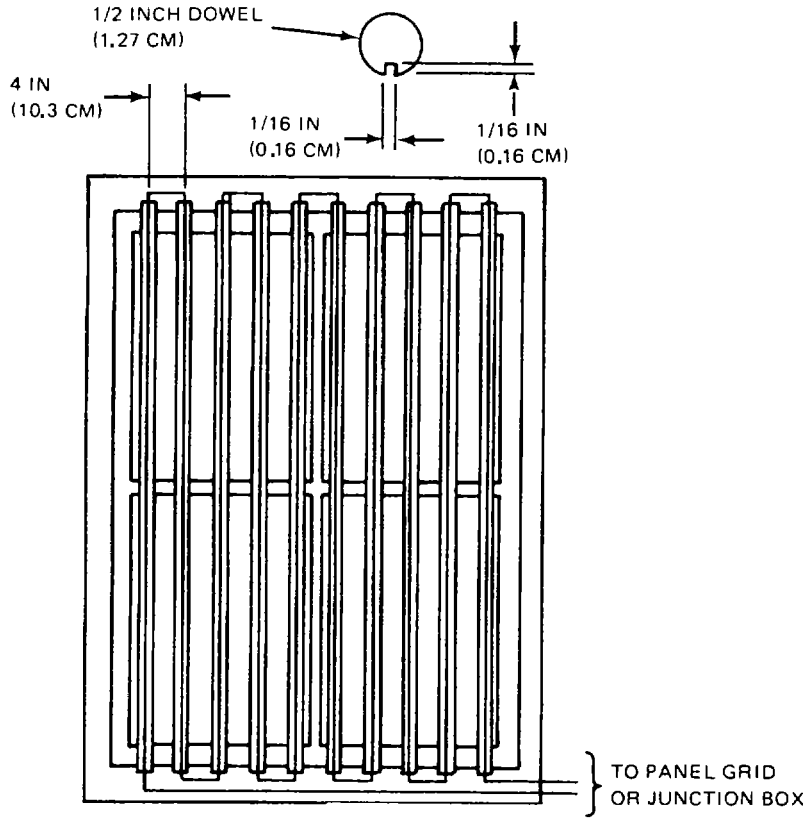


Figure 2-9. Typical Wire Grid Installation on Skylight

Connect meter leads to TB1-1 and TB1-4. This tests both grids and jumpers on TB1 Meter should indicate 1 ohm or less. If meter indicates more than 1 ohm in any of these tests, replace tamper or pry-off switch, or repair or replace wire grid or jumper.

2-13. INSTALLATION AND TESTING THE CONTROL UNIT.

a. General Installation Requirements. The CU must be mounted securely. If the wall is not strong enough to support the weight, the CU may be secured to wall studs If the prepunched mounting holes in the CU enclosure do not line up with the wall studs, the CU may be mounted on a piece of 3/4-inch (1.9 cm) exterior grade plywood. The plywood mounting board shall be secured to the wall studs The location should allow convenient routing of interconnecting wiring, easy access for authorized personnel, and convenient maintenance. It should not allow easy tampering, or be in an area of heavy traffic where accidental damage might occur See figure 2-10 for space required to mount the CU.

b. Installation of the Control Unit. Do not remove any subassembly from the CU during installation Determine the number of conduit connections to be made to the CU

CAUTION

When cutting conduit entry holes in the enclosure, ensure that no metal shavings drop into the power supply or the power supply may be damaged

Use the 7/8-inch Greenlee chassis punch (or equivalent) to cut the required holes m the areas marked on the enclosure. Do not use a hole saw because this tool generates a large number of metal shavings Mark the wall or mounting board for the fasteners. See figure 2-10 for spacing of the fasteners. Set appropriate fasteners for the upper mounting holes in the mounting surface Use two people to lift the CU and slip the upper mounting holes over the fasteners. Lower the CU, secure the upper fasteners, and insert the lower fasteners

WARNING

Disconnect ac power to the main distribution panel before connecting conduit and wiring between the Control Unit and panel. Ensure that power is not reconnected to the panel without first contacting personnel installing the Control Unit

Install conduit between CU and ac distribution panel. Pull three-wire power lines through conduit using a fishtape (or equivalent) Ensure that switch S1 on the power supply is off Connect ac power line to distribution panel Remove power supply cover to reach TB1 Connect phase wire to TB1-1, neutral wire to TB1-2, and ground wire to TB1-3 Since the J-SIIDS components are painted with a nonconducting paint, the conduit cannot be counted on for grounding. Install a ground wire at the Control Unit. Replace the power supply cover. Position battery outside CU enclosure. Carefully insert battery, end first, and turn and lower it into bottom of CU enclosure with terminals toward rear of enclosure The battery terminals and leads are color-coded red for positive and black for negative. Connect the leads to the terminals.

NOTE

As the CU is received from the factory, terminals 1, 2, and 3 of TB8-F and TB9-A through TB13-E, and terminals 3 and 4 of TB4 are jumpered. Jumpers should be left in place until sensors are connected to these terminals

c. Testing the Control Unit for Proper Operation. The controls and indicators are listed in table 2-4 and shown in figure 2-11. Open CU door.

(1) If Data Transmitter is installed, tag and disconnect wires from TB6 and TB7, remove screws that secure Transmitter to standoffs, and remove Transmitter. Remove any factory-installed jumpers from terminals 1 and 3 of TB8-F

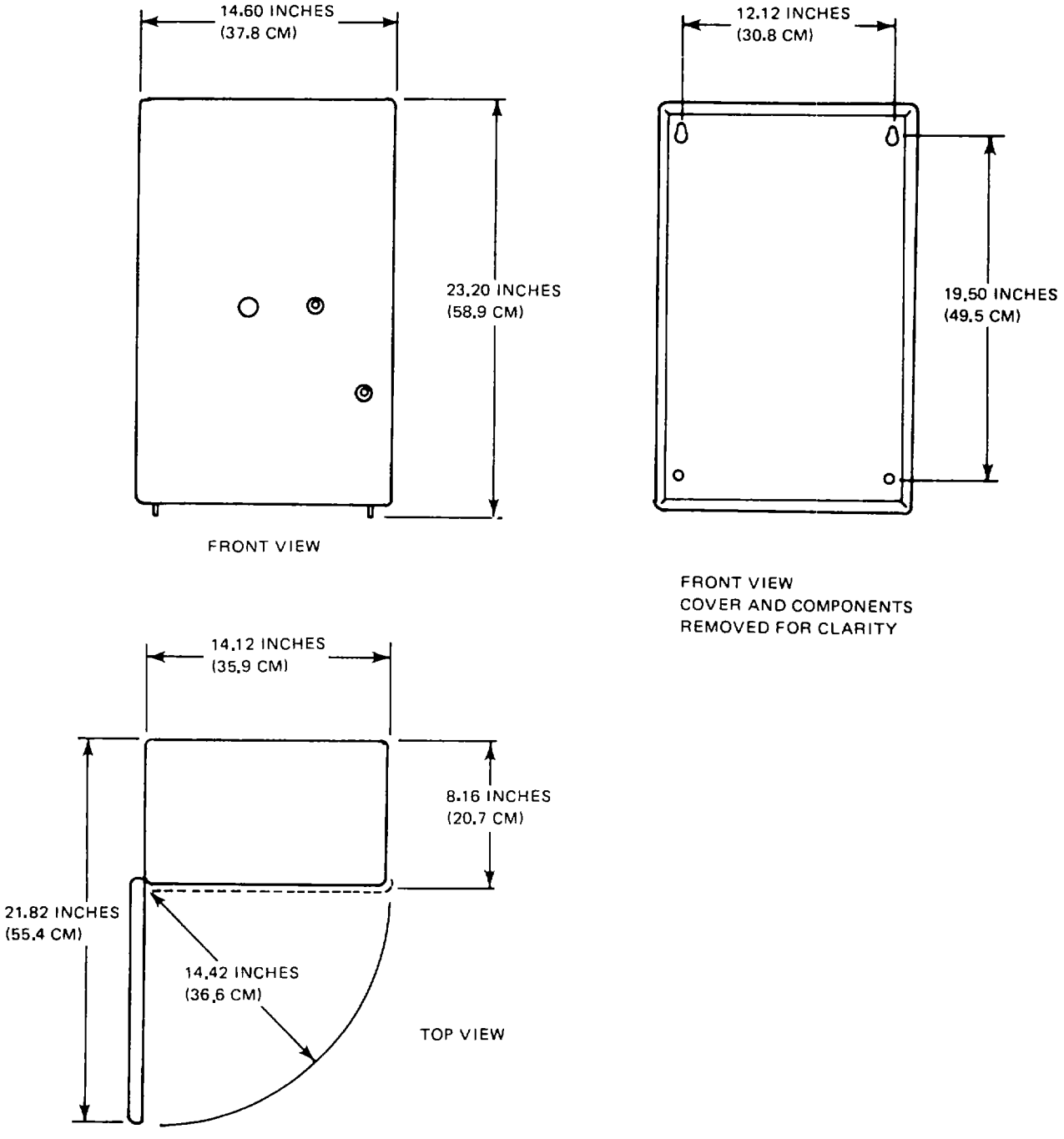


Figure 2-10. Space Requirement for Control Unit Mounting

Table 2-4. Operator's Controls and Indicators

Control or Indicator	Function
1. Operating mode switch (key-operated, 3-position rotary)	Selects the control unit operating mode (ACCESS, TEST/RESET, or SECURE). **NOTE** **Key removable in SECURE position only.**
2. AC POWER (indicating lamp) duress/ intrusion alarm display	Lights when ac power is applied to the unit. Light-emitting diodes light to indicate the respective duress or intrusion alarm input. Diode — Terminal board (alarm input) F — F (duress) A — A (intrusion) B — B (intrusion) C — C (intrusion) D — D (intrusion) E — E (intrusion) **NOTE** **Reset display by moving operating mode switch to TEST/RESET than back to SECURE.**
3. LATCH/NON-LATCH (2-position toggle switch)	Controls mode of operation for the delayed alarm output presented at terminal S1-D as follows: LATCH position - Normal operating position. Permits latched alarm conditions to remain until reset by positioning operating mode switch to TEST/RESET. NON-LATCH position – Limits latched alarm output at terminal S1-D to 10 ± 2 sec. after alarm disappears.
4. TRANSMITTER RESYNC (pushbutton switch)	When pressed, resynchronizes operation of Data Transmitter T-1257( )/FSS-9(V) and Data Receiver R-1861( )/FSS-9(V).
5. POWER (2-position toggle switch)	Connects ac power and emergency battery power to control unit power supply.
6. Audible signal device	Sounds when the operating mode switch is at TEST/RESET and a duress, intrusion, or tamper alarm is received at the control unit.
7. Tamper Alarm switch	a. Normal position - Detects opening of enclosure door. b. Plunger pulled out - Bypasses the alarm function of the switch.

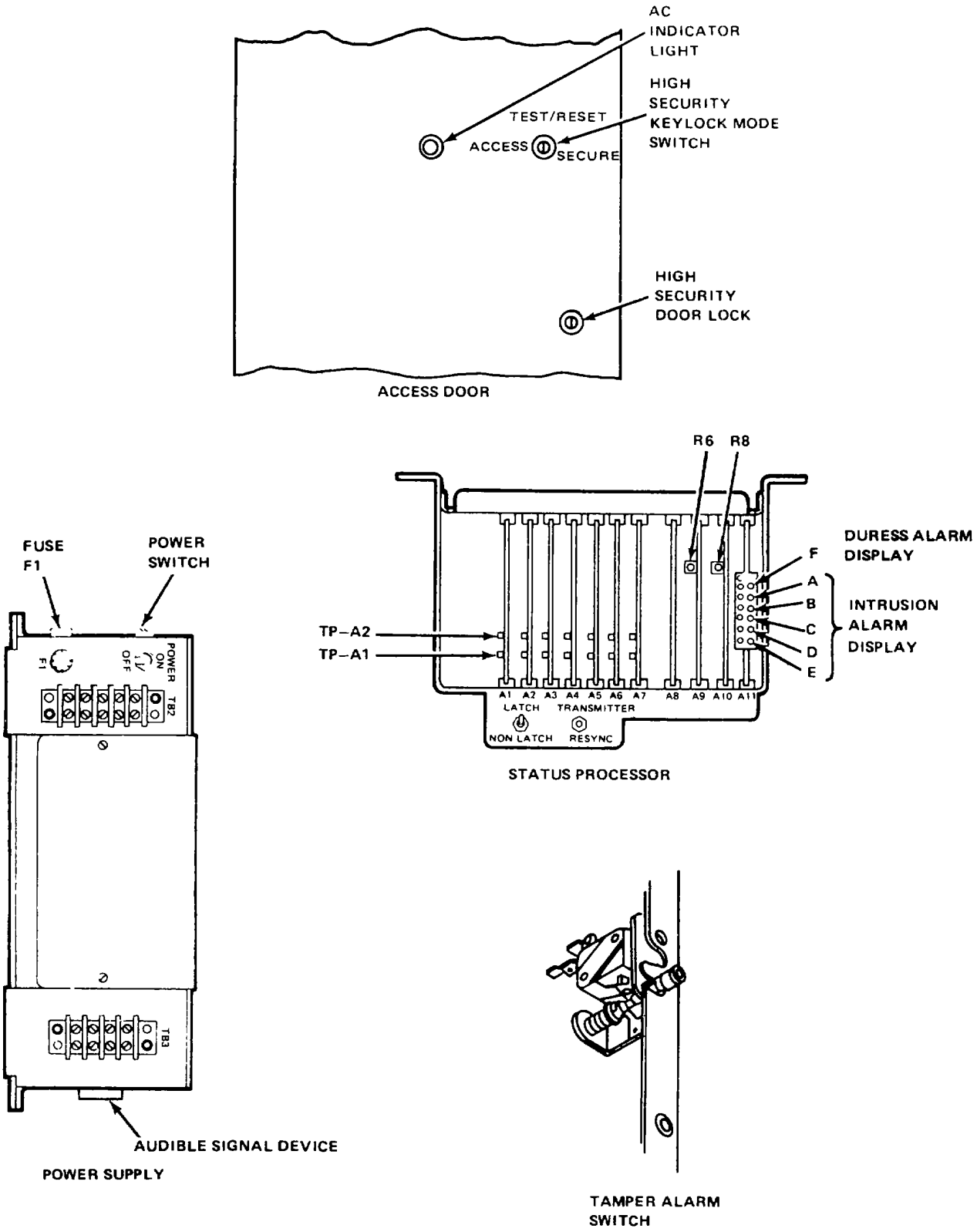


Figure 2-11. Maintenance Controls and Indicators.

through TB13-E, and TB7-S8. Ensure that there is a jumper on TB4-3 and TB4-4 in the power supply. Jumper terminals TB6-S11 S-1DR, S-2R and TB7-S-3R and S-4 together. Remove power supply cover. Inspect all controls and mechanical assemblies for loose or missing screws, bolts, and nuts. Inspect enclosure for dust, rust, corrosion, and damaged finish. Inspect electrical assemblies for damaged parts, frayed or broken insulation, and for signs of damage to connectors. Check fuses F1 (2 amp slow blow) and F2 (1 amp fast blow) for proper rating. Reinstall fuses.

(2) Turn on switch S1 on power supply. AC POWER indicator DS1 should light. Set multimeter to ac volts. Connect meter leads to TB5-1 and TB5-2. Meter should indicate input power, approximately 115 vac.

(3) Connect meter leads to TB1-5 and TB1-6. Meter should indicate 6.3 vac.

(4) Remove fuse F1. Set multimeter to dc volts and connect positive meter lead to TB2-2 and negative meter lead to TB2-4 Meter should indicate 24 vdc. Install fuse F1. Meter should indicate 26.0 to 26.5 vdc Connect positive lead to TB2-3. Meter should indicate 20 ±1 vdc. Connect positive meter lead to TB2-5. Meter should indicate 5 ±0.25 vdc. Connect positive meter lead, in turn, to each of the following test points: A1-TP1, A1-TP2, A2-TP1, A2-TP2, A3-TP1, A3-TP2, A4-TP1, A4-TP2, A5-TP1, A5-TP2, A6-TP1, A6-TP2, A7-TP1, and A7-TP2 Meter should indicate 18.5 vdc at each test point. Turn mode switch to TEST/ RESET and then to SECURE. Alarm LED's F and A through E should light after expiration of exit time delay. Pull Tamper Alarm Switch (TAS) plunger all the way out.

CAUTION

Ensure that 20 vdc on terminal 4 of TB8-F through TB13-E is not shorted to ground.

(5) Turn off switch S1 on top of power supply. Install jumper wires between terminals 1, 2, and 3 on terminal boards TB9-A through TB13-E, and between terminals S-8 and S-9 on TB7. Turn on switch S1 on top of power supply. Turn mode switch to TEST/RESET and then to SECURE. All alarm LED's should go out. Alarm LED F should light after expiration of exit time delay. Disconnect jumper wire from terminal 1 of terminal board TB9-A. Alarm LED A should NOT light. Reconnect jumper wire to TB9-A-1 Connect jumper wire to TB8F terminals 1, 2, and 3. Connect negative meter lead to chassis and positive lead, in turn, to each of the following test points: A1-TP1, A1-TP2, A2-TP1, A2-TP2, A3-TP1, A3-TP2, A4-TP1, A4-TP2, A5-TP1, A5-TP2, A6-TP1, A6-TP2, A7-TP1, and A7-TP2. Meter should indicate less than 0.5 volt at each test point.

(6) Turn mode switch to TEST/RESET. Connect negative meter lead to chassis and positive lead to A10-TP1. Turn mode switch to SECURE. Meter should Indicate 18 to 21 vdc. Disconnect jumper wire between TB4-3 and TB4-4. Meter should indicate approximately 0.5 vdc. Reconnect jumper wire.

(7) Set multimeter to ohms and connect leads to TB6 S-3 and TB7 S-3R. Remove ac power fuse F1. Meter should indicate more than 100,000 ohms. Install ac power fuse F1. Meter should indicate less than 2,000 ohms. Connect meter leads to TB6 S-2 and S-2R. Meter should indicate more than 100,000 ohms. Turn mode switch to TEST/RESET, and then to SECURE. Meter should Indicate less than 2,000 ohms for 4.5 to 6 seconds and then indicate more than 100,000 ohms.

(8) Set multimeter to dc volts and connect positive meter lead to TB9-A-7 and negative lead to TB9-A-6. Meter should indicate 0 vdc. Turn mode switch to ACCESS. Connect positive meter lead.

to terminal 7 and negative meter lead to terminal 6 on TB9-A through TB13-E, in turn. Meter should indicate 26 to 30 vdc at each terminal board.

(9) Turn mode switch to SECURE and LATCH/NON-LATCH switch to NON-LATCH. Set multimeter to ohms and connect leads to TB6 S1-I and S1-IR. Meter should indicate less than 2,000 ohms Disconnect jumper from TB8-F-1. Meter should indicate more than 100,000 ohms. Reconnect jumper to TB8-F-1. Meter should indicate more than 100,000 ohms and then change to less than 2,000 ohms after 10 ± 2 seconds Turn mode switch to TEST/ RESET. Disconnect jumper from TB8-F-1. Audible signal device should sound. Reconnect jumper to TB8-F-1. Audible signal device should stop sound- ing after 10 ± 2 seconds. Disconnect jumper from TB8-F-3. Audible signal device should sound. Reconnect jumper to TB8-F3. Audible signal device should stop sounding after 10 ± 2 seconds. Disconnect jumper from TB9-A1. Audible signal device should sound. Reconnect jumper to TB9-A-1. Audible signal device should stop sounding after 10 ± 2 seconds. Turn mode switch to SECURE. Set meter to ohms and connect leads to TB6 S1-I and S1-IR. Dis- connect jumper from TB9-A1. Meter should indicate more than 100,000 ohms and then change to less than 2,000 ohms after 10 ± 2 seconds. Turn off switch S1 on power supply. Meter should indicate more than 100,000 ohms.

(10) Turn on switch S1 on power supply, turn mode switch to SECURE, and set LATCH/NON-LATCH switch to NON-LATCH. Set meter to ohms and connect leads to TB6 S1-D and S1-DR. Meter should indicate less than 2,000 ohms. Disconnect jumper from TB8-F-1. Meter should indicate more than 100,000 ohms. Reconnect jumper to TB8-F-1. Meter should indicate more than 100,000 ohms and then change to less than 2,000 ohms after 10 ± 2 seconds Depress, release, and then pull TAS plunger all the way out. Meter should indicate more than 100,000 ohms and then change to less than 2,000 ohms after 10 ± 2 seconds. Disconnect jumper from TB9-A1. Meter should indicate more than 100,000 ohms. Reconnect jumper to TB9-A-1. Meter should indicate more than 100,000 ohms and then change to less than 2,000 ohms 10 ± 2 seconds after expiration of time delay period (8 to 100 seconds). Turn mode switch to TEST/RESET. Disconnect jumper from TB9-A-1. Meter should indicate more than 100,000 ohms. Reconnect jumper to TB9-A-1. Meter should indicate more than 100,000 ohms and then change to less than 2,000 ohms after 10 ± 2 seconds.

(11) Turn mode switch to SECURE. Set LATCH/NON-LATCH switch to LATCH. Meter should indicate less than 2,000 ohms. Disconnect and then reconnect jumper to TB8-F-1. Meter should indi- cate more than 100,000 ohms. Turn mode switch to TEST/RESET and then to SECURE. Meter should indicate less than 2,000 ohms. Press, release, and then pull TAS plunger all the way out. Meter should indicate more than 100,000 ohms. Turn mode switch to TEST/RESET and then to SECURE. Meter should indicate less than 2,000 ohms. Turn mode switch to TEST/ RESET. Disconnect jumper from TB9-A-1. Turn mode switch to SECURE. Meter should indicate less than 2,000 ohms for duration of combined exit and entrance time delays (16 to 200 seconds), and then change to more than 100,000 ohms. Turn mode switch to TEST/RESET and then to SECURE. Meter should indicate less than 2,000 ohms. Reconnect jumper to TB9-A-1. Turn mode switch to TEST/ RESET then to ACCESS. Press, release, and then pull TAS plunger all the way out. Meter should indicate more than 100,000 ohms. Turn mode switch to TEST/RESET and then to SECURE. Meter should indicate less than 2,000

ohms. Turn off switch S1 on power supply. Meter should indicate more than 100,000 ohms. Disconnect meter leads.

(12) Turn on switch S1 on power supply. Turn mode switch to TEST/RESET and then to SECURE Set multimeter to dc volts and connect positive meter lead to TB4-1 and negative meter lead to TB4-2. Meter should indicate 5 vdc. After expiration of exit time delay period (10 ± 2 to 90 ±10 seconds), disconnect and connect jumper on TB9-A-1 After expiration of entrance time delay period (10 ± 2 to 90 ±10 seconds), meter should indicate less than 1 vdc Turn mode switch to TEST/RESET. Meter should indicate 5 vdc Turn mode switch to ACCESS. After expiration of entrance time delay period (10 ± 2 to 90 ±10 seconds), disconnect and reconnect jumper on TBA-1. Meter should indicate 5 vdc

(13) Turn off switch S1 on power supply. Set multimeter to ohms and connect leads to TB7 S-6 and S-7. Meter should indicate more than 100,000 ohms. Press TRANSMITTER RESYNC switch. Meter should indicate 1 ohm or less.

(14) Ensure that jumpers are installed on power supply TB4-3 and TB4-4, TB7-1-S-8 and TB7-S9 terminals 1, 2, and 3 of TB9-A through TB8-F. Install power supply cover. If Data Transmitter was removed for this test, reinstall it. Position Transmitter over standoffs in CU and secure with four screws Connect wires to TB6 and TB7.

d. Adjustment of Entrance and Exit Time Delay Periods. The entrance and exit time delay periods must be adjusted after initial installation of the system and may be adjusted in a functioning system any time security requirements dictate. Since measurement or adjustment of the exit time delay is dependent upon the entrance time delay period, the entrance time delay must always be measured or adjusted first.

NOTE

If the CU is in a functioning system, refer to TM 5-6350-264-14/10 & P on the CU for steps to disable the Audible Alarm.

(1) To adjust entrance time delay, turn mode switch to TEST/RESET, open CU door, and pull TAS plunger all the way out. Turn on switch S1 on power supply. Ensure that all sensors are in a no-alarm state. Ensure that only terminal boards TB8-F through TB13-E without sensors wired to them have jumpers on terminals 1, 2, and 3. Turn mode switch to TEST/RESET and then to SECURE Set multimeter to dc volts and connect positive lead to A10-TP1 and negative lead to chassis. The meter should indicate 18 to 21 vdc. Disconnect a sensor input wire on jumper from terminal 1 on one of the terminal boards, TBA through TBE, and begin timing the delay period. When the meter indication changes to less than 1 vdc, end timing of the delay period. The elapsed time is the entrance time delay period. If the time delay is satisfactory, record the time and proceed to the exit time delay. Loosely reconnect the wire or jumper to terminal number 1. Turn mode switch to TEST/RESET and then to SECURE To adjust entrance time delay, turn R8 on PC board A10 clockwise to decrease time delay and counterclockwise to increase time delay. Repeat adjustment and timing steps until entrance time delay period is satisfactory.

(2) To adjust exit time delay, set multimeter to dc volts and connect positive lead to A10-TP1 and negative lead to chassis. Meter should indicate 18 to 21 vdc. Disconnect sensor wire or jumper from terminal 1 on TBA through TBE. Turn mode switch to TEST/RESET and then to SECURE and begin timing exit period When the meter indication changes to less than 1 vdc, end timing of the delay period. Subtract the

entrance time delay from the elapsed time just taken to obtain the exit time delay period. If the time delay is satisfactory; record the time, disconnect meter leads, and turn mode switch to TEST/RESET. To adjust exit time delay, turn R6 on PC board A9 clock-wise to decrease time delay and counter-clockwise to increase time delay. Repeat adjustment and timing steps until exit time delay period is satisfactory. Remove meter leads and reconnect sensor input wire on jumper to terminal number 1. If the CU is in a functioning system, refer to TM 5-6350-264-14/10 & P on the CU for steps to activate the Audible Alarm. If this is initial installation; turn mode switch to TEST/RESET, test for proper system operation, then turn off switch S1 on power supply, and continue with sensor installation.

NOTE

Remove jumpers from TB6 and TB7 prior to configuring for desired option.

e. Testing for Proper System Operation. Connect the GWS to any unused terminal board TB9-A through TB13-E in the CU as shown in figures 2-4 and 2-5. Open the Control Unit door and pull the TAS plunger all the way out. Turn on switch S1 on power supply. Press TRANSMITTER RESYNC switch S2. Wait about 5 minutes for system to stabilize. During 5-minute stabilization period, check power supply. Set multimeter to dc volts and connect negative lead to chassis (ground). Connect positive lead to power supply TB2-3. Meter should indicate 20 ±1 vdc. Connect positive lead to TB2-5. Meter should indicate 5 ± 0.25 vdc. Connect lead to TB2-2. Meter should indicate 28 ± 2 vdc. Turn mode switch to TEST/RESET. At each GWS junction box, remove screws that secure cover. Slowly raise cover. When cover is raised 1/8 to 1/4 inch (0.318 to 0.635 cm), the audible signal device in the CU should sound. Depress the TAS and secure with tape. The audible signal device should stop sounding after 10 ± 2 seconds. Disconnect grid wire from TB1-1 to check horizontal grid. The audible signal device in the CU should sound. Reconnect wire to TB1-1. The audible signal device should stop sounding after 10 ± 2 seconds. Disconnect grid wire from TB1-3 to check vertical grid. The audible signal device IN the CU should sound. Reconnect wire to TB1-3. The audible signal device should stop sounding after 10 ±2 seconds Loosen four mounting screws and slowly raise junction box from its mounting surface. When the box has been raised 1/8 to 1/4 inch (0.318 to 0.635), the audible signal device should sound. Secure the junction box mounting screws and the audible signal device should stop sounding after 10 ± 2 seconds Remove tape from the TAS and replace and secure cover. Turn off switch S1 on power supply.

2-14. INSTALLATION AND TESTING OF THE BALANCED MAGNETIC SWITCH.

a. General Installation Requirements.

(1) The Balanced Magnetic Switch is designed to be installed on a door or window. The Magnetic Switch Assembly should be mounted on the frame of the door or window. The Actuating Magnet Assem- bly should be mounted such that move- ment of the door or window produces the relative motion depicted in figure 2-12. If the Balanced Magnetic Switch is installed on a door, both the door and door frame must be constructed of steel or covered with steel plates

(2) There is an index mark on one side of each half of the Actuating Magnet Assembly. The halves should always be assembled such that the index marks are in alignment There is also an index mark on one side of the Magnetic Switch Assembly. When the assemblies are installed, the Actuating Magnet Assembly should be on the side of the Magnetic Switch Assembly which has the index mark, and the index marks in both assemblies should be oriented as shown in figure 2-13.

(3) If the Actuating Magnet Assembly is to be installed on a door that is not constructed of steel and is not covered on the outside with steel plates, the door shall be covered with steel (minimum 16 gauge) as shown in figure 2-14. The steel plating shall extend from the jamb to at least 1 foot (30.48 cm) below the top of the door and across the door from jamb to jamb. If the door frame is not constructed of steel, it shall be covered with steel as shown in figure 2-14. The plate shall extend across the top of the frame from jamb to jamb. The top of the Actuating Magnet Assembly should be flush with the top edge of the door as shown in figure 2-14.

(4) The conduit should be pre-bent to fit the installation requirements prior to installing the switch assembly. The switch assembly should be installed on the conduit prior to installing the assembly on the mounting surface.

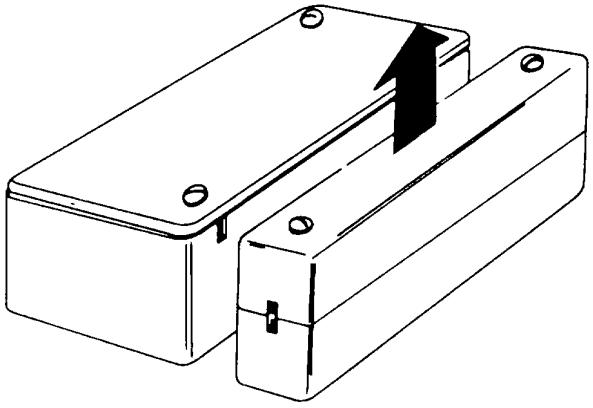


Figure 2-12. Balanced Magnetic Switch Recommended Actuation

b. Installation. If multiple series-connected switches are to be installed in a single protected area, the switches shall be installed in sequence beginning with the switch nearest the Control Unit.

(1) Spacer Installation. If the Balanced Magnetic Switch assemblies are to be mounted on ferrous surfaces, the switch assemblies should be first mounted in a

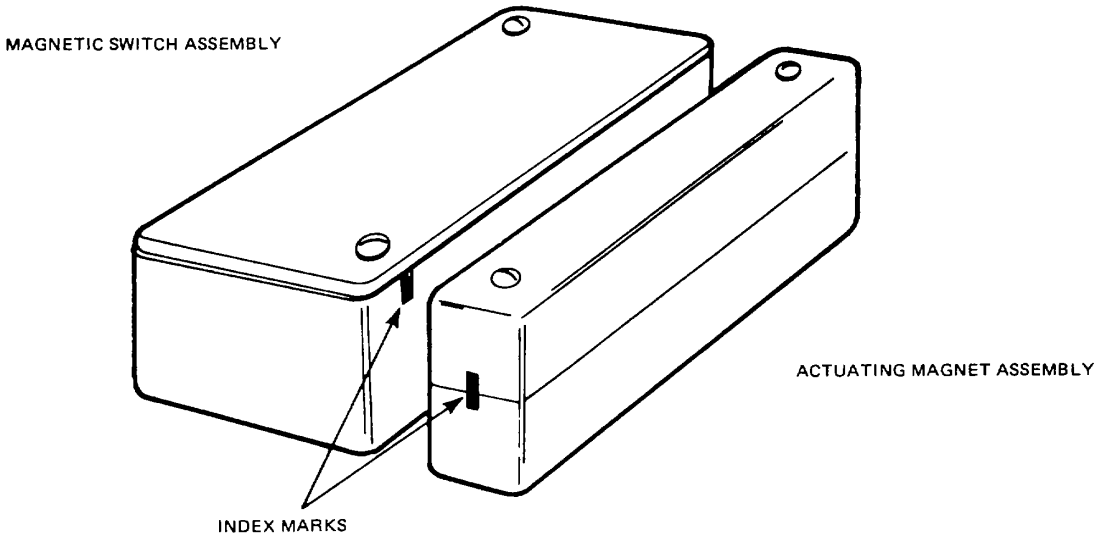
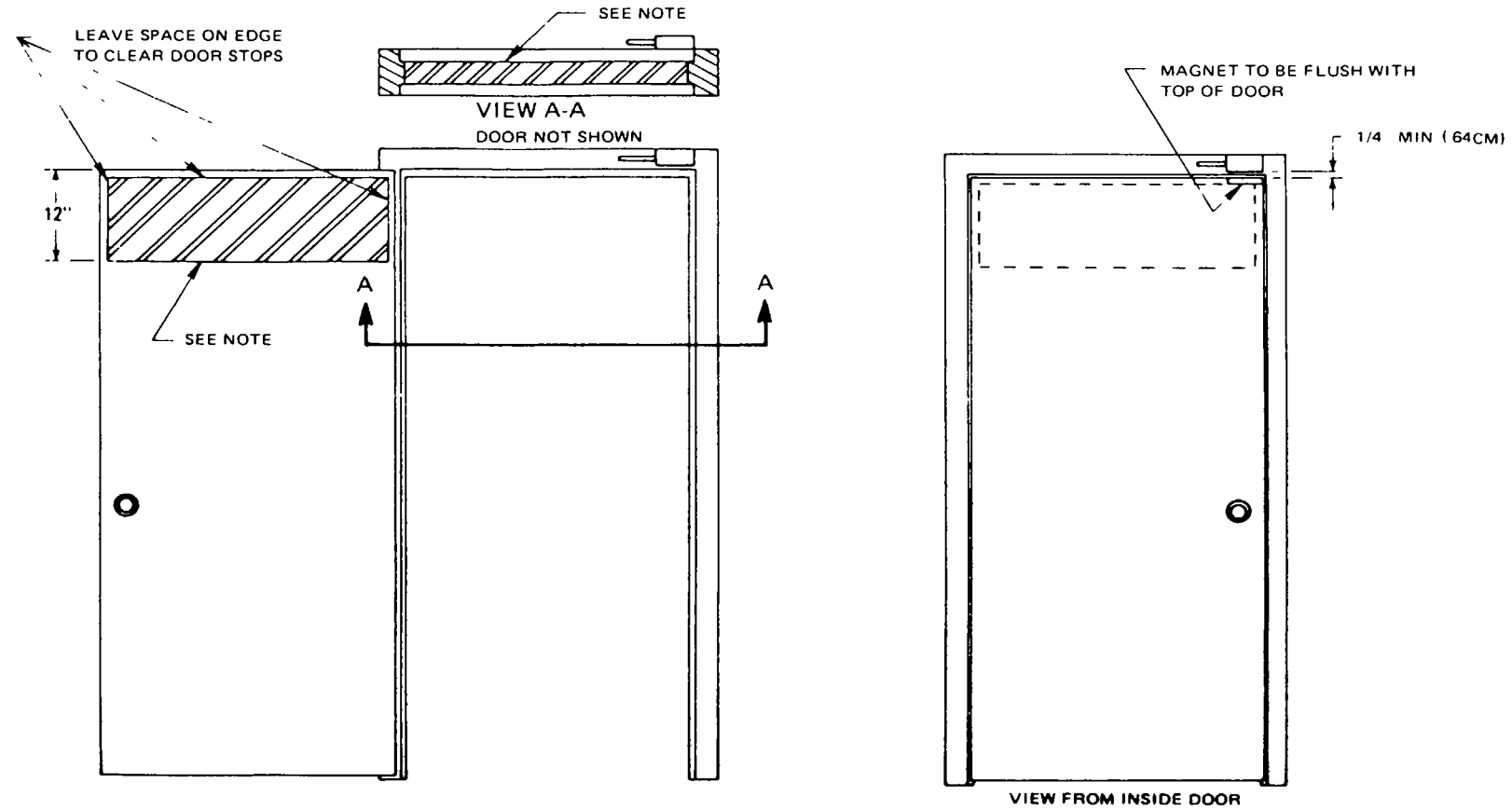


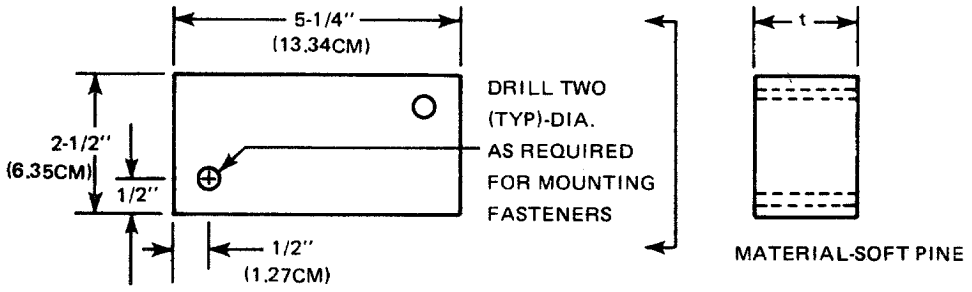
Figure 2-13. Correct Orientation of the Balanced Magnetic Switch



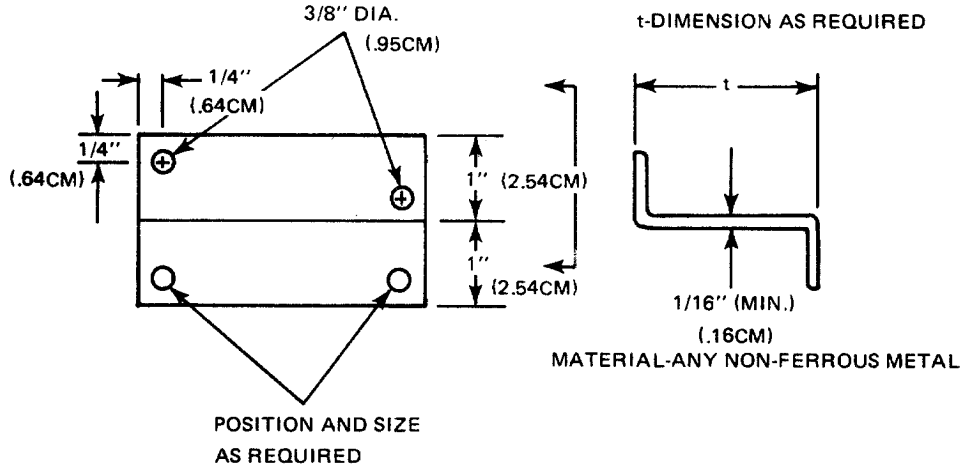
NOTE
COVER WITH STEEL SHEET, 16GA MIN, AS SHOWN
SECURE TO DOOR JAMB USING ONE WAY SCREWS
SECURE TO DOOR USING MACHINE SCREWS AND SELF LOCKING NUTS

Figure 2-14. Wooden Door and/or Door Frame Modified for Balanced Magnetic Switch

temporary manner and tested. If the switch does not function properly, remove the assemblies and reinstall them with a nonferrous spacer between the assemblies and the mounting surfaces. The spacer must be sized to keep the backs of the switch assembly and actuating magnet m the same plane. The thickness of the spacers may have to be increased to obtain proper operation of the switch. If the switch assemblies are to be mounted on nonferrous surfaces, the spacers may not be required. However; if the door and jamb on which the switch assembly and actuating magnet are mounted are not even, spacers may be needed to mount these two items in the same plane. Figure 2-15 provides typical spacer and bracket designs.



WOODEN SPACER FOR SWITCH ASSEMBLY



BRACKET FOR ACTIVATING MAGNET

Figure 2-15. Typical Balanced Magnetic Switch Spacer and Bracket Designs.

(2) Determine the exact proposed location of the Magnetic Switch Assembly. The switch assembly should be positioned such that the Actuating Magnet Assembly and the switch assembly will be in the same plane and separated by a distance greater than 1/4 inch (0.64 cm) and less than 1 inch (2.54 cm) when the door or window is closed. The separation should be as narrow as possible within these limits (figure 2-16). The fabrication of a mounting bracket or spacer may be necessary.

CAUTION

Use care when pulling wire through the Balanced Magnetic Switch enclosure to avoid damaging the tamper switch. Damage can be avoided by removing the printed wiring board assembly during the wire pulling operation.

(3) Install conduit and interconnection wiring between the proposed location and

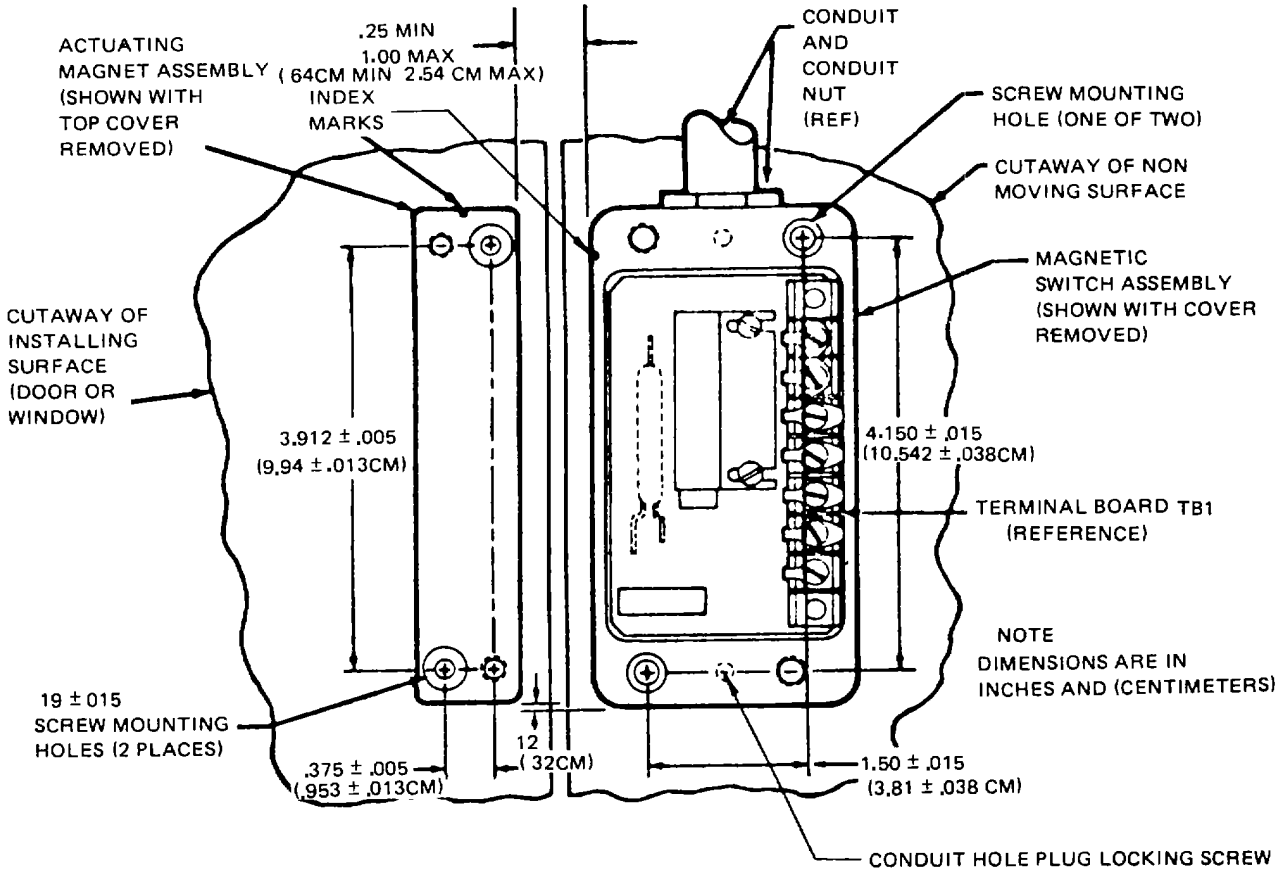


Figure 2-16. Mounting Dimensions typical Balanced Magnetic Switch Installation

the preceding switch m the sequence. (In the case of the first switch m the sequence, install conduit between the proposed location and the Control Unit.) That end of the conduit on which the switch assembly to be mounted must have a 1/2-inch American Standard Taper Pipe (NPT) thread. At the proposed location, loosely mount the conduit to enable the end to be pulled about 2 inches (5.08 cm) from the wall. Three conductors not smaller than No 22 AWG are needed between adjacent switch assemblies and between a switch assembly and Control Unit. Two conductors are needed between a normal access door and an emergency access door. (See figure 2-17.)

(4) Remove the cover screws from the switch assembly cover and remove the cover.

(5) Loosen, but do not remove, the conduit hole plug locking screw.

(6) Remove the conduit hole plug.

(7) If the switch is the last in the sequence to be mounted, only one conduit hole will be used. Insert conduit hole plug in the unused conduit hole. Secure the plug with the locking screw.

(8) Thread the switch assembly on to the threaded end of the conduit. Mount the switch assembly securely in place by inserting a fastener through each of the two mounting holes on the case (figure 2-16).

NOTE

If the Balanced Magnetic Switch assemblies are to be mounted on ferrous surfaces, the switch assemblies should be first mounted m a temporary manner and tested. If the switch does not function properly, dismount the assemblies and reinstall them with spacers [step b.(1)]. Retest the operation of the switch. Care must be exercised to properly orient the two halves of the Actuating Magnet Assembly when reassembling. Index marks are provided on the exterior of these halves and on the switch assembly to assure correct orientation.

(9) Fasten the conduit securely in place.

(10) Remove the screws holding the two halves of the Actuating Magnet Assembly together.

(11) One half of the Actuating Magnet Assembly has two mounting holes. Mount this half near the edge of the moveable member of the door or window such that it is separated from the Magnetic Switch Assembly by the distance specified m step (2).

(12) Secure the other half of the Actuating Magnet Assembly to the mounted half.

c. Biasing Magnet Adjustment. The biasing magnet adjustment should be performed following equipment installation.

(1) Remove cover from switch assembly.

(2) Tag and disconnect all wires except jumpers from TB1 (figure 2-18).

(3) Set multimeter to ohms and connect leads to TB1-1 and TB1-2.

(4) Make sure door or window is closed. The multimeter should indicate less than 50 ohms.

(5) If multimeter indicates greater than 50 ohms, loosen the two bias magnet adjustment screws (figure 2-19) and reposition bias magnet until multimeter indicates less than 50 ohms. Tighten screws.

(6) Slowly open window or door a maximum of 1/2 inch (1.27 cm). The multimeter should indicate less than 50 ohms.

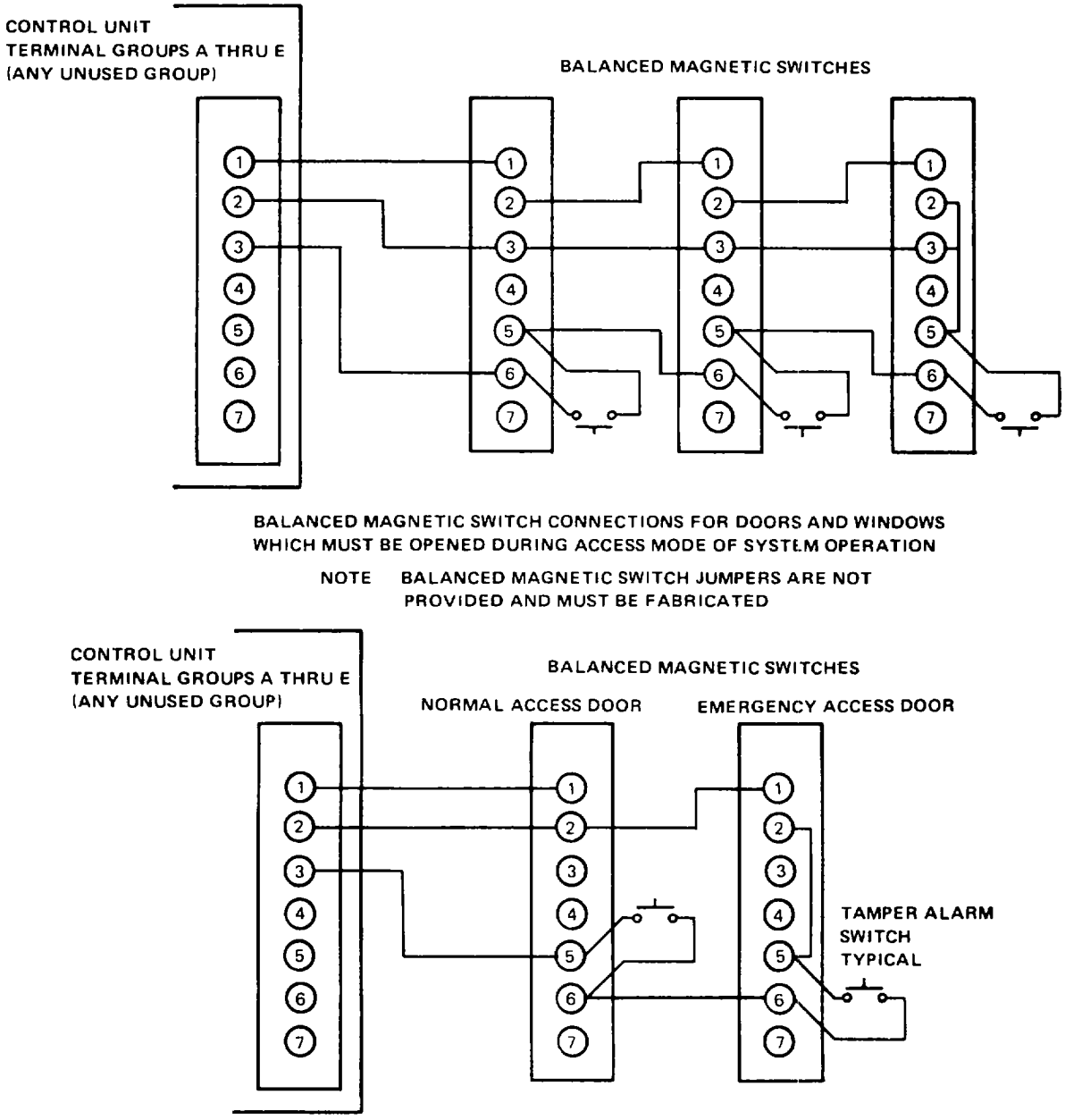
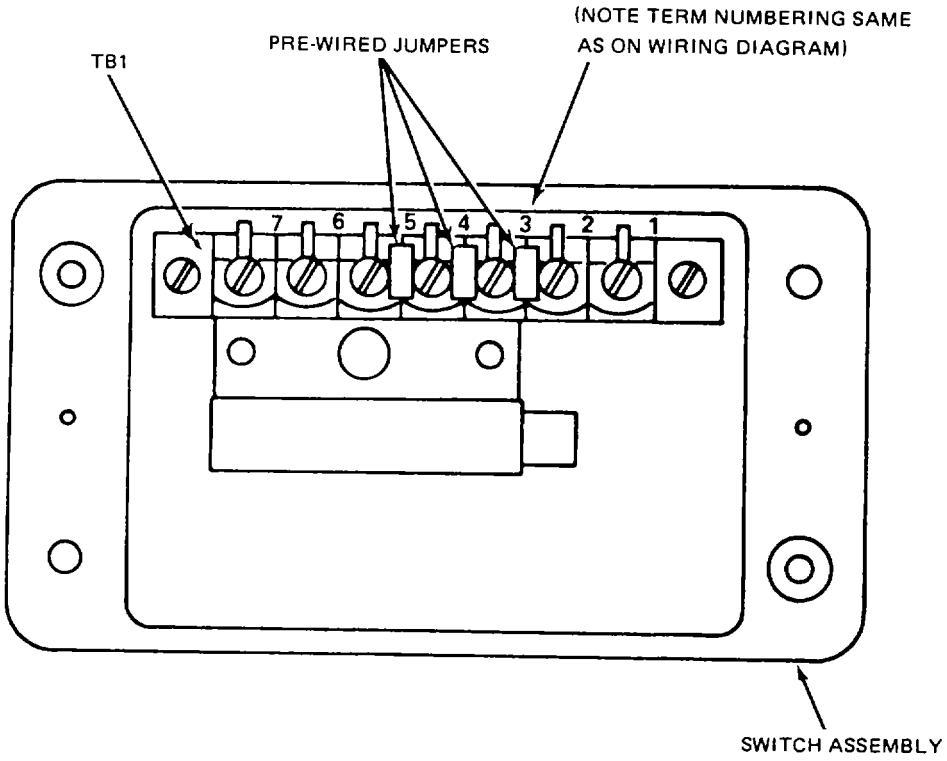


Figure 2-17. Balanced Magnetic Switches Connected to Control Unit



TERMINAL BOARD
WIRING DATA

TERM	FUNCTION
1	ALARM SWITCH NORMALLY CLOSED CONTACT
2	ALARM SWITCH COMMON CONTACT
3	SPARE
4	SPARE
5	TAMPER OUTPUT
6	TAMPER RETURN
7	ALARM SWITCH NORMALLY OPEN CONTACT

Figure 2-18. Balanced Magnetic Switch Terminal Locations

(7) If multimeter indicates greater than 50 ohms; repeat step (5), then repeat steps (4) through (6). If switch action is too sensitive, it may be necessary to adjust bias magnet away from reed switch.

(8) Open door or window 1-1/4 inch (3.18 cm). The multimeter indication should be greater than 100,000 ohms.

(9) If multimeter does not indicate greater than 100,000 ohms, loosen the two bias magnet adjustment screws and reposition bias magnet until multimeter indicates greater than 100,000 ohms. Tighten bias magnet adjustment screws. If switch action Is not sensitive enough, it may be necessary to adjust bias magnet toward reed switch.

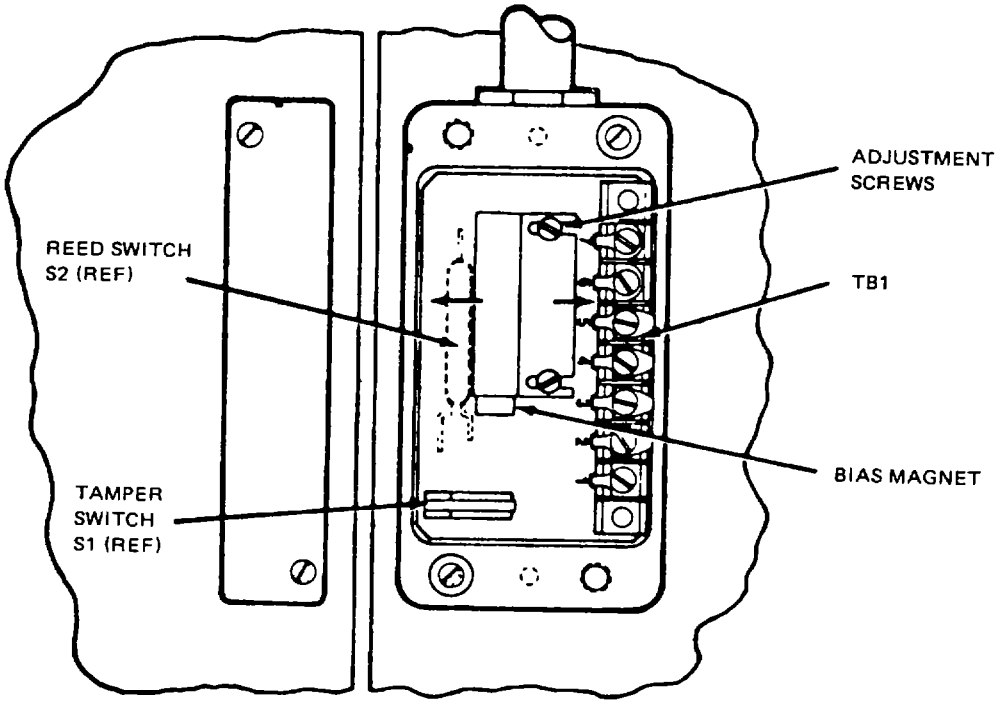


Figure 2-19. Adjustment of Bias Magnet

(10) Repeat steps (4) through (9) until Balanced Magnetic Switch operates satisfactorily.

(11) Disconnect multimeter.

(12) Connect wires to TB1.

(13) Ensure that Control Unit POWER switch is in OFF position.

(14) Make electrical connections as shown in figure 2-17. The Balanced Magnetic Switch terminal locations are shown in figure 2-18.

(15) Inspect interior of switch assembly for presence of foreign material.

(16) Install cover. Make sure cover is seated properly on gasket and cover screws are tight.

d. Testing the Balanced Magnetic Switch.

(1) Unlock and open door to the Control Unit. Pull door tamper switch out to the maintenance position.

(2) Place mode switch to the TEST/RESET position. Allow 1 minute for Control Unit to stabilize. Ensure that the audible signal device has silenced.

(3) Perform steps (4) through (9) at each Balanced Magnetic Switch assembly.

(4) With all doors or windows closed, open the door or window a maximum of 1/2 inch (1.27 cm). The audible signal device should be silenced.

(5) Open the door or window 1-1/4 inch (3.18 cm). The audible signal device should sound.

(6) Close the door or window and the audible signal device should be silenced within 12 seconds.

(7) Remove Magnetic Switch assembly cover screws while holding cover in place.

(8) Slowly raise cover. The audible signal device should sound within a displacement of 1/16 to 1/4 inch (0.159 to 0.635 cm)

(9) Position cover on Magnetic Switch Assembly and install cover screws. The audible signal device should silence within 10 ± 2 seconds.

(10) Firmly shake or vibrate the protected door or window. The audible signal device should not sound.

2-15. INSTALLATION AND TESTING OF CAPACITANCE PROXIMITY SENSOR

a. General Installation Requirements. The Capacitance Proximity Sensor (CPS) consists of a signal processor, sensor cable [50 feet (15.24 m) of RG58A/U], and insulating blocks. If high sensitivity (detection capability) is desired, the CPS can protect equipment having a total capacitance of 5,000 picofarads (approximately 400 sq ft, 37.16 sq m). A total capacitance of 15,000 picofarads (approximately 1,200 sq ft, 111.48 sq m) can be protected if low sensitivity is desired. Protected Items must be isolated from electrical ground, having a minimum resistance to ground of 6,000 ohms. For this purpose, mounting (insulating) blocks may be used.

b. Installation of the CPS.

(1) Open the signal processor enclosure.

(2) Remove the 470,000-ohm resistor installed between terminals 1 and 2 of TB2. Retain the resistor.

(3) Disconnect the quick-disconnect terminals from the tamper switch. Remove the screws that secure the circuit card to the enclosure and remove the circuit card.

(4) Cut a conduit entry hole in the signal processor enclosure for interconnection wiring between the signal processor and the Control Unit. (See figures 2-20 and 2-21.)

NOTE

The grommeted hole at the bottom of the signal processor Is not to be used for interconnection wiring between the signal processor and the Control Unit. This hole is the entry hole for the sensor cable from protected objects.

(5) Mount the signal processor enclosure on a wall by securing it with four 1/4 inch fasteners passed through the holes m the back panel of the enclosure. The signal processor should be mounted at a height of approximately 5 feet (1.52 m). The hinged side of the box should be to the left.

(6) Install conduit and interconnection wiring between the signal processor and the Control Unit. Six conductors not smaller than No. 22 AWG are needed.

(7) Reinstall the circuit card assembly and reconnect wires to tamper switch.

CAUTION

Ensure the +20-V wire is connected to TB1 terminal 7, as improper connection may cause equipment damage.

(8) Make electrical connections as shown in figure 2-22. The Capacitance Proximity Sensor terminal locations are shown in figure 2-23.

(9) Pass one end of the RG-58A/U sensor cable into the CPS signal processor enclosure. At this end, install isolated lugs on the center conductor and the braided outer conductor.

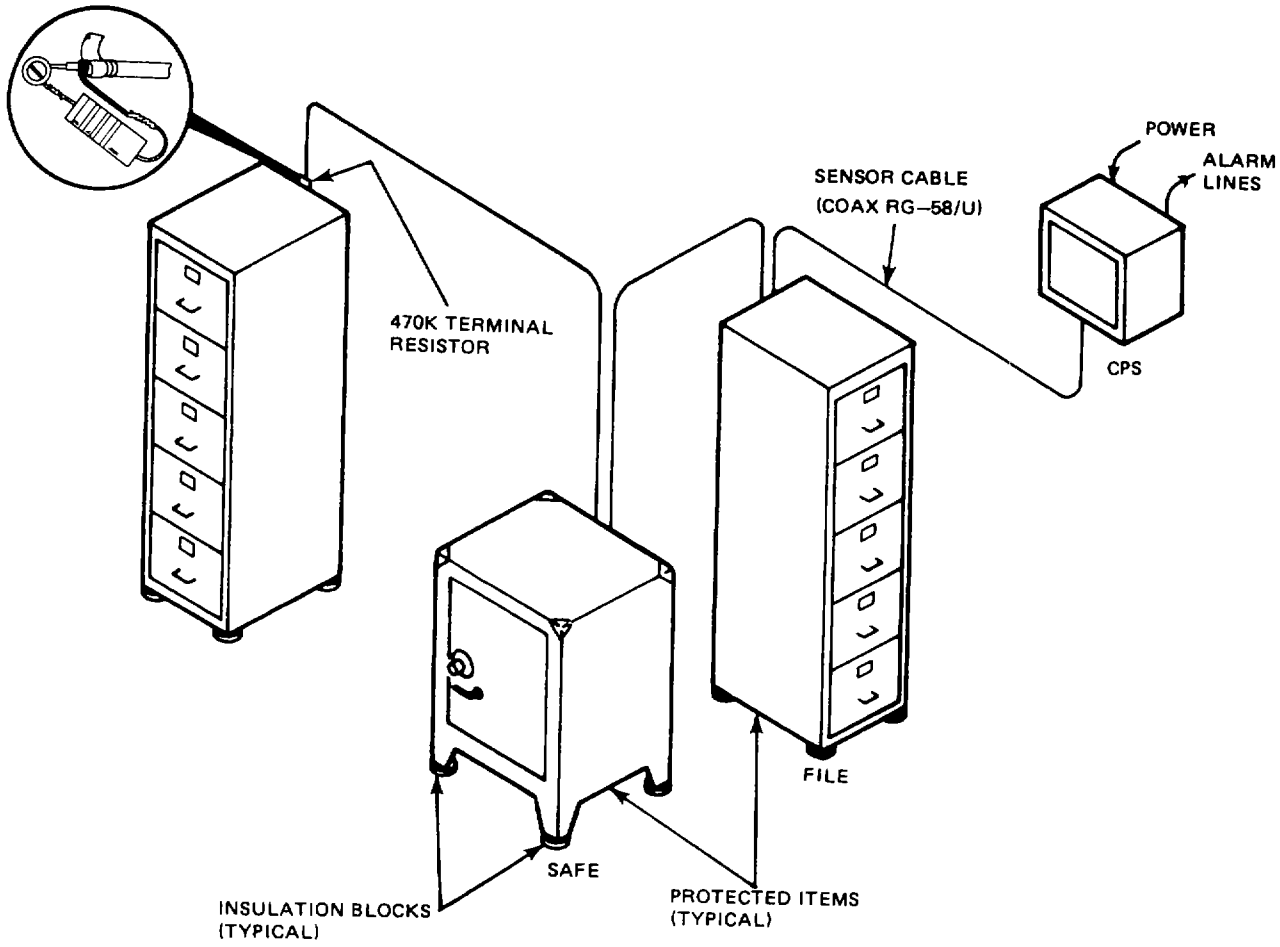


Figure 2-20. Typical Capacitance Proximity Sensor Installation

(10) Connect the center conductor of the sensor cable to terminal 1 of TB2 and the braided outer conductor to terminal 2 of TB2 in the signal processor en- closure as shown in figure 2-22.

(11) Set the sensitivity switch in the LO position. (See figure 2-23.)

(12) Ensure that each item to be protected (except capacitance grills) is separated from the nearest wall by a distance of at least 1 foot (30.48 cm) as shown in figure 2-24.

NOTE

Under certain environmental conditions, it may be necessary to place grounding screens under and around the items to be protected.

(13) If necessary, place insulating blocks under the equipment to be protected.

(14) The items to be protected shall be connected in parallel. Attach the sensor cable to each piece of equipment except the last using the following procedure. (See figures 2-20 and 2-25.)

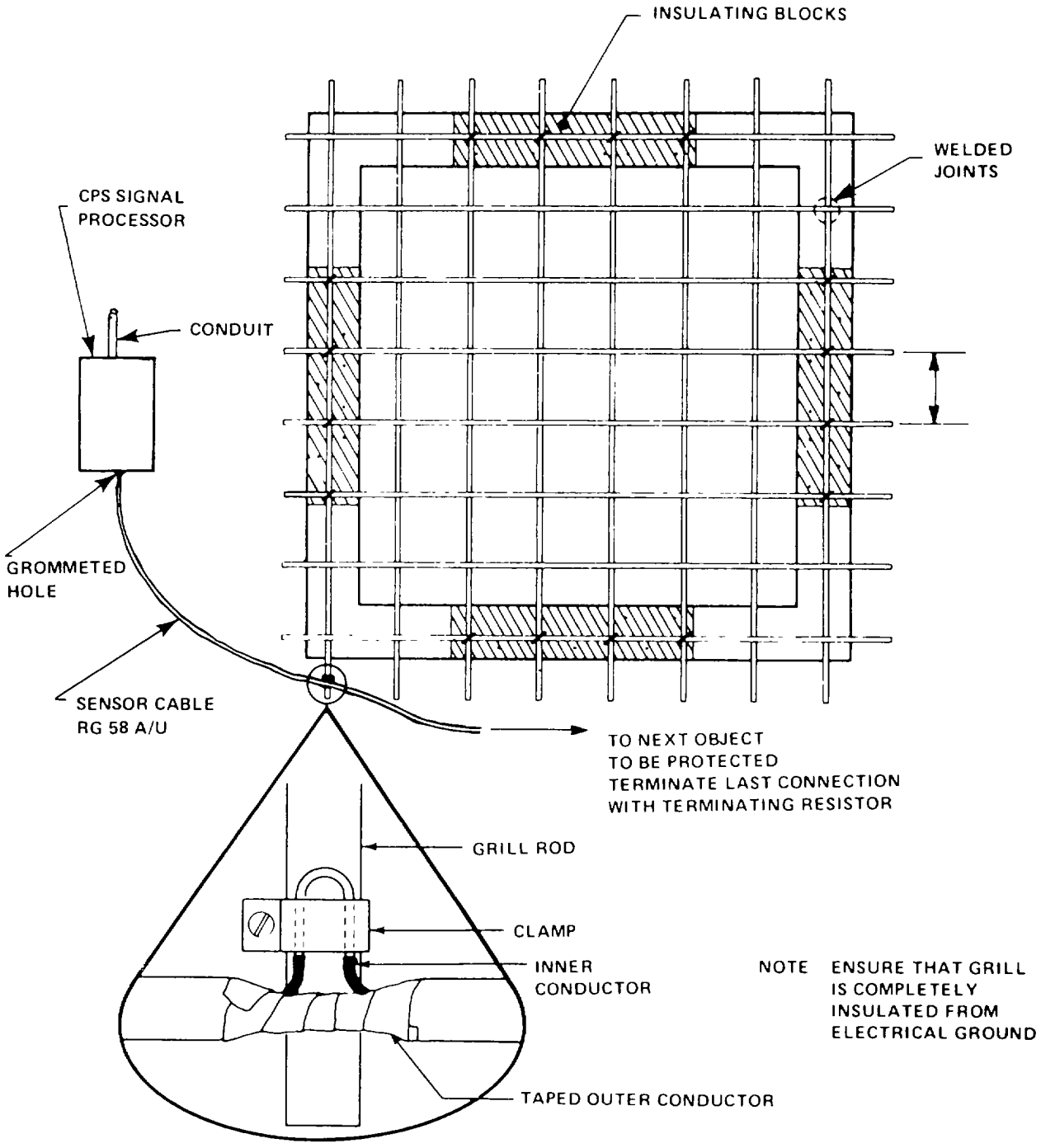


Figure 2-21. Typical Capacitance Grill Installation Over Window

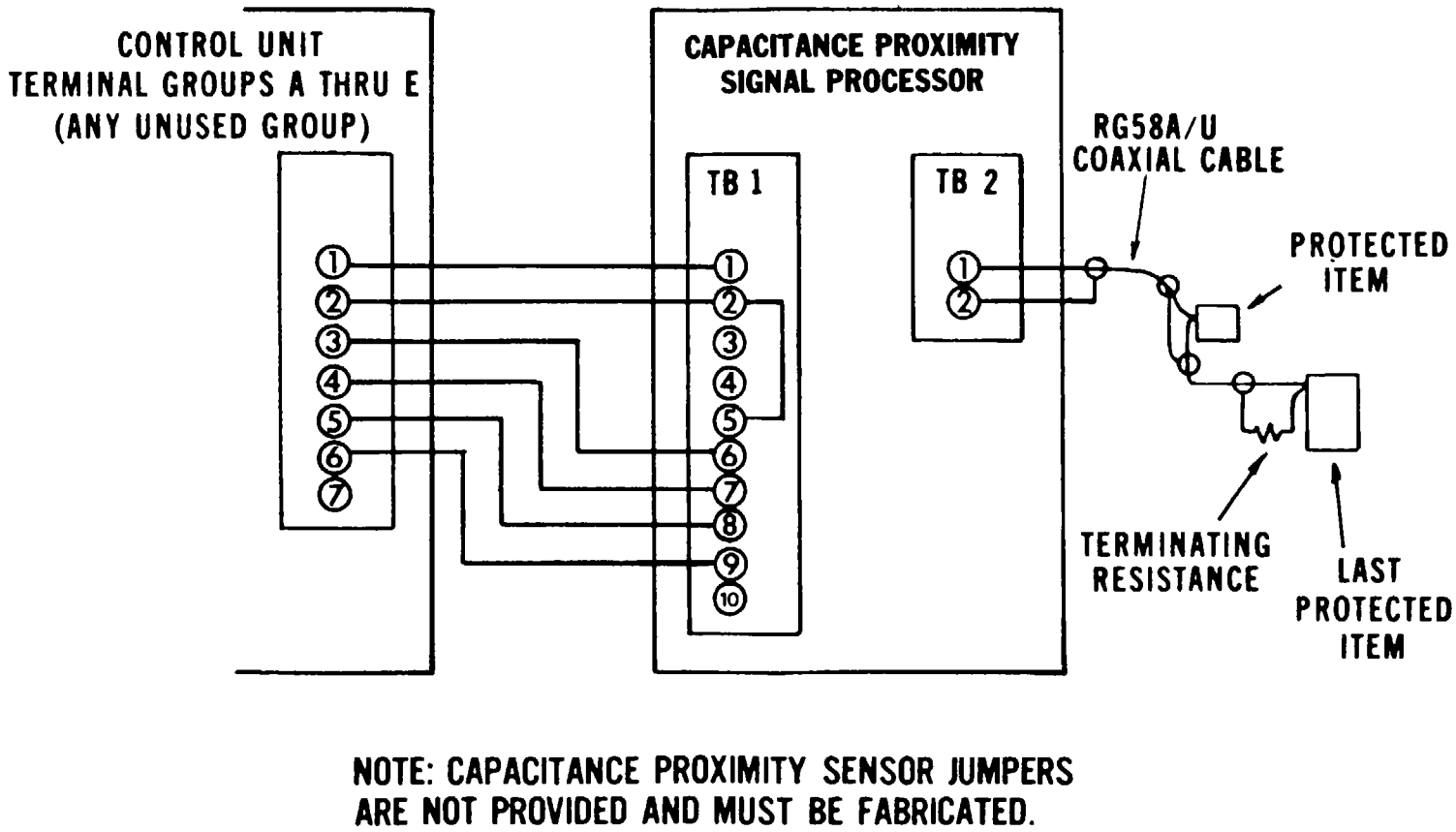
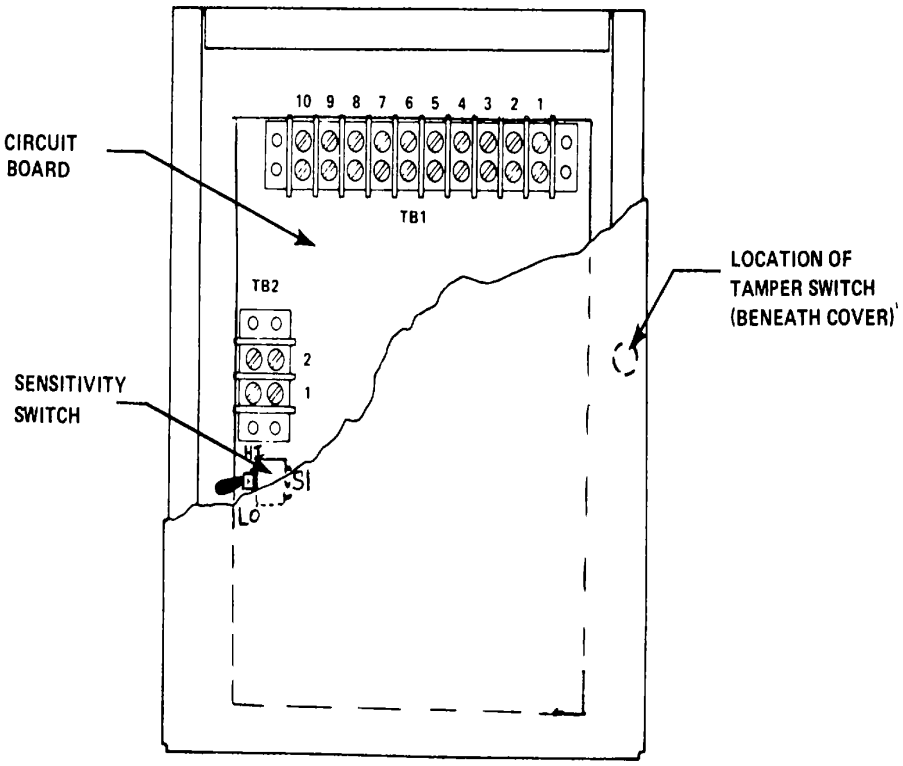


Figure 2-22. Capacitance Proximity Sensor Connected to Control Unit

TB1 WIRING DATA

TERMINAL	*FUNCTION*
1	INTRUSION ALARM OUTPUT
2	ALARM COMMON
3	SPARE
4	SPARE
5	TAMPER OUTPUT
6	TAMPER RETURN
7	+20 VDC INPUT
8	DC RETURN
9	ENCLOSURE GROUND
10	SPARE



TB2 WIRING DATA

TERMINAL	*FUNCTION*
1	COAXIAL CABLE CENTER CONDUCTOR
2	COAXIAL CABLE SHIELD

Figure 2-23. Capacitance Proximity Sensor Terminal Locations

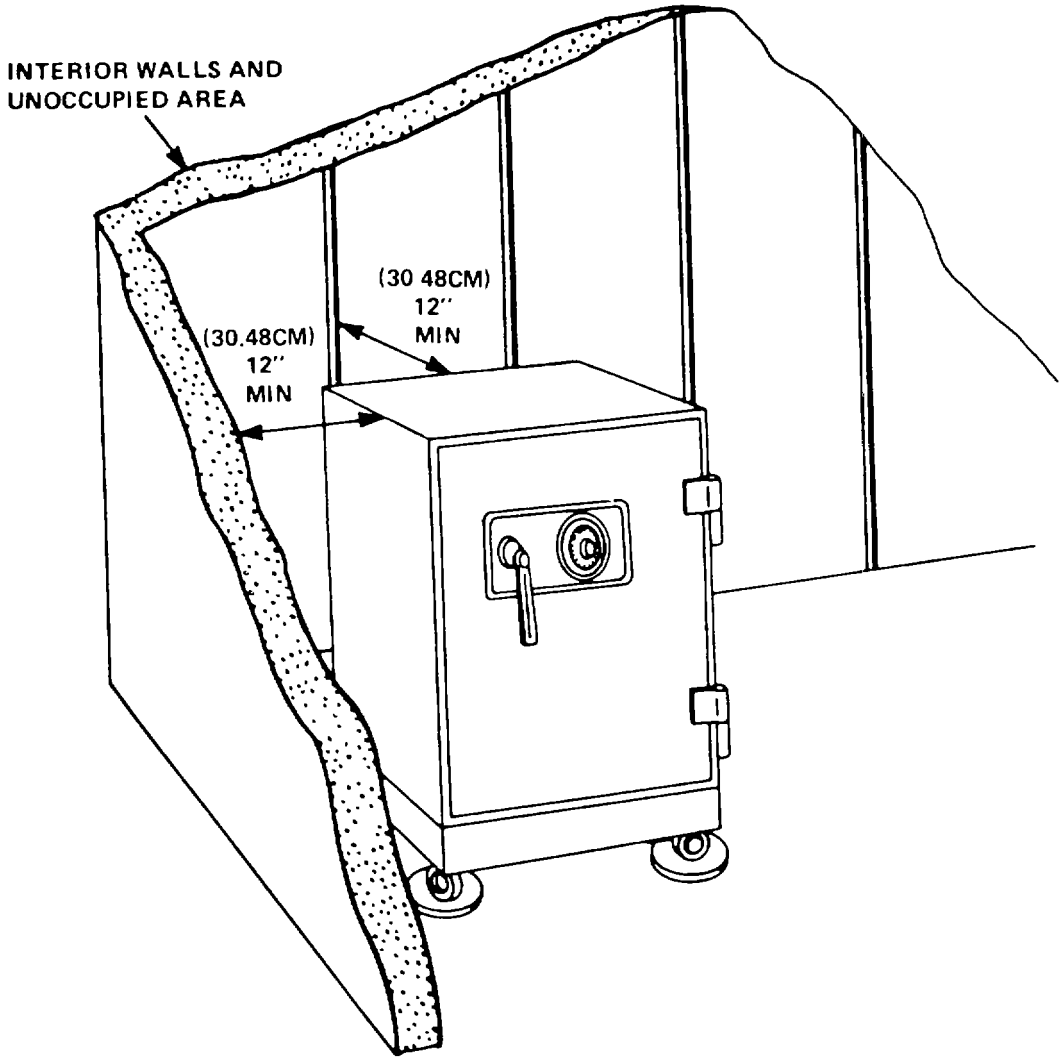


Figure 2-24. Minimum Spacing Between Wall and Safe (Without Ground Screen)

NOTE
Splicing parallel branches is not permissible since this destroys tamper protection. Ensure that the outer conductor is insulated from the protected item.

(a) Cut away a section of the sensor cable outer insulation.

(b) Make an opening in the braided outer conductor using a pointed tool.

(c) Through the opening m the braided outer conductor, pull out about 1 Inch of the inner conductor.

(d) Remove a section of the insulation from the center conductor.

(e) Fasten the bare section of the center conductor to the equipment using a self-tapping metal screw and a washer as shown in figure 2-25.

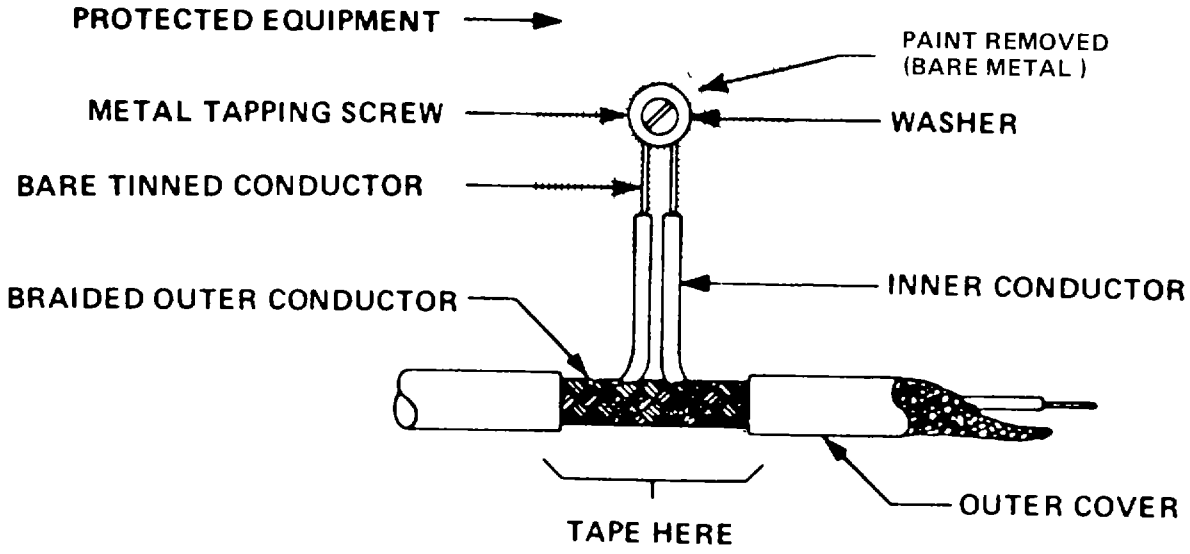


Figure 2-25. Method of Preparing Capacitance Proximity Sensor Cable Connections

(f) Tape the exposed area of the braided outer conductor to insulate it from contact with the equipment.

NOTE

The sensor cable may be lengthened by splicing, per approved methods, additional RG-58A/U cable to the end. The 470,000-ohm terminating resistor must be placed at the far end of the added cable. Any cable added must be included in the total capacitance to determine effective protection.

(15) Cut the sensor cable at the last piece of equipment to be protected

c. System Sensitivity. Optimum sensitivity may be achieved by properly setting the sensitivity switch or, in some critical installations, establishing some intermediate level of sensitivity by use of series capacitors. Table 2-5 contains typical capacities of some of the most often protected items, a discussion of sensitivity switch position, and series capacitance selection.

NOTE

Adding, deleting, or rearranging objects in the protected area may affect system sensitivity and require retesting.

(1) The sensitivity switch, located just below TB2 (figure 2-23), allows selection of detection range and/or quantity of items to be protected In the HI position, the unit is very sensitive, capable of detecting a person approximately up to 10 inches away The range of protected capacitance in this position is from approximately 0 to 5,000 picofarads. In the LO position, the unit is approximately one-third as sensitive to rapid capacitance changes, but the range of protected capacitance is increased to approximately 15,000 picofarads. Both the required sensitivity and the amount of equipment to be protected must be taken into account in order to utilize the proper switch selection for optimum performance and least amount of false alarms For example; if personnel are normally expected to pass by the protected equipment without generating an

Table 2-5. Typical Equipment Capacities

Item	Capacitance load	Installation method
Two-drawer file	650 pf	On cement floor
Two-drawer file	300 pf	On insulating blocks
Desk	300 pf	On cement floor
Desk	600 to 700 pf	On tile floor
Safe	300 pf	On cement at approx. 1 inch (2.54 cm) from masonry wall
RG-58A/U	Approx. 30.8 pf per foot	

alarm, the LO position is recommended so that an alarm will be generated only if personnel come very close to or touch the equipment.

(2) The LO switch position is commonly used as an initial setting and then tested to ensure adequate sensitivity, since in this position the probability of false alarms is low. If the detection is not sufficient for the established requirements, then the HI position should be tested. Remember, though, that the total capacitance range of protection is changed by swatch position and If the range is exceeded, the system may become unbalanced and may not generate any alarms or it may go into a constant alarm condition.

(3) Intermediate sensitivities can be obtained by adding a stable capacitor (silver-mica or equal) in series with the protected equipment. The dc path through the center conductor of the sensor cable, the 470,000-ohm terminating resistor, and the outer conductor of the sensor cable must not be broken or the system will generate a continuous tamper alarm. See figure 2-26 for the method of installing the series capacitor. The value of this capacitor may be determined by the following formula:

$$C_s = \frac{SC_o}{1-S}$$

where:

C_s = value of series capacitor in picofarads

C_o = capacitance of protected object in picofarads

S = fractional (decimal) degree of reduction of sensitivity.

For example; if the capacitance at the protected item is 2,000 picofarads, and it is necessary to reduce sensitivity by 1/4 (0.25), then:

$$C_s = \frac{0.25 \times 2000}{1 - 0.25} \quad \frac{500}{0.75} = 666 \text{ picofarads}$$

It is often difficult to define the degree of sensitivity reduction required, and the capacitance of the protected item may be unknown. Therefore; it may be more practical to connect a decade capacitance

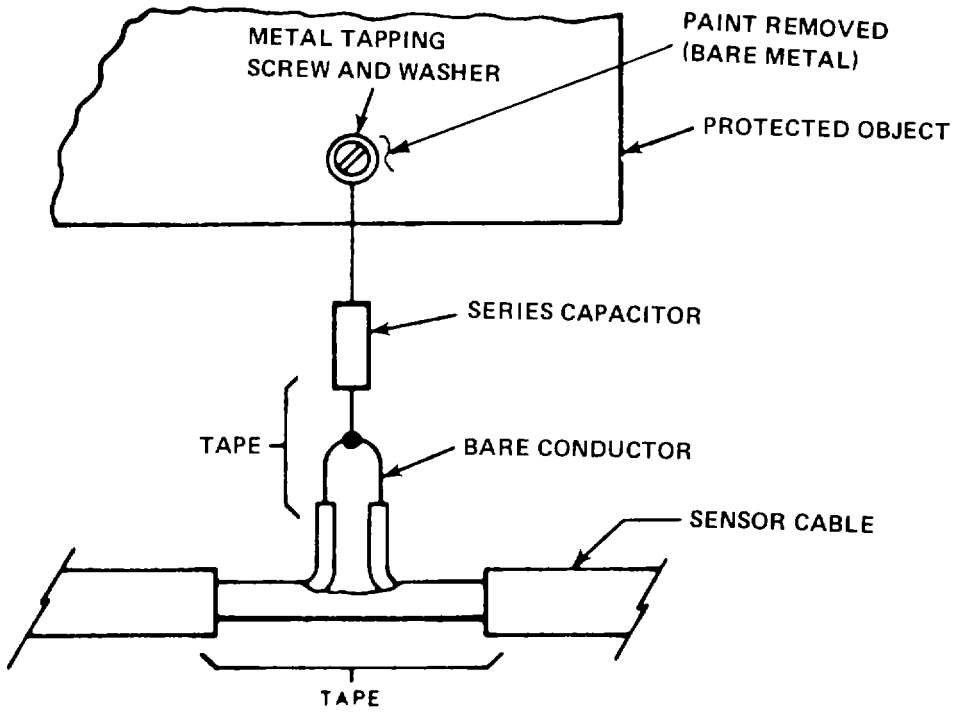


Figure 2-26. Method of Installing Series Capacitor for Reduced Sensitivity

box, having adjustable increments of 100 picofarads or less, as the series capacitor. Then by experimentation the required sensitivity can be obtained and a capacitor of the value indicated by the decade capacitor box can be wired into the system as shown in figure 2-26.

d. Testing the CPS for Proper Operation.

(1) If applicable, turn off power at the Control Unit

(2) At the CPS, tag, remove, and isolate the wires from TB1-1, TB1-2, and TB1-6 so that only the +20 vdc is terminated at TB1-7 and TB1-8.

(3) Turn on power to the CPS at the Control Unit.

(4) At the CPS signal processor enclosure, set the multimeter to ohms scale and connect leads to TB1-1 and TB1-2. The indication should be less than 2,000 ohms

NOTE

The multimeter may initially indicate greater than 100,000 ohms or may be erratic. This may be due to recent application of power or personnel having been in close proximity to protected equipment. Ensure that all protected items are clear and allow 5 to 10 seconds for the CPS signal processor circuits to stabilize.

(5) Approach one of the protected items and test for acceptable sensitivity; i.e., touch item The multimeter should indicate greater than 100,000 ohms, when the item is touched or approached, for an alarm condition.

(6) Step away from the Item. After 5 to 10 seconds, the multimeter should indicate less than 2,000 ohms, a no-alarm condition.

(7) Repeat steps (5) and (6) for each protected item.

(8) At the CPS signal processor enclosure, move the multimeter leads from TB1-1 and TB1-2 to TB1-5 and TB1-6.

(9) Place the enclosure tamper switch to the door open position. The multimeter should indicate greater than 100,000 ohms, tamper alarm

(10) Pull the enclosure tamper switch out to the maintenance position. The multimeter should indicate less than 2,000 ohms.

(11) Temporarily connect a jumper wire from TB2-2 to TB2-1 The multimeter should indicate greater than 100,000 ohms while continuity is maintained at TB2-1 and TB2-2, tamper alarm.

(12) Remove the jumper wire from TB2-1 and TB2-2. The multimeter should indicate less than 2,000 ohms.

(13) Disconnect the outer conductor of the sensor cable from TB2-2. The multimeter should indicate greater than 100,000 ohms, tamper alarm.

(14) Reconnect the outer conductor to TB2-2. The multimeter should indicate less than 2,000 ohms.

(15) Repeat steps (14) and (15) for the center conductor of the sensor cable at TB2-1.

(16) Turn off power to the CPS at the Control Unit.

(17) At the CPS, reinstall the wires removed in step (2) and close and secure the CPS enclosure.

(18) Turn on power at the Control Unit. Allow 1 minute for stabilization and then turn the Control Unit mode swatch to TEST/RESET. The audible signal device should be silenced

(19) Test the CPS sensitivity by approaching or touching one of the protected items. The Control Unit audible signal device should sound.

(20) Move away from the protected item The audible signal device should silence within 25 seconds

(21) Repeat steps (19) and (20) at each protected item.

(22) At the CPS enclosure, remove the cover screws while holding the cover securely in place.

(23) Slowly open the enclosure cover. The Control Unit audible signal device should sound after the cover has been raised 1/8 to 1/4 inch (0.32 to 0.64 cm).

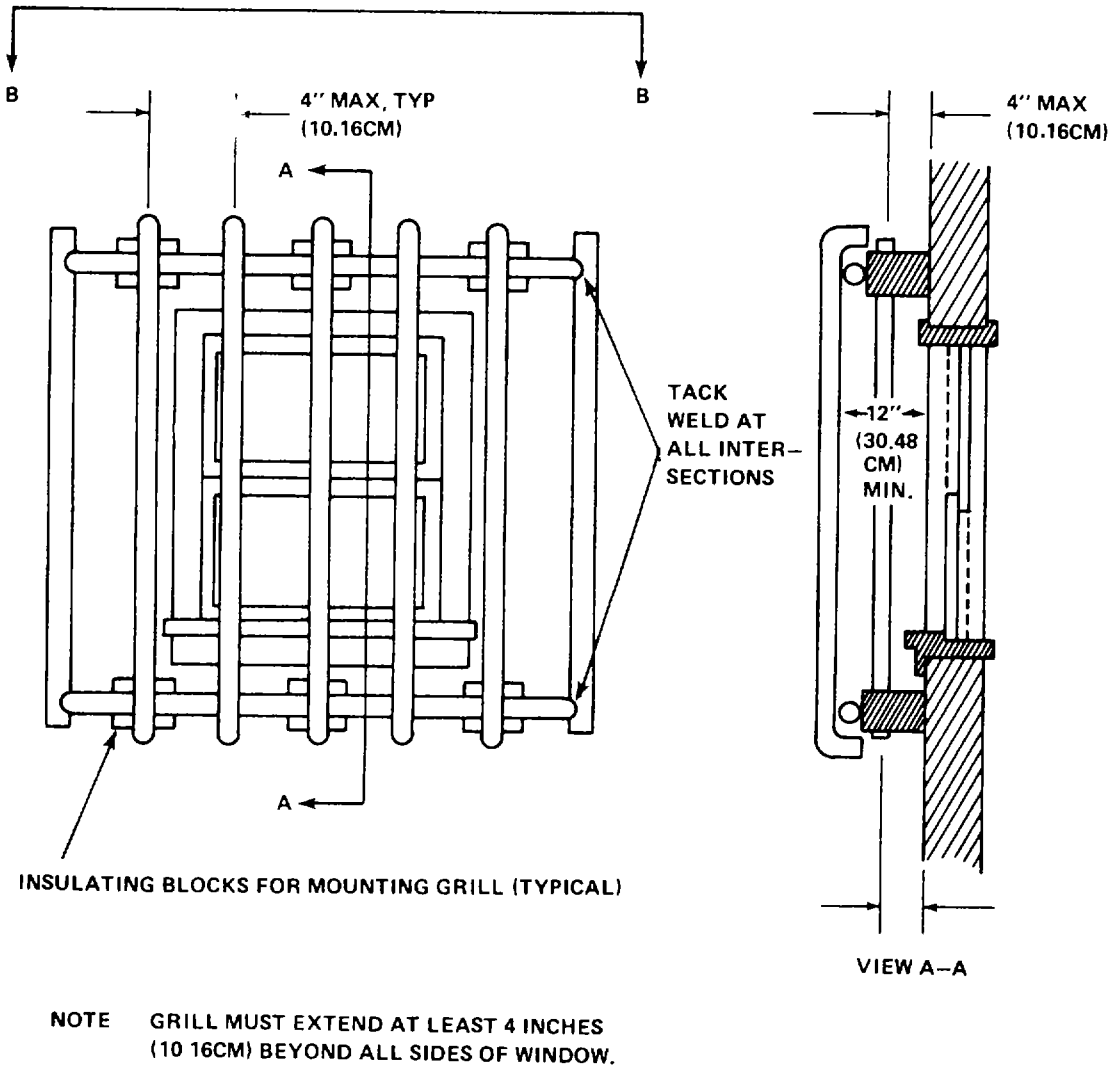
(24) Pull the CPS enclosure tamper switch out to the maintenance position. The audible signal device should silence within 10 ± 2 seconds.

(25) Repeat steps (11) through (15). The Control Unit audible signal device should sound for an alarm and silence for a no-alarm condition.

(26) Close and secure the CPS enclosure cover. Close and lock CU door. Turn mode switch to TEST/RESET and then to appropriate position. Testing is now complete.

e. Capacitance Grills for Windows and Ventilation Openings. Grills must be fabricated out of a conducting material Materials suitable for use in fabrication of the grill include expanded metal, heavy wire screen such as that used to reinforce concrete, and steel bars. All joints or overlaps in the grill shall be welded, and the grill shall have electrical continuity throughout. A window that must be opened during normal access periods can be protected with a grill of vertical bars. Figures 2-27 and 2-28 provide typical grill configurations.

f. Capacitance Proximity Sensor Ground Screens If a Capacitance Proximity Sensor is used and the floor in the protected area is other than reinforced concrete, a metal ground screen shall be placed on the floor in front of the protected object (safe, cabinet, or grill) as shown in figure 2-29. The screen shall be connected to earth ground. Rubber



NOTE

GRILL MUST EXTEND AT LEAST 4 INCHES (10.16CM) BEYOND ALL SIDES OF WINDOW.

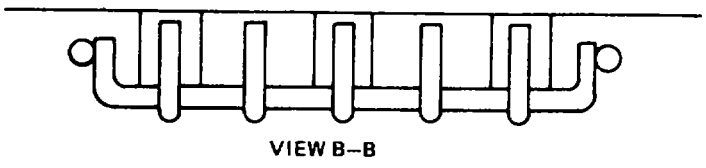


Figure 2-27. Typical Vertical Bar Capacitance Grill Over Window

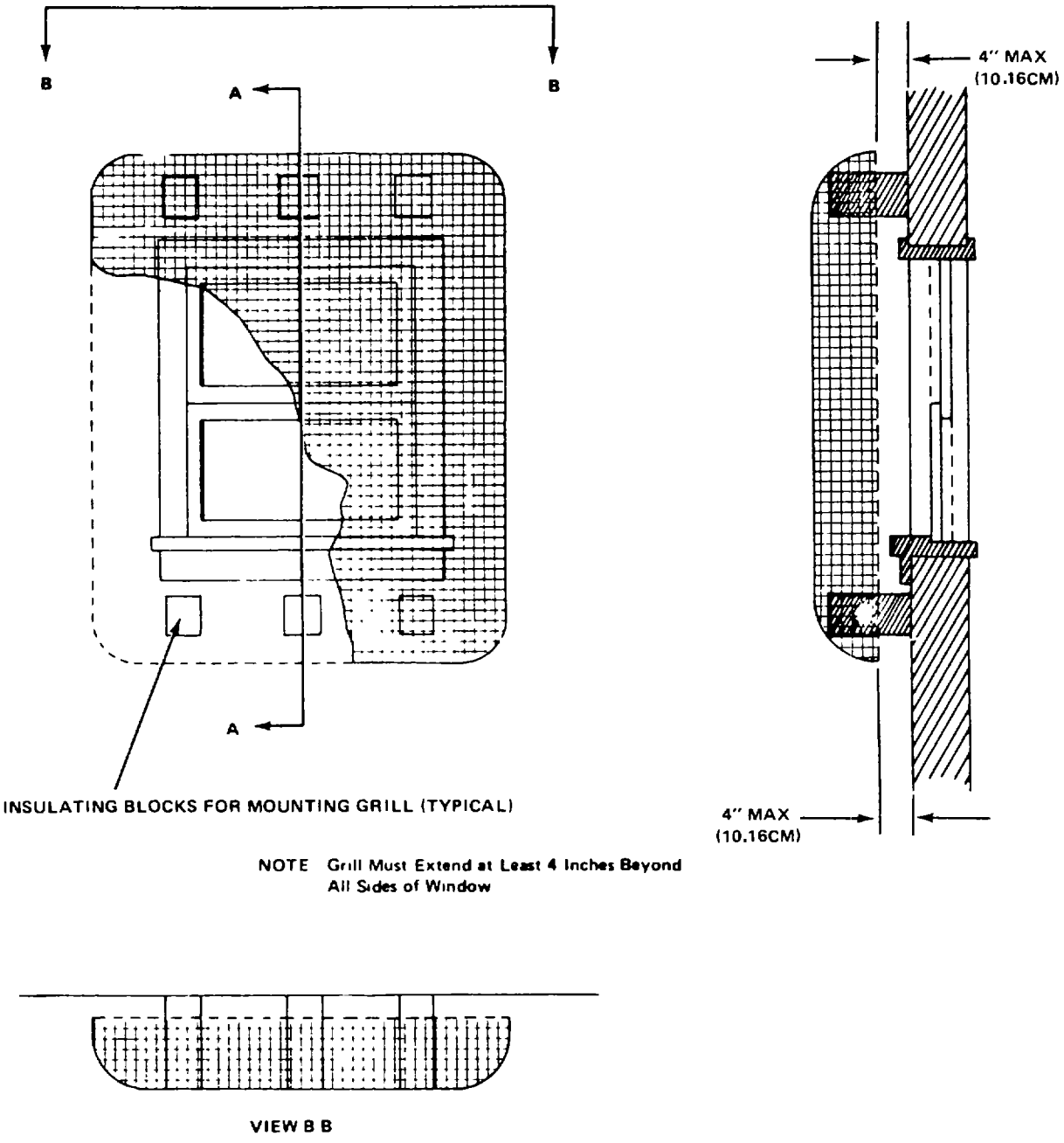


Figure 2-28. Typical Expanded Metal or Heavy Metal Screen Capacitance Grill Over Window

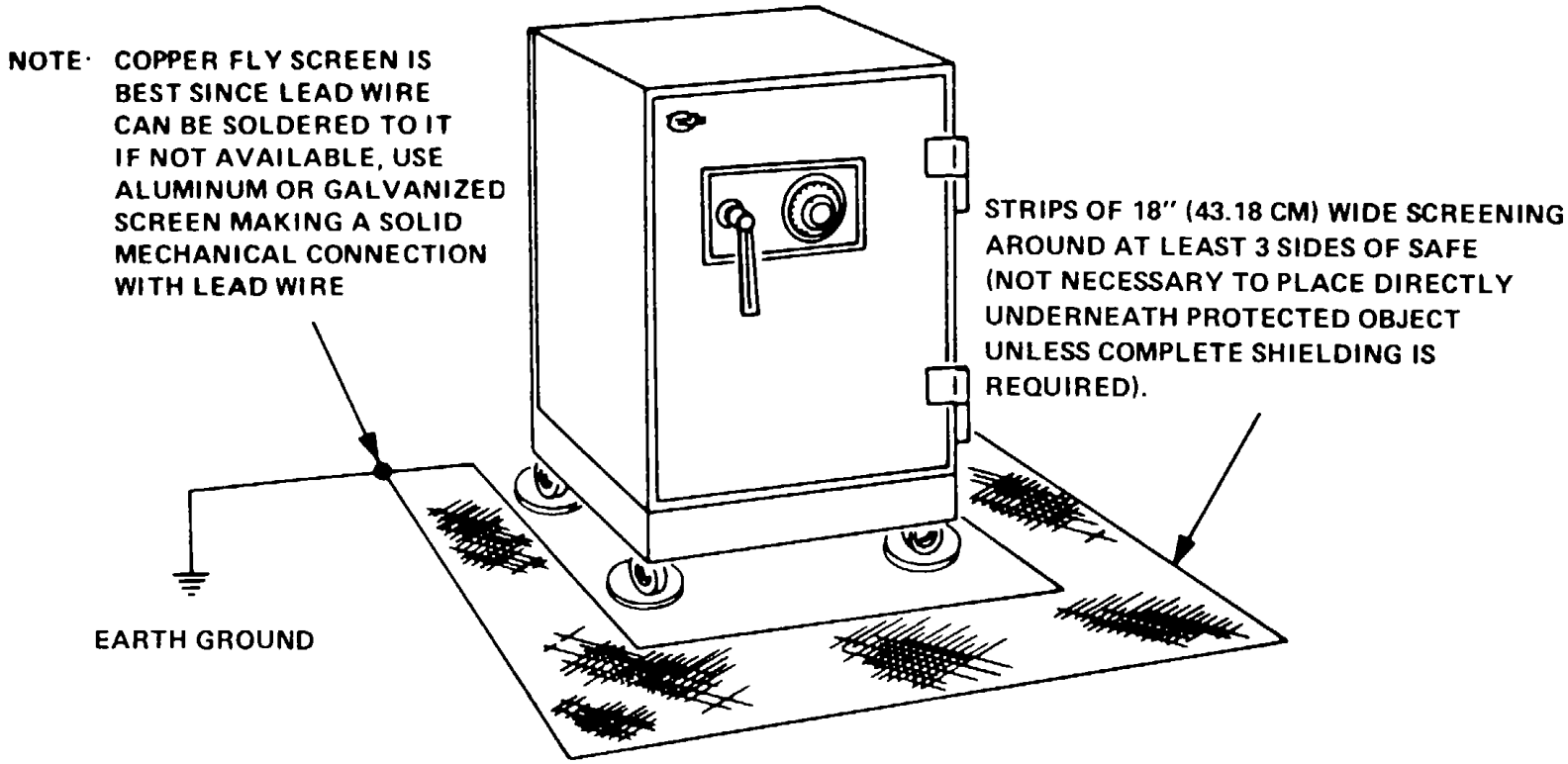


Figure 2-29. Ground Screen Installation on Floor

matting, carpeting, or similar material may be used to cover the screen. The ground screen provides a stable ground reference near the protected object to serve as the other plate of the external capacitor formed between the protected object and earth ground. For example; a steel reinforced concrete floor is a stable ground, but a wooden floor is not. Insulating blocks shall be used under the protected object. Insulating blocks may be ordered or they may be made locally Blocks may be constructed of nonporous material with good insulating qualities such as glass or plastic. This is necessary in order to ensure adequate insulation from ground and to fix the protected object's relationship to ground If a protected object cannot be moved at least 12 inches (30.48 cm) away from walls, grounded screen should be installed on the wall as shown in figure 2-30. The screen should ex- tend beyond the profile of the protected object by at least 12 inches (30.48 cm) and the protected object should not be less than 3 inches (0.76 cm) from walls with a ground screen If the protected object is less than 3 feet (91.44 cm) from an out- side wall, or less than 18 inches (43.18 cm) from an inside wall, on the other side of which people or equipment move after the system is placed in the secure mode of operation, a ground screen on the walls is necessary. The screen will prevent nuisance alarms caused by the traffic on the other side of the wall.

2-16. INSTALLATION AND TESTING OF THE ULTRASONIC MOTION SENSOR.

a. General Installation Requirements. The Ultrasonic Motion Sensor (UMS) consists of a Signal Processor and a Signal Transceiver. The two items are stocked separately. From one to twenty Transceivers may be connected to each Processor, but no more than 500 feet (152.4 m) of cable shall be used to connect them. See figure 2-31. The UMS is designed to detect an intruder's motion inside a protected area. A single Transceiver provides typical coverage of an egg-shaped area up to 35 by 25 feet (10.7 by 7.6 m), if the area is relatively free of air turbulence. A Transceiver should be mounted so that an intruder's most probable path of entry will be directly toward or away from the Transceiver. Figure 2-32 gives suggested mounting configurations. Two Transceivers should never be pointed toward each other unless they are more than 100 feet (30.48 m) apart. The direction of greatest sensitivity is perpendicular to the Transceiver cover. Detection is line-of-sight, so avoid obstructing the Transceiver's view with furniture, partitions, or other objects. Ultrasonic energy generated by fans, heating and air-conditioning systems, or other items may be a source of nuisance alarms. It may be necessary to baffle air vents and ducts to reduce nuisance alarms. Figure 2-33 illustrates a typical ultrasonic baffle for a vent Vibration, air turbulence, and other Transceivers can reduce the area of detection for a Transceiver. To eliminate the effects of vibration, ensure that the mounting surface is solid and vibration free. Figure 2-34 illustrates the percentage of detection area reduction as turbulence is increased and Transceivers are added to the system. If two or more UMS Signal Processors are installed in the same building, they must be synchronized to avoid a constant alarm. Even if they are in different rooms, synchronization is still necessary because ultrasonic energy can be transmitted from one room to another Any one Signal Processor in a group to be synchronized may be designated the master and all other Signal Processors are to be designated slaves All slave Signal Processors shall be modified. The Master Processor will not be modified. Each UMS will be noise- and walk-tested with the others turned off. The Signal Processors should be synchronized after each system has been tested.

b. Installation of the Ultrasonic Motion Sensor. Install the Processor in a location that will minimize the length of conduit and cable between Processor and Transceivers, make the Processor accessible to maintenance personnel, and reduce the possibility of tampering. It should not be in an area of heavy traffic where accidental damage might occur.

(1) Remove the Processor enclosure cover. Remove the screws that secure the PC board and remove the board. Use the 7/8-inch Greenlee chassis punch (or equivalent tool) to cut required conduit entry holes at the centerpunched locations on the enclosure. Remove all metal shavings

(2) Use the mounting holes in the back of the enclosure to mark the mounting surface. Prepare the surface for the

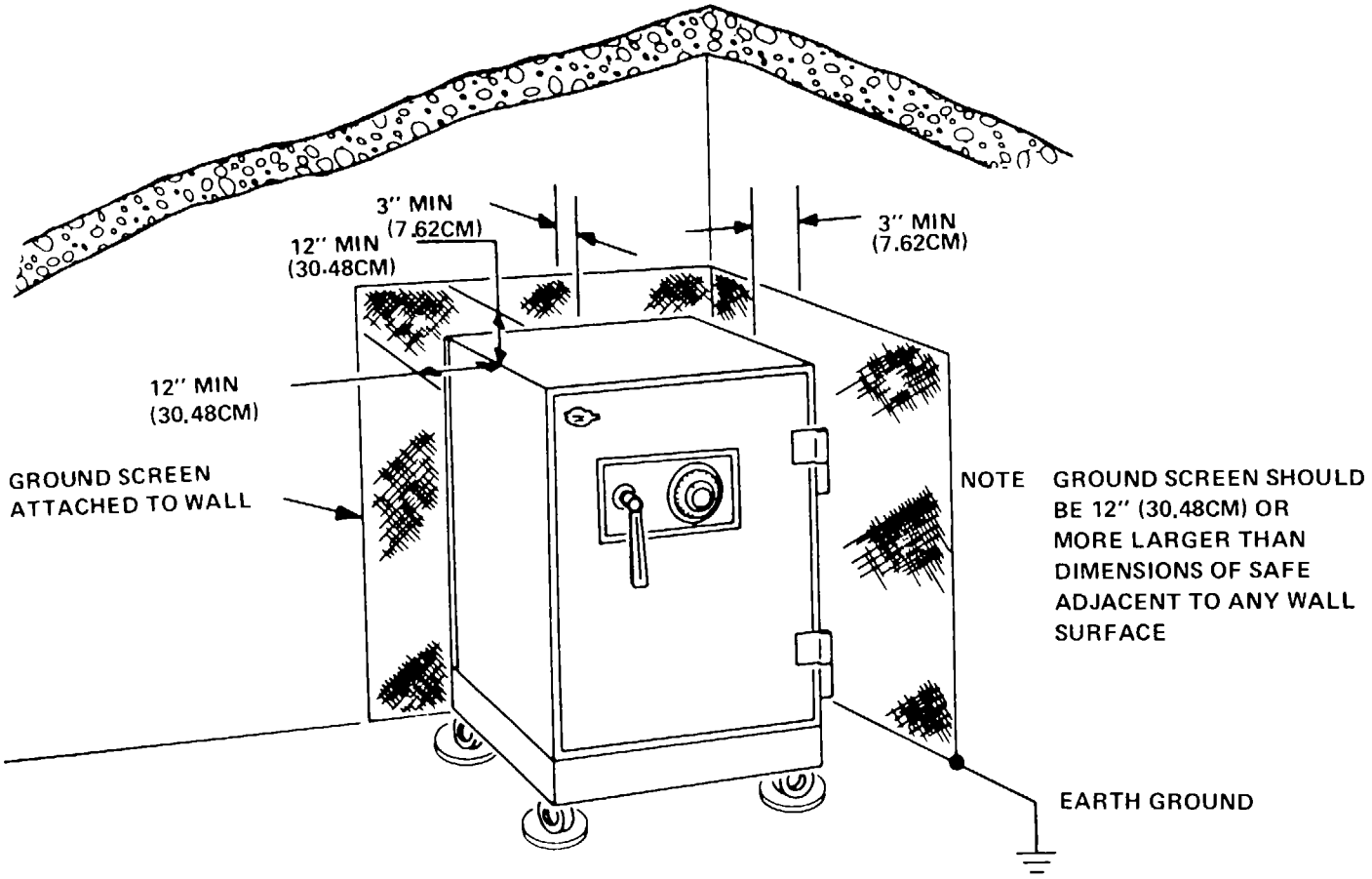


Figure 2-30. Minimum Spacing Between Wall and Safe (with Ground Screen)

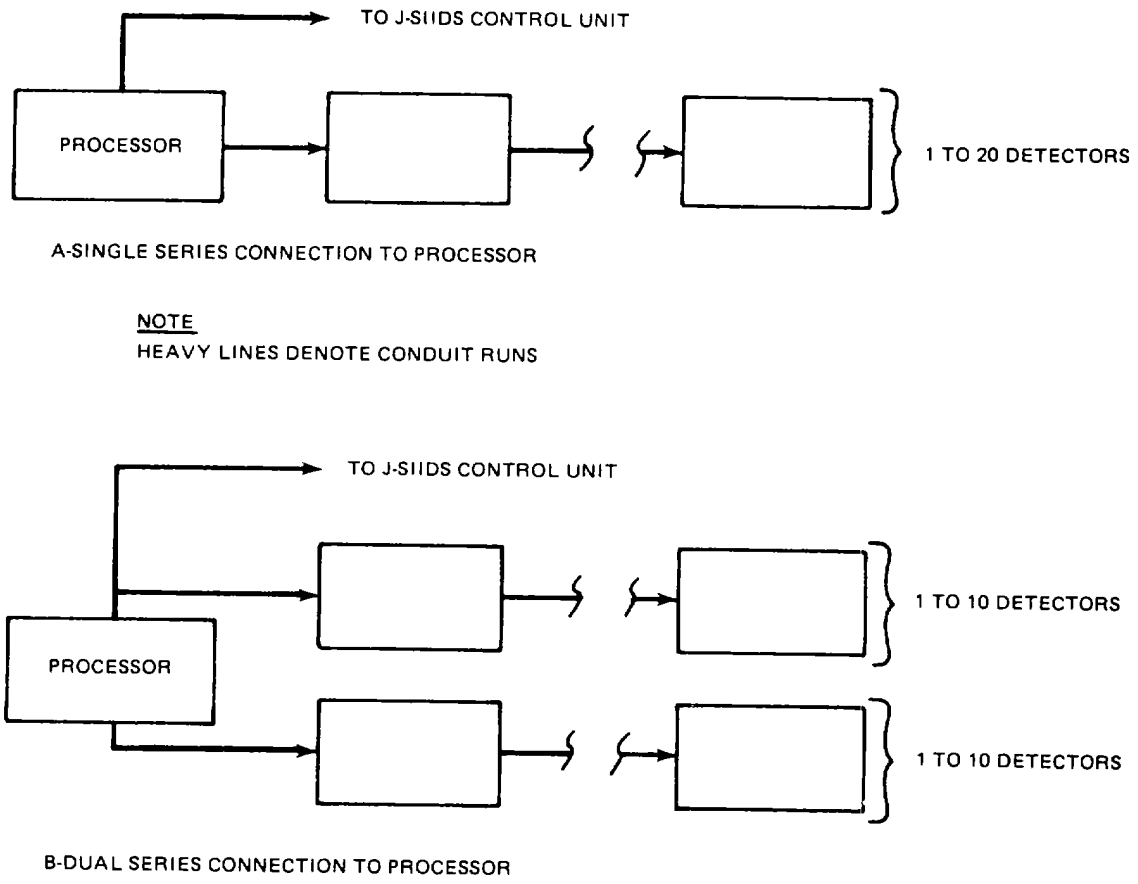


Figure 2-31. Multiple Transceiver Connections

appropriate fasteners. Mount the processor enclosure.

(3) Ensure that switch S1 on CU power supply is off. Install conduit between Processor and CU. Use a fishtape (or equivalent tool) to pull interconnecting wires through conduit. Six wires no smaller than No. 22 AWG are required. Install PC board and secure with screws.

(4) Cut wires to length, strip ends, and crimp spade lugs to wire ends. Connect wires to an unused terminal board, TB9-A through TB13-E, in the CU. Connect wires to TB1 in the Processor. See figure 2-35 for terminal numbers. Pull the tamper alarm switch all way out.

(5) Test a Transceiver at each proposed mounting point to ensure adequate performance. Cut two pieces of RG-58/U coax long enough to reach from the Processor to the proposed Transceiver mounting point farthest from the Processor. Remove a Transceiver cover. Remove the mounting screws and the PC board. Note the black ground wire. Use a support stand similar to the one shown in figure 2-36. Mount the Transceiver on the stand.

(6) Install the PC board and secure. Crimp spade lugs to the inter-connector and

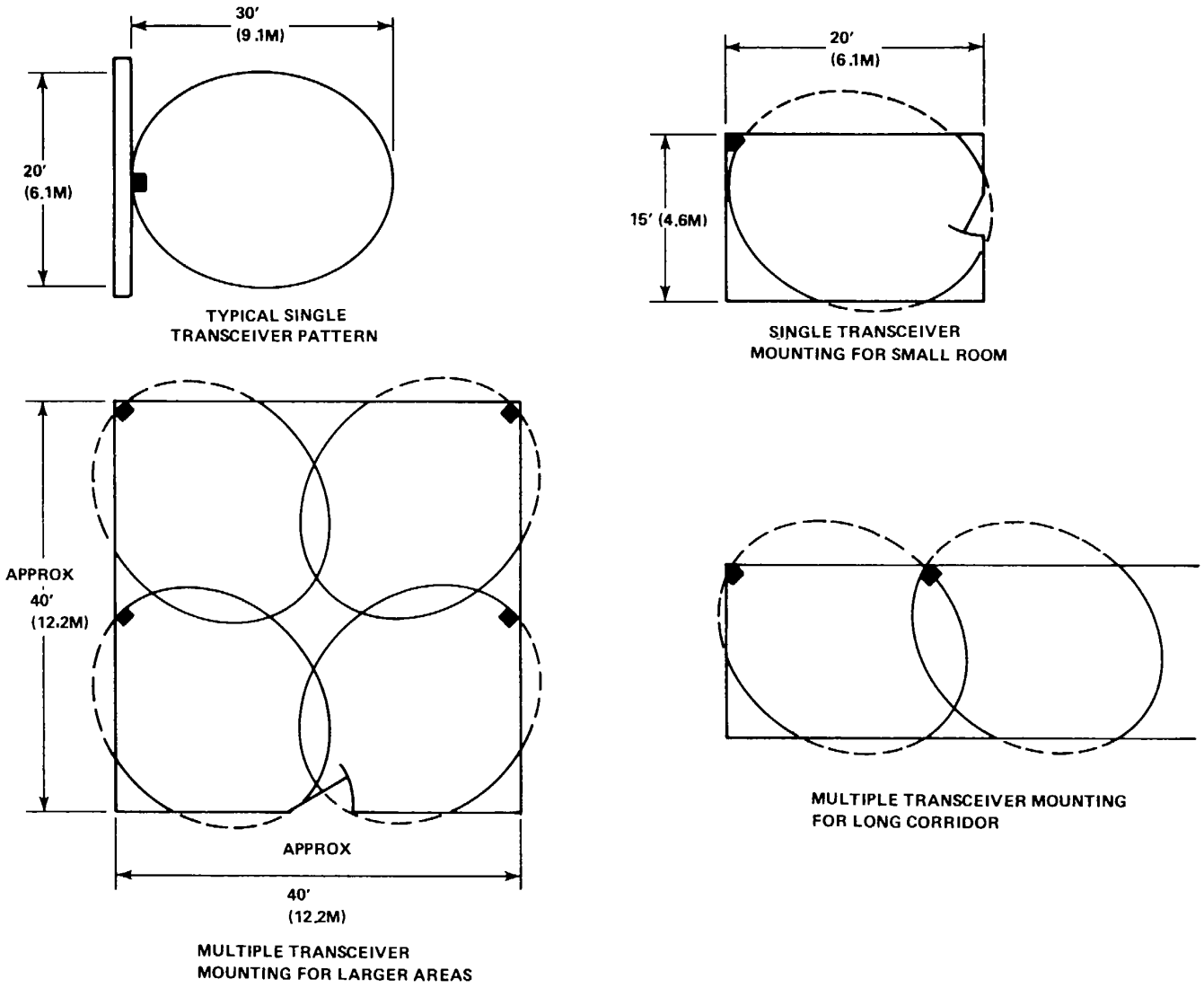


Figure 2-32. Typical Transceiver Mounting Configuration

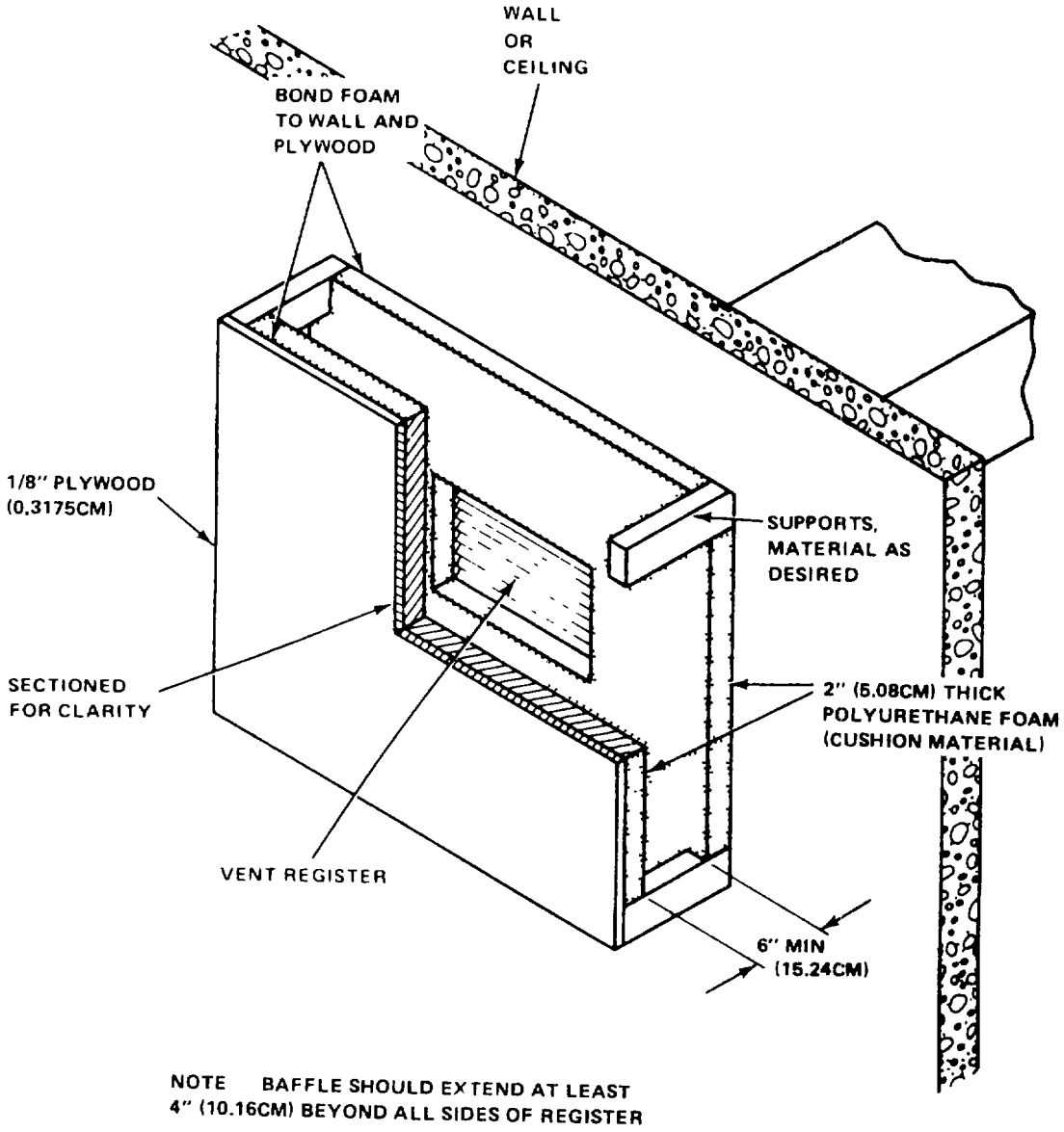


Figure 2-33. Typical Ultrasonic Vent Baffle

shield of the coax. Connect the two coax cables to terminals 1, 2, 3, and 4 of TB2 as shown in figure 2-35. Install a temporary jumper from TB1-5 to TB1-6 in the Processor.

(7) Place the stand and Transceiver at the first proposed mounting point. Make a rough estimate of the intended range of the Transceiver and set the RANGE control according to the settings given in table 2-6. The system should be operated at the lowest RANGE control setting that will give the required coverage. Operation below maximum settings will usually result in more consistent performance and fewer nuisance alarms. The area of coverage can be extended by adding Transceivers rather than raising RANGE control settings to push the system to its limits. Testing should be conducted under worst case conditions. Turn on all air conditioners, fans,

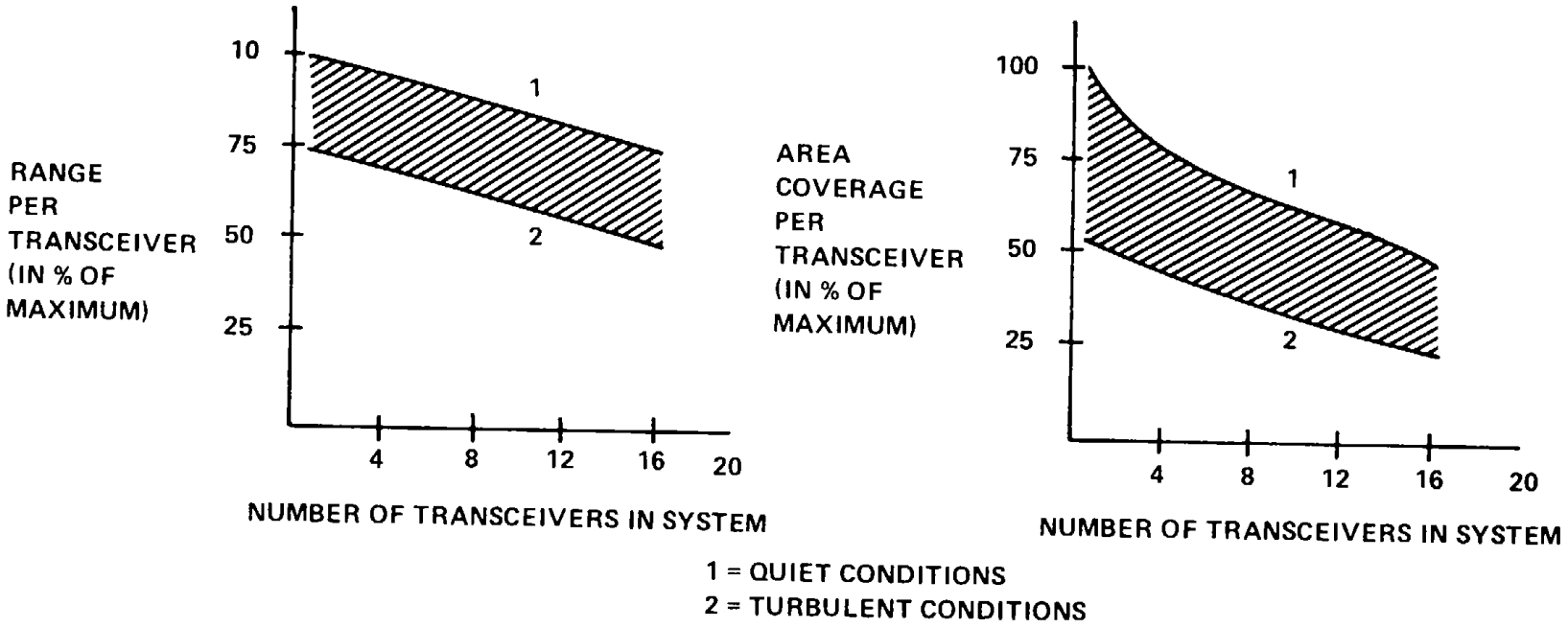


Figure 2-34. Shrinkage of Transceiver Coverage with Multiple Transceivers

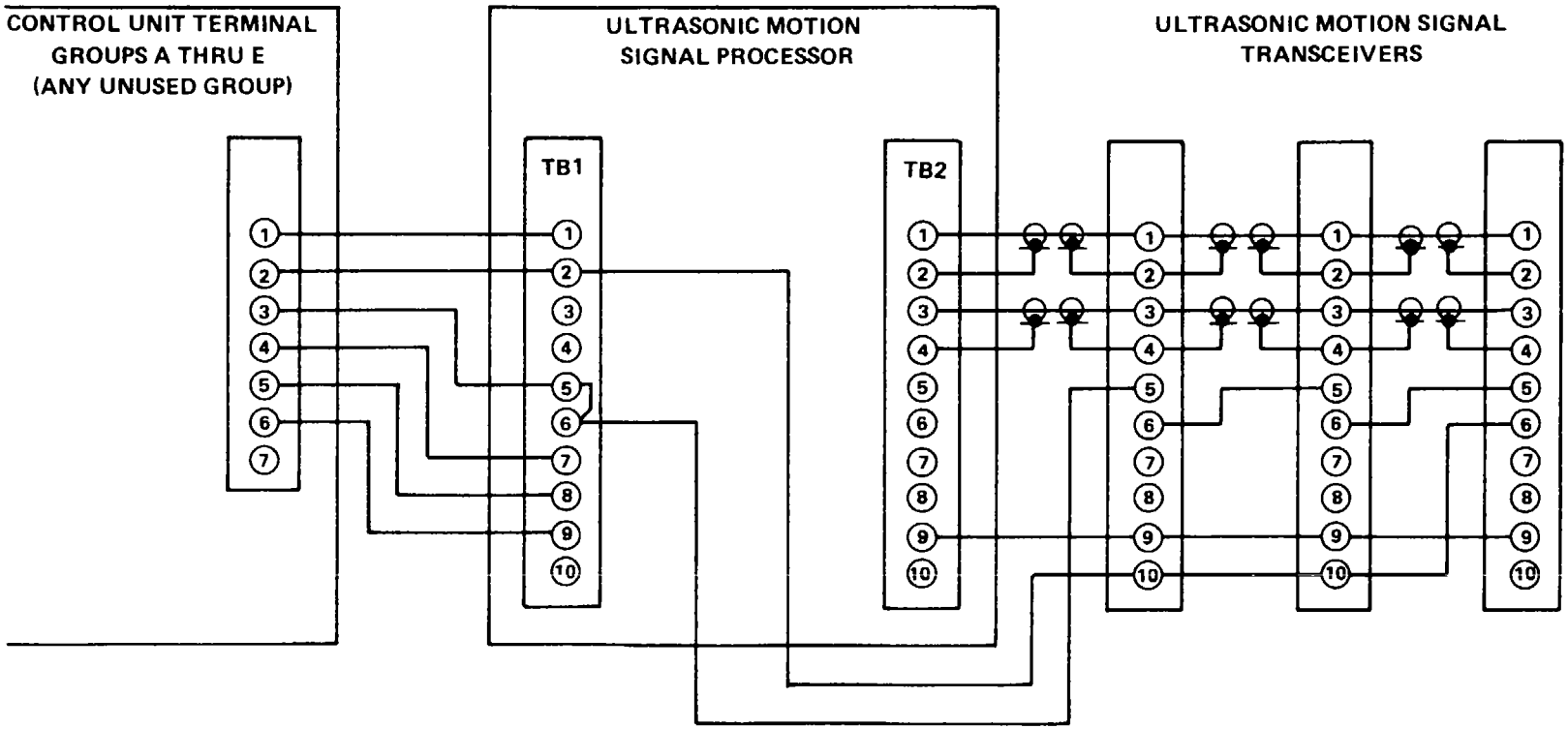


Figure 2-35. Ultrasonic Motion Sensor Processor Terminal Connections

Table 2-6. Typical Range Settings for Varying Numbers of Transceivers

Nominal range feet (meters)	Range setting for number of motion signal transceivers				
	1	4	8	16	20
35 (10.7)	8	-	-	-	-
34 (10.4)	8	-	-	-	-
33 (10.1)	8	8	-	-	-
32 (9.8)	7	8	-	-	-
31 (9.4)	7	8	-	-	-
30 (9.1)	7	7	8	-	-
29 (8.8)	7	7	8	-	-
28 (8.5)	6	7	7	8	-
27 (8.2)	6	6	7	8	8
26 (7.9)	6/8	6	6	7	8
25 (7.6)	6/8	6/8	6	7	7
24 (7.3)	6/7	6/8	6	6	7
23 (7.0)	5/6	6/7	6	6	6
22 (6.7)	5/6	5/7	6/5	6	6
21 (6.4)	5/6	5/6	5/8	6	6
20 (6.1)	4/6	4/6	4/7	5/8	6
19 (5.8)	4/5	4/6	4/7	5/7	5
18 (5.5)	3/5	4/5	4/6	4/6	4/8
17 (5.2)	3/4	3/5	4/6	4/6	4/7
16 (4.9)	3/4	3/4	3/5	3/6	3/6
15 (4.6)	2/3	2/3	3/4	3/5	3/6
14 (4.3)	2/3	2/3	2/3	2/4	2/5
13 (4.0)	2/2	2/3	2/3	2/3	2/3
12 (3.7)	2/2	2/2	2/3	2/3	2/3
11 (3.4)	2/1	2/2	2/2	2/2	2/2
10 (3.0)	1/1	1/1	1/1	1/1	1/1

NOTE: First figure in the range setting column is for a quiet condition. Second figure in the range setting column is for a turbulent condition.

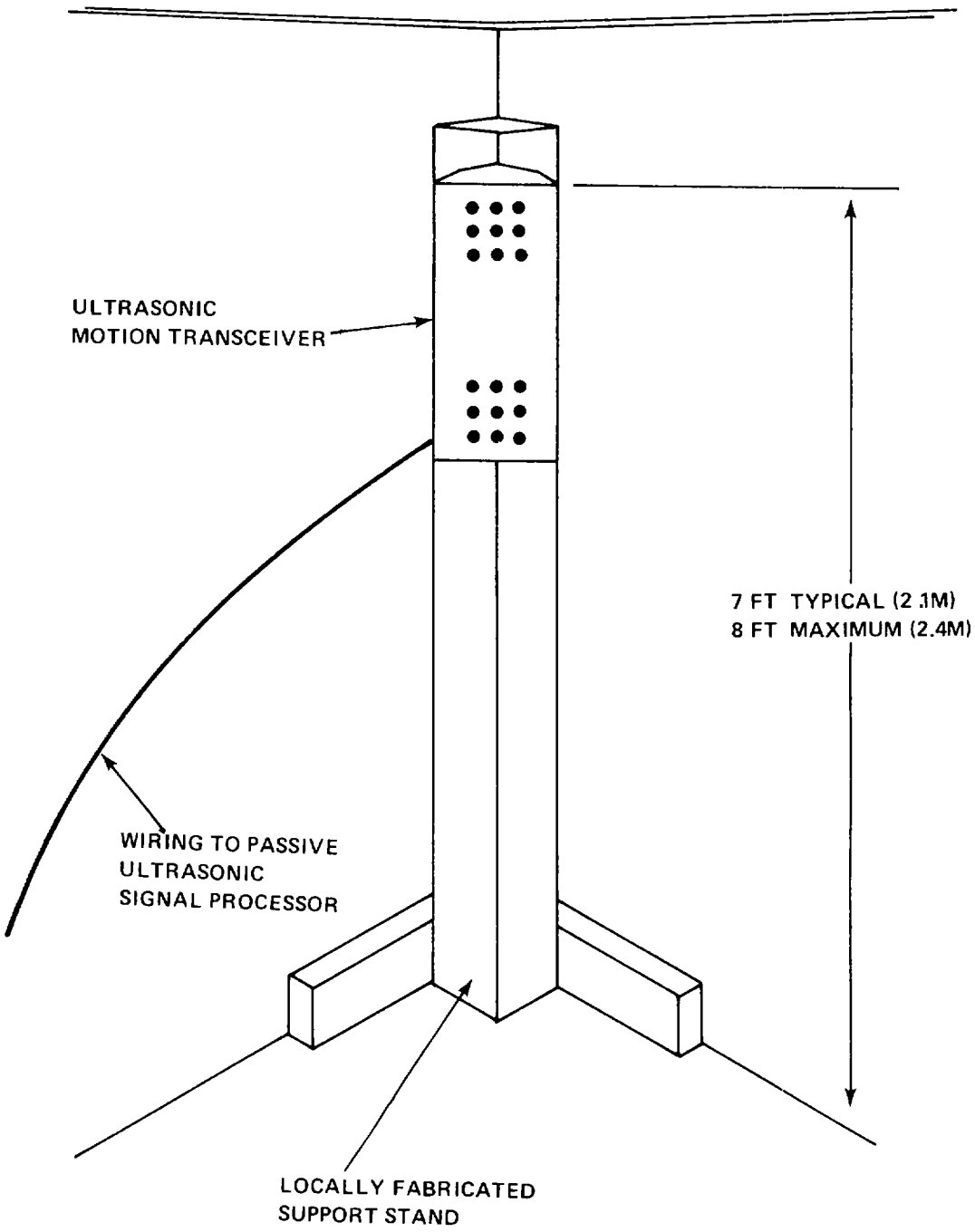


Figure 2-36. Support Stand

or other noise and turbulence producing equipment that would normally be operating when the area is secured.

(8) If any other sensors are installed, remove their associated PC boards (A1 through A6) from the CU status processor. Pull the CU TAS plunger all the way out. Turn on switch S1 on power supply. Depress TRANSMITTER RESYNC switch S2. Wait about 5 minutes for system to stabilize. During 5-minute stabilization period, check power supply. Set multimeter to dc volts and connect negative lead to chassis (ground). Connect positive lead to power supply TB2-3. Meter should indicate 20 ±1 vdc. Connect positive lead to TB2-5. Meter should indicate 5 ± 0.25 vdc. Connect lead to TB2-2 Meter should indicate 28 ± 2 vdc. Turn mode switch to TEST/RESET.

(9) Perform a noise test. Set multimeter to ac volts and connect leads to noise and reference test points in the UMS Processor. If the meter indicates more than 0.15 vac, the noise level at the Transceiver location is too high. Try to locate the source of the noise by turning off, one at a time, noise and turbulence producing equipment near the Transceiver. It may be necessary to install baffles over air vents to reduce noise to an acceptable level. If the noise level cannot be reduced enough, it may be necessary to reduce the RANGE control setting or reposition the Transceiver in order to lower the meter indication to less than 0.15 vac.

(10) Perform a walk test. Walk through the area covered by the Transceiver at a speed of approximately 1 foot (0.3 m) per second. When movement is detected by the UMS, the audible signal device in the CU will sound for 10 ±2 seconds. Walk around the edge of the protected area to ensure that all of the area is covered. If the Transceiver is intended to protect only part of a large area, locate the edges of the protected portion by walking toward the Transceiver from different directions. When the audible signal device in the CU sounds, stop and temporarily mark the floor. Repeat these steps until the protected area has been defined. Reduce the RANGE control setting one number at a time and repeat the walk test until coverage begins to diminish. The lowest setting that gives acceptable coverage should become the final RANGE control setting.

(11) If the walk test reveals inadequate cove age, reposition the Transceiver and repeat noise and walk tests

(12) If UMS performance is satisfactory, per- form a noise level fluctuation test. Turn off switch S1 on CU power supply. Disconnect meter lead from Processor noise test point. Set meter to dc volts. Connect positive lead to balance test point and negative lead to reference test point. Turn on switch S1 on power sup- ply. Depress TRANSMITTER RESYNC switch S2. Wait about 5 minutes for system to stabilize. Turn mode switch to TEST/RESET. Observe meter for about 5 minutes. Without human motion in the area, the meter indication should not vary more than 0.6 volt (0.3 volt above and below midpoint). A variation of ± 0.8 volt will activate an alarm. If the meter indication at the balance test point varies more than ±.0.3 volt, reduce it by reducing sources of noise and turbulence or repositioning Transceiver. Ensure that telephone, paging systems, and other intermittent noise sources do not cause the meter indication to vary more than ±0.3 volt. If the Transceiver is moved to reduce noise; the noise, walk, and balance tests must be repeated.

(13) If UMS performance is satisfactory, record Transceiver location and RANGE control setting. Move the Transceiver to the next proposed mounting point and repeat noise, walk, and balance tests.

c. Test the Ultrasonic Motion Sensor for System Operation. After a Transceiver has been tested at each mounting point, test the UMS as a system. Temporarily mount all Transceivers at their proposed locations and repeat the noise, walk, and balance tests for each location.

(1) Remove the Transceiver covers. Connect two pieces of coax between adjacent Transceivers and between Processor and nearest Transceiver as shown in figure 2-35.

(2) Set Transceiver RANGE controls to the levels recorded for each location in earlier tests. Conduct a noise test. Although noise level pickup at each Transceiver is random, simultaneous noise pulses from multiple Transceivers add in the Signal Processor and the meter may indicate a noise level higher than that noted during location testing. If the level exceeds 0.15 volt, investigate the cause. Experiment by reducing the RANGE setting of those Transceivers nearest sources of noise. It may be necessary to reposition one or more Transceivers.

(3) Conduct a walk test. If the walk test reveals gaps in the detection pattern, it may be necessary to reposition one or more of the Transceivers.

(4) If any Transceivers are relocated, repeat the noise and walk tests. Turn off switch S1 on CU power supply.

(5) Complete mounting of each Transceiver. Remove PC board. The en- closure can be mounted at 20°, 45°, or 90° to the mounting surface. Each end of the enclosure is marked for two conduit entry holes. If two conduit entry holes are required, both should be cut in the same end of the enclosure. Make conduit entry holes in the end next to the transmit transducer which is identified by a white dot and longer leads. Mount the Transceiver with the transmit transducer end up.

(6) Install conduit between Processor and Transceivers, and between Transceivers. Connect wiring between Processor and Transceivers, and between Transceivers. Two pieces of coax and three conductors no smaller than No. 22 AWG are required between units. Install and secure PC board. Connect coax and wires as shown in figure 2-35. Remove jumper from Processor TB2-5 and TB2-6. Set each Transceiver RANGE control to the setting re- corded during testing. Pull all TAS plungers all the way out.

(7) Turn on switch S1 on power supply. De- press TRANSMITTER RESYNC switch S2. Wait about 5 minutes for system to stabilize. Turn mode switch to TEST/ RESET. Test the tamper alarm circuit. At each Transceiver in turn, place the cover on the enclosure and hold it until the audible signal device stops sounding. Ensure that there is no motion in the area or this will cause the audible signal device to sound. Slowly open the cover. When the cover has moved 1/8 to 1/4 inch (0.3175 to 0.635 cm), the CU audible signal device should sound. Secure the cover. The audible signal device should stop sounding within 10 ± 2 seconds.

(8) After all Transceivers have been tested, test the tamper alarm in the Processor. Put the Processor enclosure cover in place and hold until the CU audible signal device stops sounding. Slowly open the cover. When the cover has moved between 1/8 and 1/4 inch (0.3175 and 0.635 cm), the audible signal device should sound. Secure the cover. The audible signal device should stop sounding within 10 ± 2 seconds.

(9) Perform a final walk test through the protected area to ensure adequate motion detection. Turn off switch S1 on CU power supply.

(10) If more than one UMS is to be used, repeat installation and testing on each one.

d. Modify All Slave Processors. Remove covers and PC boards from Processors designated as slaves A few inches of insulated wire, No. 22 AWG or smaller, and a 0.01-microfarad, 50-volt capacitor are required for each board to be modified. (See figure 2-37.)

(1) Cut a piece of wire 4-3/4 inches (12.1 cm) long and strip 1/4 inch (0.635 cm) of insulation from each end. Tin the ends of the wire.

(2) Solder one end of the wire to the junction of CR1, C5, and Q2 or the underside of the board. Solder the other end of the wire to TB2-5 on the underside of the board.

(3) Trim the capacitor leads so they will fit flat on the PC board, on the component side of the terminal strip, and reach terminals 5 and 6 on TB2. Crimp spade lugs to the capacitor leads.

(4) Connect the capacitor to TB2-5 and TB2-6.

(5) Disconnect and insulate the RED transducer lead. Install and secure PC board.

(6) Connect coax between adjacent slave Processors, and between master and nearest slave Processor to conduct synchronizing signal. Figure 2-38 shows terminal numbers.

(7) Turn on switch S1 on power supply. Depress TRANSMITTER RESYNC switch S2. Wait about 5 minutes for system to stabilize. Turn mode switch to TEST/ RESET.

(8) Set multimeter to ac volts and connect leads to TB2-1 and TB2-2 in the slave Processor. The meter should indicate approximately 12 vac. Gently tap the PC board five or six times with the handle of a screwdriver and observe the meter. The meter indication should remain steady. If the meter indication varies, check solder connections on the back of the PC board and the synchronizing coax connections to TB2. Repeat this test for each slave Processor.

2-17. INSTALLATION AND TESTING OF THE VIBRATION SENSOR.

The Vibration Sensor consists of a Vibration Signal Processor and a Vibration Signal Detector. The two components are stocked separately.

a. General Installation Requirements. The Vibration Sensor should be installed only in areas that are free of noise and vibration that could cause nuisance alarms. The detectors are designed to be mounted only on metallic barriers that are not exposed to uncontrolled human or environmental activity. The expanded metal grillwork of an arms cage is a good location for a detector. The mounting surface should be flat and smooth to provide solid, uniform contact for the vibration pickup assembly. Metal surfaces provide the most effective Detector mounting. Clean, unpainted metal door jambs, metal strips, or plate located at or near the expected area of entry make the best mounting points. The detector may be mounted in any position, at any angle. Masonry and wood are poor mounting surfaces because they rapidly damp out any vibrations. The detectors should not be mounted near blowers, large fans, or other machinery that produces strong vibrations. A single detector can protect a metal barrier 8 feet (2.44 m) in diameter with the detector mounted at the center. Large banners may be protected by using multiple detectors. A sectionalized metal barrier should be treated as a grouping of separate barriers and a detector mounted at the center of each section as illustrated in figure 2-39. As many as 20 detectors may be coupled to a single signal processor, but no more than 500 feet (152.4 m) of cable shall be used to connect them. See figure 2-40.

b. Installation of the Vibration Sensor. The Processor should be installed in a location that will minimize the length of conduit and wire to con- nect to the Detector(s). The Processor should also be readily accessible for maintenance.

(1) Remove the Processor cover and the PC board from the Processor enclosure. Use the 7/8-inch Greenlee chassis punch (or equivalent tool) to cut the required number of conduit entrance holes in the enclosure. Remove all metal shavings from the enclosure.

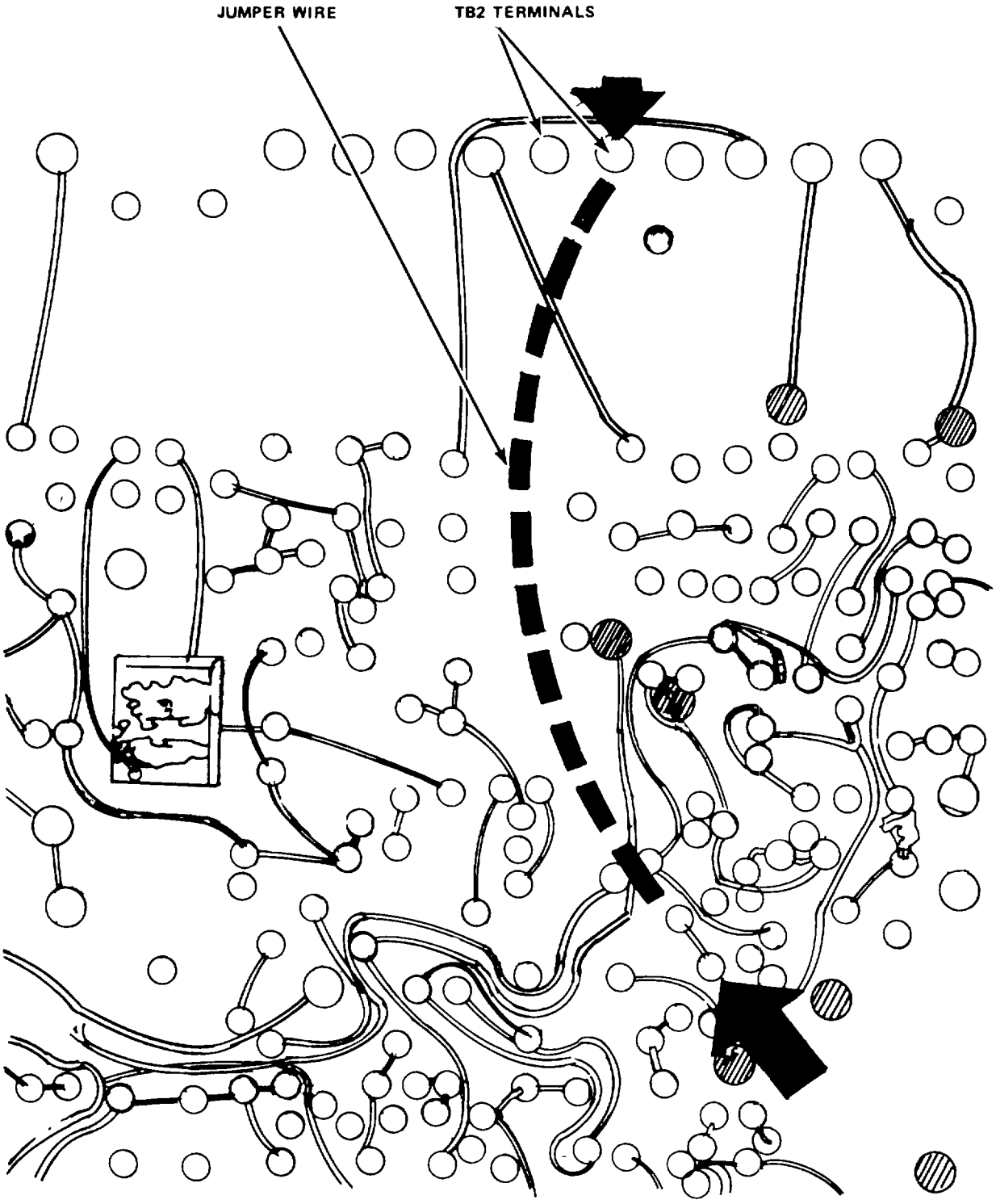


Figure 2-37. Modification of Signal Processor Circuit Board

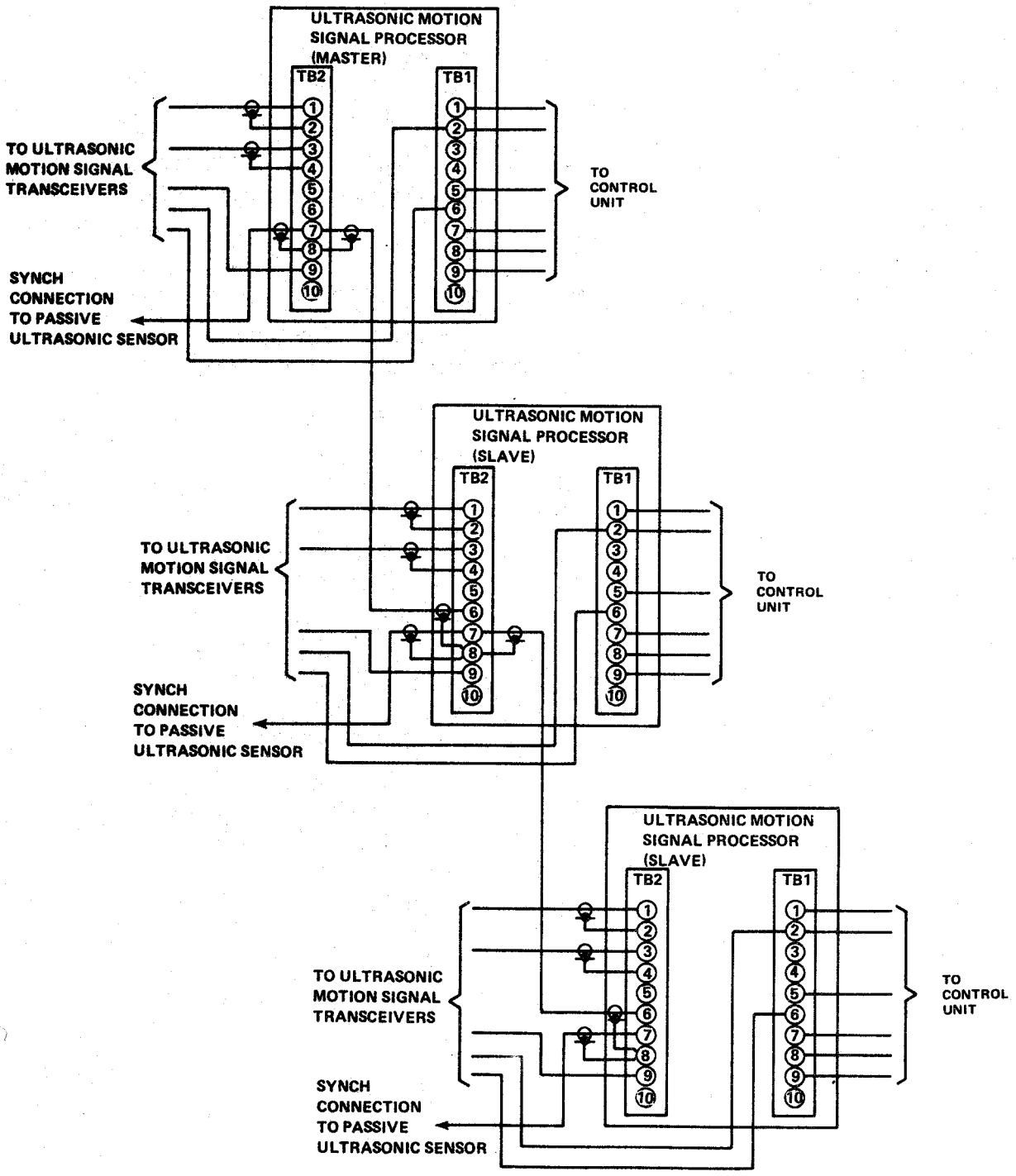


Figure 2-38. Processor Terminal Connections

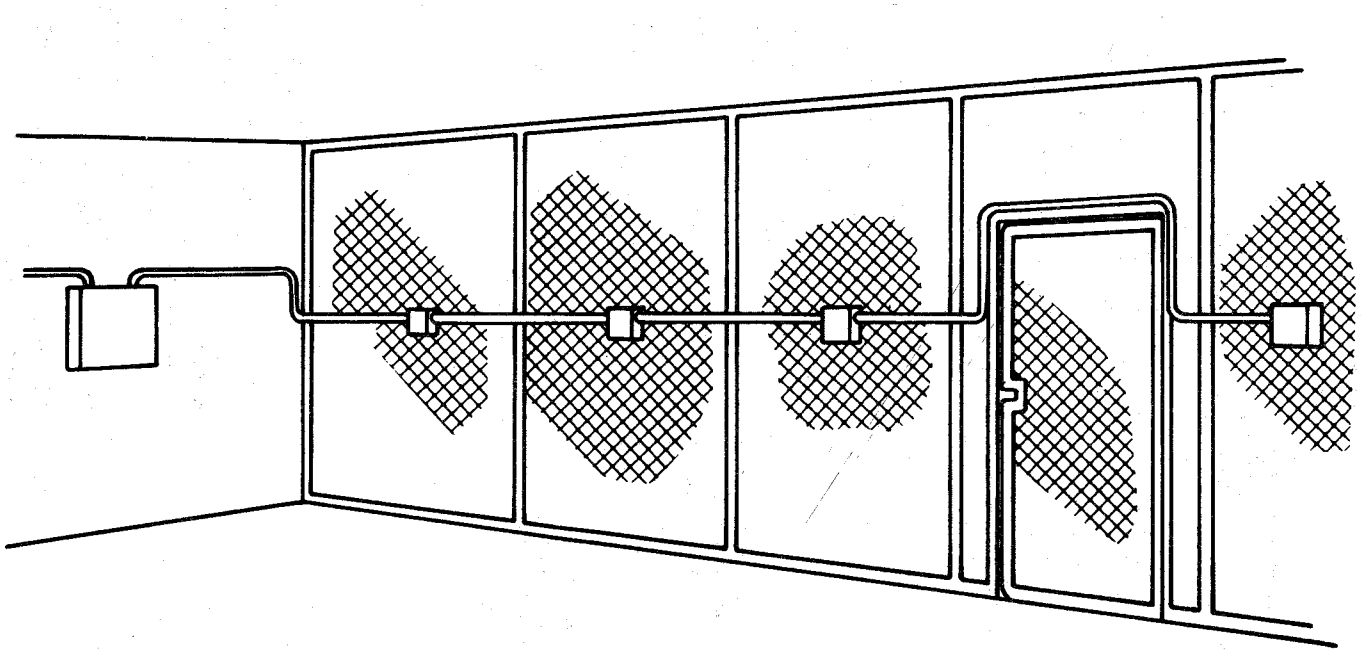


Figure 2-39. Typical Installation of Detectors on Sectionalized Metal Mesh

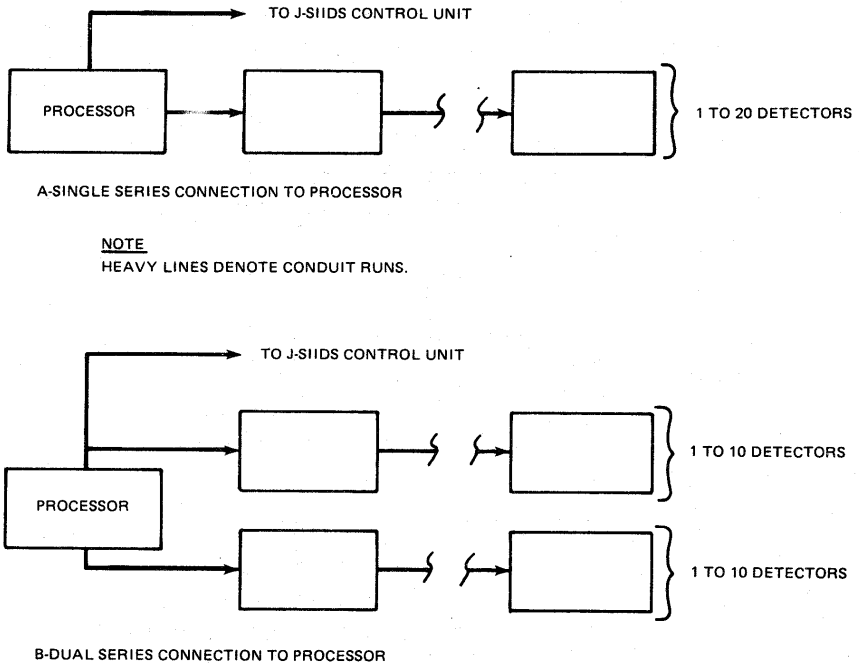


Figure 2-40. Multiple Detector Connections

(2) Use the four holes in the back of the enclosure to mark the mounting surface. Prepare the surface for the appropriate fasteners and mount the enclosure.

(3) Install conduit between Processor and Control Unit. Ensure that switch S1 on CU power supply is turned off. Pull interconnecting wiring through the conduit, using a fishtape (or equivalent tool). Six wires, no smaller than No. 22 AWG, are required. Replace Processor PC board and secure with screws.

(4) Strip wire ends and crimp spade lugs to the wires. Connect wires to any unused terminal board, TB9-A through TB13-E, in the CU. Use color coding or some other means to ensure that wires are not crossed. In the Processor, connect wires to TB1. See figure 2-41 for terminal numbers. Pull the TAS plunger all the way out.

(5) A Detector should be tested at each proposed mounting location to ensure adequate protection and minimum nuisance alarms. Testing consists of mounting a Detector and conducting a simulated forced penetration test. Remove the screws that secure the Detector cover and remove the cover. Be careful not to damage the red and black wires that connect the vibration pickup assembly to the PC board.

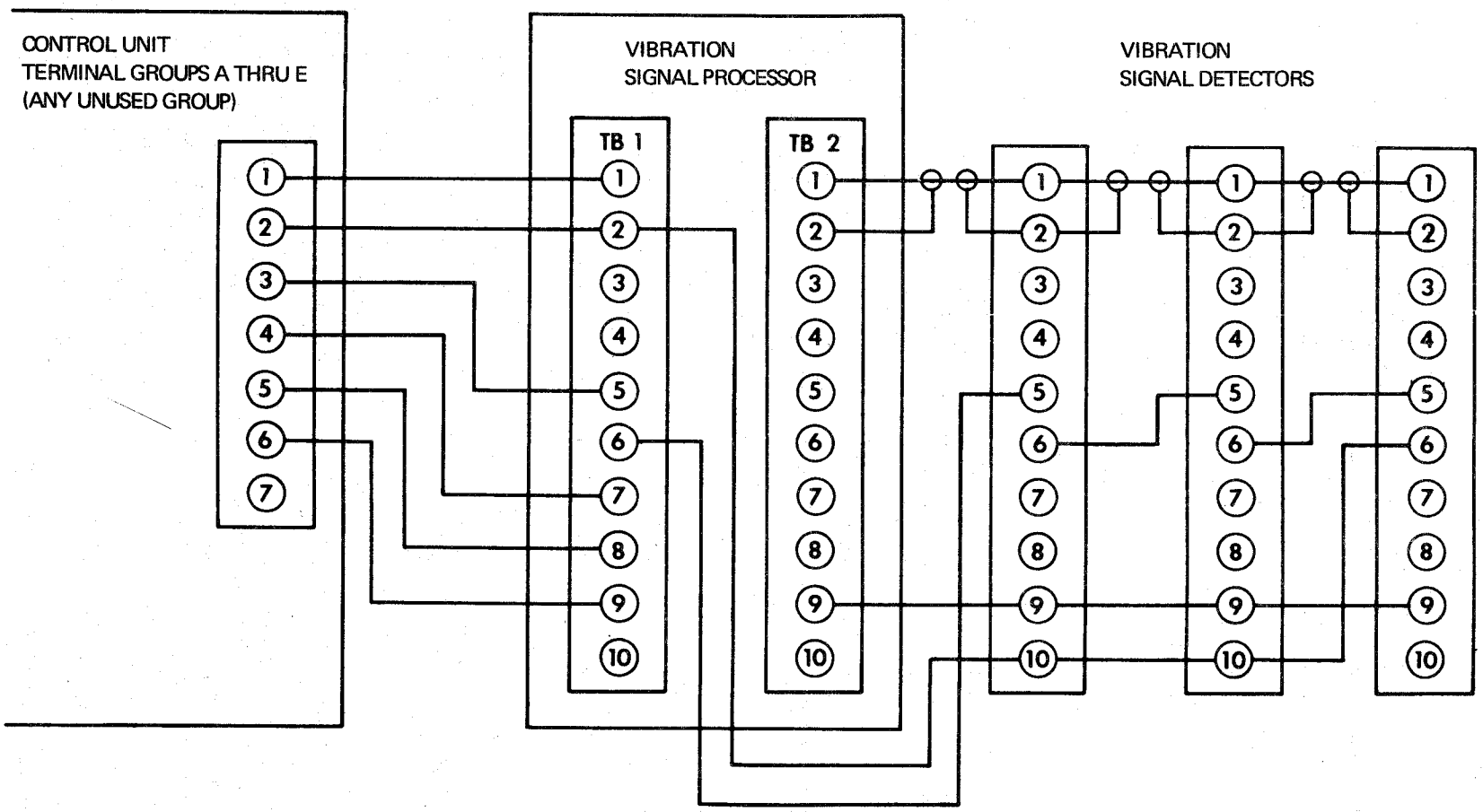
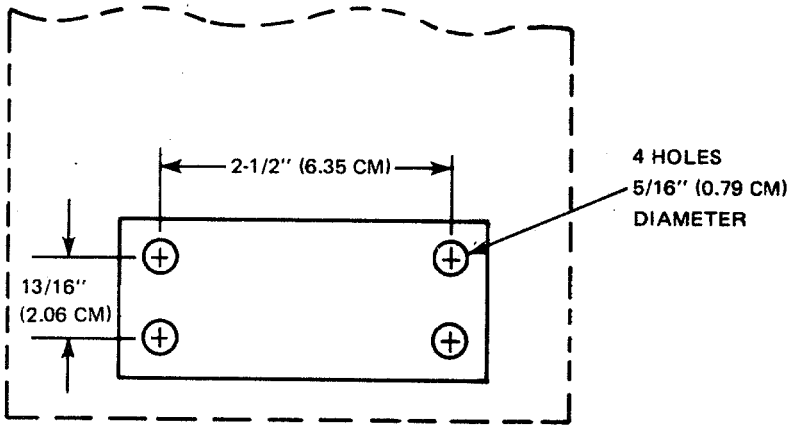


Figure 2-41. Typical Connections Between Detectors and Processor

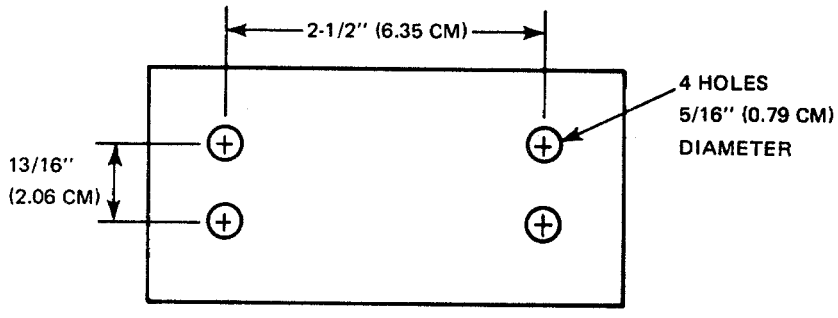
(6) Cut a piece of RG-58/U coaxial cable long enough to reach from the Vibration Signal Processor to the proposed Detector mounting point farthest from the Processor. To prepare the ends of the coax; strip the outer insulation, loosen the braided shield, and work it to one side. Twist the braided shield tightly, tin the end, and crimp a spade lug to the tinned section. Strip about 1/2 inch (1.27 cm) of inner insulation and crimp a spade lug to the center conductor. Prepare both ends of the coax in this manner.

(7) Connect the inner conductor to TB2-1 and the shield to TB2-2 in the Processor. See figure 2-41. Connect a jumper between TB1-5 and TB1-6 in the Processor.

(8) Mount the Detector at the first proposed location. If the surface on which the Detector is mounted is open, such as bars or expanded metal mesh, fabricate a 1/8-inch (0.32 cm) thick steel backing plate of suitable size with four 5/16-inch (0.79 cm) holes to match the mounting holes in the pickup assembly. See figure 2-42 for hole spacing.



A-VIBRATION PICKUP ASSEMBLY MOUNTING HOLE DIMENSIONS



MATERIAL, STEEL PLATE 2 x 4 x 1/8-INCH (5.08 x 10.16 x 0.3 CM) THICK

B-BACKING PLATE

NOTE: OVERALL SIZE OF MOUNTING PLATE DEPENDS ON MOUNTING SURFACE.

Figure 2-42. Dimensions for Detector Mounting and Backing Plate

(9) Place the backing plate on the back of the mounting surface and the Detector on the front surface. Insert four 1/4inch (0.635 cm) round headed, slotless screws through the backing plate and the pickup assembly. Secure with nuts inside the Detector. If the mounting surface is solid metal, a backing plate is not needed.

(10) Drill the four mounting holes through the surface. Insert 1/4-inch (0.635 cm) round headed, slotless screws through the surface from the back. Place the Detector on the front of the mounting surface and insert the screws through the pickup assembly and secure with nuts. Only the pickup assembly should touch the mounting surface. Ensure that the enclosure does not touch the surface. Connect the coax center conductor to TB1-1 and the outer shield to TB1-2 in the Detector. See figure 2-41.

c. Test Vibration Sensor for Proper Operation Turn the Detector GAIN control to 8. Turn the Processor SENSITIVITY control to 1. In the protected area, turn on all noise and vibration producing equipment that would normally operate when the area is secured. If any other sensors have been installed, remove their associated PC boards, A1 through A6 from the CU status processor.

(1) Pull the CU TAS plunger all the way out. Turn on switch S1 on power supply. Wait about 5 minutes for system to stabilize. Turn mode switch to TEST/RESET and then to SECURE.

(2) Turn mode switch to TEST/RESET and conduct a simulated forced penetration test. Use a metal screwdriver blade to tap the mounting surface 3 feet (0.9 m) from the Detector. Tap the surface four times at 1-second intervals. Within 15 seconds after the fourth tap, the audible signal alarm in the CU should sound for 10 ± 2 seconds. If the audible signal alarm does not sound, turn the Processor SENSITIVITY control to the next higher setting and repeat the taps. Continue these steps until the audible signal alarm does sound.

(3) Then repeat these steps at four more points around the Detector. Record the lowest sensitivity setting that provides detection at all points around the Detector and turn the Processor SENSITIVITY control back to 1.

(4) Turn off switch S1 on the CU power supply. Disconnect wiring. Mount another Detector at the next proposed mounting point and repeat the steps for mounting and testing the Detector. Repeat the mounting and testing steps at each proposed new Detector mounting point.

d. Test Vibration Sensor for Proper System Operation. Remove the PC board from the Detectors. Use the 7/8-inch Greenlee chassis punch (or equivalent) to cut conduit entrance holes in each Detector enclosure. Remove any metal shavings from the enclosures.

(1) Install conduit between Detectors and between Detectors and Processor. Pull interconnecting wiring through the conduit using a fishtape (or equivalent tool). One length of coax, RG-58/U, and three wires, no smaller than No. 22 AWG, are required between Detectors and between Detectors and Processor. Crimp spade lugs to the wire ends, coax center, and shield conductor. Reinstall PC board. Connect the coax shield to TB1-2 in each Detector and TB2-2 in the Processor. Connect coax and wires to Detectors and Processor per figure 2-41. Disconnect the jumper from TB1-5 and TB1-6 in the Processor.

(2) Turn all Detector GAIN controls to 1, and pul all TAS plungers all the way out. Set the Processor SENSITIVITY control to the highest setting recorded during testing of the individual Detector locations and pull the TAS plunger all the way out.

(3) Turn on switch S1 on power supply. Wait about 5 minutes for system to stabilize. Turn mode switch to TEST/ RESET and then to SECURE.

(4) Turn mode switch to TEST/RESET and conduct a simulated forced penetration test. If, after the fourth tap, the system has not reacted with an alarm, turn the Detector GAIN control to the next higher setting and repeat the test. When the system does react to the test, repeat these steps at four more points around the Detector.

(5) Record the Detector location and the lowest GAIN setting that provides detection at all points around the Detector. Turn the GAIN control to 1. Repeat these steps at each Detector.

e. Final System Adjustments and Testing. Set each Detector GAIN control to the setting recorded in the last test. Repeat the simulated forced penetration test at each Detector.

(1) Then at the Processor and at each Detector in turn, depress, release, and pull the TAS plunger all the way out. The audible signal device should sound for 10 +2 seconds.

(2) Install and secure enclosure covers on the Processor and on all Detectors. Turn off switch S1 on CU power supply and reinstall any printed circuit boards removed from the status processor.

2-18. INSTALLATION AND TESTING OF THE PASSIVE ULTRASONIC SENSOR.

a. General Installation Requirements. The Passive Ultrasonic Sensor (PUS) consists of a Signal Processor and a Signal Receiver. The two items are stocked separately. From one to twenty Receivers may be connected to each Processor, but no more than 500 feet (152.4 m) of cable shall be used to connect them. See figure 2-43. The PUS is designed to detect ultrasonic energy generated by intrusion, or attempted intrusion, through metal or masonry barriers. It will detect energy generated by sawing, hammering, or burning. A single Receiver provides typical coverage of an egg-shaped area 15 by 20 feet (4.6 by 6.1 m), in a room with an 8- to 12-foot (2.4 to 3.7 m) ceiling.
See figure 2-44. The direction of greatest sensitivity is perpendicular to the Receiver cover.
Detection is line-of-sight, so avoid obstructing the Receiver's view with furniture, partitions, or other objects. Ultrasonic energy generated by fans, heating and air-conditioning systems, or other items may be a source of nuisance alarms. It may be necessary to baffle air vents and ducts to reduce nuisance alarms. Figure 2-45 illustrates a typical ultrasonic baffle for a vent.

b. Use With an Ultrasonic Motion Sensor. If an Ultrasonic Motion Sensor (UMS) is to be installed in the same area as the PUS, the two must be synchronized to prevent the UMS from keeping the PUS in a constant state of alarm. The synchronization line must be enclosed in conduit, either existing or new.

c. Installation of the Passive Ultrasonic Sensor.
Install the Processor in a location that will minimize the length of conduit and cable between Processor and Receivers, make the Processor accessible to maintenance personnel, and reduce the possibility of tampering. It should not be in an area of heavy traffic where accidental damage might occur.

(1) Remove the Processor enclosure cover. Remove the screws that secure the PC board and remove the board. Use the 7/8-inch Greenlee chassis punch (or equivalent tool) to cut required conduit entry holes at the centerpunched locations on the enclosure. Remove all metal shavings.

(2) Use the mounting holes in the back of the enclosure to mark the mounting surface. Prepare the surface for the appropriate fasteners. Mount the Processor.

(3) Ensure that switch S1 on CU power supply is off. Install conduit between Processor and CU. Use a fishtape (or equivalent tool) to pull interconnecting wires through conduit. Six wires no smaller than No. 22 AWG are required. Install PC board and secure with screws.

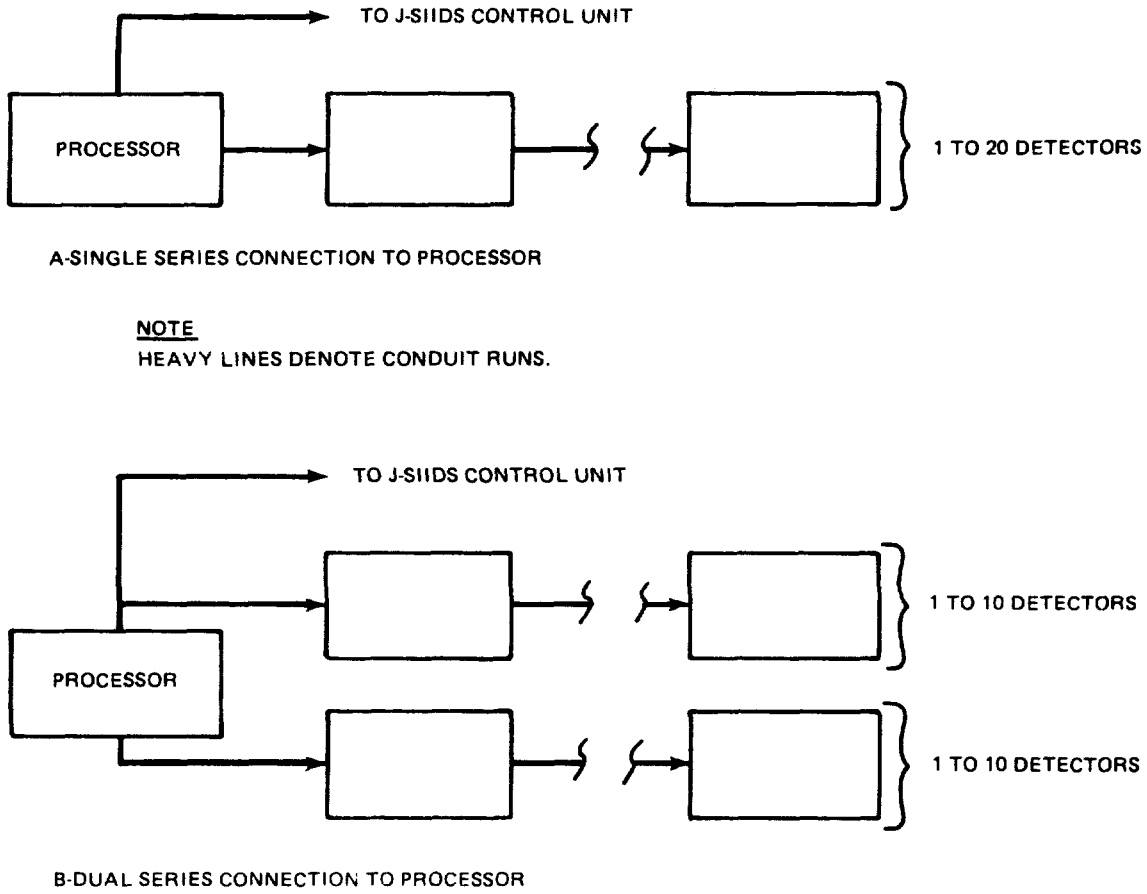


Figure 2-43. Multiple Receiver Connections

(4) Cut wires to length, strip ends, and crimp spade lugs to wire ends. Connect wires to an unused terminal board, TB9-A through TB13-E, in the CU. Connect wires to TB1 in the Processor. See figure 2-46 for terminal numbers. If the PUS is to be operated alone, ensure that a jumper is connected between TB3-2 and TB3-3. See figure 2-46. If the PUS is to be operated with a UMS, TB3-1 to TB3-2, and from TB3-3 to TB3-4. See figure 2-46. Pull the the tamper alarm switch all the way out.

CAUTION

Do not touch the Receiver microphone or it may be damaged.

(5) Test a Receiver at each proposed mounting point to ensure adequate performance. Cut a piece of RG-58/U coax long enough to reach from the Processor to the proposed Receiver mounting point farthest from the Processor. Remove a Receiver cover. Remove the mounting screws and the PC board. Handle the board with care. Use a support stand similar to the one shown in figure 2-47.

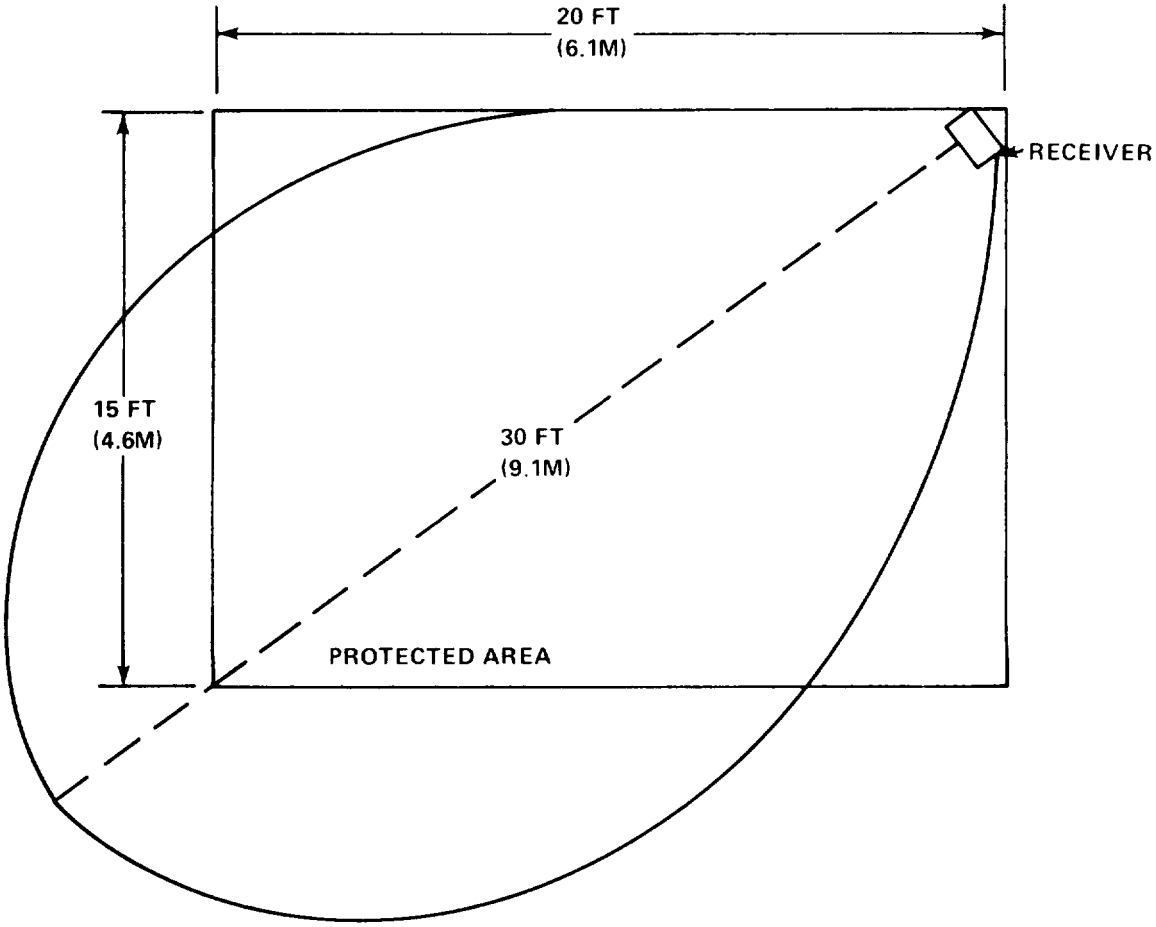


Figure 2-44. Typical Passive Ultrasonic Sensor Coverage

Mount the Receiver on the stand. The Receiver may be mounted at an angle of 0°, 45°, or 900. See figure 2-48.

(6) Install the PC board and secure. Crimp spade lugs to the inner conductor and shield of the coax. Connect the inner conductor to TB1-1 in the Receiver and to TB2-1 in the Processor. Connect the shield to TB1-2 in the Receiver and to TB2-2 in the Processor. Install a temporary jumper from TB1-5 to TB1-6 in the Processor.

(7) Place the stand and Receiver at the first proposed mounting point. Set the Receiver GAIN control to 8. Set the Processor SENSITIVITY control to 1. Testing should be conducted under worst case conditions. Turn on all air conditioners, fans, or other noise producing equipment that would normally be operating when the area is secured.

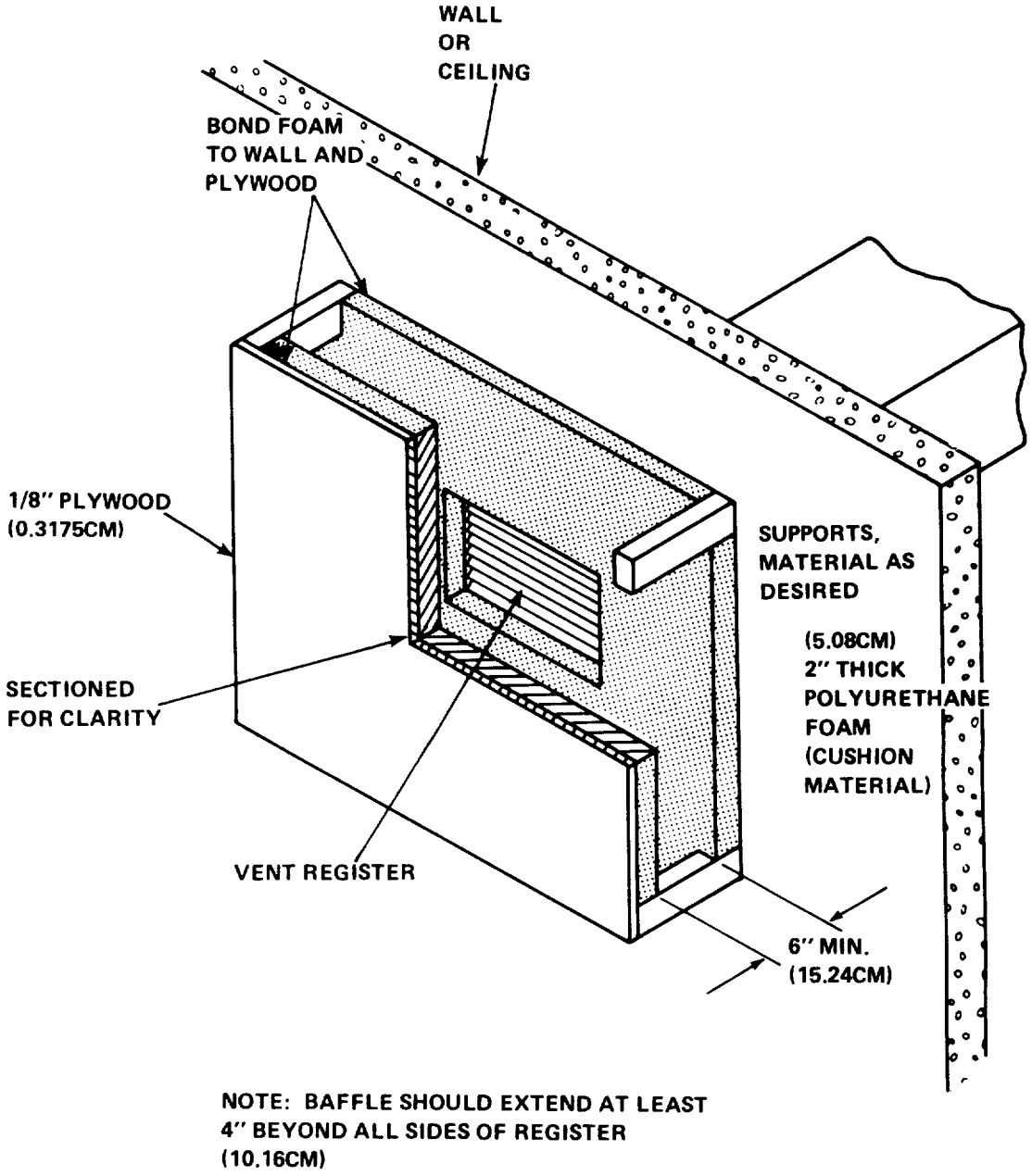


Figure 2-45. Typical Ultrasonic Vent Baffle

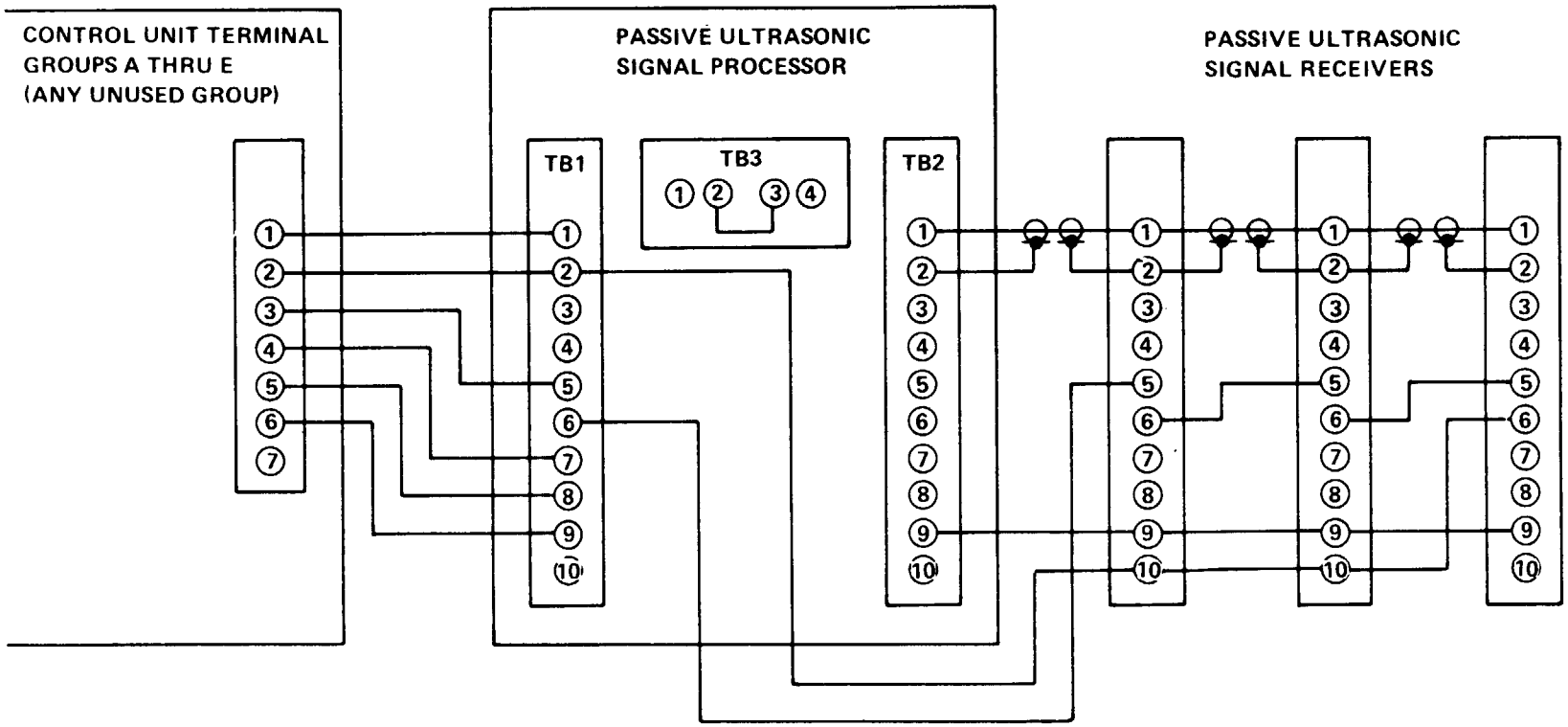


Figure 2-46. Passive Ultrasonic Processor Connections

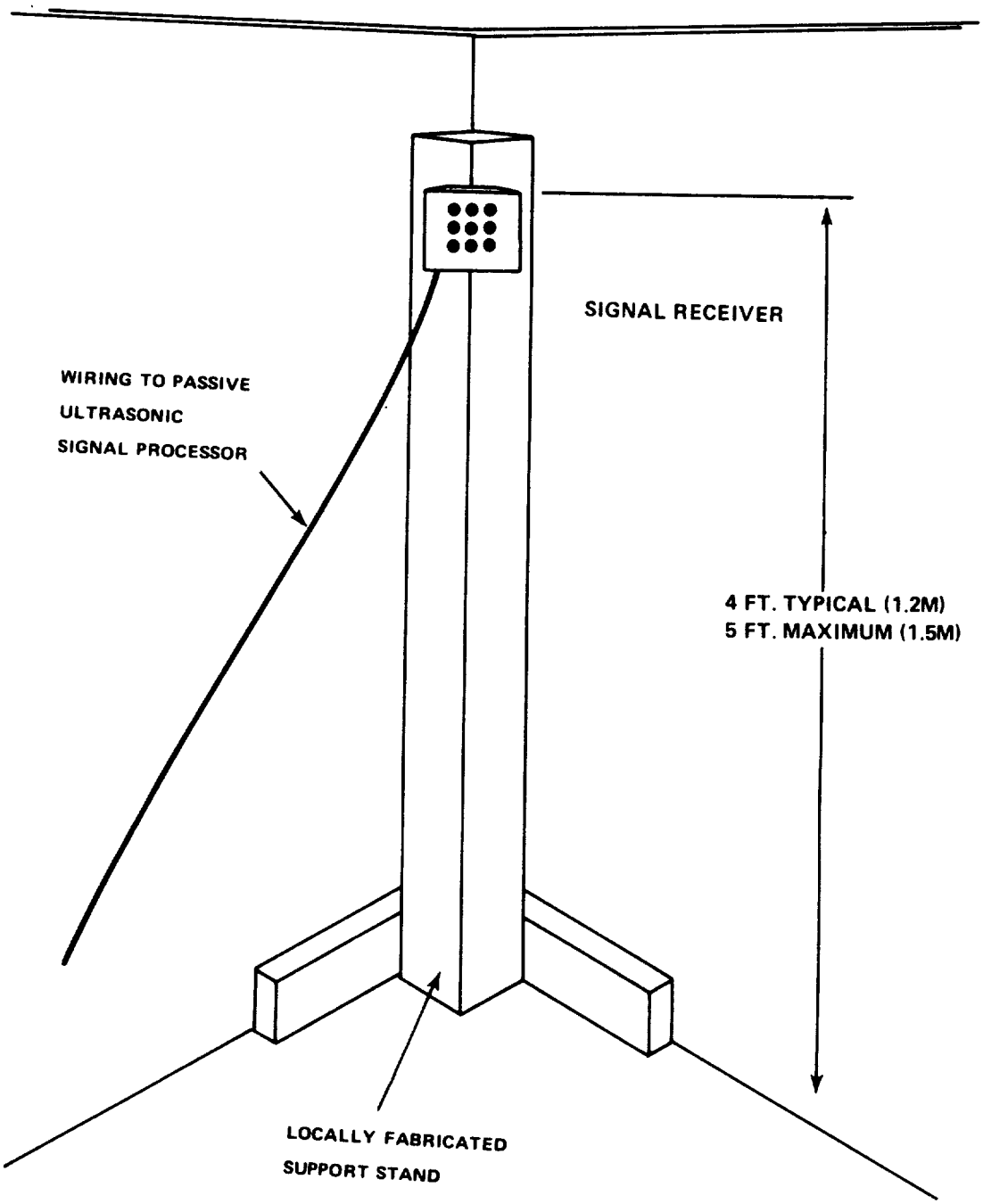


Figure 2-47. Support Stand

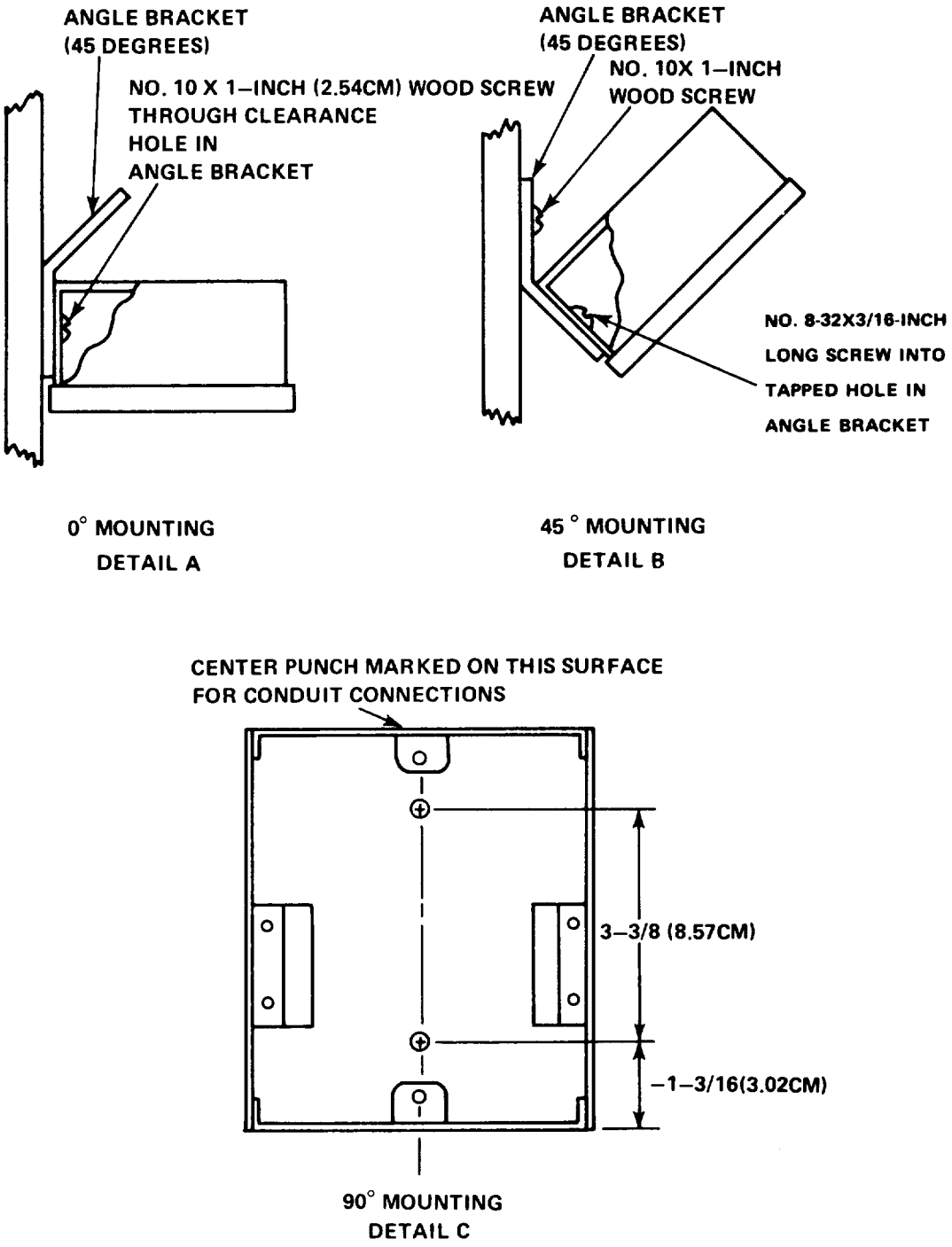


Figure 2-48. Receiver Mounting Dimensions

(8) If any other sensors are installed, remove their associated PC boards (Al through A6) from the CU status processor. Pull the CU TAS plunger all the way out. Turn on switch S1 on power supply. Depress TRANSMITTER RESYNC switch S2. Wait about 5 minutes for system to stabilize. Turn mode switch to TEST/RESET.

(9) Perform a simulated forced penetration test. Stand about 20 feet (6.1 m) from the Receiver, at the edge of the area to be covered. Jingle a key ring with four to six brass keys at 1-second intervals. After the fourth time, the audible signal device in the CU should sound for 10 +2 seconds. If the audible signal device does not sound to indicate an alarm, turn the Processor SENSITIVITY control to the next higher setting and repeat the test until the simulated penetration is detected. Repeat the test at six more points around the Receiver's intended area of coverage. It may help to mark the edges of the detection area on the floor with chalk or tape.

(10) Perform a noise test. Set multimeter to ac volts. To ensure that the meter will indicate only the ac portion of the signal, connect a 0.5-microfarad or larger capacitor between one meter lead and TP2 in the Processor and the other lead to ground. The meter should indicate 0.3 vac or less. If the meter indicates more than 0.3 vac, the ambient ultrasonic energy level is too high. Attempt to reduce the level by installing ultrasonic baffles over all ventilation anl air-conditioning vents. Inspect for cracks in floors, walls, around doors and windows, and in other locations where the flow of air or the wind may generate ultrasonic energy. Caulk cracks in floors, walls, and around window and door frames. Install or replace weather stripping around doors and windows. If the measured voltage cannot be reduced below 0.3 vac, the Receiver should be relocated and the test repeated. It may be necessary to settle for a reduced area of coverage (and a reduced SENSITIVITY setting). If such is the case, it will probably be necessary to plan for additional Receivers in the system with some Receivers having smaller areas of coverage than originally planned for.

(11) After the ultrasonic noise level has been reduced enough to give a meter indication of less than 0.3 vac at TP2, record the lowest SENSITIVITY setting that provides adequate detection during the simulated forced penetration test. Reset the SENSITIVITY control to 1.

(12) Move the stand and Receiver to the next proposed mounting point. Repeat the simulated forced penetration test and the noise test. Record the lowest SENSITIVITY setting that provides adequate coverage.

(13) Move the Receiver and repeat the tests until the Receiver has been tested at each proposed mounting point. Record each SENSITIVITY setting. Ensure that all parts of the area to be protected fall into the detection pattern of at least one Receiver. Overlap should be kept to a minimum. If there are gaps between detection patterns, new mounting points should be selected and more tests conducted until coverage is satisfactory. Turn off switch Si on CU power supply.

d. Test the Passive Ultrasonic Sensor for Proper Operation. After a Receiver has been tested at each mounting point, test the PUS as a system. Mount all the Receivers at their proposed locations and repeat the tests for each location.

(1) Remove the Receiver cover. Remove the PC board. Cut required conduit entry holes in the enclosure at the marked points. Remove all metal shavings. Use the holes in the back of the enclosure as a guide to mark the mounting surface. Prepare the surface for the appropriate fasteners. Mount the enclosure. Install and secure the PC board. Install the conduit between the Receiver and

Processor. Use the fishtape (or equivalent) to pull coax and wires through the conduit. Three wires no smaller than No. 22 AWG are required between Processor and Receivers, and between Receivers. Connect coax and wires as shown in figure 2-46. Remove jumper from Processor TB1-5 and TB1-6. Repeat these steps until all Receivers are mounted and connected.

(2) Set all Receiver GAIN controls to 1 and pull all TAS plungers all the way out. Set Processor SENSITIVITY control to the highest setting recorded during the simulated forced penetration tests. Ensure the Processor TAS plunger has been pulled all the way out. Turn on switch S1 on power supply. Depress TRANSMITTER RESYNC switch S2. Wait about 5 minutes for system to stabilize. Turn mode switch to TEST/RESET.

(3) Perform the simulated forced penetration tests on one of the Receivers. If the penetration is not detected, turn the Receiver GAIN control to the next higher setting and repeat the test. Once the penetration has been detected, repeat the test at six more points around the Receiver's intended area or coverage.

(4) Perform the noise test on the Receiver. If the meter indicates more than 0.3 vac, turn the Receiver GAIN control to the next lower setting and repeat the test. When the meter indicates 0.3 vac or less, record the Receiver location and the GAIN control setting. Reset the GAIN control to 1.

e. Test the Passive Ultrasonic Sensor for System Operation.

(1) Set all Receiver GAIN controls to the settings recorded in the last step. Install and secure covers on all Receivers.

(2) Conduct a final system noise test by connecting the meter leads to TP2 and ground in the Processor. If the meter indicates more than 0.3 vac, it will be necessary to readjust one or more Receiver GAIN controls. If this is necessary, remove the cover, adjust the GAIN control, install and secure the cover.

(3) Conduct a final system simulated forced penetration test. Jingle the keys four times at 1-second intervals at the edge of a Receiver's detection area. After the fourth time, the CU audible signal device should sound for 10 ±2 seconds. Repeat test at each Receiver to ensure adequate coverage.

(4) Test the tamper alarm circuit. Carefully and quietly remove each Receiver cover. The noise of the screwdriver may activate an intrusion alarm. If the CU audible signal device sounds, hold the cover on by hand until the signal device stops sounding. Slowly open the cover. When the cover has moved between 1/8 and 1/4 inch (0.3175 and 0.635 cm), the CU audible signal device should sound. Secure the cover. The audible signal device should stop sounding within 10 ±2 seconds.

(5) After all Receivers have been tested, test the tamper alarm in the Processor. Put the Processor enclosure cover in place and hold until the CU audible signal device stops sounding. Slowly open the cover. When the cover has moved between 1/8 and 1/4 inch (0.3175 and 0.635 cm), the audible signal device should sound. Secure the cover. The audible signal device should stop sounding within 10 +2 seconds.

(6) Turn off switch Si on the CU power supply.

(7) Use RG-58/U coax to make the synchronizing connection between the UMS and PUS Processors. Connect the center conductor to TB2-7 in both Processors. Connect the shield to TB2-2 in the PUS Processor and TB2-8 in the UMS Processor. In the PUS Processor, remove the jumper from TB3-2 and TB3-3. Connect a jumper from TB3-1 to TB3-2, and

from TB3-3 to TB3-4. The jumpers should be no smaller than No. 22 AWG. Figure 2-49 illustrates typical connections for synchronizing UMS and PUS.

2-19. INSTALLATION AND TESTING OF THE MONITOR CABINET AND STATUS MONITOR MODULE.

a. General Installation Requirements. The Monitor Cabinet (MC) comes in three variations which are described as one-, five-, or twenty-five-zone monitors. These three variations can contain one, five, or twenty-five Status Monitor Modules, and can monitor one, five, or twenty-five different secure zones. The installation procedure for each of the three types of Monitor Cabinets is the same with the exception of mounting. The one-zone and five-zone Monitor Cabinets are designed for mounting on a wall or on a desk or shelf. They are provided standoffs to facilitate their being stacked. They have four prepunched holes in the back panel of the enclosure for wall mounting. The twenty-five-zone Monitor Cabinet is freestanding and should be mounted on a suitable platform not exceeding 24 inches (61 cm) high. All Monitor Cabinets must have an open space to the right of the cabinet in order that the cabinet door may be fully opened. The Status Monitor Module is installed in a swingout rack behind the Monitor Cabinet door.

b. Installation of Monitor Cabinets

(1) Install the Monitor Cabinet in a location that will simplify the routing of wiring and conduit, provide access for maintenance and monitor personnel, and reduce the possibility of tampering. It should not be in an area of heavy traffic where accidental damage might occur.

(2) Determine the number and locations of conduits to be connected to the enclosure. Conduit entry zones in the three cabinets are shown in figures 2-50, 2-51, and 2-52. Ensure that a direct wire-carrying conduit does not enter through a data transmission line-carrying zone, and vice versa. Ac power conductors shall enter through a direct wire-carrying zone.

(3) Cut the required number of conduit entry holes.

(4) Mount the Monitor Cabinet in the desired location.

(a) If the enclosure is to be wallmounted, secure the enclosure to the mounting surface with 1/4-inch fasteners.

(b) If the twenty-five-zone Monitor Cabinet is to be used, it should be placed on a suitable platform not exceeding 24 inches (61 cm) high.

WARNING

The ac power to the distribution panel must be disconnected before installing conduit and wiring between the Monitor Cabinet and the panel. Ensure that ac power is not reconnected to the panel without first contacting personnel installing the Monitor cabinet.

(5) Install conduit and a three-wire power line between the Monitor Cabinet and the ac power distribution panel. On the twenty-five-zone Monitor Cabinet, the ac power terminal board is below the lower right-hand corner of the power supply.

(6) Ensure that Monitor Cabinet POWER switch is in the OFF position.

(7) Position batteries in cabinet.

(8) Remove CAUTION HIGH VOLTAGE plate from front of power supply.

(9) Connect terminal leads to battery.

(10) Connect ac phase wire to TB1-1. Connect neutral wire to TB1-2 and ground wire to TB1-3.

(11) Replace the CAUTION HIGH VOLTAGE plate. Ensure that plate does not contact terminals.

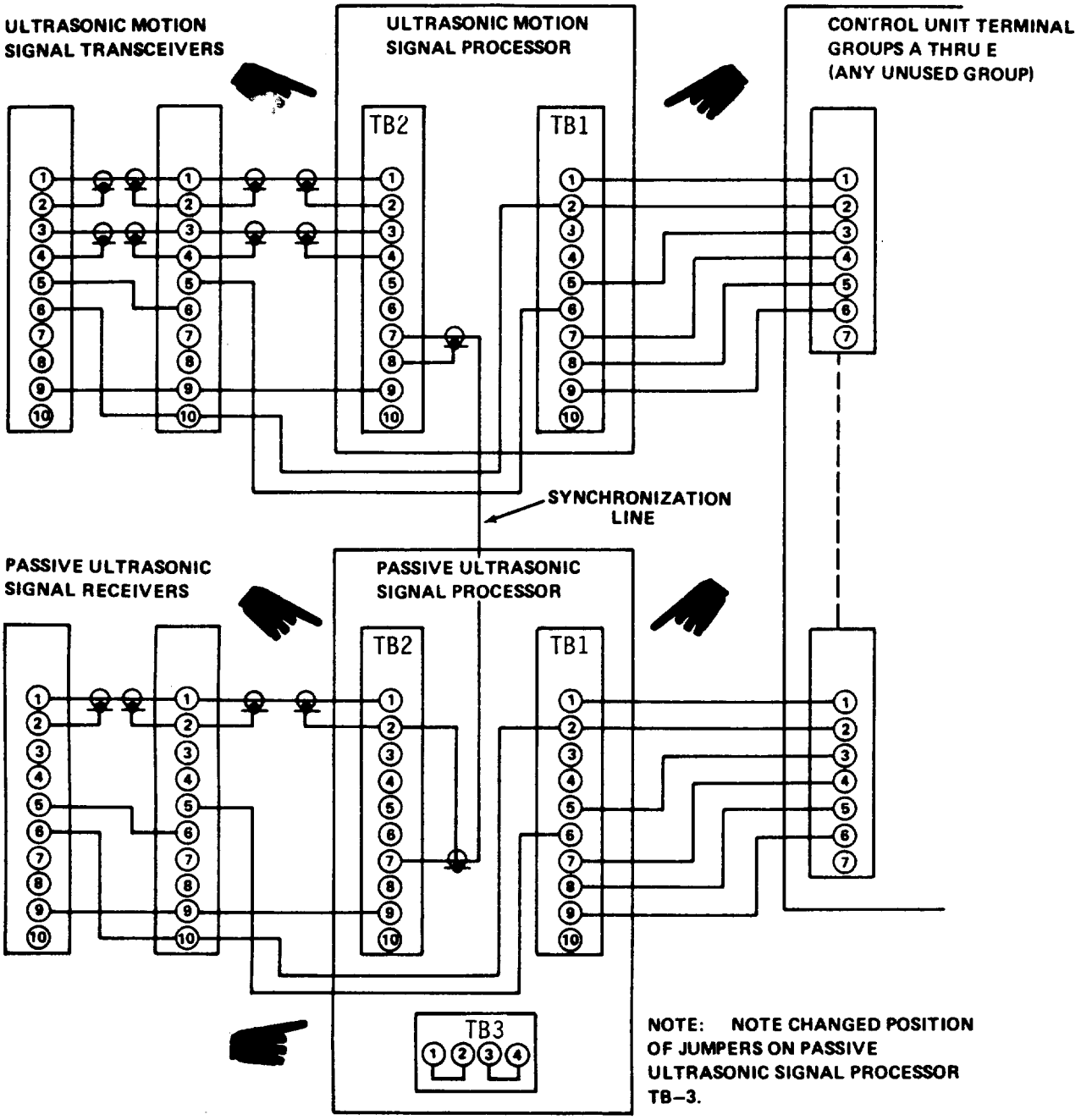


Figure 2-49. Synchronizing Connections for Ultrasonic Motion Sensor and Passive Ultrasonic Sensor Processors

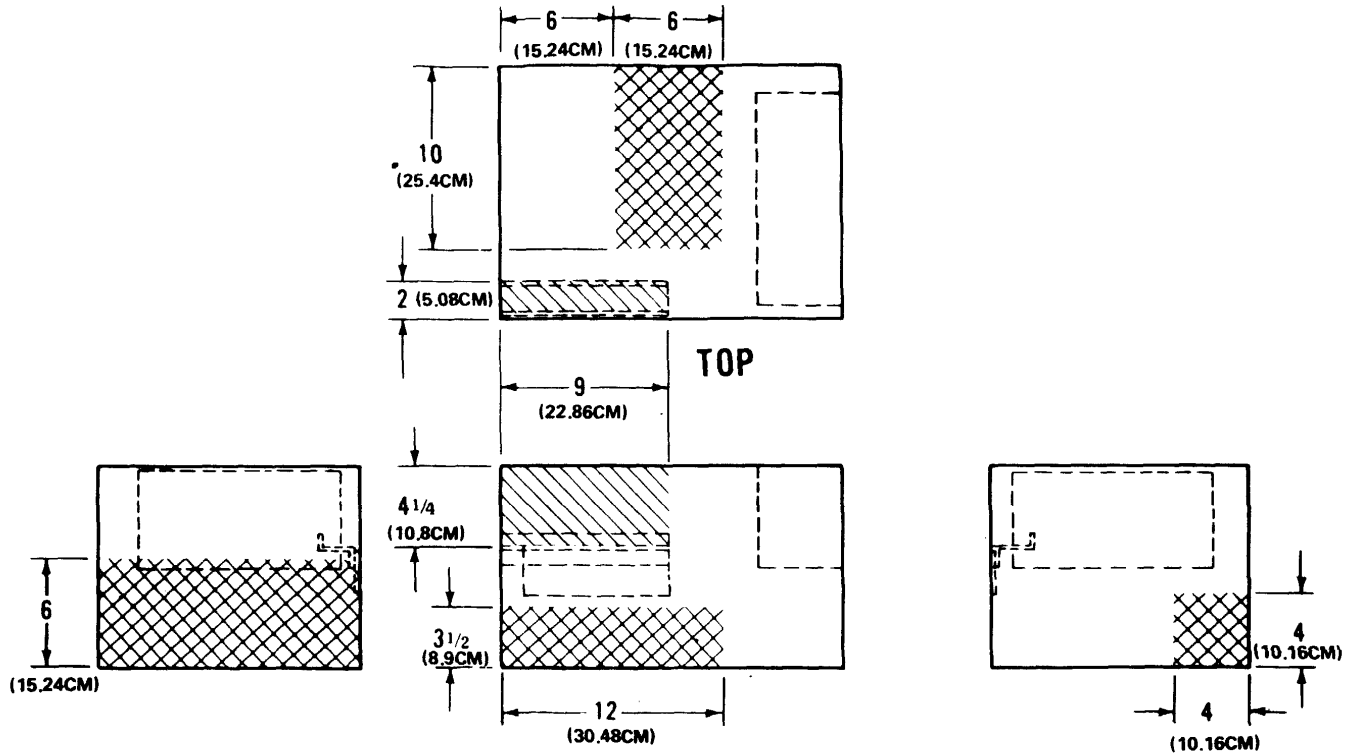


Figure 2-50. One-Zone Monitor Cabinet Conduit Entry Zones

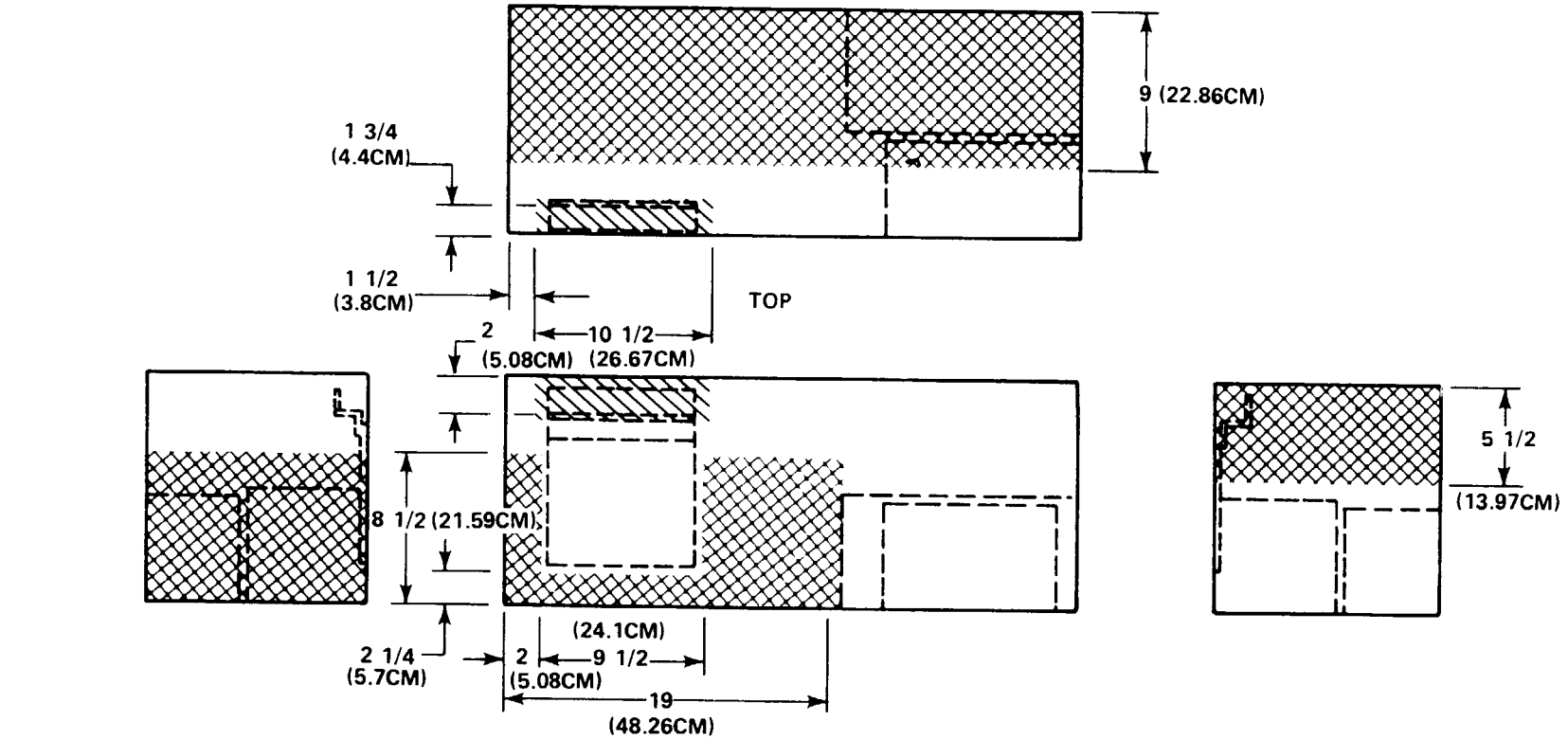


Figure 2-51. Five-Zone Monitor Cabinet Conduit Entry Zones

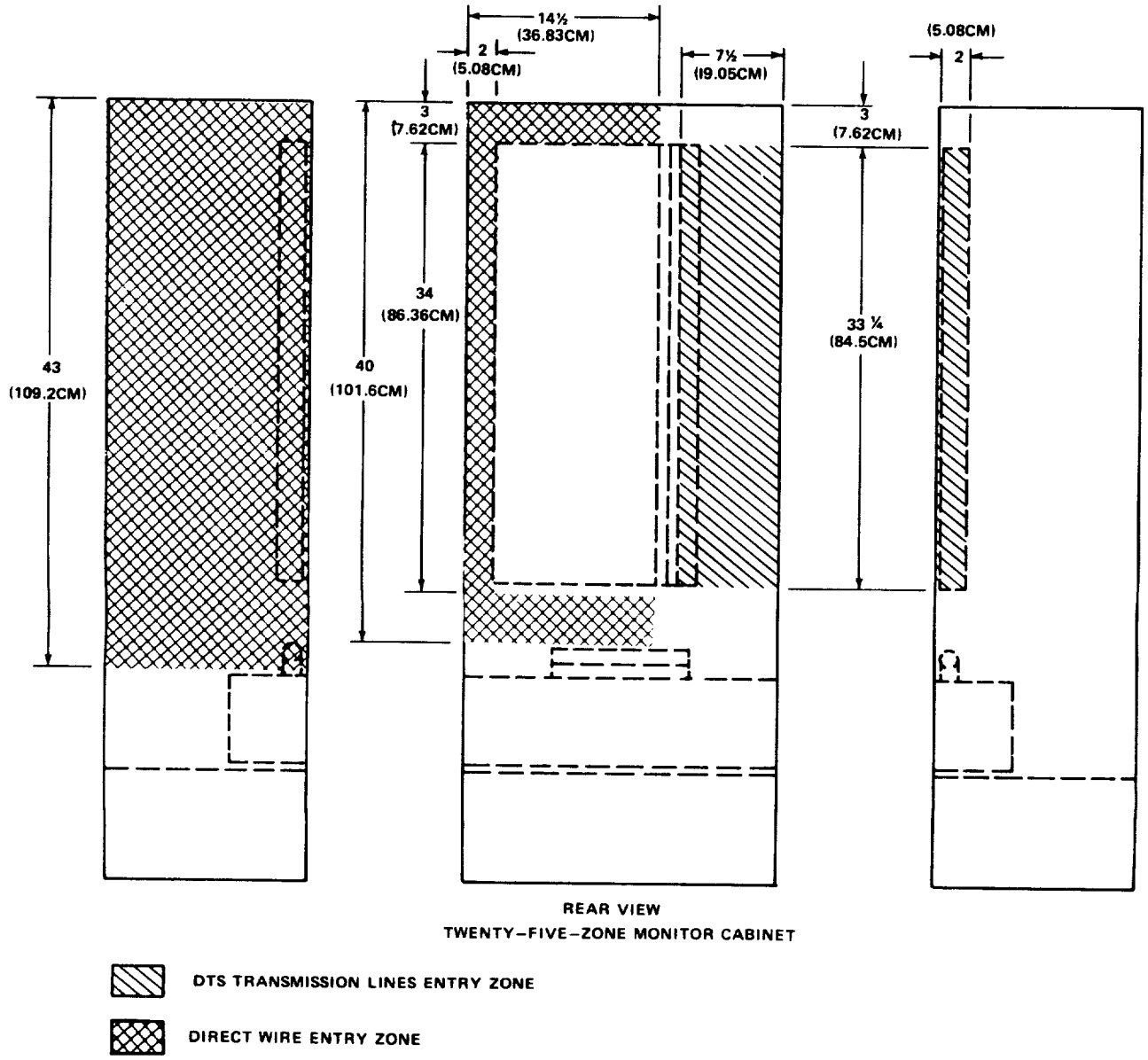


Figure 2-52. Twenty-Five-Zone Monitor Cabinet Conduit Entry Zones

(12) Unfasten and swing out the module rack.

(13) Remove the blank plate over the cutout in which the Status Monitor Module is to be installed. Retain the screws. See figure 2-53.

(14) If a Data Transmission System is to be installed, connect a Data Receiver to the Status Monitor Module.

(15) Plug the connector plug on the Status Monitor Module into the connector receptacle on the swingout rack.

(16) Secure the Status Monitor Module to the swingout rack using screws.

(17) Mark each Status Monitor Module as to the zone, area, or building being monitored. To facilitate identification, a clear plastic covered panel located near the center of the front face is provided for inserting a control zone identification tag.

(18) Remove screws from the four standoffs inside the Control Unit. Position the Data Transmitter over the standoffs, with TB1 on the bottom. Insert screws and tighten to secure.

2-20. INSTALLATION OF DATA TRANSMISSION SYSTEM.

a. General Installation Requirements. If a Data Transmission System is to be used, signal transmission between the Data Transmitter and the Data Receiver is over either a dedicated telephone line or a twisted wire pair. The telephone line is provided by the telephone company or facility signal section.

(1) If a telephone line is provided, enclose that part of the line that is within the protected area in conduit. Do the same for that part of the line that is within

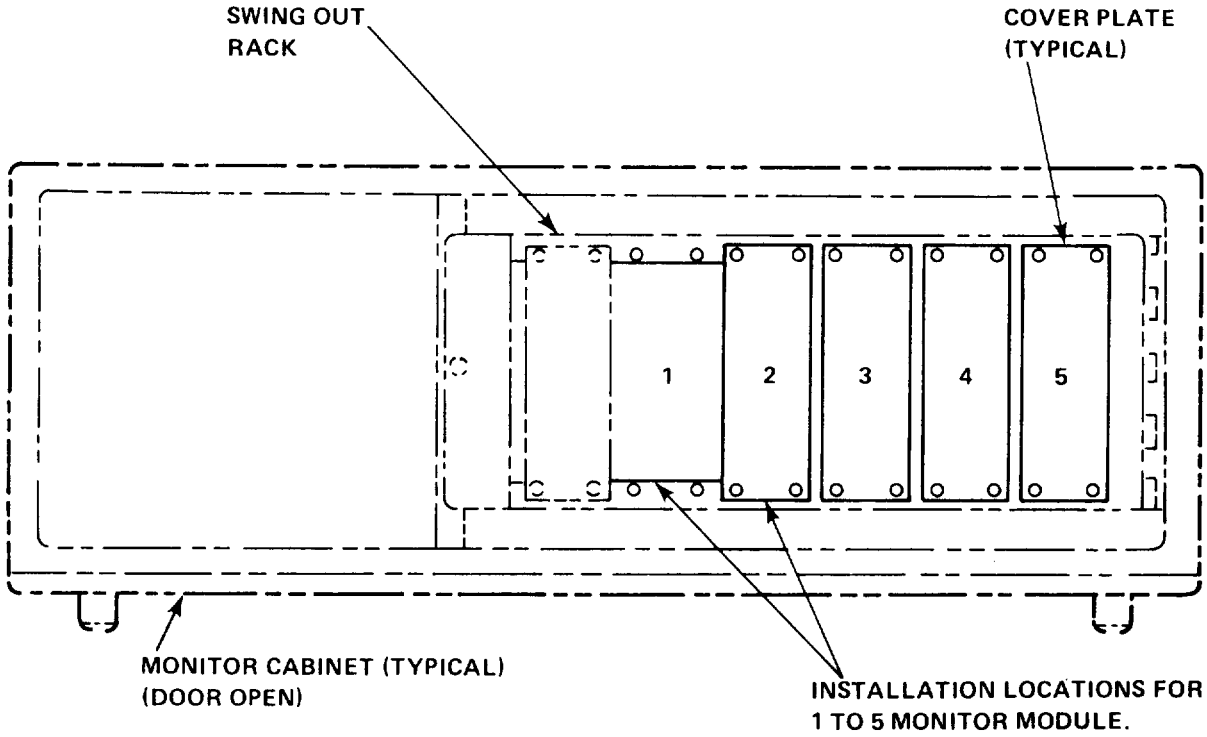


Figure 2-53. Typical Cover Plate Location

the monitoring area. Do not make electrical connections at the Control Unit or Monitor Cabinet.

(2) If the telephone line is terminated at telephone junction boxes, connect a twisted pair of conductors (no smaller than No. 22 AWG) to the junction box at each end. Install conduit between the Control Unit and the junction box inside the protected area and between the Monitor Cabinet and the junction box inside the monitoring area. Do not make electrical connections at either end at this time.

(3) If a telephone line is not to be used, install a twisted pair of conductors no smaller than No. 22 AWG between the Control Unit and the Monitor Cabinet. Do not make electrical connections at either end. That part of the twisted pair that is within the protected area and that part within the monitoring area should be encased in conduit.

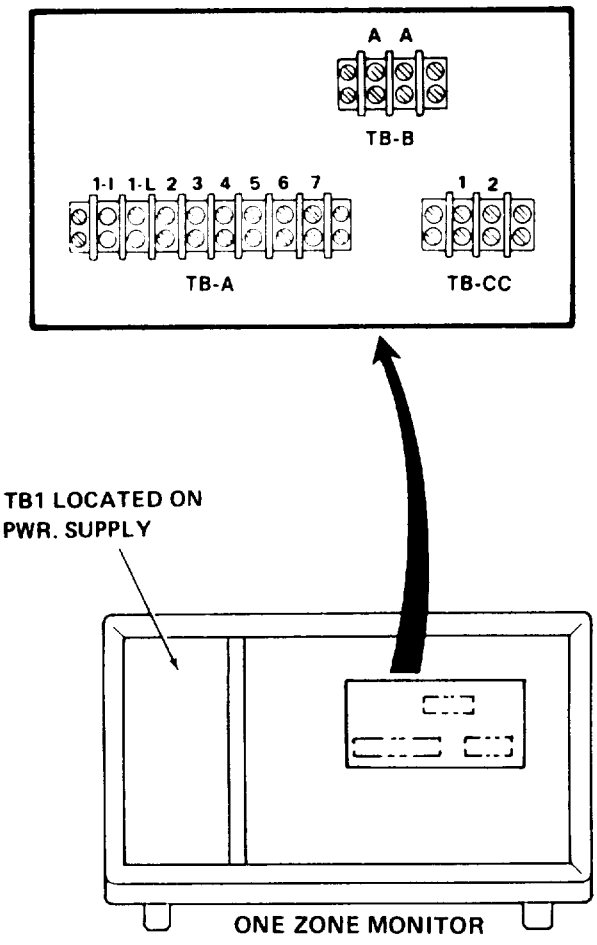
(4) If a Data Transmission System is not to be used, install five conductors no smaller than No. 22 AWG between the Control Unit and the Monitor Cabinet. Do not make electrical connections at this time. The conductors shall be completely enclosed in conduit.

b. Installation of Data Transmitter and Receiver.

(1) Connect signal transmission lines to the Monitor Cabinet terminal boards, ensuring that each protected area is mated to the proper terminal group or pair of terminals. Direct-wire connections are made at terminal group TBA on the one-zone Monitor Cabinet, terminal groups TBA through TBE on the fivezone Monitor Cabinet, and TBA through TB-BB on the twenty-five-zone Monitor Cabinet. Data transmission lines are connected at terminal group TBB on the one-zone cabinet, TBF on the fivezone cabinet, and TB-DD through TB-HH on the twenty-five-zone cabinet. The pair of terminals marked A corresponds to the upper left monitor module slot, B to the slot next to it, etc. The terminal locations on the one-zone Monitor Cabinet are shown in figure 2-54; those on the five-zone, in figure 2-55; and those on the twenty-fivezone, in figure 2-56. Consult table 2-7 for the proper wiring diagram to be followed when making electrical connections.

Table 2-7. Wiring Diagram Selection Table

Alarm option	Type of signal transmission	
	Data transmission system	Direct-wire connection
Instantaneous alarm option	Figure 2-60	Figure 2-57
Nonlatched delayed alarm option or latched delayed alarm option	Figure 2-61	Figure 2-58
Instantaneous alarm with latched delayed alarm option	Figure 2-62	Figure 2-59



TB-A WIRING DATA

TERMINAL	FUNCTION
1-I	INSTANT ALARM
1-L	LATCHED ALARM
2	SECURE/ACCESS
3	AC POWER STATUS
4	SIGNAL COMMON
5	INTERNAL WIRING
6	INTERNAL WIRING
7	NC

TB-CC WIRING DATA

TERMINAL	FUNCTION
1	CHASSIS GND
2	ALARM OUT

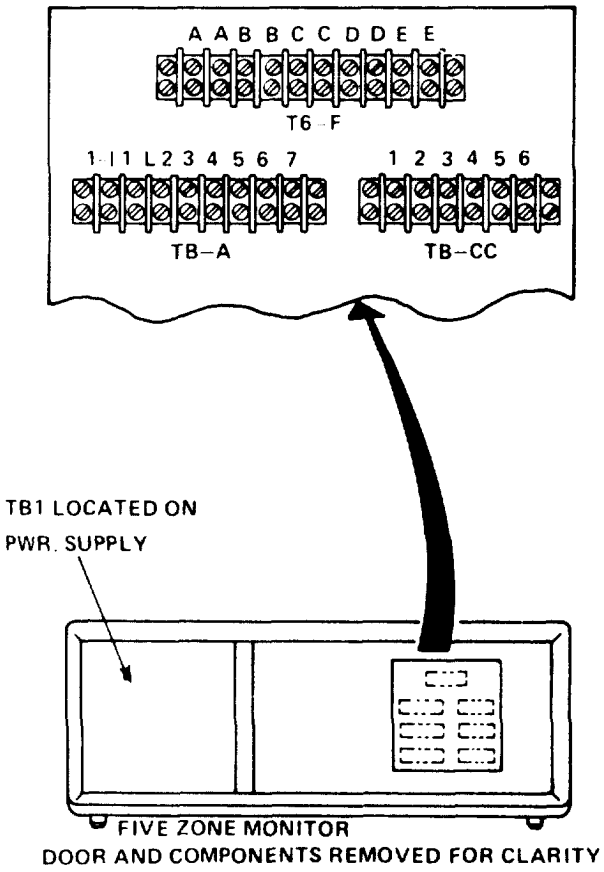
TB-1 WIRING DATA

TERMINAL	FUNCTION
1	115 VAC, PHASE
2	115 VAC, NEUTRAL
3	GND

TB-B WIRING DATA

TERMINAL	FUNCTION
A	DATA TRANSMISSION LINE
A	DATA TRANSMISSION LINE

Figure 2-54. One-Zone Monitor Cabinet Terminal Locations



TB-A WIRING DATA

TERMINAL	FUNCTION
1 I	INSTANT ALARM
1 L	LATCHED ALARM
2	SECURE/ACCESS
3	AC POWER STATUS
4	SIGNAL COMMON
5	INTERNAL WIRING
6	INTERNAL WIRING
7	NC

NOTE: TB-A TYPICAL OF TB-B THROUGH TB-E

TB-CC WIRING DATA

TERMINAL	FUNCTION
1	CHASSIS GND
2	ALARM OUT
3	ALARM OUT
4	ALARM OUT
5	ALARM OUT
6	ALARM OUT

TB-F WIRING DATA

TERMINAL	FUNCTION
A	DATA TRANSMISSION LINE
A	DATA TRANSMISSION LINE
.	
.	
.	
E	DATA TRANSMISSION LINE
E	DATA TRANSMISSION LINE

TB-1 WIRING DATA

TERMINAL	FUNCTION
1	115 VAC, PHASE
2	115 VAC, NEUTRAL
3	GND

Figure 2-55. Five-Zone Monitor Cabinet Terminal Locations

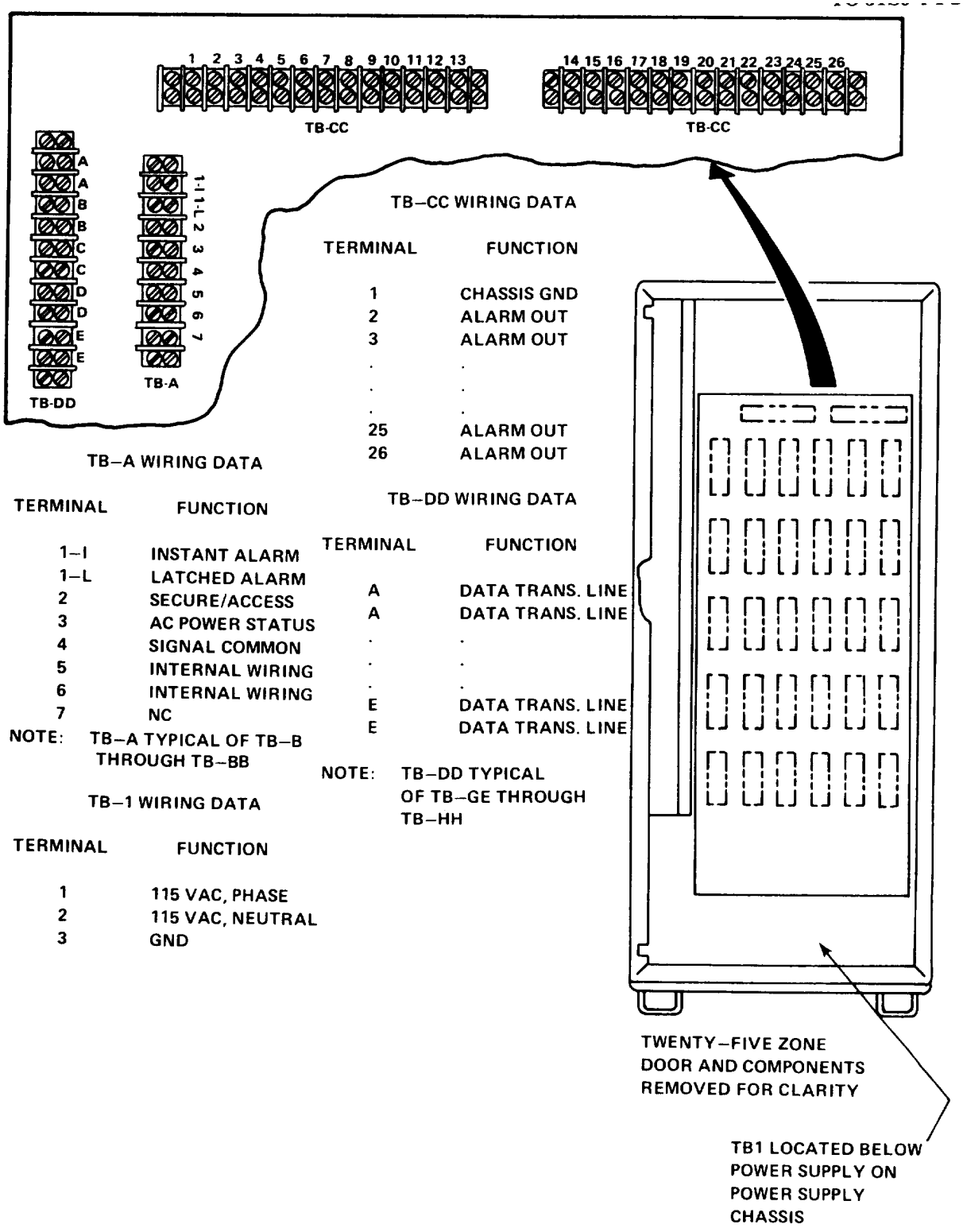


Figure 2-56. Twenty-five-zone Monitor Cabinet Terminal Locations

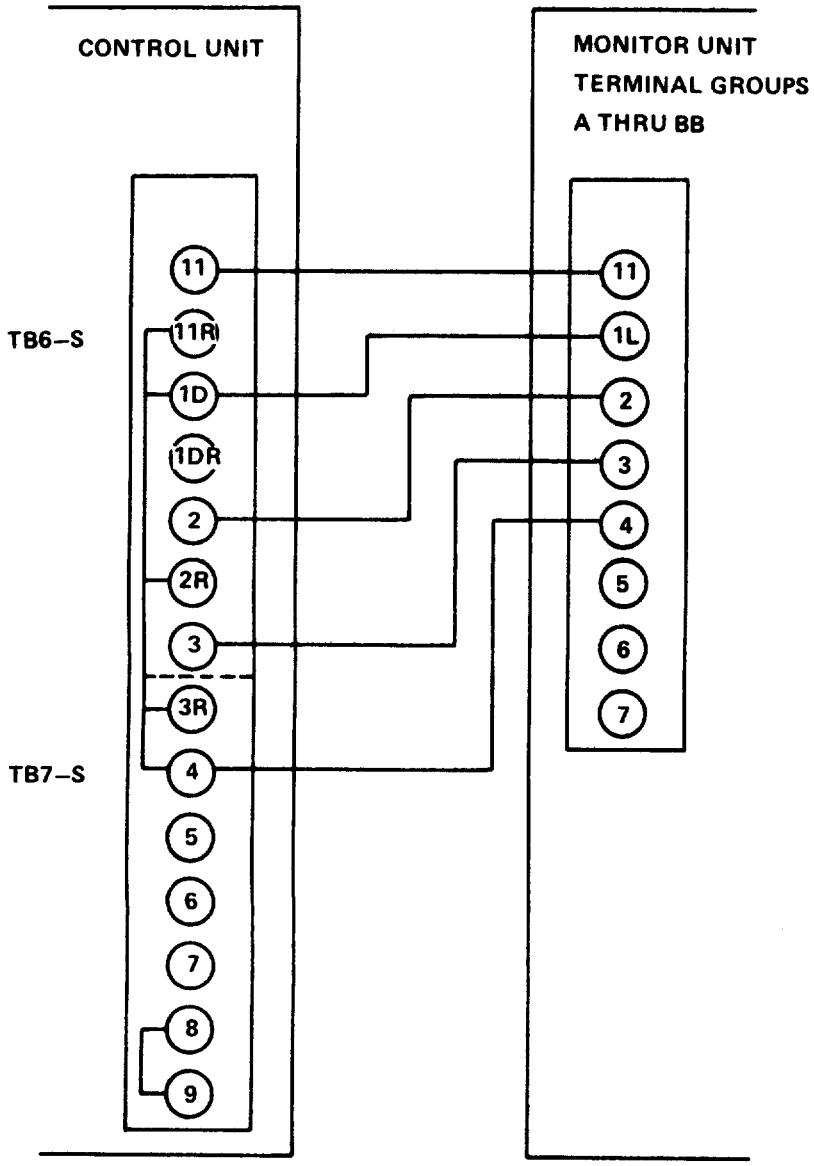


Figure 2-57. Direct-Wire Connections for Instantaneous Alarm Option

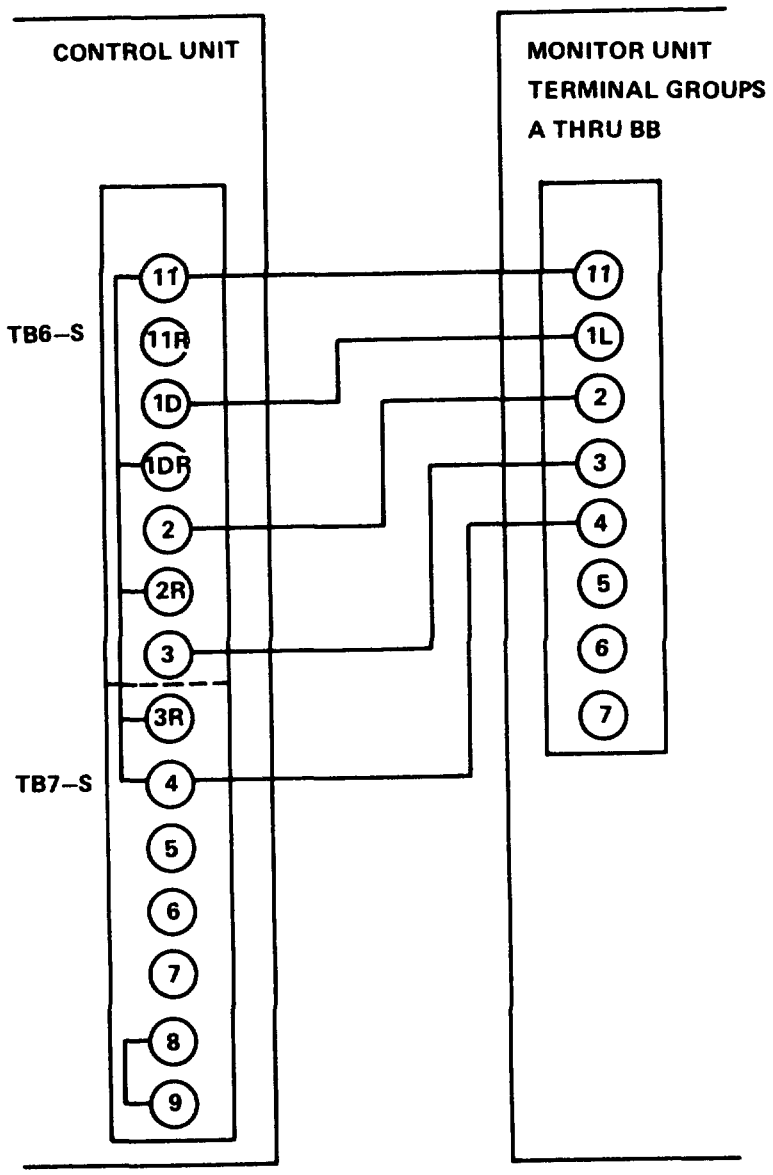


Figure 2-58. Direct-Wire Connections for Latched or Nonlatched Delayed Alarm Option

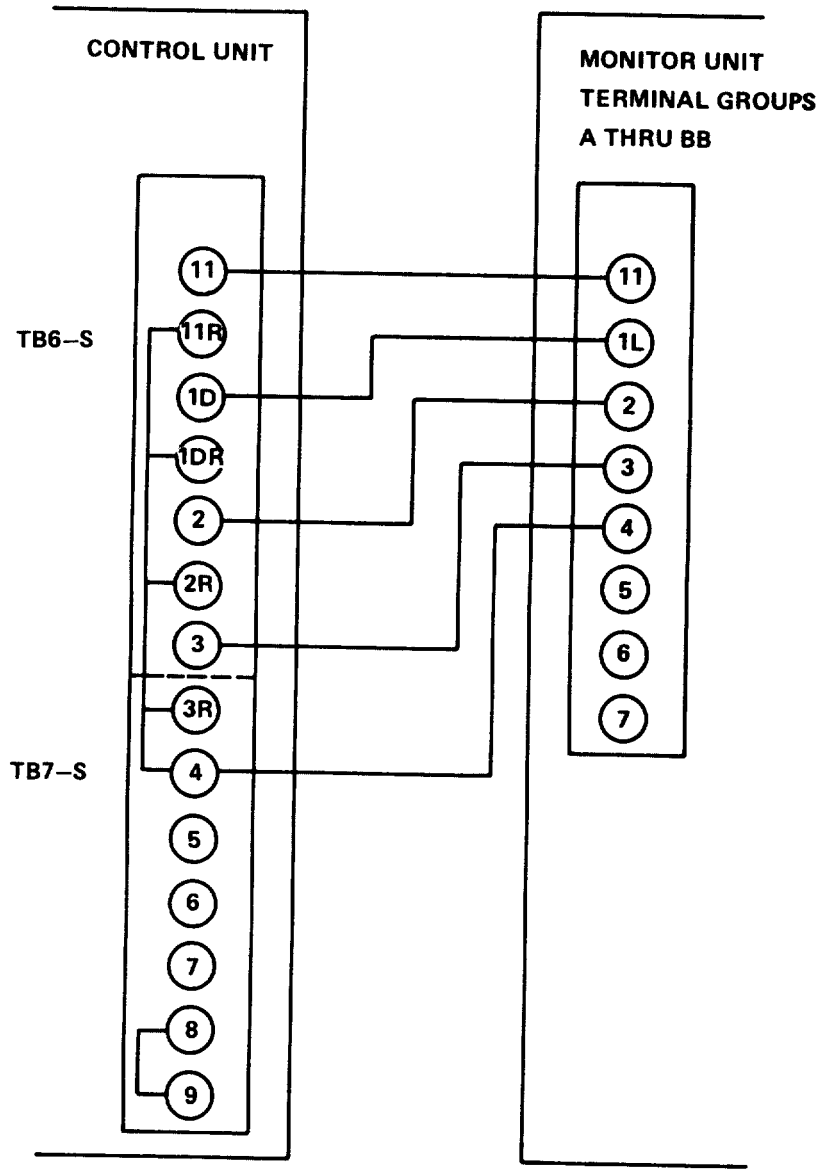


Figure 2-59. Direct-Wire Connections for Instantaneous Alarm with Latched Delayed Alarm Option

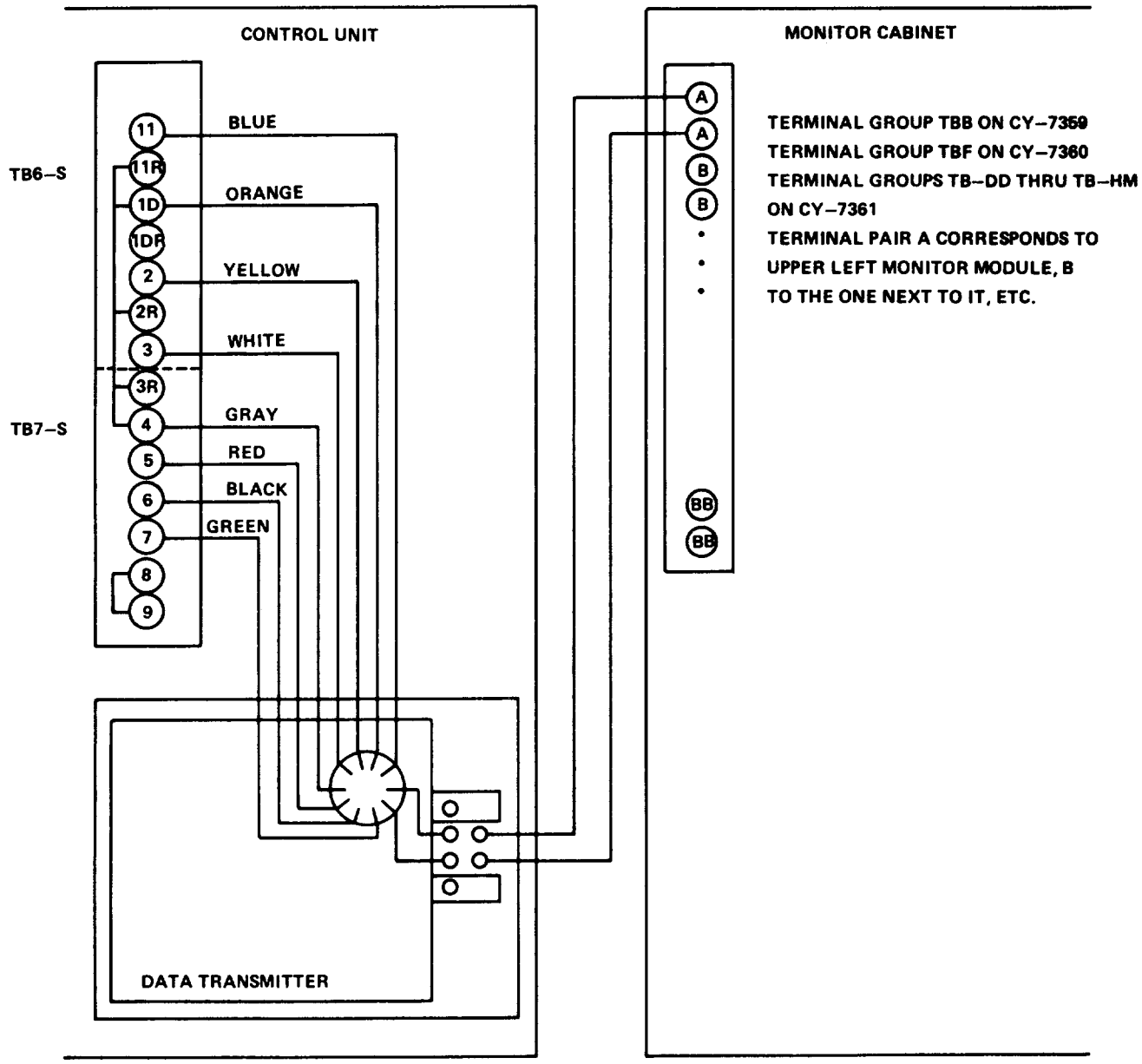


Figure 2-60. Data Transmission Connections for Instantaneous Alarm Option

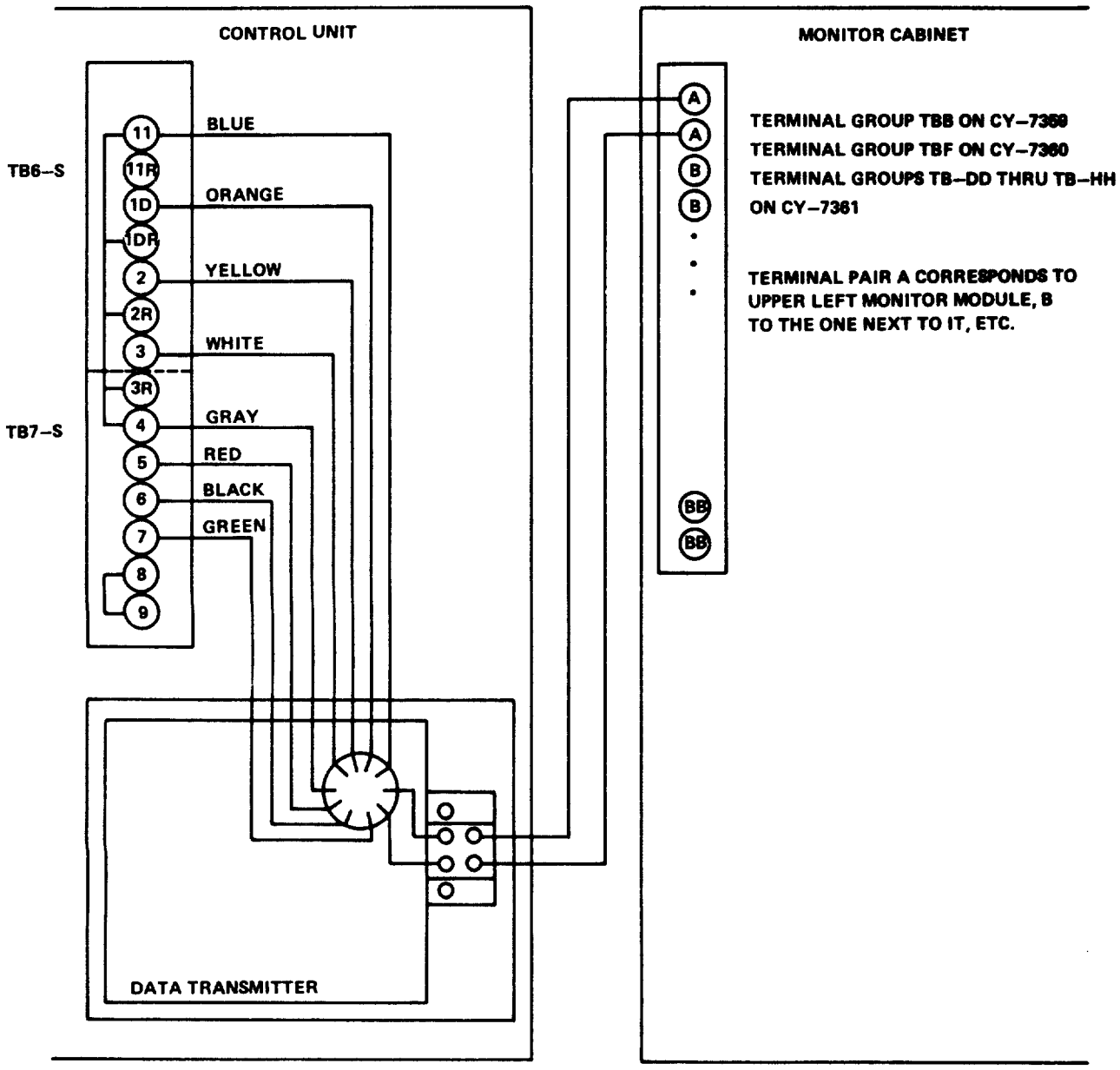


Figure 2-61. Data Transmission Connections for Latched or Nonlatched Delayed Alarm Option

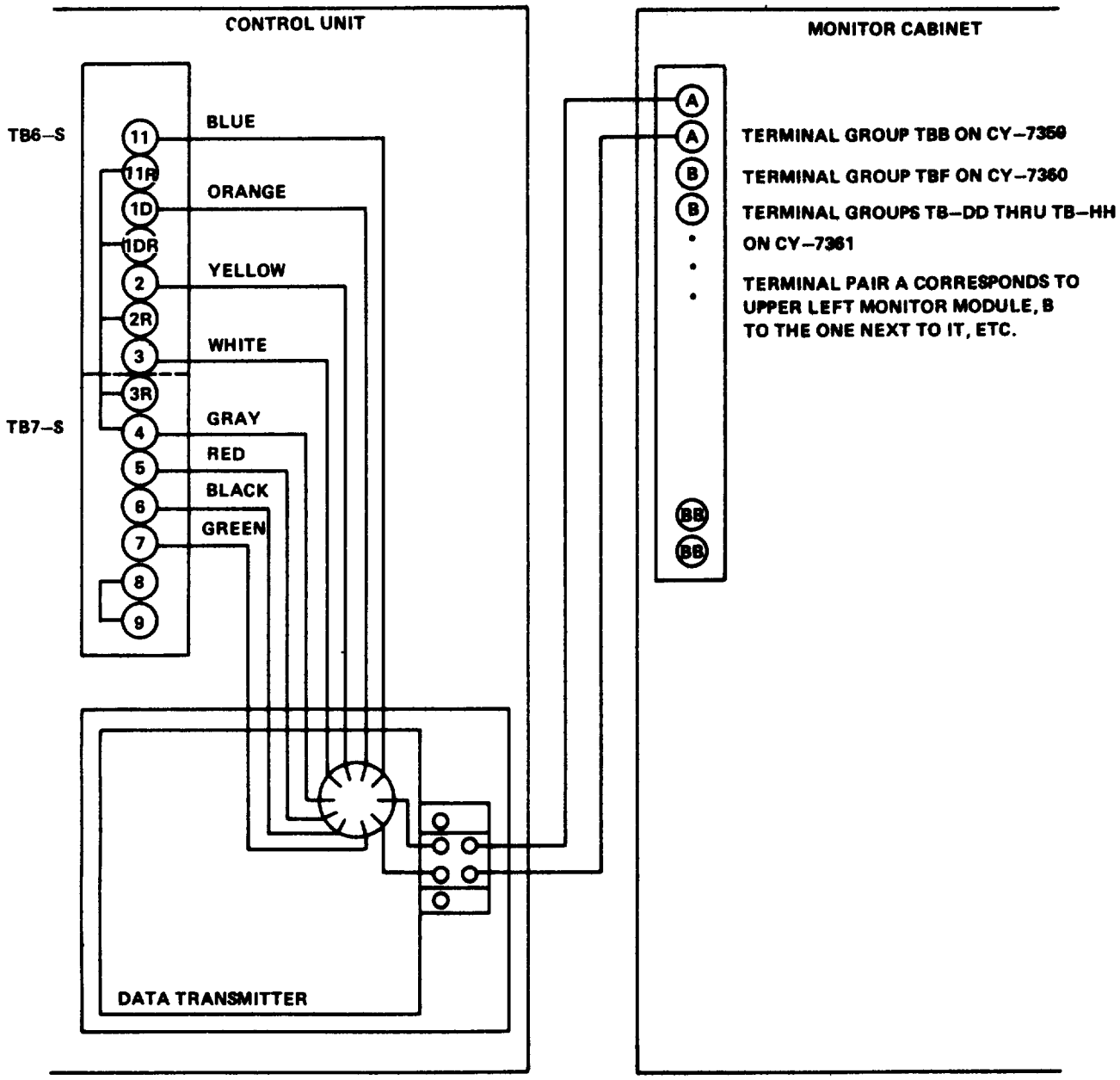


Figure 2-62. Data Transmission Connections for Instantaneous Alarm with Latched Delayed Alarm Option

(2) Connect the signal transmission line to the Monitor Cabinet terminal board in accordance with the selected wiring diagram. After all signal transmission lines have been connected to the proper terminal boards, close the monitor module rack and secure it.

(3) Connect the signal transmission lines at the Control Unit in accordance with the wiring diagram selected from table 2-7. Install jumpers as necessary.

(4) If the Data Transmitter is installed, connect the transmitter input leads to terminal boards TB6-S and TB7-S.

(5) If the Data Transmitter is not installed, connect the signal transmission lines from the Monitor Cabinet to terminal boards TB6-S and TB7-S.

c. Leased Telephone Line for Data Transmission System. If a leased telephone line is to be used for data transmission between a J-SIIDS Data Transmitter and Data Receiver, a type 3002 data channel should be used. Arrangements for this leased line should be made well in advance of the planned system installation since dedicated lines are difficult to acquire. The Data Transmitter and Data Receiver are designed to properly interface with telephone system equipment.

d. Test the Monitor Cabinet for Proper Operation.

(1) Turn mode switch on CU to ACCESS, open CU door, and pull Tamper Alarm Switch (TAS) plunger all the way out. Press TRANSMITTER RESYNC button. Turn mode switch to REST/RESET and then to SECURE. Monitor Cabinet should indicate a secure condition.

(2) If an Ultrasonic Motion Sensor (UMS) is installed near the CU, ensure that it does not cause an alarm to be activated when a secure condition is desired. Create an alarm condition by activating a nearby sensor. After expiration of the time delay period, the Monitor Cabinet should indicate an alarm condition.

(3) Remove cause of alarm and turn mode switch to TEST/RESET and then to SECURE. At the Monitor Cabinet, go to the Status Monitor Module with alarm lights flashing and move reset switch to ACK and then to RESET. Monitor Cabinet should indicate a secure condition.

(4) Turn mode switch to ACCESS. Monitor Cabinet should indicate an access condition.

(5) Remove ac power fuse F1 from CU power supply. AC POWER indicator lights on Monitor Cabinet should change from on steady to flashing and the audible signal device should sound.

(6) Move reset switch on Status Monitor Module to ACK. Indicator lights should go out and audible signal device should be silenced.

(7) Reinstall ac power fuse F1 in CU power supply. AC POWER indicator lights should flash and the audible signal device should sound.

(8) Move reset switch on Status Monitor Module to ACK. AC POWER indicator lights should change from flashing to on steady and the audible signal device should be silenced.

(9) Remove ac power fuse F2 from Monitor Cabinet power supply. Signal Module lights should change from on steady to flashing and the audible signal device should sound.

(10) Momentarily depress ACKNOWLEDGE switch. Signal Module lights should go out and the audible signal device should be silenced.

(11) Reinstall ac power fuse F2 in Monitor Cabinet power supply. Signal Module lights should flash and the audible signal device should sound.

(12) Momentarily depress ACKNOWLEDGE switch. Signal Module lights should

change from flashing to on steady and the audible signal device should be silenced.

e. Test the Data Transmission System for Proper Operation.

(1) Turn mode switch on CU to ACCESS, open CU door, and pull Tamper Alarm Switch (TAS) plunger all the way out. Turn mode switch to TEST/RESET and then to SECURE. Press TRANSMITTER RESYNC button. Monitor Cabinet should indicate a secure condition.

(2) If an Ultrasonic Motion Sensor (UMS) is installed near the CU, ensure that it does not cause an alarm to be activated when a secure condition is desired. Create an alarm condition by activating a nearby sensor. After expiration of the time delay period, the Monitor Cabinet should indicate an alarm condition.

(3) Remove cause of alarm and turn mode switch to TEST/RESET and then to SECURE. At the Monitor Cabinet, go to the Status Monitor Module with alarm lights flashing and move reset switch to ACK and then to RESET. Monitor Cabinet should indicate a secure condition.

(4) Turn mode switch to ACCESS. Monitor Cabinet should indicate an access condition.

(5) Remove ac power fuse F1 from CU power supply. AC POWER indicator lights on Monitor Cabinet should change from on steady to flashing and the audible signal device should sound.

(6) Move reset switch on Status Monitor Module to ACK. Indicator lights should go out and audible signal device should be silenced.

(7) Reinstall ac power fuse F1 in CU power supply.' AC POWER indicator lights TM 5-6350-264-14-1 NAVELEX EE181-AA-INM-020/ E121J-SIIDS INS TO 31S9-4-1-201 should flash and the audible signal device should sound.

(8) Move reset switch on Status Monitor Module to ACK. AC POWER indicator lights should change from flashing to on steady and the audible signal device should be silenced.

2-21. INSTALLATION AND TESTING OF THE LATCHING ALARM SWITCH.

a. General Installation Requirements. The Latching Alarm System (LAS) should be installed in a location that is convenient for personnel under duress and is unobserved by intruders. Do not locate it where it is likely to be accidentally activated.

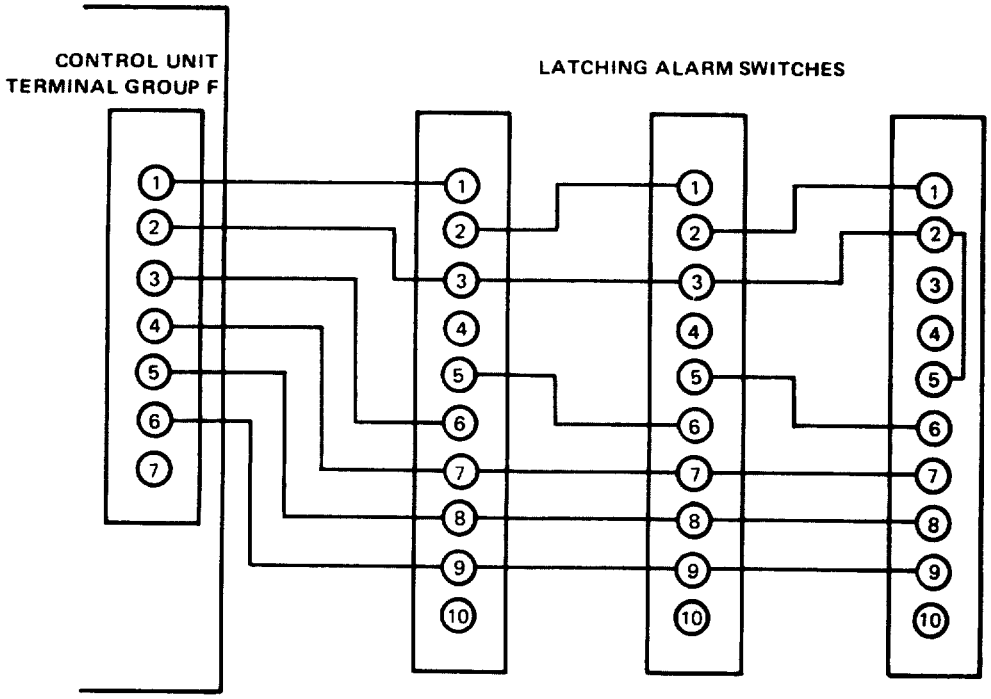
b. Installation. One conduit entry hole is provided in the switch enclosure. If more than one switch is to be installed, they must be connected in series, and a second conduit entry hole cut in each enclosure except the last one. Use the 7/8inch Greenlee chassis punch (or equivalent) to cut any additional conduit entry holes.

(1) Remove the LAS enclosure cover. Use the mounting holes in the enclosure to mark the mounting surface. Secure the switch enclosure to the mounting surface.

(2) Ensure that the CU power switch is off. Install conduit between the LAS and CU. Use the fishtape (or equivalent) to pull the wires through the conduit. Six wires no smaller than No. 22 AWG are required. Make connections as shown in figure 2-63. Install the LAS enclosure cover. If only one LAS is installed, make connections as shown in figure 2-64.

c. Test the Latching Alarm Switch for Proper Operation.

(1) Turn the CU mode switch to TEST/ RESET. Open the CU door and pull the TAS plunger all the way out. Turn on switch S1 on the power supply.



NOTE: LATCHING ALARM SWITCH MAY BE CONNECTED ONLY TO TERMINAL GROUP F. LATCHING ALARM SWITCH JUMPER IS NOT PROVIDED AND MUST BE FABRICATED.

Figure 2-63. Multiple Latching Alarm Switch Installation Connections

(2) Raise the activating lever on the LAS. The audible signal device in the CU should sound and the light-emitting diode (LED) in the LAS should come on.

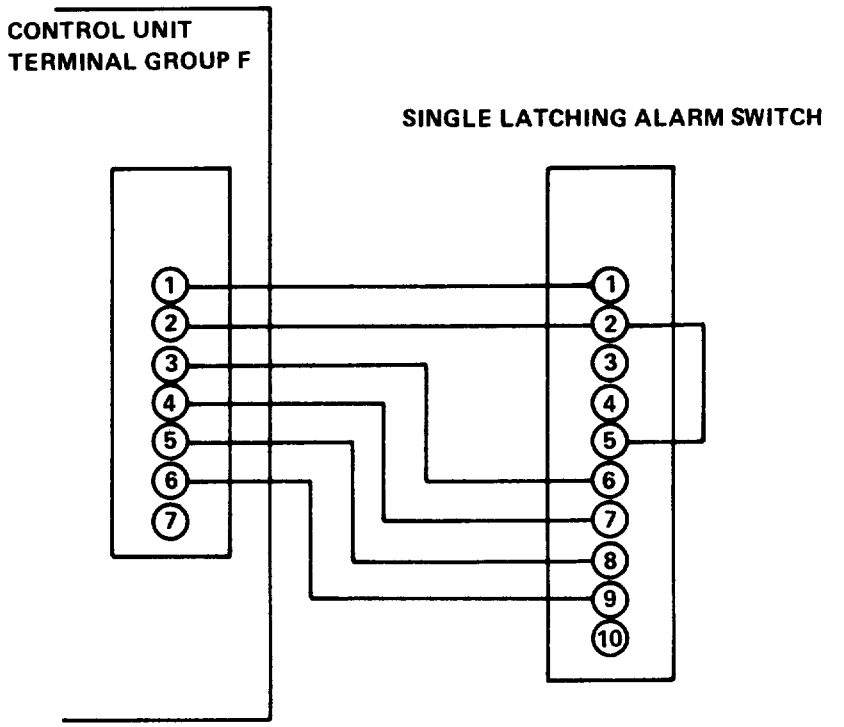
(3) To reset, remove the LAS enclosure cover and press the reset switch (red plastic button). Refer to figure 2-65 for LAS reset button location. The LED on the LAS should go out. Install the cover. The audible signal device should silence after 10 +2 seconds. Slowly raise the enclosure cover. When the cover has moved about 3/16 inch (0.476 cm), the audible signal device should sound. Install the cover and secure. The audible signal device should silence.

(4) Repeat these tests for each LAS.

(5) Turn off CU power switch.

2-22. INSTALLATION AND TESTING OF THE AUDIBLE ALARM.

a. General Installation Requirements. The Audible Alarm (AA) is installed at or near the protected area. It can be installed on almost any vertical surface that is strong enough to support its weight. Install the AA in a location that will simplify the routing of wiring and conduit. The location should be as high as possible, but it must allow



NOTE: LATCHING ALARM SWITCH MAY BE CONNECTED ONLY TO TERMINAL GROUP F. LATCHING ALARM SWITCH JUMPER IS NOT PROVIDED AND MUST BE FABRICATED.

Figure 2-64. Single Latching Alarm Switch Installation Connections

access by maintenance personnel using ladders or scaffolds. The location should not allow easy tampering or be in an area of heavy traffic where accidental damage might occur. Orient the AA in the direction that will give the desired coverage when it sounds. The AA is designated for exterior mounting, but it should be oriented to reduce the possibility of ice or snow blocking the louvers in the cover. Position the AA to take advantage of any weather protection available at its mounting location.

b. Installation of Audible Alarm.

(1) Unlock and open the AA door. Remove the screws that secure the faceplate and remove the faceplate. To separate the connector in the center of the unit, unscrew the collar on the connector about 1/2 turn, turn the metal tab 90°, and pull the plug straight out of the connector. Slide the inner enclosure out of the outer enclosure.

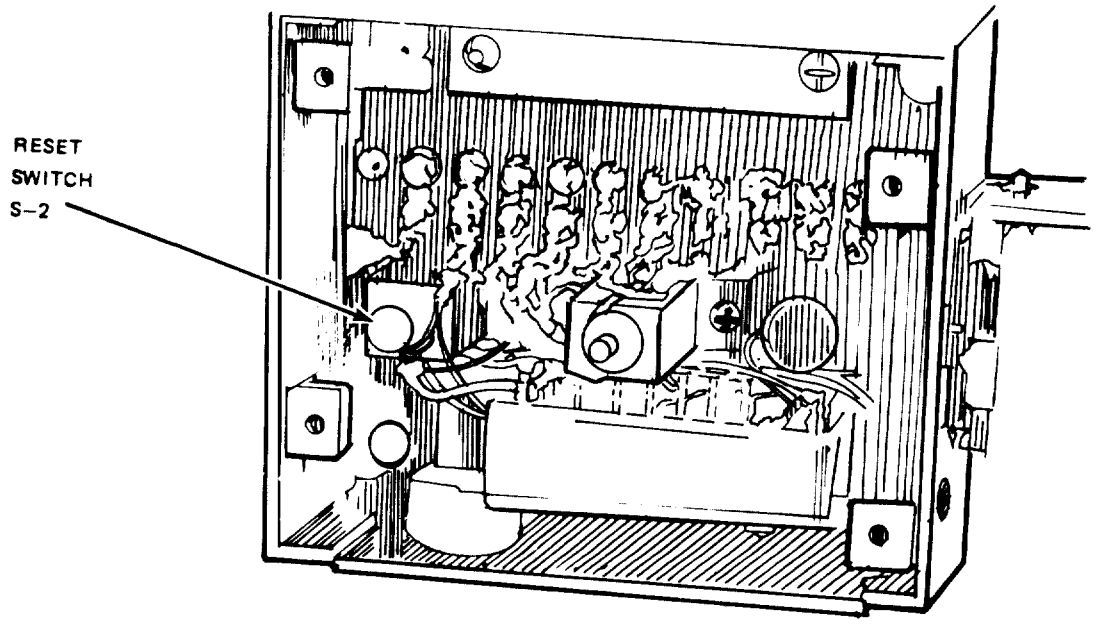


Figure 2-65. Latching Alarm Switch Reset Button

CAUTION

Be careful not to damage the pryoff alarm switch when handling or mounting the outer enclosure.

(2) If the AA is to be mounted on a wall, make a hole through the wall for the conduit. Determine the position of the conduit end and align one of the conduit Entry holes in the hack of the enclosire with the conduit. Then use the mounting holes in the back of the enclosure as a guide to mark the mounting surface. Remove the plug covering the pry-off alarm switch at the back of the enclosure. Mount the enclosure with 1/4-inch (0.635 cm) bolts.

(3) Install conduit between the AA and CU. Ensure that the conduit does not extend more than 1/2 inch (1.27 cm) inside the outer enclosure. If the conduit shorts the inner and outer enclosures together, it will cause a constant tamper alarm. Use the fishtape (or equivalent tool) to pull the wires through the conduit. Use three conductors no smaller than No. 14 AWG for ac power, and three conductors no smaller than No. 22 AWG for low voltage (dc) signals. Leave about 1 foot (30.48 cm) of wire inside the AA enclosure.

(4) Position the inner enclosure so the wires can be routed through the access port in the rear of the inner enclosure. Slide the inner enclosure into the outer enclosure. Push the plug into the connnector in the center of the AA. Turn the metal tab 90° and screw the collar down tight.

WARNING

Ensure that ac power switches in the Control Unit and Audible Alarm are off. Ear protection shall be worn in the vicinity of the Audible Alarm.

(5) Connect wiring to the CU and AA as shown in figure 2-66. Pull the AA TAS plunger all the way out. Install the battery with the positive terminal end up. Pull the CU TAS plunger all the way out. Turn the mode switch to TEST/RESET and turn on switch S1 on the CU power supply. Secure the battery holddown strap. Connect the battery leads. Turn on the AA power switch S3. Install the faceplate; close and lock the AA door.

WARNING

The Audible Alarm presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Authorized protective equipment must be worn by all personnel in the work area.

c. Test the Audible Alarm for Proper Operation.

(1) Turn the mode switch to SECURE and activate one of the sensors. After expiration of the time delay, the AA should sound.

(2) Turn the mode switch to TEST/RESET. The AA should be silenced.

(3) Turn mode switch to ACCESS. Slowly open the AA enclosure door. When the door has moved 1/8 to 1/4 inch (0.3175 to 0.635 cm), the AA should sound.

(4) Pull the AA TAS plunger all the way out and turn the mode switch to TEST/ RESET. The AA should be silenced.

(5) Turn mode switch to ACCESS. Short the inner and outer enclosures together. The AA should sound. Remove the short and turn the mode switch to TEST/RESET. The AA should be silenced.

(6) Turn mode switch to ACCESS. Close and lock the AA enclosure door. The AA should sound. Turn the mode switch to TEST/RESET. The AA should be silenced.

(7) The system is now ready to be placed in operation.

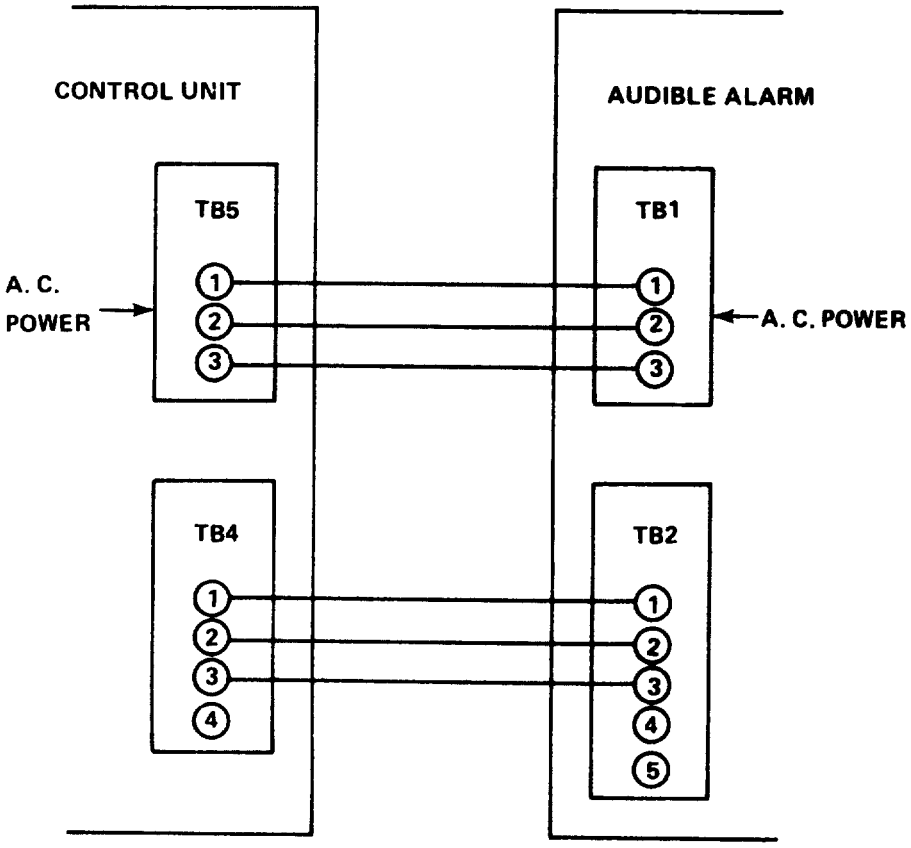


Figure 2-66. Audible Alarm Installation Connections

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. CONTROLS AND INDICATORS

3-1. CONTROLS AND INDICATORS. Operator controls for the J-SIID System are located on the Control Unit, Monitor Cabinet, and Status Monitor Modules. A list of controls and indicators and the function of each is provided in tables 3-1 and 3-2. Figures 3-1, 3-2, and 3-3 show each of the controls and indicators.

NOTE

These tables cover only items used by the operator; items used by higher level maintenance personnel are covered in instructions for the appropriate maintenance level.

Table 3-1. Controls and Indicators (Control Unit)

Control or indicator	Function
1. Mode switch (3-position, key-operated switch; key removable only in the SECURE position)	Selects mode of system operation. (1) ACCESS — Selected when authorized personnel are working in area. Inhibits intrusion alarms from Monitor Modules and Audible Alarm. Tamper and duress alarms are presented to Monitor Modules. (2) SECURE — Selected when area is secure. Presents tamper and intrusion alarms to AA and MM. Presents duress to MM only. (3) TEST/RESET — Selected when performing system test or resetting latched alarms. Inhibits alarms from Audible Alarm. Presents alarms to Monitor Modules and an audible signal device in the Control Unit.
2. AC POWER indicator light	When lit, indicates ac power is being supplied to Control Unit.

Table 3-2. Controls and Indicators (Signal Module and Status Monitor Modules)

Control or indicator	Function
1. MONITOR AC POWER indicator lights (Signal Module)	When one or both are lit, indicates ac power is being supplied to Monitor Cabinet. When flashing, indicates ac power has failed or has been restored, depending upon condition of equipment when LAMP TEST/ACKNOWLEDGE is momentarily placed in ACKNOWLEDGE position.
2. LAMP TEST/ACKNOWLEDGE switch (Signal Module)	(1) LAMP TEST position tests MONITOR AC POWER indicator lights. (2) ACKNOWLEDGE position resets MONITOR AC POWER indicator lights from flashing state to steady state (on or off) depending on status of ac power to Monitor Cabinet. Also silences audible signal device in Signal Module when activated by ac state change.
3. AC POWER indicator lights (Status Monitor Module)	When one or both are lit, indicates ac power is being supplied to associated protected area Control Unit. When flashing, indicates ac power to associated protected area Control Unit has failed or has been restored, depending upon condition of equipment when RESET/ACK switch (Status Monitor Module) is momentarily placed in the ACK position.
4. ACCESS indicator lights (Status Monitor Module)	When one or both are lit, indicates associated protected area Control Unit is in ACCESS mode of operation. When flashing, indicates associated protected area Control Unit has been switched into ACCESS mode of operation. Momentarily placing the RESET/ACK switch in ACK position will cause SECURE indicator lights to go out and ACCESS indicator lights to light.
5. SECURE indicator lights (Status Monitor Module)	When one or both are lit, indicates associated protected area Control Unit is in the SECURE mode of operation. When flashing, indicates protected area Control Unit has been switched into the SECURE mode of operation. Momentarily placing the RESET/ACK switch in the ACK position will cause ACCESS indicator lights to go out and SECURE indicator lights to light.

Table 3-2. Controls and Indicators (Signal Module and Status Monitor Modules)-Continued

Control or indicator	Function
6. ALARM indicator lights (Status Monitor Module)	When flashing; indicates an intrusion, duress, or tamper alarm from the associated protected area or loss of transmission line. Momentarily placing the RESET/ ACK switch on the Status Monitor Module in the ACK position will cause the ALARM lights to light. If there is no alarm, the ALARM indicator lights can be extinguished by momentarily placing the RESET/ ACK switch in the RESET position.
7. RESET/ACK switch (Status Monitor Module)	(1) ACK position silences audible signal device in Signal Module and causes flashing lights on Status Monitor Module to reset to steady state. (2) RESET position extinguishes ALARM indicator lights on Status Monitor Module when alarm input to module has ceased.
8. LAMP TEST switch (Status Monitor Module)	Tests all indicator lights on Status Monitor Module.

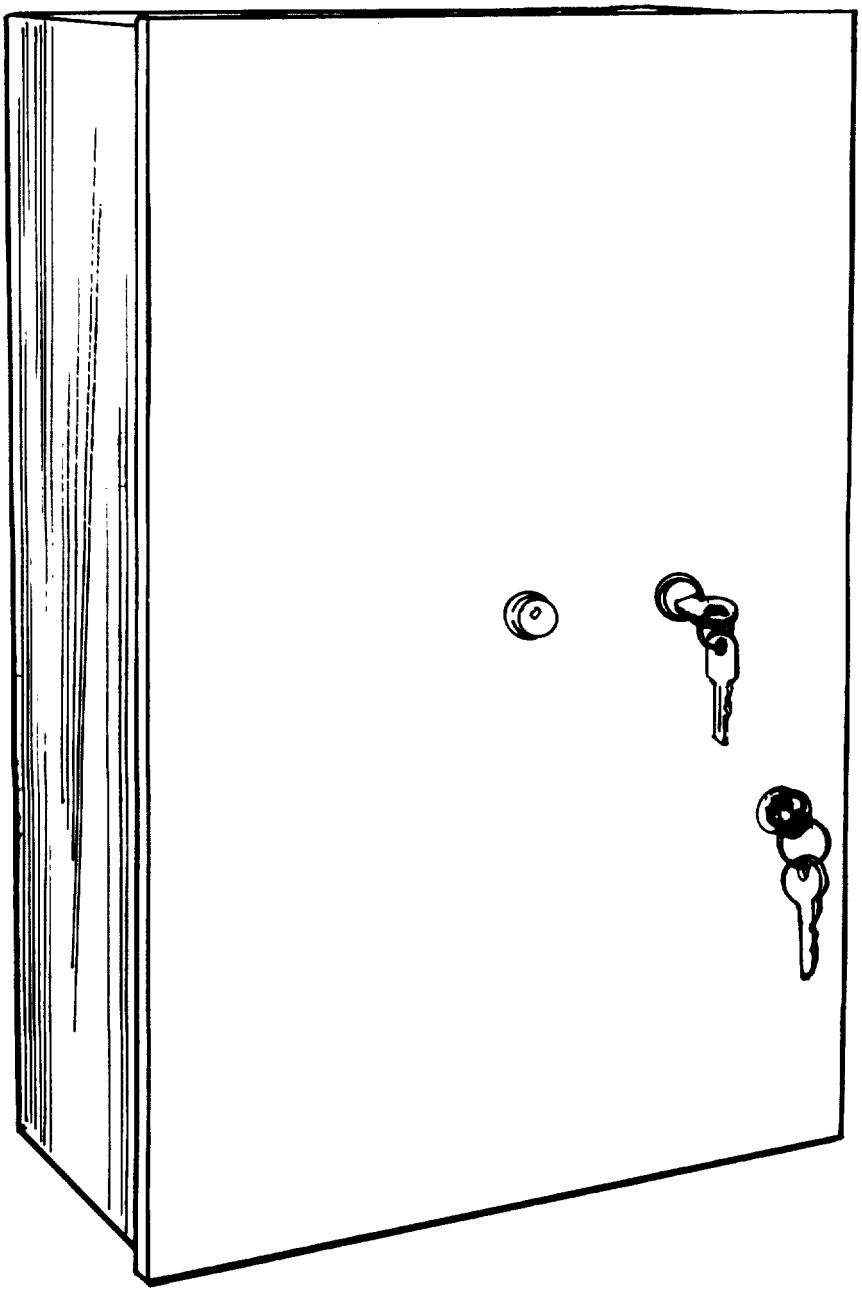


Figure 3-1. Control Unit Controls and Indicators

Figure 3-2. Monitor Cabinet (Signal Module) Controls and Indicators

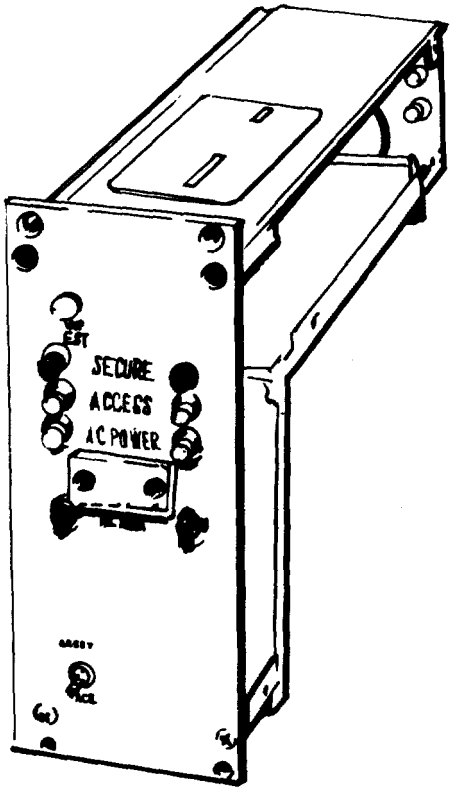


Figure 3-3. Status Monitor Module Controls and Indicators

Section II. OPERATING PROCEDURES

3-2. SYSTEM OPERATING PROCEDURE. The JSIID System normally requires two operators; one at the Control Unit and one at the Monitor Cabinet. If an Audible Alarm is used without a Monitor Cabinet, an operator is required only at the Control Unit. The Control Unit operator should secure the protected area at the end of normal working hours. Selection of proper operating procedures should be made in accordance with table 3-3. Tables 3-4 through 3-9 provide operating procedures for the Control Unit and Monitor Cabinet/Status Monitor Module. Certain items have been left blank in these tables and should be filled in Ly those responsible for the security of the protected area or maintenance of the System.

Table 3-3. Guide for Selection of Proper Control Unit and Monitor Cabinet/Status Monitor Module Operating Procedures

Alarm display option used				Status monitor module used		Audible alarm used		Proper control unit operating procedure	Proper monitor cabinet and status monitor module operating procedure
suoenatnatsnl	dehctal-noN	deyaledd ehctaL	htiw suoenatnaL yaled dehctaL	seY	oN	seY	oN		
x				x			x	C-1 (Table 3-4)	M-1 (Table 3-6)
x				x		x		C-1 (Table 3-4)	M-2 (Table 3-7)
	x			x			x	C-1 (Table 3-4)	M-3 (Table 3-8)
		x		x		x		C-1 (Table 3-4)	M-4 (Table 3-9)
		x		x			x	C-1 (Table .3-4)	M-4 (Table 3-9)
			x	x		x		C-1 (Table 3-4)	M-2 (Table 3-7)
			x	x			x	C-1 (Table 3-4)	M-2 (Table 3-7)
					x	x		C-2 (Table 3-5)	

Table 3-4. Control Unit Operating Procedure C-1

Item	Operating procedures
1. Opening Protected Area	a. Inform personnel at Monitor Cabinet that you are preparing to open protected area. b. Unlock main entrance door, proceed promptly to Control Unit, insert mode switch key and turn to ACCESS position. c. Verify with personnel at Monitor Cabinet that alarm was transmitted when room was entered and that system is now in ACCESS mode.
2. Securing Protected Area	a. Ensure that all personnel have left protected area. b. Shut all doors and windows in protected area. c. Inform personnel at Monitor Cabinet that you are preparing to secure room. d. Secure all windows and doors except main entrance door. e. Verify Control Unit AC POWER indicator light is on. f. Turn mode switch to SECURE. g. Promptly remove mode switch key, leave protected area through main entrance door and secure main entrance door. h. Verify with personnel at Monitor Cabinet that change from ACCESS to SECURE was received.

(1) Telephone extension for Monitor Cabinet personnel is_____

(2) Abnormal conditions shall be reported to the following personnel:_____

_____, telephone_____

_____, telephone_____

Table 3-5. Control Unit Operating Procedure C-2

Item	Operating procedures
1. Opening Protected Area Unit, insert mode switch key and turn to ACCESS position.	Unlock main entrance door, proceed promptly to Control
2. Securing Protected Area	a. Ensure all personnel have left protected area. b. Shut all doors and windows in protected area. c. Secure all windows and doors except main entrance door. d. Verify Control Unit AC POWER indicator light is on. e. Turn mode switch to SECURE. f. Promptly remove mode switch key, leave protected area through main entrance door and secure main entrance door.

(1) Abnormal conditions shall be reported to the following personnel:

_____ , telephone _____

_____ , telephone _____

Table 3-6. Monitor Cabinet and Status Monitor Module Operating Procedure M-1

NOTE

When assuming responsibility for attending the Monitor Cabinet(s); ensure that all ALARM (red) lights are extinguished, that all AC POWER (white) lights are on, and that proper operating mode (ACCESS or SECURE) is indicated on all Status Monitor Modules. Also verify that all indicator bulbs are operable by momentarily placing each lamp test switch in the LAMP TEST position. If lights are burned out, request responsible maintenance personnel to replace bulbs at earliest opportunity.

Indication	Operator response
1. ALARM indicator lights (red) flashing and audible tone sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If alarm is not generated during a time of prearranged opening or securing of protected area or system test, direct security personnel to indicated protected area (NOTE 1). c. After security personnel have investigated cause of alarm, momentarily place RESET/ACK switch in RESET position to extinguish ALARM indicator lights.
2. MONITOR AC POWER indicator	a. Momentarily place LAMP TEST/ACKNOWLEDGE switch on Monitor Cabinet Signal Module in ACKNOWLEDGE position. b. If lights extinguish, inform designated personnel that ac power to Monitor Cabinet has just been lost (NOTE 2) (NOTE 3). c. If lights stay on steady state, ac power has been restored to Monitor Cabinet.
3. ACCESS indicator lights (amber) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If change to ACCESS is not part of a prearranged opening of protected area, direct security personnel to indicated protected area.

Table 3-6. Monitor Cabinet and Status Monitor Module Operating Procedure M-1-Continued

Indication	Operating response
4. SECURE indicator lights (green) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If change to SECURE is not part of a prearranged securing of protected area, direct security personnel to indicated protected area to ensure that area is physically secure.
5. AC POWER indicator lights (white) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If lights extinguish, inform designated personnel that ac power to associated protected area has just been lost (NOTE 2) (NOTE 4). c. If lights stay on steady state, ac power has been restored to Control Unit.

NOTE 1

If alarm occurs when SECURE lights (green) are on, a high probability exists that an intrusion is in progress. If alarm occurs when ACCESS (amber) lights are on, a high probability exists that personnel are tampering with the system in the protected area or that personnel in the protected area are in danger. Security personnel responding to the alarm should be provided with this information if possible.

NOTE 2

Abnormal conditions shall be reported to the following personnel:

_____ , telephone _____

_____ , telephone _____

NOTE 3

At normal operating temperatures [60°F to 100°F (15.6°C to 37.8°C)], Monitor Cabinet battery will supply power for at least the following times:

One-zone, 24 hours.
Five-zone, 20 hours.
Twenty-five-zone, 12 hours.

Table 3-6. Monitor Cabinet and Status Monitor Module Operating Procedure M-1-Continued

NOTE 3-Continued

Lower operating temperatures will provide less battery power and shortened Monitor Cabinet operating time. If ac power is not anticipated to be restored within these times, arrangements should be made to station guards at the associated protected area(s).

NOTE 4

Ac power failure at protected area may be an indication of attempted intrusion. Personnel investigating power failure should proceed with caution. At normal operating temperature [60°F to 100°F (15.6°C to 37.8°C)], Control Unit battery will supply power for at least 24 hours. If battery power is exhausted prior to restoration of ac power, an alarm will be transmitted.

Table 3-7. Monitor Cabinet and Status Monitor Module Operating Procedure M-2

NOTE

When assuming responsibility for attending the Monitor Cabinet(s); ensure that all ALARM (red) lights are extinguished, that all AC POWER (white) lights are on, and that proper operating mode (ACCESS or SECURE) is indicated on all Status Monitor Modules. Also verify that all indicator bulbs are operable by momentarily placing each lamp test switch in the LAMP TEST position. If lights are burned out, request responsible maintenance personnel to replace bulbs at earliest opportunity.

Indication	Operator response
1. ALARM indicator lights (red) flashing and audible tone signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If alarm is not generated during a time of prearranged opening or securing of protected area or system test, direct security personnel to indicated protected area (NOTE 1) (NOTE 5). c. After security personnel have investigated cause of alarm and reset the Control Unit, momentarily place RESET/ACK switch in RESET position to extinguish ALARM indicator lights.

Table 3-7. Monitor Cabinet and Status Monitor Module Operating Procedure M-2-Continued

Indication	Operator response
2. MONITOR AC POWER indicator lights (white) flashing and audible signal device sounding.	a. Momentarily place LAMP TEST/ACKNOWLEDGE switch on Monitor Cabinet Signal Module in ACKNOWLEDGE position. b. If lights extinguish, inform designated personnel that ac power to Monitor Cabinet has just been lost (NOTE 2) (NOTE 3). c. If lights stay on steady state, ac power has been restored to Monitor cabinet.
3. ACCESS indicator lights (amber) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If change to ACCESS is not part of prearranged opening of protected area, direct security personnel to indicated protected area.
4. SECURE indicator lights (green) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If change to SECURE is not part of a prearranged securing of protected area, direct security personnel to indicated protected area to ensure that area is physically secure.
5. AC POWER indicator lights (white) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If lights extinguish, inform designated personnel that ac power to associated protected area has just been lost (NOTE 2) (NOTE 4). c. If lights stay on steady state, ac power has been restored to Control Unit.

NOTE 1

If alarm occurs when SECURE lights (green) are on, a high probability exists that an intrusion is in progress. If alarm occurs when ACCESS (amber) lights are on, a high probability exists that personnel are tampering with the system in the protected area or that personnel in the protected area are in danger. Security personnel responding to the alarm should be provided with this information if possible.

Table 3-7. Monitor Cabinet and Status Monitor Module Operating Procedure M-2-Continued

NOTE 2

Abnormal conditions shall be reported to the following personnel:

_____ , telephone _____

_____ , telephone _____

NOTE 3

At normal operating temperatures [600F to 100°F (15.6°C to 37.8° C)], Monitor Cabinet battery will apply power for at least the following times:

One-zone, 24 hours.
Five-zone, 20 hours.
Twenty-five-zone, 12 hours.

Lower operating temperatures will provide less battery power and shortened Monitor Cabinet operating time. If ac power is not anticipated to be restored within these times, arrangements should be made to station guards at the associated protected area(s).

NOTE 4

Ac power failure at protected area may be an indication of attempted intrusion. Personnel investigating power failure should proceed with caution. At normal operating temperatures [60°F to 100°F (15.6°C to 37.8°C)], Control Unit battery will supply power for at least 24 hours. If battery power is exhausted prior to restoration of ac power, an alarm will be transmitted.

NOTE 5

Inform the following personnel that protected area must be opened and associated Control Unit mode switch key must be taken to protected area to reset the Control Unit:

_____ , telephone _____

_____ , telephone _____

Table 3-8. Monitor Cabinet and Status Monitor Module Operating Procedure M-3

NOTE

When assuming responsibility for attending the Monitor Cabinet(s); ensure that all ALARM (red) lights are extinguished, that all AC POWER (white) lights are on, and that proper operating mode (ACCESS or SECURE) is indicated on all Status Monitor Modules. Also verify that all indicator bulbs are operable by momentarily placing each lamp test switch in the LAMP TEST position. If lights are burned out, request responsible maintenance personnel to replace bulbs at earliest opportunity.

Indication	Operator response
1. ALARM indicator lights (red) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If alarm is not generated during a time of prearranged opening or securing of protected area or system test, direct security personnel to indicated protected area (NOTE 1) (NOTE 5). c. After security personnel have investigated cause of alarm and reset the Control Unit, momentarily place RESET/ACK switch in RESET position to extinguish ALARM indicator lights.
2. MONITOR AC POWER indicator lights (white) flashing and audible signal device sounding.	a. Momentarily place LAMP TEST/ACKNOWLEDGE switch on Monitor Cabinet Signal Module in ACKNOWLEDGE position. b. If lights extinguish, inform designated personnel that ac power to Monitor Cabinet has just been lost (NOTE 2) (NOTE 3). c. If lights stay on steady state, ac power has been restored to Monitor Cabinet.
3. ACCESS indicator lights (amber) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If change to ACCESS is not part of prearranged opening of protected area, direct security personnel to indicated protected area.

Table 3-8. Monitor Cabinet and Status Monitor Module Operating Procedure M-3-Continued

Indication	Operator response
4. SECURE indicator lights (green) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If change to SECURE is not part of a prearranged securing of protected area, direct security personnel to indicated protected area to ensure that area is physically secure.
5. AC POWER indicator lights (white) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If lights extinguish, inform designated personnel that ac power to associated protected area has just been lost (NOTE 2) (NOTE 4). c. If lights stay on steady state, ac power has been restored to Control Unit.

NOTE 1

If alarm occurs when SECURE lights (green) are on, a high probability exists that an intrusion is in progress. If alarm occurs when ACCESS (amber) lights are on, a high probability exists that personnel are tampering with the system in the protected area or that personnel in the protected area are in danger. Security personnel responding to the alarm should be provided with this information if possible.

NOTE 2

Abnormal conditions shall be reported to the following personnel:

_____ , telephone _____

_____ , telephone _____

NOTE 3

At normal operating temperatures [60°F to 100°F (15.60C to 37.80C)], Monitor Cabinet battery will apply power for at least the following times:

One-zone, 24 hours.
Five-zone, 20 hours.
Twenty-five-zone, 12 hours.

Table 3-8. Monitor Cabinet and Status Monitor Module Operating Procedure M-3-Continued

NOTE 3-Continued

Lower operating temperatures will provide less battery power and shortened Monitor Cabinet operating time. If ac power is not anticipated to be restored within these times, arrangements should be made to station guards at the associated protected area(s).

NOTE 4

Ac power failure at protected area may be an indication of attempted intrusion. Personnel investigating power failure should proceed with caution. At normal operating temperatures [60°F to 100°F (15.6°C to 37.80C)], Control Unit battery will supply power for at least 24 hours. If battery power is exhausted prior to restoration of ac power, an alarm will be transmitted.

Table 3-9. Monitor Cabinet and Status Monitor Module Operating Procedure M-4

NOTE

When assuming responsibility for attending the Monitor Cabinet(s); ensure that all ALARM (red) lights are extinguished, that all AC POWER (white) lights are on, and that proper operating mode (ACCESS or SECURE) is indicated on all Status Monitor Modules. Also verify that all indicator bulbs are operable by momentarily placing each lamp test switch in the LAMP TEST position. If lights are burned out, request responsible maintenance personnel to replace bulbs at earliest opportunity.

Indication	Operator response
1. ALARM indicator lights (red) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If alarm is not generated during a time of prearranged opening or securing of protected area or system test, direct security personnel to indicated protected area (NOTE 1) (NOTE 5). c. After security personnel have investigated cause of alarm and reset the Control Unit, momentarily place RESET/ACK switch in RESET position to extinguish ALARM indicator lights.

Table 3-9. Monitor Cabinet and Status Monitor Module Operating Procedure M-4-Continued

Indication	Operator response
2. MONITOR AC POWER indicator lights (white) flashing and audible signal device sounding.	a. Momentarily place LAMP TEST/ACKNOWLEDGE switch on Monitor Cabinet Signal Module in ACKNOWLEDGE position. b. If lights extinguish, inform designated personnel that ac power to Monitor Cabinet has just been lost (NOTE 2) (NOTE 3). c. If lights stay on steady state, ac power has been restored to Monitor Cabinet.
3. ACCESS indicator lights (amber) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If change to ACCESS is not part of prearranged opening of protected area, direct security personnel to indicated protected area.
4. SECURE indicator lights (green) flashing and audible signal sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If change to SECURE is not part of a prearranged securing of protected area, direct security personnel to indicated protected area to ensure that area is physically secure.
5. AC POWER indicator lights (white) flashing and audible signal device sounding.	a. Momentarily place RESET/ACK switch on associated Status Monitor Module in the ACK position. b. If lights extinguish, inform designated personnel that ac power to associated protected area has just been lost (NOTE 2) (NOTE 4). c. If lights stay on steady state, ac power has been restored to Control Unit.

NOTE 1

If alarm occurs when SECURE lights (green) are on, a high probability exists that an intrusion is in progress. If alarm occurs when ACCESS (amber) lights are on, a high probability exists that personnel are tampering with the system in the protected area or that personnel in the protected area are in danger. Security personnel responding to the alarm should be provided with this information if possible.

Table 3-9. Monitor Cabinet and Status Monitor Module Operating Procedure M-4-Continued

NOTE 2

Abnormal conditions shall be reported to the following personnel:

_____ , telephone _____

_____ , telephone _____

NOTE 3

At normal operating temperatures [60°F to 100°F (15.6°C to 37.8°C)], Monitor Cabinet battery will apply power for at least the following times:

One-zone, 24 hours.
Five-zone, 20 hours.
Twenty-five-zone, 12 hours.

Lower operating temperatures will provide less battery power and shortened Monitor Cabinet operating time. If ac power is not anticipated to be restored within these times, arrangements should be made to station guards at the associated protected area(s).

NOTE 4

Ac power failure at protected area may be an indication of attempted intrusion. Personnel investigating power failure should proceed with caution. At normal operating temperatures [60°F to 100°F (15.6°C to 37.8°C)], Control Unit battery will supply power for at least 24 hours. If battery power is exhausted prior to restoration of ac power, an alarm will be transmitted.

NOTE 5

Inform the following personnel that protected area must be opened and associated Control Unit mode switch key must be taken to protected area to reset the Control Unit:

_____ , telephone _____

_____ , telephone _____

CHAPTER 4

OPERATOR/CREW MAINTENANCE

Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

4-1. SPECIAL TOOLS AND EQUIPMENT. No special tools or equipment are required.

4-2. REPAIR PARTS. No repair parts are authorized at the operator/crew level.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-3. PREVENTIVE MAINTENANCE CHECKS AND SERVICES. The preventive maintenance checks and services specified in table 4-1 should be performed by operator/crew personnel. Conditions which require repair should be reported to direct support maintenance personnel for corrective action.

Table 4-1. Preventive Maintenance Checks and Services

Sequence NO.	Items to be inspected	Procedure
1.	Component surfaces	Clean and dust as necessary. **NOTE** **Do not clean with hydrocarbons. Clean exterior surfaces with cloth dampened in water and mild detergent. Rinse with cloth dampened in cold water. Dry with lint-free cloth.**
2.	Component mounting	Inform direct support maintenance personnel to secure any loosely mounted items.

Table 4-1. Preventive Maintenance Checks and Services-Continued

Sequence NO.	Items to be inspected	Procedure
3.	Component enclosures, component interconnecting conduit transmission line between Control Unit and Monitor Cabinet, and conduit between Control Unit and Audible Alarm (if these items are installed)	Inform responsible security personnel if visual inspection shows evidence of tampering or electronic devices attached to system wiring. Inform direct maintenance personnel to repair as necessary.

Section III. KEY CONTROL

4-4. KEY CONTROL. Keys for the door locks on Control Units, Audible Alarms, and Monitor Cabinets should be placed in the custody of responsible personnel and checked out only when direct support maintenance is required. The Control Unit mode switch key must be available to the Control Unit operator when opening and securing the protected area; however, if possible, the mode switch keys should be placed in the custody of organizational maintenance personnel when the protected areas are secure. Since the mode switch key can be removed only when the mode switch is in the SECURE position, this key control procedure will help ensure that a Control Unit is not left in the ACCESS mode when the protected area is secured.

CHAPTER 5

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

This chapter is not applicable to this equipment.

CHAPTER 6

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

6-1. SPECIAL TOOLS. No special tools are required for the JSIID System.

6-2. REPAIR PARTS. Repair parts for this equipment are listed and illustrated in the individual equipment manuals.

Section II. TROUBLESHOOTING

6-3. TROUBLESHOOTING PROCEDURES.

a. This section contains troubleshooting information for locating and correcting troubles which may develop in the JSIID System. Each malfunction is followed by a list of tests or inspections which will help you to determine corrective actions to take. You should perform the test/inspections in the corrective actions column in the order listed.

System troubleshooting consists of determining the malfunctioning equipment and then referring to the appropriate equipment manual for equipment troubleshooting. Prior to referring to equipment manual, ensure that interconnecting wiring is not defective. Refer to system wiring fault corrective actions in paragraph 6-4 and JSIIDS wiring diagram, figure FO-1.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. Table 6-1 lists the common malfunctions which may be found during the operation or maintenance of the JSIID System.

WARNING

The Audible Alarm presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Authorized protective equipment must be worn by all personnel in the work area.

NOTE

If the Audible Alarm is installed, it must be disabled BEFORE any troubleshooting procedures are attempted.

d. To disable the Audible Alarm (AA) for maintenance or troubleshooting, perform the following procedures:

(1) Notify proper authorities per installation/site security procedures.

(2) Enter the Control Unit room and turn the operating mode switch (key-operated) to TEST/RESET position. If the Control Unit audible signal device sounds, ignore it for the moment.

(3) Inspect the Control Unit door to ensure that it is flat, straight, and completely closed.

(4) Open the door, pull the TAS plunger all the way out, and ensure that there is no debris between the door and enclosure.

(5) There are six LED's on PC board A12 in the upper right corner of the Control Unit. Note any of these LED's that are on.

(6) Turn the operating mode switch to ACCESS.

(7) If the AA stops, put on ear protection and open the AA door. Pull the TAS plunger all the way out, remove screws that secure the faceplate, and remove the faceplate. Turn the power switch off (upper left corner of AA).

(8) If the AA sounds; tag, remove, and isolate the green wire (from status processor) from TB4-1 in the Control Unit. Install a jumper between TB4-4 and TB4-1. AA should be off. Put on ear protection and open the AA door. Pull the TAS plunger all the way out, remove screws that secure the faceplate, and remove the faceplate. Turn the power switch off (upper left corner of AA).

(9) In the Control Unit, remove the purple wire from TB4-3 and connect a jumper wire between TB4-4 and TB4-3. The AA is now disabled. For safety it should be treated as if it were on. Remove jumper from TB4-4 and TB4-1 and connect green wire to TB4-1.

WARNING

Shut off ac power before disconnecting components or wiring.

NOTE

Troubleshooting procedures listed in table 6-1 may require more than one person to perform corrective action.

Table 6-1. Troubleshooting Procedures

Trouble	Probable cause	Corrective action
1. AC lamp on Control Unit (CU) not illuminated.	a. Loss of ac power.	a. Set multimeter to ac volts. Connect meter leads to TB1-1 and TB1-2 on Control Unit. Meter should indicate 115 ± 5 vac.
		b. If meter does not indicate 115 ± 5 vac, check facility ac power.
	b. Defective lamp.	Replace lamp.
	c. Defective CU.	Refer to TM 5-6350-264-14/10 & P for CU troubleshooting.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
2. Audible Alarm prematurely activates before expiration of entrance time delay.	Defective CU.	Refer to TM 5-6350-264-14/10 & P for CU troubleshooting.
3. In TEST/RESET mode, with CU door tamper switch in nonalarm position, audible signal device does not respond to sensor alarm condition. CU troubleshooting.	Defective CU or sensor.	a. Disconnect associated sensor alarm input from terminal 1 of respective terminal board in CU. b. If audible signal device does not occur, CU is defective. Refer to TM 5-6350-264-14/10 & P for c. If audible signal device occurs, associated sensor is defective. Refer to associated sensor TM for troubleshooting.
4. In TEST/RESET mode, with CU door tamper switch in nonalarm position, Status Monitor Module (SMM) in Monitor Cabinet does not respond to sensor alarm condition.	a. Defective sensor in CU.	a. Disconnect associated sensor alarm input from terminal 1 of respective terminal board in CU. b. If alarm is received at SMM, sensor is defective. Refer to associated sensor TM for troubleshooting. c. If alarm is not received, reconnect sensor alarm input. Tag and disconnect TB6S1-I and TB6S1-IR or TB6S1-D and TB6S1-DR (whichever is connected) at CU terminal board TB6S. d. Set multimeter to ohms. Connect meter leads to S1-I and S1-IR or S1-D and S1-DR. Meter should indicate 2000 ohms. e. If meter does not indicate 2000 ohms, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
4. (Cont)	a. (Cont)	f. Disconnect sensor alarm input at associated CU input terminal 1. Meter should indicate 100,000 ohms. g. If meter does not indicate 100,000 ohms, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting. h. Connect sensor alarm input to associated CU input terminal.
	b. Defective transmission line (TL) or Data Transmitter (DT)/ Data Receiver (DR).	a. Observe lightemitting diode (LED) on DR. If illuminated, reset with line fault switch. If reset cannot be accomplished, DR or TL is defective. Refer to TM 5-6350-264-14/12 & P for DR and TL troubleshooting. b. If reset is accomplished but the LED is again activated within 1 or 2 minutes, resync the DT/DR at the CU. c. If LED continues to be activated, refer to TM 5-6350-264-14/12 & P for DT/DR and TL troubleshooting.
	c. Defective DT/DR or SMM.	a. Remove DR and SMM from one-zone MC. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swing-out rack. Remove screws that secure status monitor module to rack and remove module through front of rack. b. Connect jumper between terminals 1-I, 1-L, and 4 of associated SMM input terminal board. To replace DR and SMM, replace status monitor module in swingout rack and

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
4. (Cont)	c. (Cont)	secure with screws. Secure swing-out rack. Turn on switch S1 on power supply. c. Actuate ACKNOWLEDGE then RESET switch on SMM. SMM should display a no-alarm condition. d. If a no-alarm condition is displayed, DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for troubleshooting. e. If an alarm condition is displayed, SMM is defective. Refer to TM 5-6350-264-14/11 & P for troubleshooting. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swingout rack. Remove screws that secure status monitor modu+le to rack and remove module through front of rack. f. Remove jumper from terminal 4 of input terminal board. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply. SMM should display an alarm condition (flashing alarm lights). g. If an alarm condition is displayed, DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for troubleshooting. h. If a no-alarm condition is displayed, SMM is defective. Refer to TM 5-6350-264/14-11 & P for troubleshooting. To remove DR and SMM, unlock and open

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
4. (Cont)	c. (Cont)	Monitor Cabinet and turn off switch S1 on power supply. Release swingout rack. Remove screws that secure status monitor module to rack and remove module through front of rack. Remove jumper from terminals 1-I and 1-L of SMM input terminal board. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply.
5. In SECURE mode, Audible Alarm (AA) does not respond to sensor alarm conditions after expiration of entrance ime delay.	Defective sensor, CU, or AA.	a. Disconnect associated sensor alarm input from terminal 1 of respective CU terminal board. Remove screws that secure DT to standoffs in CU. Carefully move DT aside to reach terminal board. b. If AA sounds, sensor is defective. Refer to associated TM for roubleshooting. c. If AA does not sound, set multimeter to dc volts. Connect positive meter lead to TB4-1 and negative meter lead to TB4-2 on CU. Meter should indicate 0.75 ± 0.25 vdc. d. If meter indicates less than 0.5 vdc, AA is defective. Refer to TM 5-6350-264-14/9 & P for AA troubleshooting. e. If meter indicates greater than 1 vdc, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
6. In SECURE mode, AA does not respond to tamper condition.	Defective sensor, CU, or AA.	a. Disconnect terminal 3 of suspected sensor at CU terminal board. b. If AA sounds, sensor is defective. Refer to associated sensor TM for troubleshooting. c. If AA does not sound, connect positive meter lead to TB4-1 and negative meter lead to TB4-2 on CU. Meter should indicate 0.75 +0.25 vdc. d. If meter indicates less than 0.5 vdc, AA is defective. Refer to TM 5-6350-264-14/9 & P for AA troubleshooting. e. If meter indicates greater than 1 vdc, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting.
7. In ACCESS mode, SMM does not respond to tamper condition.	a. Defective sensor. sensor at CU terminal board.	a. Disconnect terminal 3 of suspected b. If SMM displays alarm condition, sensor is defective. Refer to associated sensor TM for trouble-shooting.
	b. Defective CU.	a. If SMM displays no-alarm condition, tag and disconnect wires from CU TB6S1-I and TB6S1-IR or TB6S1-D and TB6S1-DR (which-ever is connected) at terminal board TB6S. b. Set multimeter to ohms. Connect leads to TB6S1-I and TB6S1-IR or TB6S1-D and TB6S1-DR. Meter should indicate 100,000 ohms.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
7. (Cont)	b. (Cont)	c. If meter does not indicate 100,000 ohms, CU is defective. Refer to TM 5-6350-264-14/10 & P for troubleshooting. d. Connect jumper between terminals 2 and 3. Meter should indicate 2000 ohms. e. If meter does not indicate 2000 ohms, CU is defective. Refer to TM 5-6360-264-14/10 & P. f. Connect terminal 3 of suspected sensor at CU terminal board.
	c. Defective TL or DT/DR.	a. Observe LED on DR. If illuminated, reset with line fault switch. If reset cannot be accomplished, DR or TL is defective. Refer to TM 5-6350-264-14/12 & P for DR and TL troubleshooting. b. If reset is accomplished but the LED is again activated within 1 or 2 minutes, resync the DT/DR at the CU. c. If LED continues to be activated, refer to TM 5-6350-264-14/12 & P for DT/DR and TL troubleshooting.
	d. Defective DT/DR or SMM.	a. Remove DR and SMM from one-zone MC. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swingout rack. Remove screws that secure status monitor module to rack and remove module through front of rack.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
7. (Cont)	d. (Cont)	b. Connect jumper between terminals 1-I, 1-L, and 4 of associated SMM input terminal board. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply. c. Actuate ACKNOWLEDGE then RESET switch on SMM. d. If a no-alarm condition is displayed, DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for DT/DR troubleshooting. e. If an alarm condition is displayed, SMM is defective. Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swingout rack. Remove screws that secure status monitor module to rack and remove module through front of rack. f. Remove jumper from terminal 4 of input terminal strip. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply. g. If an alarm condition is displayed, DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for DT/DR troubleshooting.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
7. (Cont)	d. (Cont)	h. If as no-alarm condition is displayed, SMM is defective. Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swingout rack. Remove screws that secure status monitor module to rack and remove module through front of rack. Remove jumper from terminals 1-I and 1-L of SMM input terminal board. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply.
8. Changing mode switch from SECURE to ACCESS does not cause corresponding change at SMM in MC.	a. Defective CU.	a. Tag and disconnect terminal TB6-S-2 in CU. b. Set multimeter to ohms. Connect meter leads to TB6-S-2 and TB6-S-2R in CU. c. In ACCESS, meter should indicate 2000 ohms. d. If meter does not indicate 2000 ohms, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting. e. In SECURE, meter should indicate 100,000 ohms. f. If meter does not indicate 100,000 ohms, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting. g. Reconnect TB6S-2.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
8. (Cont)	b. Defective TL or DT/DR.	a. Observe LED on DR. If illuminated, reset with line fault switch. If reset cannot be accomplished, DR or TL is defective. Refer to TM 5-6350-264-14/12 & P for DR and TL troubleshooting. b. If reset is accomplished but the LED is again activated within 1 or 2 minutes, press the TRANSMITTER RESYNC switch at the CU. c. If LED continues to be activated, refer to TM 5-6350-264-14/12 & P for DT/DR and TL troubleshooting.
	c. Defective DT/DR or SMM.	a. Remove DR and SMM from one-zone MC. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swingout rack. Remove screws that secure status monitor module to rack and remove module through front of rack. b. Connect jumper between terminal 2 and 4 of associated MC terminal board. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply. c. Actuate ACKNOWLEDGE switch on SMM. d. If access condition is displayed, DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for DT/DR troubleshooting.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
8. (Cont)	c. (Cont)	e. If access condition is not displayed, SMM is defective. Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swingout rack. Remove screws that secure status monitor module to rack and remove module through front of rack. f. Remove jumper from MC terminal board. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply. Actuate ACKNOWLEDGE switch on SMM. g. If secure condition is displayed, DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for DT/DR troubleshooting. h. If secure condition is not displayed, SMM is defective. Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting.
9. SMM does not correspond to ac power condition at CU.	a. Defective CU.	a. Tag and disconnect TB6-S3 at CU. b. Set multimeter to ohms. Connect meter leads to TB6S3 and TB7S3R. c. With CU power on, meter should indicate 2000 ohms. d. If meter does not indicate 2000 ohms, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
9. (Cont)	a. (Cont)	e. With CU power off, meter should indicate 100,000 ohms. f. If meter does not indicate 100,000 ohms, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting. g. Reconnect TB6-53 at CU.
	b. Defective TL or DT/DR.	a. Observe LED in MC. If illuminated, reset with line fault switch. If reset cannot be accomplished, DR or TL is defective. Refer to TM 5-6350-264-14/12 & P for DR and TL troubleshooting. b. If reset is accomplished but the LED is again actuated within 1 or 2 minutes, press the TRANSMITTER RESYNC switch at the CU. c. If LED continues to be activated, refer to TM 5-6350-264-14/12 & P for DT/DR and TL troubleshooting.
	c. Defective DT/DR or SMM.	a. Remove DR and SMM from one-zone MC. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swing-out rack. Remove screws that secure status monitor module to rack and remove module through front of rack. b. Connect jumper between terminals 3 and 4 of applicable SMM terminal board. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swing-out rack. Turn on switch S1 on power supply.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
9. (Cont)	c. (Cont)	c. Actuate ACKNOWLEDGE then RESET switch on SMM. d. If AC POWER lights are not lit, DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for DT/DR troubleshooting. e. If AC POWER lights are lit, SMM is defective. Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swingout rack. Remove screws that secure status monitor module to rack and remove module through front of rack. f. Remove jumper from SMM terminal block. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply. g. If AC POWER lights are lit, DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for DT/DR troubleshooting. h. If AC POWER lights are not lit, SMM is defective. Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting.
10. In SECURE mode, SMM does not display a tamper alarm condition.	a. Defective sensor.	a. Tag and disconnect terminal 3 of suspected sensor at CU terminal board.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
10. (Cont)	a. (Cont)	b. If SMM displays alarm condition, sensor is defective. Refer to associated sensor TM for troubleshooting.
	b. Defective CU.	a. If SMM does not display alarm condition, tag and disconnect TB6 S1-1 and TB6 S1-IR or TB6 S1-D and TB6 S1-DR (whichever is connected) at CU TB6-S . b. Set multimeter to ohms. Connect leads to TB6 Si-I and TB6 S1-IR or TB6 S1-D and TB6 S1-DR. Meter should indicate 100,000 ohms. c. If meter does not indicate 100,000 ohms, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting. d. Connect jumper between terminals 3 and 2. Meter should indicate 2000 ohms or less. e. If meter does not indicate 2000 ohms or less, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting.
	c. Defective TL or DT/ DR.	a. Remove jumper from terminals 3 and 2. Connect terminal 3 at CU barrier strip. b. Observe line fault indicator on DR. If illuminated, reset with line fault switch. If reset cannot be accomplished, DR or TL is defective. Refer to TM 5-6350-264-14/12 & P for DR and TL troubleshooting.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
10. (Cont)	c. (Cont)	c. If reset is accomplished but the LED is again activated within 1 or 2 minutes, press the TRANSMITTER RESYNC switch at the CU. d. If LED continues to be activated, refer to TM 5-6350-264-14/12 & P for DT/DR and TL troubleshooting.
	d. Defective DT/DR or SMM.	a. Remove DR and SMM from one-zone MC. To remove DR and SMM, unlock and open Monitor Cabinet and turn off switch S1 on power supply. Release swing-out rack. Remove screws that secure status monitor module to rack and remove module through front of rack. b. Connect jumper between terminals 1-I, i-L, and 4 of associated MC input terminal strip. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply. c. Actuate ACKNOWLEDGE then the RESET switch on SMM. d. If SMM displays a no-alarm condition, DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for DT/DR troubleshooting. e. If SMM displays an alarm condition, SMM is defective. Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting. To remove DR and SMM, unlock and

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
10. (Cont)	d. (Cont)	open Monitor Cabinet and turn off switch S1 on power supply. Release swingout rack. Remove screws that secure status monitor module to rack and remove module through front of rack. f. Remove jumper from terminal 4 of input terminal strip. To replace DR and SMM, replace status monitor module in swingout rack and secure with screws. Secure swingout rack. Turn on switch S1 on power supply. g. If SMM displays an alarm condition (flashing alarm lights), DT/DR is defective. Refer to TM 5-6350-264-14/12 & P for DT/DR troubleshooting. h. If SMM displays a no-alarm condition, SMM is defective. Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting.
11. All indicator lamps off at MC.	Defective MC power supply.	Refer to TM 5-6350-264-14/11 & P for MC troubleshooting.
12. Indicators at SMM are randomly flashing.	Defective DT/DR.	a. Initiate a resync cycle at CU. SMM indicators should stop flashing. b. If SMM indicators continue to flash, DT/DR or TL is defective. Refer to TM 5-6350-264-14/12 & P for DT/DR or TL troubleshooting.
13. MC audible signal device does not sound when indicator lamps on SMM are flashing.	Defective MC.	a. Connect jumper from terminal 1 to terminal 4 on Signal Module Terminal board. b. If audible signal device sounds, SMM is defective. Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
13. (Cont)	Defective MC (Cont).	c. If audible signal device does not sound, MC is defective. Refer to TM 5-6350-264-14/11 & P for MC troubleshooting.
14. All lamps on SMM are out.	Defective SMM. **WARNING** Operating of this equipment presents a noise hazard to personnel in the area. The noise level exceeds allowable limits for unprotected personnel. Wear authorized ear protection.	Refer to TM 5-6350-264-14/11 & P for SMM troubleshooting.
15. AA continuously sounding and cannot be reset with no-alarm inputs to CU.	Defective CU or AA.	a. Open door to AA, remove inner enclosure cover, and turn off POWER switch. b. Set CU to TEST/RESET mode and disconnect AA input lines from TB4 in CU. c. Connect jumper between terminals 3 and 4 of TB4. d. Set multimeter to dc volts. Connect positive meter lead to TB4-1 and negative meter lead to TB4-2. Meter should indicate 0.75 ± 0.25 vdc. e. If meter indicates greater than 1 vdc, the AA is defective. Refer to TM 5-6350-264-14/9 & P for AA troubleshooting. f. If meter indicates less than 0.5 vdc, CU is defective. Refer to TM 5-6350-264-14/10 & P for CU troubleshooting.

Table 6-1. Troubleshooting Procedures-Continued

Trouble	Probable cause	Corrective action
16. Loss of ac power to MC is not indicated by Signal Module (SM).	Defective SM.	Refer to TM 5-6350-264-14/11 & P for MC troubleshooting.
17. Nuisance alarms.	a. Loose connections.	Inspect all terminal board connections between the Control Unit and sensor and verify that terminal board screws are tightened.
	b. Defective sensor or sensor false alarms.	Refer to appropriate sensor TM for troubleshooting.
	c. Defective DT/DR.	Refer to TM 5-6350-264-14/12 & P for DT/DR troubleshooting.

6-4. SYSTEM WIRING FAULT CORRECIIVE ACTIONS.

NOTE

To troubleshoot any component at the JSIID System wiring, the affected component of the system must be properly deactivated.

a. Remove both ends of the wiring in question. If only one wire is causing the malfunction, also remove a wire to act as a test return line for continuity testing.

b. To test for opens; at one end of the wire under test, attach a jumper to both the wire under test and the test return line. At the other end of the wire under test, attach a multimeter set to ohms. The multimeter shall indicate a low reading (or the total value of resistance of the type/gauge wire used in relation to the total length of both wires).

c. To test for shorts to ground or other points, ensure that both ends of the wire under test are isolated. Set multimeter to ohms and attach a lead to the end of the wire under test. Use the other lead of the multimeter to contact ground or other points. The multimeter shall read open or infinity.

d. If the indications as called out in steps b and c are incorrect, replace the wire under test.

APPENDIX A

REFERENCES

1. DEMOLITION TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use
2. FIRE PROTECTION TB5-4200-200-10	Hand Portable Fire Extinguishers Approved for Army Users
3. MAINTENANCE TM-38-750	The Army Maintenance Management System
4. TRI-SERVICE MANUALS	
DMWR 5-6350-264 NAVELEX EE181-AA-MMD-O10/E121 J-SIIDS MWR AIR FORCE T.O. 31S9-4-1-213	Depot Maintenance Work Requirement
TM 5-6350-264-14-1 NAVELEX EE181-AA-INM-020/E121 J-SIIDS INS AIR FORCE T.O. 31S9-4-1-201	Installation, Operation and Checkout Procedures
TM 5-6350-264-14&P-2 NAVELEX EE181-AA-OMI-030/E121 RT1161 M9443 AIR FORCE T.O. 31S9-2FSS9-1-2	Transceiver, Ultrasonic Signal and Processor, Ultrasonic Motion Signal
TM 5-6350-264-14&P-3 NAVELEX EE181-AA-OMI-040/E121 R1860 M9443 AIR FORCE T.O. 31S9-2FSS9-1-3	Receiver Passive Signal, Ultrasonic and Processor, Passive Signal, Ultrasonic
TM 5-6350-264-14&P-4 NAVELEX EE181-AA-OMI-050/E121 DT546 M9442 AIR FORCE T.O. 31S9-2FSS9-1-4	Detector, Vibration Signal and Processor, Vibration Signal
TM 5-6350-264-14&P-5 NAVELEX EE181-AA-OMI-060/E121 SA-1955 AIR FORCE T.O. 31S9-2FSS9-1-5	Switch, Balanced Magnetic
TM 5-6350-264-14&P-6 NAVELEX EE181-AA-OMI-070/E121 DT-545 AIR FORCE T.O. 31S9-2FSS9-1-6	Sensor, Grid Wire
TM 5-6350-264-14&P-7 NAVELEX EE181-AA-OMI-080/E121 DT-548 AIR FORCE T.O. 31S9-2FSS9-1-7	Sensor, Capacity Proximity

TM 5-6350-264-14&P-8 NAVELEX EE181-AA-OMI-090/E121 SA-1954 AIR FORCE T.O. 31S9-2FSS9-1-8	Switch, Alarm Latching
TM 5-6350-264-14&P-9 NAVELEX EE181-AA-OMI-100/E121 DZ-204 AIR FORCE T.O. 31S9-2FSS9-1-9	Alarm, Audible
TM 5-6350-264-}4&P-10 NAVELEX EE181-AA-OMI-110/E121 C-9412 AIR FORCE T.O. 31S9-2FSS9-1-10	Control Unit, Alarm Set
TM 5-6350-264-14&P-11 NAVELEX EE181-AA-OMI-120/E121 C-7359-60-1 AIR FORCE T.O. 31S9-2FSS9-1-11	Cabinet, Monitor, Type A, Type B, Type C and Monitor Module, Status, Monitor
TM 5-6350-264-14&P-12 NAVELEX EE181-AA-OMI-130/E121 R1861-T1257 AIR FORCE T.O. 31S9-2FSS9-1-12	Receiver, Data and Transmitter, Data
TM 5-6350-264-14&P-13 NAVELEX EE181-AA-OMI-140/E121 DT-547 AIR FORCE T.O. 31S9-2FSS9-I-13	Sensor, Magnetic Weapons (DT-547)
TB 5-6350-264 NAVELEX EE181-AB-OMI-010/E121 J-SIIDS AIR FORCE T.O. 31S9-1-111	Selection and Application of Joint Services Interior Intrusion Detection System
5. PAINTING SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronic Equipment
TM 43-0139	Painting Instructions for Field Use
6. RADIOACTIVE MATERIAL TB 43-0141	Instructions for Safe Handling, Maintenance, Storage, and Disposal of Radioactive Commodities
7. SHIPMENT AND STORAGE TM 740-90-1	Administrative Storage of Equipment

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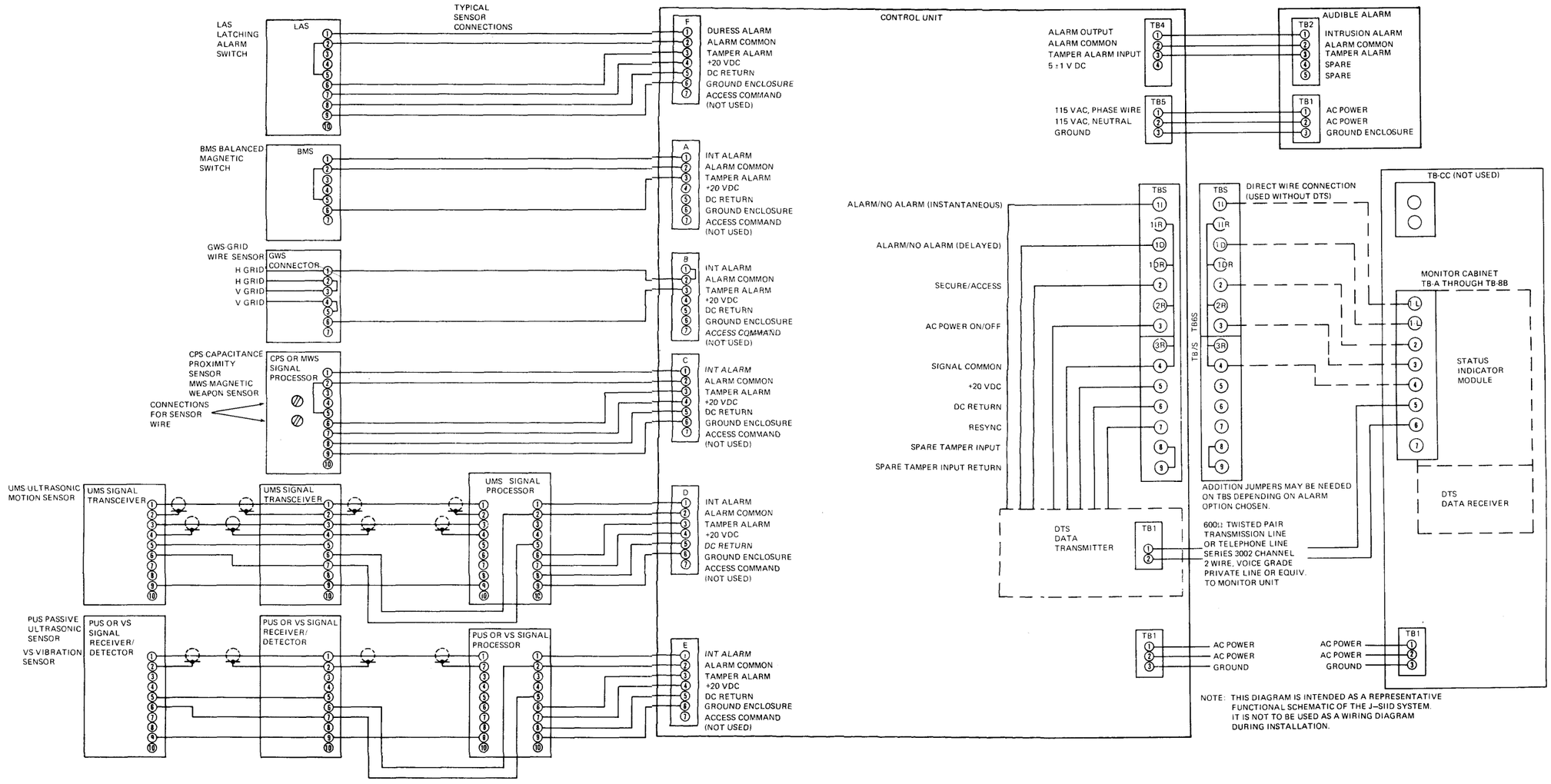

Figure FO-1. J-SIIDS Interconnecting Wiring Diagram, Typical

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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