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NAVY PUBLICATION NAVELEX EE 181-AA-OMI-040/E121 R1860 M9443
AIR FORCE TECHNICAL ORDER T.O. 31S9-2FSS9-1-3

TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

RECEIVER, PASSIVE SIGNAL ULTRASONIC R-1860/FSS-9(V) NSN 6350-00-228-2534

PROCESSOR, PASSIVE SIGNAL ULTRASONIC TMX-9442/FSS-9(V) NSN 6350-00-228-2548

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE
27 AUGUST 1982

HEADQUARTERS
CHANGE **DEPARTMENTS OF THE ARMY, NAVY and AIR FORCE**
WASHINGTON, D.C. 25 September 1986

NO.1

Operator's, Organizational, Direct Support, and General Support
Maintenance Manual
(Including Repair Parts and Special Tools List)

RECEIVER, PASSIVE SIGNAL ULTRASONIC
R-1860/FSS-9(V)
NSN 6350-00-228-2534

PROCESSOR, PASSIVE SIGNAL ULTRASONIC
MX-9443/FSS-9(V)
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TM 5-6350-264-14 & P-3/NAVELEX EE 181-AA-OMI-040/E121 R1860 M9443/ T.O. 31S9-2FSS9-1-3, 27 August 1982, is changed as follows:

1. Title is changed as shown above.

2. 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
i and ii	i and ii
---	iii/iv
1-1 and 1-2	1-1 and 1-2
A-1 through A-3/A-4	A-1 and A-2
B-3 and B-4	B-3 and B-4
C-1 through C-6	C-1 through C-6
---	C-7 through C-12
D-1 and D-2	

3. 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's, 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.

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Current as of 17 April 1984

REPORTING OF ERRORS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. ARMY: Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), should be mailed directly to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Blvd St. Louis, MO 63120-1798. 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 forms should be mailed to: Naval Electronics Systems Command Training and Publications Management Office, ATTN; ELEX: Code 8122, Washington, DC 20360.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. SCOPE. This manual is for your use in operating and maintaining the Passive Signal Ultrasonic Processor, MX-9443/FSS-9(V), and a Passive Signal Ultrasonic Receiver, R-1860/FSS-9(V), under normal operating conditions. The processor and Receiver together, make up the Passive Ultrasonic Sensor, which is an integral part of the Joint-Services Interior Intrusion Detection System (JSIIDS). For information on other major assemblies of the J-SIIDS, refer to the applicable manuals listed in appendix A.

1-2. MAINTENANCE FORMS AND RECORDS. Equipment maintenance forms and procedures for their use are contained in DA Pamphlet 738-750, 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 DA Pamphlet 738-750. EIR's should be mailed directly to Commander, U.S. Army Troop Support Command, ATTN: AMSTR-QX, 4300 Goodfellow Blvd., St. Louis, Missouri 63120-1798. 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. DESCRIPTION.

a. The Passive Ultrasonic Sensor (PUS) consists of a Processor and a Receiver. The sensor is one of a series of components used to detect an intrusion into a secure area. It receives operating power from and sends alarm signals to the J-SIIDS Control Unit.

b. The Processor (fig. 1-1) consists of a printed circuit board (PC board) mounted inside a steel housing. Mounted on the PC board are the sensitivity control, tamper alarm switch (TAS), terminal strips for wire connections, and all electronic components. The housing has a removable cover and access holes where interconnecting wiring is brought in through conduit.

c. The Receiver (fig. 1-2) consists of a PC board mounted inside a steel housing. Mounted on the PC board are the gain control, TAS, terminal strip for wire connecting microphone, and all electronic components. The housing has a removable cover and access holes where interconnecting wiring is brought in through conduit.

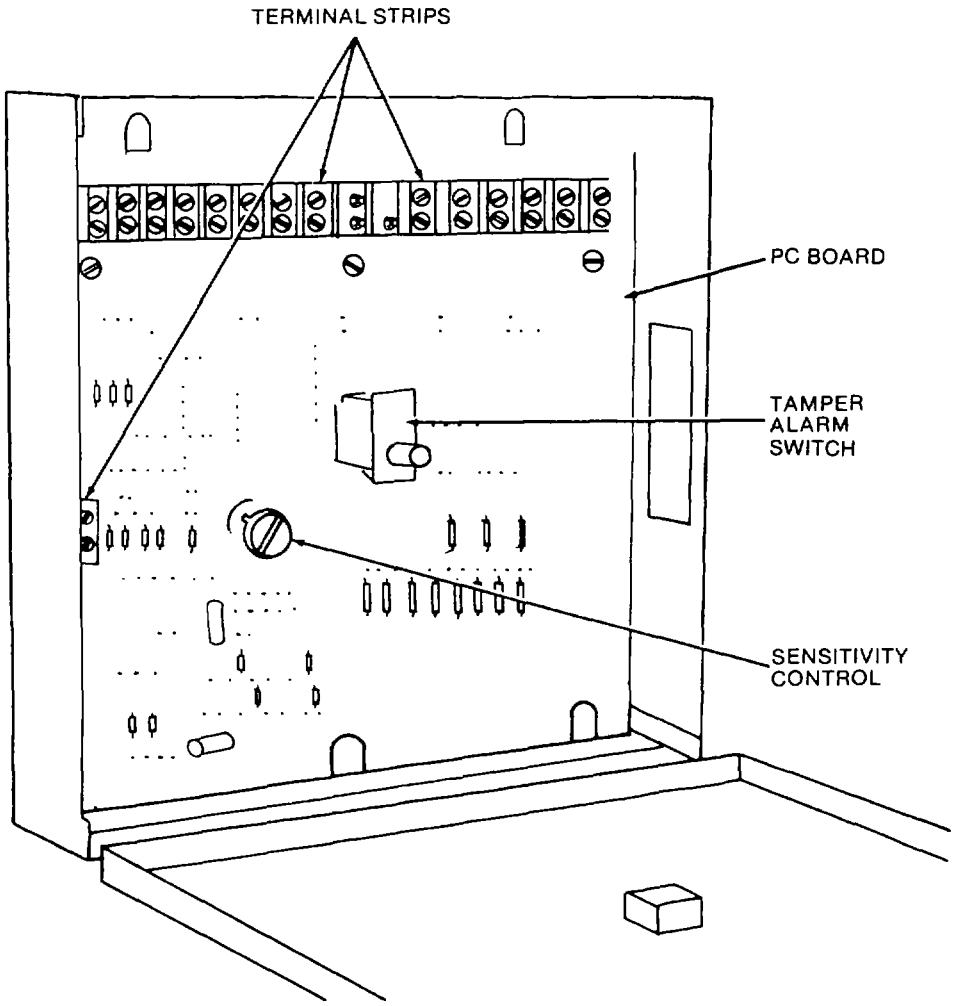

Figure 1-1. Processor with Cover Removed

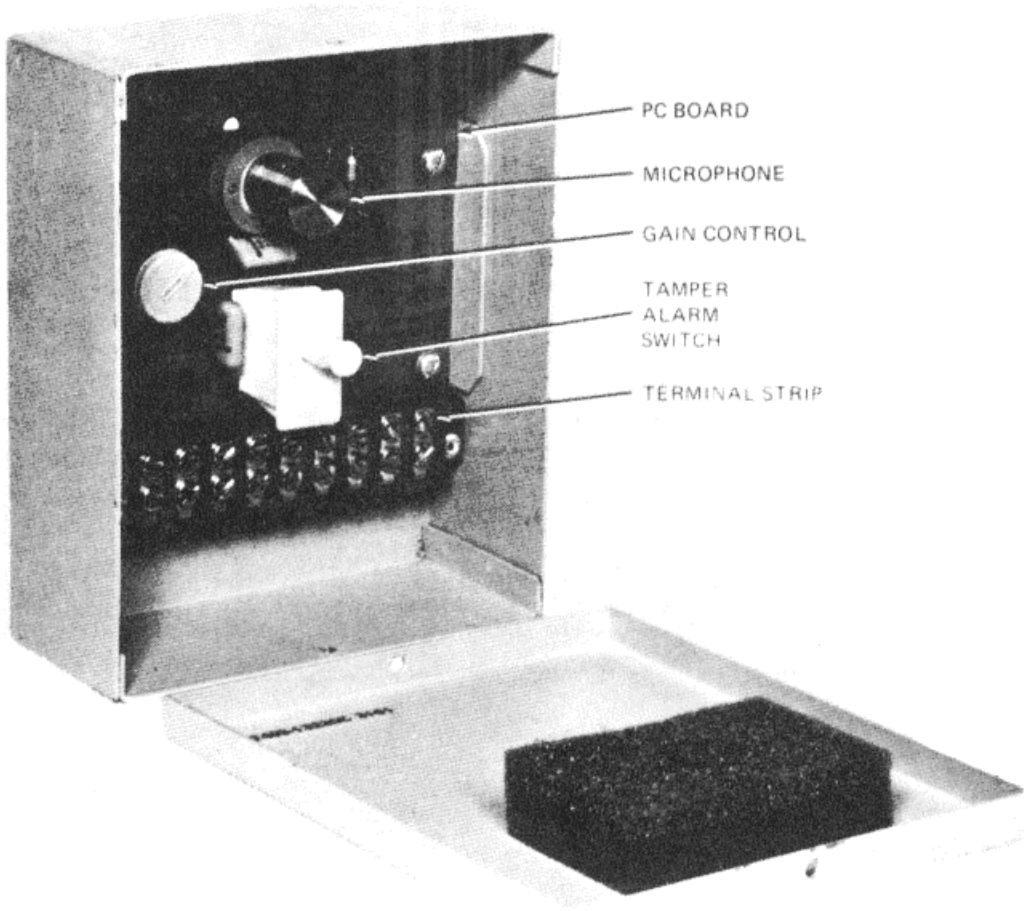

Figure 1-2. Receiver with Cover Removed

1-9. TABULATED DATA.

a. Identification Data. Two plates, identification and NSN, are mounted inside each housing. Plates for the Receiver are shown in figure 1-3 and for the Processor in figure 1-4.

b. Equipment Characteristics.

Weight:

Processor ..... 6.75 pounds (3.1 kg)

Receiver ..... 2.25 pounds (1.0 kg)

Dimensions (overall)

Processor ..... 10.2" (25.9 cm) wide, 9.7" (24.6 cm) high, 2.1" (5.3 cm) deep

Receiver ..... 6.0" (15.2 cm) wide, 4.8" (12.2 cm) high, 2.1" (5.3 cm) deep

Color (housing ..... Gray per Federal Standard 595, color chip 3644 MIL-C-22751

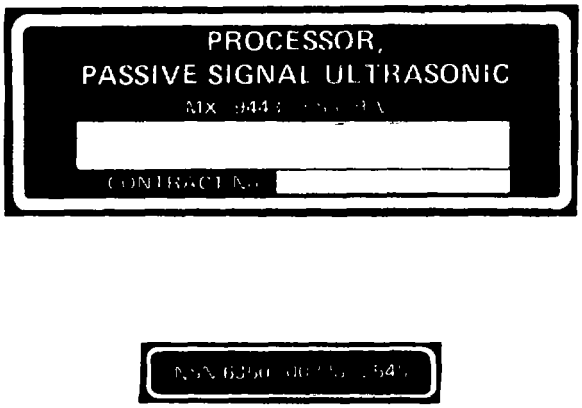

Figure 1-3. Identification Plates, Receiver

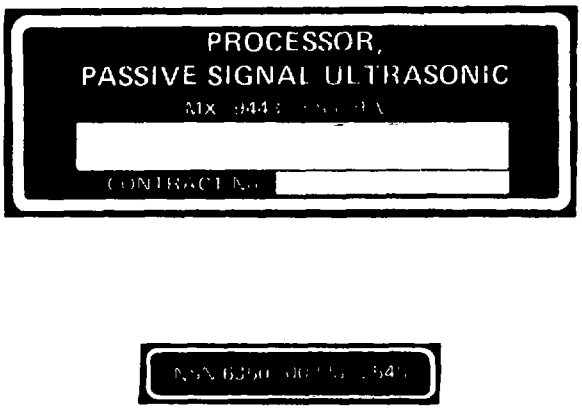

Figure 1-4. Identification Plates, Processor

Environmental (operational)

Temperature range ..... -20° to 150 F (-29° to 650C)

Relative humidity..... Up to 95%

Environmental (non-operational and storage)

Temperature range .....-30°to 165° F (-34° to 74°C)

Relative humidity ..... Up to 95%

Shock .....20 g, 11-ms duration

Vibration ..... Withstands all forms of transportation vibration

Power requirements ..... 20 +2 vdc; supplied by J-SIIDS Control Unit

Processor .....35 ma (60 ma max with 20 receivers)

Receiver ..... 0.5 ma

Tamper alarm criteria .....Movement of cover of 1/4 inch (0.635 cm) or more.

Alarm circuit..... No alarm, less than 2, 000 ohms. Alarm, over 100, 000 ohms

Sensitivity.....50 dB, referenced to 0.0002 microbar

Bandwidth.....20 to 30 kHz (+4 dB, -8 dB)

Intrusion alarm criteria ..... Four pulses of 40 ms within 15 seconds, one 4.5-second continuous signal. Two or more pulses within 1.5 seconds are processed as one pulse.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. OPERATING PROCEDURES

2-1. CONTROLS AND INDICATORS. There are no operator controls or indicators applicable to this equipment.

2-2. NORMAL OPERATING PROCEDURES. The Passive Ultrasonic Sensor is operational after being installed, tested, and interconnected with the J-SIIDS Control Unit. Since the startup and shut-down of the sensor are dependent on power from the Control Unit, no operating procedures are required.

2-3. EMERGENCY OPERATION. Operation with incomplete surveillance coverage or faulty tamper circuit should be held to a minimum. Extended periods of operation on battery (stand-by) power should be avoided.

2-4. UNUSUAL OPERATING CONDITIONS. Relocation of files, cabinets and partitions, or operation of new or faulty equipment with the protected area, will affect system sensitivity.

Section II. THEROY OF OPERATION

2-5. FUNCTIONAL DESCRIPTION. The Passive Ultrasonic Sensor provides an intrusion alarm signal to the J-SIIDS Control Unit when it detects and processes an ultrasonic signal meeting the necessary standards. An attempt to penetrate the secure area through metal or masonry walls, ceilings, floors, or insulated windows and vents by means of hammers, drills, saws, or torches will generate an ultrasonic signal that is sensed by the Receiver. The Receiver routes the signal to the Processor, where it is amplified, filtered, and used to activate an alarm circuit. The alarm signal is then sent to the Control Unit so it can be used in monitoring the status of the protected area. Figure 2-1 is a simplified block diagram. Each Processor can handle up to twenty Receivers; however, the total length of interconnecting cable is limited to 500 feet (152.4 m). The Processor and Receiver/housings are each protected with a cover tamper switch. The tamper switch activates an alarm when a cover is raised more than 1/4 inch (0.635 cm) from the closed position. Penetration through a wooden wall may not generate enough ultrasonic energy to activate the alarm. To protect such an area, the Ultrasonic Motion Sensor may be used as a complement to the Passive Ultrasonic Sensor.

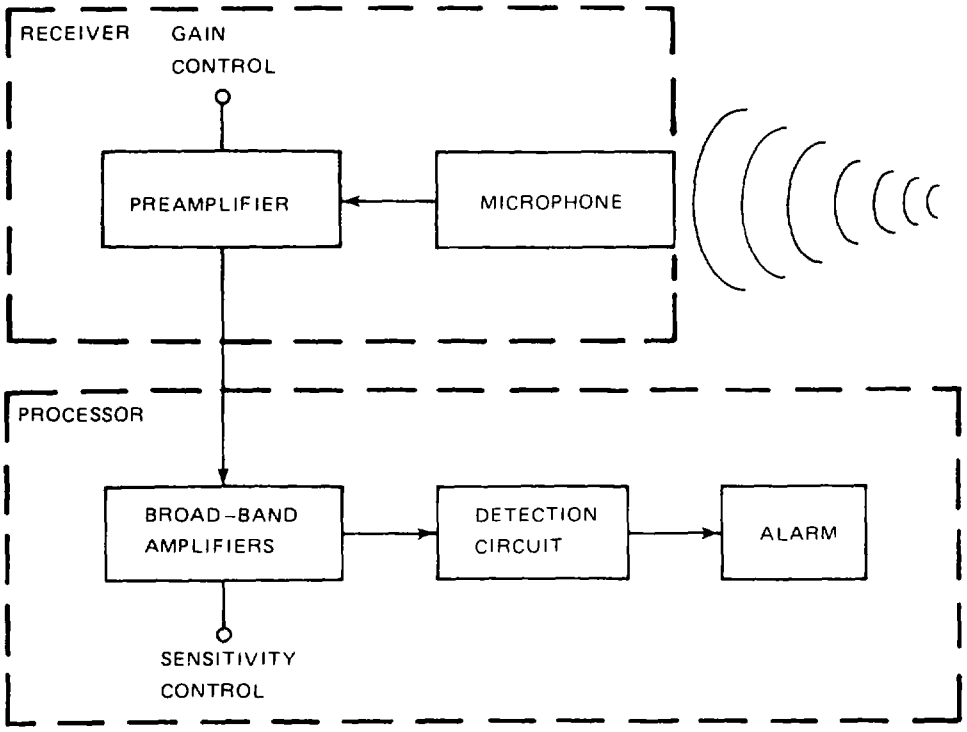

Figure 2-1. Passive Ultrasonic Sensor Simplified Block Diagram

CHAPTER 3

OPERATOR MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

This section is not applicable.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

3-1. PMCS PROCEDURES. The PUS requires minimum organizational maintenance. The necessary PMCS to be performed are listed in table 3-1. The item numbers indicate the sequence of PMCS requirements. Any defects occurring during operation will be noted for correction during equipment shutdown. Record all deficiencies and corrective actions on DA Form 2404.

Table 3-1. Operator's Preventive Maintenance Checks and Services

Sequence no.	Item to be inspected	Procedure
		CAUTION Do not use TRICHLOROETHANE or other hydrocarbon cleaning compounds.
1	Receiver chassis	Inspect exterior for damage, properly secured covers, securely attached conduit, and rust or corrosion. Clean exterior surface using a cloth dampened in cold water and dry thoroughly.
2	Processor chassis	Inspect exterior for damage, properly secured covers, securely attached conduit, and rust or corrosion. Clean exterior surface using a cloth dampened in a solution of mild detergent and water. Rinse with a cloth dampened in cold water and dry thoroughly.

Section III. TROUBLESHOOTING

This section is not applicable.

Section IV. MAINTENANCE PROCEDURES

This section is not applicable.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIAL

This section is not applicable.

Section II. MOVEMENT TO A NEW WORKSITE

This section is not applicable.

Section III. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

4-1. SPECIAL TOOLS AND EQUIPMENT. No special tools or equipment is required for this equipment.

4-2. REPAIR PARTS. No repair parts are authorized at the organizational level.

4-3. FABRICATED TOOLS AND EQUIPMENT. No fabricated tools or equipment is required.

Section IV. LUBRICATION INSTRUCTIONS

This section is not applicable.

Section V. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4-4. The Passive Ultrasonic Sensor requires minimum organizational maintenance. The necessary PMCS to be performed are listed in table 4-1. The item numbers indicate the sequence of PMCS requirements. Any defects occurring during operation will be noted for correction during equipment shutdown. Record all deficiencies and corrective actions on DA Form 2404.

Table 4-1. Organizational Preventive Maintenance Checks and Services

Sequence no.	Item to be inspected	Procedure
1	Receiver housing	Inspect exterior for damage, for improperly secured covers, for securely attached conduit, and for rust or corrosion.
2	Processor housing	Inspect exterior for damage, for improperly secured covers, for securely attached conduit, and for rust or corrosion.

Section VI. TROUBLESHOOTING

This section is not applicable.

Section VII. RADIO INTERFERENCE SUPPRESSION

This section is not applicable.

Section VIII. GENERAL MAINTENANCE

This section is not applicable.

CHAPTER 5

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND REQUIREMENTS

5-1. SPECIAL TOOLS. No special tools are required for the Passive Ultrasonic Sensor.

5-2. REPAIR PARTS. Repair parts are listed and illustrated in the repair parts and special tools list covering direct and general support maintenance for this equipment in appendix C of this manual.

Section II. TROUBLESHOOTING

5-3. TROUBLESHOOTING PROCEDURES.

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. Disable the Alarm by setting the key-operated switch on Control Unit to TEST/RESET position. Open Audible Alarm, remove faceplate, and turn 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.

NOTE

Before you use table 5-1, be sure you have performed all applicable operating checks.

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the Passive Ultrasonic Sensor. Each malfunction for an individual component, unit, or system 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.

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. The table lists the common malfunctions which you may find during the operation or maintenance of the Passive Ultrasonic Sensor or its components. You should perform the test/inspections in the corrective actions column in the order listed.

d. Check all available information on the equipment for aid in diagnosing problems.

CAUTION

When the Receiver cover is removed, do NOT touch the microphone (metal cylinder on the PC board), or damage may result.

e. Make a visual inspection of the equipment.

(1) Inspect the equipment for evidence of physical damage.

(2) Inspect the terminal strips for clean and secure connections.

(3) Inspect all wiring and cabling for worn or frayed insulation and broken wires.

(4) Inspect all resistors for discoloration due to overheating.

(5) Inspect the complete subsystem for the presence of dirt, corrosion, moisture, and bits of wire or solder inside the housings.

NOTE

Touchup paint is recommended instead of refinishing whenever practical.

(6) Inspect all metal surfaces intended to be painted for condition of finish and legibility of panel lettering.

f. Refer to figures 5-1 and 5-2 for all test points referred to in table 5-1. Step-by-step troubleshooting procedures, including Trouble, Probable Cause, and Corrective Action, are listed in table 5-1.

NOTE

Troubleshooting procedures listed in table 5-1 may require more than one person to perform corrective action.

Covers should be removed as necessary to perform troubleshooting procedures.

Never disconnect a wire without first marking that wire to assure proper reconnection.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. Constant alarm.	a. Open or damaged cover on one or more housings.	Physically check all housings and make certain that all covers are straight, flat, and tightly closed. Inspect for any debris between the cover and housing that would interfere with complete closing.
	b. Low voltage to Processor.	a. Set multimeter to dc volts. Connect positive meter lead to TB1-7 and negative meter lead to TB1-8. Meter should indicate 20 +2 vdc.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	b. (cont)	b. If voltage is below tolerance, disconnect wires from TB1-7 and TB1-8 and measure voltage on these wires. (1) If voltage on wires is below tolerance, refer to TM 5-6350-264-14/10 & P on J-SIIDS Control Unit. (2) If voltage at Control Unit is good, check wires for open circuits and shorts-to-ground per instructions in TM 5-6350-264-14/1. c. If voltage on wires is good, replace PC board. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board. (2) To install new PC board, orient the board so the terminal strips are adjacent to conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. (3) Adjust sensitivity control per steps in TM 5-6350-264-14/1.
	c. Low voltage to	a. Set multimeter to dc volts. Connect receiver positive lead to TB2-1 and negative lead to TB2-2. Meter should indicate 5.3 0.5 vdc. b. If voltage is below tolerance, disconnect wires from TB2-1 and TB2-2 and measure voltage on these terminals. c. If voltage is still below tolerance, replace PC board. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	c. (cont)	(2) To install new PC board, orient board so the terminal strips are adjacent to conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. (3) Adjust sensitivity control per steps in TM 5-6350-264-14/1. d. If voltage at TB2-1 and TB2-2 is good, check interconnecting wiring for open circuits and shorts-to-ground. (1) To check for a grounded circuit, disconnect wires from TB2-1 and TB2-2 in the Processor and TBl-1 and TB1-2 in the Receiver. Set multimeter to ohms, and check between each wire and conduit or between each wire and shield. An indication of infinity means a good wire. Any indication of less than infinity means a short-to-ground. (2) To check for an open circuit, ground the wires at one end of the conduit. At the other end, check between each wire and the conduit. A low or zero indication means a good wire; an indication of infinity means an open wire. (3) Replace any wire that checks bad. e. If wiring is good, replace Receiver PC board. (1) To remove Receiver PC board, tag and remove the wires from TB1. Remove screws holding the PC board in the housing. Remove the PC board. (2) To replace the PC board, orient the board so that terminal strip TB1 is adjacent to the conduit

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	c. (cont)	connections. Secure the PC board to the housing with screws. Attach the wires to TB1. (3) Adjust the gain control per steps in TM 5-6350-264-14/1.
	d. Receiver gain control or Processor sensitivity control set too high.	**NOTE** BEFORE touching any gain or sensitivity controls, note their settings so that they may be returned to their original positions after testing. a. One at a time, turn Receiver gain controls all the way down, then back to their original setting. b. If Receiver gain controls do not correct the problem, turn Processor sensitivity control down, then back to its original setting.
	e. Open wire in tamper alarm circuit.	a. To check for an open circuit, disconnect wires from TB1-4 and TB1-6 in the Processor and TB1-5 and TB1-6 in the Receiver. Ground the wire at one end of the conduit. At the other end, use the multimeter set on ohms to check between the wire and conduit. A low or zero indication means a good wire; an indication of infinity means an open wire. b. Replace any open wire.
	f. Bad tamper alarm switch in one or more housings.	a. Check all tamper alarm switches (TAS). Tap each cover to ensure no switch contacts are in a floating condition and causing alarms. Open the cover on the Processor. Pull the TAS plunger all the way out. Disconnect wire from TB1-2. Set multimeter to ohms and connect leads to TB1-6 and TB1-5. With all Receiver covers closed, resistance indication should

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	f. (cont)	be 2, 000 ohms or less. Slowly open the cover on the first Receiver. Before the cover flanges clear the edge of the housing, the meter indication should change to over 100, 000 ohms. Pull the TAS plunger all the way out; the resistance should drop to its former level. Close cover and repeat test on remaining Receivers. With Processor cover open, use a straightedge across the housing to hold TAS plunger down. Slowly raise the straightedge to simulate opening the cover. After a movement of less than 1/4 inch (0.635 cm), the meter indication should change to over 100, 000 ohms. b. If the TAS on any unit fails, replace the PC board in that unit. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board. (2) To install new PC board, orient the board so the terminal strips are adjacent to conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. (3) Adjust sensitivity control per steps in TM 5-6350-264-14/1. (4) To remove Receiver PC board, tag and remove the wires from TB1. Remove screws holding the PC board in the housing. Remove the PC board. (5) To replace the PC board, orient the board so that terminal strip TB1 is adjacent to the conduit connections. Secure the PC board to the housing with screws. Attach the wires to TB1.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	f. (cont) NOTE Probable cause g. applies only if the Ultrasonic Motion Sensor and the Passive Ultrasonic Sensor are operated together.	(6) Adjust the gain control per steps in TM 5-6350-264-14/1.
	g. No SYNC pulse from the J-SIIDS Ultrasonic Motion Sensor (TM 5-6350-264-14/2 & P) to the notch filter in the Processor.	a. Set oscilloscope as follows: volts/division @ 0.5 v time/division @ 50 µsec trigger source @ internal trigger level @ auto and connect leads to TB2-7 and TB2-8. The scope should display the SYNC pulse as a sawtooth pattern of 1.5 to 10 v p-p and approximately 26.3 kHz. b. If the SYNC pulse signal is not correct, disconnect wires from TB2-7 and TB2-8. Connect 0-scope leads to these wires and check the signal on the wires. (1) If the signal, as displayed on the 0-scope, is not correct on these wires, refer to TM 5-6350-264-14/2 & P on J-SIIDS Ultrasonic Motion Sensor. (2) If the signal at the Ultrasonic Motion Sensor is correct, check interconnecting wires for open circuits or shorts-to-ground. (3) To check for a grounded circuit, disconnect wires from TB2-7 and TB2-8 in the Processor of the Ultrasonic Motion Sensor and the Passive Ultrasonic Sensor. Set multimeter to ohms, and check between each wire and shield. An indication of

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	g. (cont)	infinity means a good wire. Any indication of less than infinity means a short-to-ground. (4) To check for an open circuit, ground the wires at one end of the conduit. At the other end, use the multimeter set on ohms to check between each wire and conduit. A low or zero indication means a good wire; an indication of infinity means an open wire. (5) Replace any bad wires. c. If the signal on the wires removed from TB2-7 and TB2-8 is correct, check that the notch filter in the Processor is hooked up. To verify hook-up, ensure that there are jumpers from TB3-1 to TB3-2 and from TB3-3 to TB3-4. d. If the notch filter is hooked up, replace the Processor PC board. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board. (2) To install new PC board, ensure that the new board has jumpers from TB3-1 to TB3-2 and from TB3-3 to TB3-4. Orient the board so the terminal strips are adjacent to conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. (3) Adjust sensitivity control per steps in TM 5-6350-264-14/1.
	h. Bad Processor PC board.	a. Remove wires from TBl-1 and TB1-2 in the Processor. Set multimeter to ohms and connect meter leads to TBl-1 and TB1-2. Meter should indicate about 110 ohms.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	h (cont)	b. Remove wire from TB1-7 in the Processor. The meter indication should change to over 100,000 ohms. c. If the meter does not match these indications, replace the Processor PC board. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board. (2) To install new PC board, orient the board so the terminal strips are adjacent to conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. (3) Adjust sensitivity control per steps in TM 5-6350-264-14/1.
2. Nuisance alarms.	a. Receiver gain control or Processor sensitivity control set too high.	Calibrate gain and sensitivity controls per steps in TM 5-6350-264-14/1.
	b. Stray ultrasonic energy in protected area.	a. When the Passive Ultrasonic Sensor is first set up, all machinery or other equipment that will be operating in the secure area should be turned on so the Sensor can be adjusted to the proper level of sensitivity. Any changes in operating equipment or any piece of faulty equipment can cause nuisance alarms. b. Check for stray ultrasonic energy by using a dismounted Receiver to listen throughout the protected area. Temporarily connect a signal cable from Receiver TBl-1 and TB1-2 to Processor TB2-1 and TB2-2. Disconnect the wires from Processor TBL-1 and TB1-2. Set multimeter on ohms and connect leads to

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	b. (cont)	TBI-1 and TB1-2 in the Processor. Carry the Receiver around the protected area and check for sources of energy. When the Receiver detects stray ultrasonic energy, the meter indication will change from less than 2,000 ohms to over 100,000 ohms to signal an alarm status. Pay special attention to operating equipment such as motors, fans, bells, buzzers and horns. Other likely sources are ducts, vents, windows, and cracks in walls, floors, ceilings, and areas around doors and windows. Vents and windows should be baffled, cracks caulked. If the problem cannot be eliminated, receivers may be added or relocated as necessary.
	c. Poor or broken systems ground connections.	a. Check that Receiver TB1-9 and Processor TB1-9 and TB2-9 are connected to housings and conduit. b. Use the multimeter set on ohms to check between these terminals and conduit. c. If a high resistance is found at any of these points, check for bad connections. Remove the PC board, and visually inspect the underside of the board where it connects to the housing. Ensure that circuitry is clean and unbroken. If any broken or damaged circuitry is found, replace PC board. Check that paint has been removed from housing where conduit is connected. Check that conduit retainers are tight. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board. (2) To install new PC board, orient the board so the terminal strips are adjacent to conduit entrance

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	c. (cont)	holes Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. (3) Adjust sensitivity control per steps in TM 5-6350-264-14/1. (4) To remove Receiver PC board, tag and remove the wires from TB1. Remove screws holding the PC board in the housing. Remove the PC board. (5) To replace the PC board, orient the board so that terminal strip TB1 is adjacent to the conduit connections. Secure the PC board to the housing with screws. Attach the wires to TB1. (6) Adjust the gain control per steps in TM 5-6350-264-14/1.
	d. Bad tamper alarm switch.	a. Tap each housing cover to ensure no switch contacts are in a floating condition and causing alarms. b. If any TAS is bad, replace that PC board. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board. (2) To install new PC board, orient the board so the terminal strips are adjacent to conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. (3) Adjust sensitivity control per steps in TM 5-6350-264-14/1. (4) To remove Receiver PC board, tag and remove the wires from TB1. Remove screws holding the PC board in the housing. Remove the PC board.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	d. (cont)	(5). To replace the PC board, orient the board so that terminal strip TB1 is adjacent to the conduit connections. Secure the PC board to the housing with screws.
Attach the wires to		TB1.
		(6). Adjust the gain control per steps in TM 5-6350-2641/1.
	NOTE Probable cause applies only if the Ultrasonic Motion Sensor and the Passive Ultrasonic Sensor are operated together.	
	e. No SYNC pulse from the J-SIIDS Ultrasonic Motion Sense (TM 5-6350-264-14/2 & P to the notch filter in the Processor.	a. Set oscilloscope as follows: volts/division@0.5v time/division@50 µsec trigger level@auto and connect leads to TB2-7 and TB2-8. The scope should display the SYNC pulse as a sawtooth pattern of 1.5 to 10 v p-p and approximately 26.3 kHz.
		b. If the SYNC pulse signal is not correct, disconnect wired from TB2-7 and
TB2-8. Connect 0-scope leads to the		these wire and check the signal on wires.
scope, is not correct on these		(1) If the signal, as displayed on the 0- wires, refer to TM 5-6350-264-14/2 & P on J-SIIDS Ultrasonic Motion
Sensor.		
Sensor is correct, check circuits or shorts-to-ground.		(2) If the signal at the Ultrasonic Motion interconnection wires for open

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	e. (cont)	(3) To check for a grounded circuit, disconnect wires from TB2-7 and TB2-8 in the Processor, the Ultrasonic Motion Sensor, and the Passive Ultrasonic Sensor. Set multimeter to ohms, and check between each wire and conduit or between each wire and shield. An indication of infinity means a good wire. Any indication of less than infinity means a short-to- ground. (4) To check for an open circuit, ground the wires at one end of the conduit. At the other end, use the multimeter set on ohms to check between each wire and conduit. A low or zero indication means a good wire; an indication of infinity means an open wire. (5) Replace any bad wires. c. If the signal on the wires removed from TB2-7 and TB2-8 is correct, check that the notch filter in the Processor is hooked up. To verify hook-up, ensure that there are jumpers from TB3-1 to TB3-2 and from TB3-3 to TB3-4. d. If the notch filter is hooked up, replace the Processor PC board. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board. (2) To install new PC board, ensure that the new board has jumpers from TB3-1 to TB3-2 and from TB3-3 to TB3-4. Orient the board so the terminal strips are adjacent to conduit entrance holes. Secure the PC board to

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2 (cont)	e. (cont)	the chassis with screws. Connect wires to TB1 and TB2. (3) Adjust sensitivity control per steps in TM 5-6350-264-14/1. **NOTE** If the notch filter is hooked up, but there is no SYNC pulse, nuisance alarms will result. e. If the J-SIIDS Ultrasonic Motion Sensor is not used, check the Processor to ensure the notch filter has been by-passed. Verify that there is a jumper from TB3-2 to TB3-3 in the Processor.
(3) Poor sensitivity. Meter at negative lead to TB2-2. Meter Receivers.	Low voltage to Receiver.	a. Set multimeter to dc volts. Connect positive lead to TB2-1 and one or more Re- should indicate 5.3 ±0.5 vdc. b. If voltage is below tolerance, disconnect wires from TBI-1 and TB1-2 in the Receiver, and measure voltage on these wires. c. If voltage on wires is below tolerance, disconnect wires from TB2-1 and TB2-2 in the Processor and measure voltage on these terminals. d. If voltage on these terminals is below tolerance, replace Processor PC board. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board. (2) To install new PC board, orient the board so the terminal strips are adjacent to conduit entrance

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
3 (cont)	(cont)	(3) Adjust sensitivity control per steps in TM 5-6350-264-14/1. e. If voltage on these terminals is good, check wiring for open circuits and shorts-to-ground. (1) To check for a grounded circuit, disconnect wires from TB2-1 and TB2-2 in the Processor and TBl-1 and TB2-2 in the Receiver. Set multimeter to ohms, and check between each wire and conduit or between each wire and shield. An indication of infinity means a good wire. Any indication of less than infinity means a short-to-ground. (2) To check for an open circuit, ground the wires at one end of the circuit. At the other end, use the multimeter set on ohms to check between each wire and conduit. A low or zero indication means a good wire; an indication of infinity means an open wire. (3) Replace any bad wires. f If voltage on wires removed from TB1-1 and TB1-2 in the Receiver is good, replace Receiver PC board. (1) To remove Receiver PC board, tag and remove the wires from TB1. Remove screws holding the PC board in the housing. Remove the PC board. (2) To replace the PC board, orient the board so that terminal strip TB1 is adjacent to the conduit connections. Secure the PC board to the housing with screws. Attach the wires to TB1.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
3. (cont)	(cont)	(3) Adjust the gain control per steps in TM 5-6350-264-14/1.
4. No alarms	a. Bad Processor PC board	a Remove wires from TBl-1 and TB1-2 in the Processor. Set multimeter to ohms, and connect meter leads to TBl-1 and TB1-2. Meter should indicate about 110 ohms.
		b. Remove the wire from TB1-7 in the Processor. The meter indication should change to over 100,000
ohms.		c. If the meter does not match these indications, replace the Processor PC board.
		(1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board.
		(2) To install new PC board, orient the board so the terminal strips are adjacent to conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2.
		(3) Adjust sensitivity control per steps in TM 5-6350-264-14/1.
	b. Bad Receiver	Set multimeter to dc volts Connect PC
board positive meter		lead to TP MV and negative meter lead to TB1-8 in the Processor. The meter should indicate 0 volts. Use a key ring with four to six brass keys on it and rattle the keys in front of the Receiver. The meter should deflect when the keys are rattled. If meter does not deflect after several trials, replace Receiver PC board.
		(1) To remove Receiver PC board, tag and remove the wires from TB1. Remove screws holding the PC board in the housing. Remove the PC board.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
4. (cont)	b. (cont)	(2) To replace the PC board, orient the board so that terminal strip TB1 is adjacent to the conduit connections. Secure the PC board to the housing with screws. Attach the wires to TB1. (3) Adjust the gain control per steps in TM 5-6350-264-14/1.

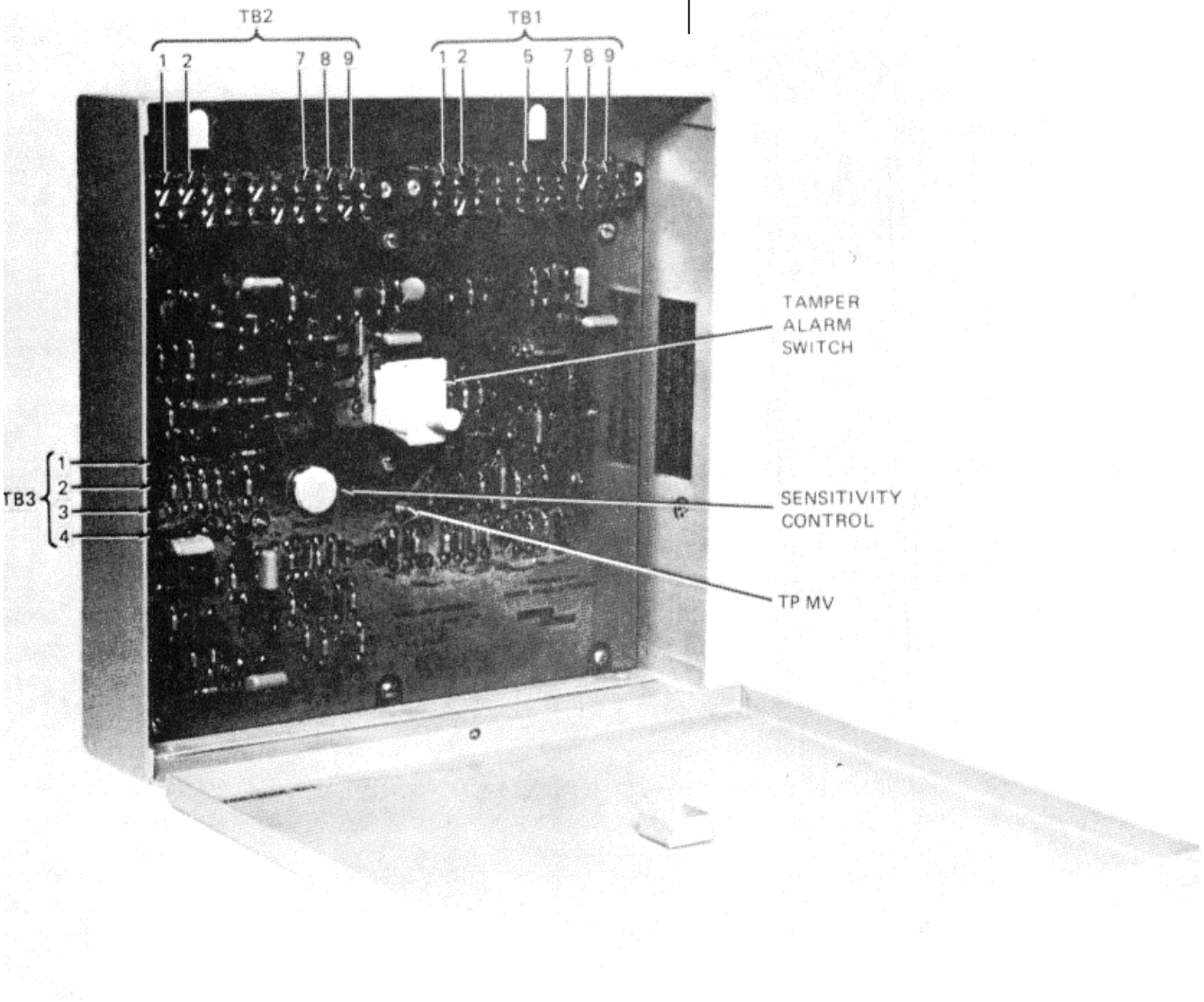

Figure 5-1. Processor, Ultrasonic Motion Sensor with Troubleshooting Test Points

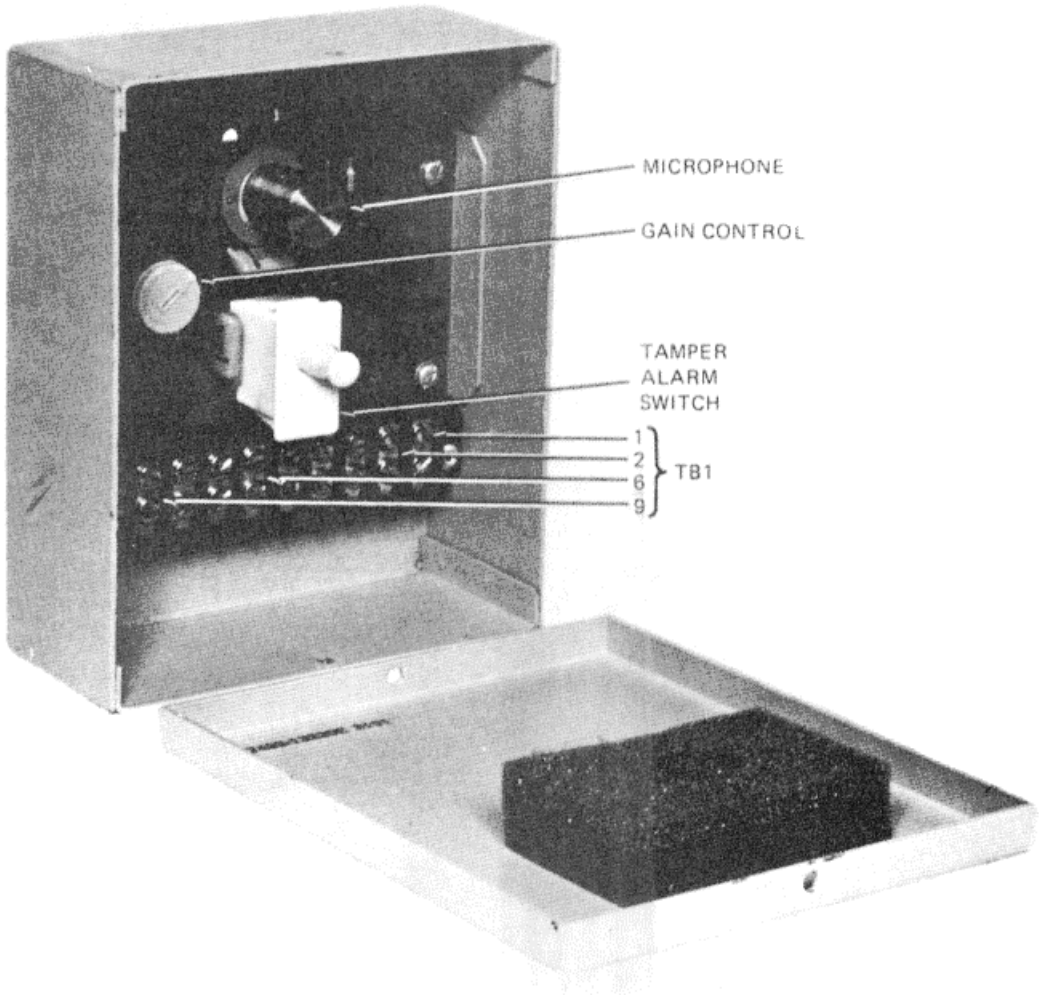

Figure 5-2. Receiver, Ultrasonic Motion Sensor with Troubleshooting Test Points

Section III. GENERAL MAINTENANCE

5-4. MAINTENANCE ACTION. The extent of direct and general support maintenance is governed by the Maintenance Allocation Chart (MAC), Appendix B. The MAC provides for on-site test and replacement of the PC boards in both the Processor and Receiver. On-site adjustment is made on the gain control in the Receiver and the sensitivity control in the Processor. Inspection only is made on the housings. Periodic testing of the Passive Ultrasonic Sensor is not scheduled because the J-SIIDS is maintained in continuous operation.

Section IV. REMOVAL AND REPLACEMENT OF MAJOR COMPONENTS AND ASSEMBLIES

5-5. REMOVAL AND INSTALLATION PROCEDURES.

a. To remove the Processor PC board, remove screws holding the cover. Remove the cover. Tag and remove the leads from TB1 and TB2. Remove screws holding the PC board in the housing. Remove the PC board.

b. To replace the processor PC board, orient the board so that terminal strips TB1 and TB2 are adjacent to the conduit connections. Secure the PC board to the housing with screws. Attach the leads to TB1 and TB2. Calibrate the PUS in accordance with steps in TM 5-6350264-14/1. Replace the cover and secure it with screws.

c. To remove the Receiver PC board, remove screws holding the cover. Remove the cover. Tag and remove the leads from TB1. Remove screws holding the PC board in the housing. Remove the PC board.

d To replace the Receiver PC board, orient the board so that terminal strip TB1 is adjacent to the conduit connections. Secure the PC board to the housing with screws. Attach the wires to TB1 Calibrate the PUS in accordance with steps in TM5-6350-264-14/1Replace the cover and secure it with screws.

e. After replacement of major components or assemblies, test the PUS for proper operation. Ensure that the keyoperated switch on the Control Unit is in the access position. Remove the Processor housing cover and pull the TAS plunger all the way out. Set the multimeter to dc volts and connect the positive lead to TP MV and the negative lead to TB1-8. The meter should indicate zero volts. Use a key ring with four to5-19/(5-20 blank) six brass keys on it. Rattle the keys in front of the Receiver. The meter should deflect. Disconnect wire from TB1-6. Set the multimeter to ohms and connect the leads to TB1-6 and 2. With the Receiver housing cover closed, the meter should indicate less than 2,000 ohms. Slowly open the cover. Before the cover flanges clear the edge of the housing, the meter indication should change to over 100,000 ohms. Remove the cover and pull the TAS plunger all the way out. The meter indication should drop to its former level. Secure the Receiver housing cover. Depress the TAS plunger in the Processor. The meter should indicate less than 2,000 ohms. Slowly release the plunger. After about 1/4 inch (0.635 cm) of movement the meter indication should change to over 100,000 ohms. Remove the meter leads, reconnect the wire to TB1-6, and secure the Processor housing cover.

CHAPTER 6

REPAIR OF THE PASSIVE ULTRASONIC SENSOR

This chapter is not applicable to this equipment.

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
   DA Pamphlet 738-750 — The Army Maintenance Management System

4. TRI-SERVICE MANUALS

   DMWR 5-6350-264
   NAVELEX EE181-AA-MMD-010/E121
   J-SIIDS MWR
   AIR FORCE T.O. 3159-4-1-213 — 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, Capacitance 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 5-6350-264-14&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 Module, Alarm
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. 31S9-2FSS9-1-13	Sensor, Magnetic Weapons (DT-547)
TB 5-6350-264 NAVELEX EE181-AB-OMI-010/E121 J-SIIDS AIR FORCE T.O. 31S9-4-1-111	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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APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions or explanatory notes for a particular maintenance function. (Not Applicable)

B-2. MATNTENANCE FUNCTIONS. Maintenance functions are defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made, or to be adjusted on instruments for test, measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, or module in a manner to allow the proper functioning of an equipment or system.

h. Replace. The act of substituting a serviceable like part, subassembly, or module for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module, end item or service.

j. Overhaul. That maintenance effort (service/ actions) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

B3. COLUMN ENTRIES.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains .the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in column 2.

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform the maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate "work time "figures will be shown for each level. The number of man-hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance levels are as follows:

C .....Operator or crew

O .....Organization maintenance

F.....Direct support maintenance

H ..... General support maintenance

D .....Depot maintenance

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

Section II. MAINTENANCE ALLOCATION CHART
for

Passive Ultrasonic Receiver (R-1860) and Passive Ultrasonic Processor (MX- 9443)

(1) Group number	(2) Component/assembly	(3) Maintenance function	(4) Maint. category C	O	F	H	D	(5) Tool/ equipment	(6) Remarks
01	Passive Ultra-sonic Receiver								
	Gain Control	Test			0.3			1	
		Adjust			0.5				
	Printed Wiring Board Assy	Test			0.5			1	
		Replace			1.0				
	Enclosure	Inspect	0.3						
02	Passive Ultra-sonic Processor								
	Sensitivity Control	Test			0.3			1, 2	
		Adjust			0.5				
	Printed Wiring Board Assy	Test			0.5			1	
		Replace			1.0				
	Enclosure	Inspect	0.3						

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

for

Passive Ultrasonic Receiver (R-1860) and Passive Ultrasonic Processor (MX-9443)

(1) REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL/NATO STOCK NUMBER	(5) TOOL* NUMBER
1.	F	Multimeter	6625-00-019-0815	Vom
2.	F	Oscilloscope	6625-00-127-0079	475A

Section IV. REMARKS

Maintenance Allocation Chart

Reference Code	Remarks
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APPENDIX C

ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST
Section I. INTRODUCTION

1. Scope.

This manual lists and authorizes repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of organizational, direct support, and general support maintenance of the Passive Ultrasonic Sensor. It authorizes the requisitioning, issue, and disposition of spares, repair parts and special tools as indicated by the Source, Maintenance and Recoverability (SMR) codes.

2. General.

This Repair Parts and Special Tools List is divided into the following sections:

a. Section II. Repair Parts List. A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Bulk materials are listed in NSN sequence.

b. Section III. Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL for the performance of maintenance.

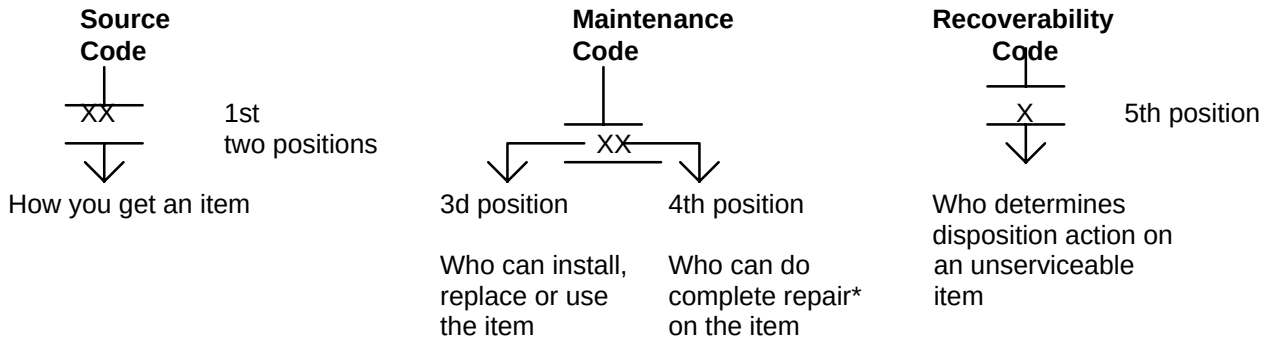
c. Section IV. National Stock Number and Part Number Index. A list, in National Item Identification Number (NIIN) sequence, of all National Stock Numbers (NSN) appearing in the listings, followed by a list in alphanumeric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance.

3. Explanation of Columns.

a. Illustration (Column (1)). This column is divided as follows:
(1)((a) FIG NO.) Figure Number. Indicates the figure number illustrating an exploded view of a functional group.

(2)((b) ITEM NO.). Indicates the number used to identify items called out in the illustration.

b. SMR CODE (Column (2)). The Source, Maintenance, and Recoverability (SMR) code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instructions, as shown in the following breakout:



*Complete Repair: Maintenance capacity, capability, and authority to perform all the corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

(1) Source Code. The source code tells you how you get an item needed for maintenance, repair, or overhaul of an end item/equipment. Source codes are always the first two positions of the SMR code. Explanations of source codes follow:

Code	Explanation
PA PB PC PD PE PF PG	Stocked items: use the applicable NSN to request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3d position of the SMR code.
KD KF KB	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated in the 3d position of the SMR code. The complete kit must be requisitioned and applied.
MO-(Made at org/ AVUM Category) **MF**-(Made at DS/ AVIM Category) **MH**-(Made at GS Category) **MD-(**Made at Depot)	Items with these codes are not to be requested/requisitioned individually. They, must be made from bulk material which is identified by NSN in the Description column and listed in the Bulk Material group in the repair parts list in this manual. If the item is authorized to you by the 3d position code of the SMR code, but the source code indicates it is made at a higher category. order the item from the higher category of maintenance.

Code	Explanation
AO-(Assembled by org/ AVUM Category) **AF**-(Assembled by DS/ AVIM Category) **AH-**(Assembled by GS Category) **AD**-(Assembled by Depot)	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the category of maintenance indicated by the source code. If the 3d position code of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher category, order the item from the higher category of maintenance.

XA- Do not requisition an "XA"-coded item. Order its next higher assembly. (Also, refer to the NOTE below.)

XB- If an "XB" item is not available from salvage, order it using the FSCM and part number given.

XC- Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.

XD- Item is not stocked. Order an "XD"-coded item through normal supply channels using the FSCM and part number given, if no NSN is available.

NOTE

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 700-42.

(2) Maintenance Code. Maintenance codes tell you the category(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the SMR Code as follows:

(a) The maintenance code entered in the third position tells you the lowest maintenance category authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to one of the following categories of maintenance.

Code	Application/Explanation
C	- Crew or operator maintenance done within organizational or aviation unit maintenance.
O	- Organizational or aviation unit category can remove, replace, and use the item.
F	- Direct support or aviation intermediate category can remove, replace, and use the item.
H	- General support category can remove, replace, and use the item.
L	- Specialized repair activity can remove, replace, and use the item.
D	- Depot category can remove, replace, and use the item.

(b) The maintenance code entered in the fourth position tells you whether or not the item is to be repaired and identifies the lowest maintenance category with the capability to do complete repair (i.e., perform all authorized repair functions). (NOTE: Some limited repair may be done on the item at a lower category of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.) This position will contain one of the following maintenance codes.

Code	Application/Explanation
O	- Organizational or aviation unit is the lowest category that can do complete repair of the item.
F	- Direct support or aviation intermediate is the lowest category that can do complete repair of the item.
H	- General support is the lowest category that can do complete repair of the item.
L	-Specialized repair activity (designate the specialized repair activity) is the lowest category that can do complete repair of the item.
D	- Depot is the lowest category that can do complete repair of the item.
Z	- NonreparableNo repair is authorized.
B	- No repair is authorized(No parts or special tools are authorized for the maintenance of a "B" coded item.) However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

(3) Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the SMR Code as follows:

Recoverability Codes	**Definition**
Z	- Nonreparable itemWhen unserviceable, condemn and dispose of the item at the category of maintenance shown in 3d position of SMR Code.
O	- Reparable itemWhen uneconomically reparable, condemn and dispose of the item at organizational or aviation unit category.
F	- Reparable itemWhen uneconomically reparable, condemn and dispose of the item at the direct support or aviation intermediate category.
H	- Reparable itemWhen uneconomically reparable, condemn and dispose of the item at the general support category.
D	- Reparable itemWhen beyond lower category repair capability, return to depotCondemnation and disposal of item not authorized below depot category.

L	- Reparable itemCondemnation and disposal not authorized below specialized repair activity.
A	-Item requires special handling or condemnation procedures because of specific reasons (i.e., precious metal content, high dollar value, critical material, or hazardous material)Refer to appropriate manuals/directives for specific instructions.

c. National Stock Number (Column (3)). Lists the National Stock Number (NSN) assigned to the item. Use the NSN for requests/requisitions.

d. FSCM (Column (4)). The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

e. Part Number (Column (5)). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different part number from the part ordered, but go ahead and use or furnish it as the replacement part.

f. Description (Column (6)). This column includes the following information:

(1) The Federal item name and, when required, a minimum description to identify the item.

(2) The physical security classification of the item is indicated by the parenthetical entry (insert applicable physical security classification abbreviation, e.g., Phy Sec C1 (C)- Confidential, Phy Sec C1 (S) - Secret, Phy Sec C1 (T) - Top Secret).

(3) Items that are included in kits and sets are listed below the name of the kit or set.

(4) Spare/repair parts that make up an assembled item are listed immediately following the assembled item line entry.

(5) NSN's for bulk materials are referenced in the description column in the line item entry for the item to be manufactured/fabricated.

(6) When the part to be used differs between serial numbers of the same model, the effective serial numbers are shown as the last line of the description.

(7) The USABLE ON CODE, when applicable (see paragraph 4, Special Information).

(8) In the Special Tools List section, the Basis of Issue (BOI) appears as the last line(s) in the entry for each special tool, special TMDE, and other special support equipment. When density of equipments supported exceeds density spread indicated in the basis of issue, the total authorization is increased proportionately.

g. U/M (Column (7)). The Unit of Measure (U/M) indicates the measure (e.g., foot, gallon, pound) or count (e.g., each, dozen, gross) of a listed item. A two-character alpha code (e.g., FT, GL, LB, EA, DZ, GR) appears in this column to indicate the measure or count. If the U/M code appearing in this column differs from the Unit of Issue (U/I) code listed in the Army Master Data File (AMDF), request the lowest U/I that will satisfy your needs.

h. QTY INC IN UNIT (Column (8)). The Quantity Incorporated In Unit (QTY INC IN UNIT) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable (e.g., shims, spacers).

4. Special Information.

a. The "USABLE ON CODE" title appears in the lower right corner of column (6), Description. Usable on codes are shown in the right-hand margin of the description column. Uncoded items are applicable to all models. Identification of the usable on codes used in this publication are:

Code	Used On
CWM	R-1860/FSS-9(V)
CWN	MX-9443/FSS-9(V)

b. Line item entries for repair parts kits and sets appear as the last entries in the repair parts listing for the figure in which their parts are listed as repair parts.

5. How to Locate Repair Parts.

a. When National Stock Number or Part Number is Not Known:

(1) First. Using the table of contents, determine the functional group or subfunctional group to which the item belongs. This is necessary since figures are prepared for functional groups and subfunctional groups, and listings are divided into the same groups.

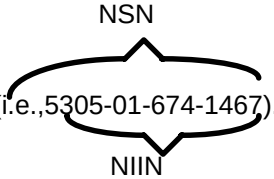
(2) Second. Find the figure covering the functional group or subfunctional group to which the item belongs.

(3) Third. Identify the item on the figure and note the item number of the item.

(4) Fourth. Refer to the Repair Parts List for the figure to find the line item entry for the item number noted on the figure.

b. When National Stock Number or Part Number is Known:

(1) First. Using the Index of National Stock Numbers and Part Numbers, find the pertinent National stock number or part number. The NSN index is in National Item Identification Number (NIIN)* sequence. The part numbers in the Part Number index are listed in ascending alphanumeric sequence. Both indexes cross-reference you to the illustration figure and item number of the item you are looking for.



*The NIIN consists of the last 9 digits of the NSN (i.e.,5305-01-674-1467).

(2) Second. After finding the figure and item number, verify that the item is the one you're looking for, then locate the item number in the repair parts list for the figure.

6. Abbreviations.

Abbreviations	Explanation
cd-or	Cadmium-ore
zn-pltd	zinc-plated
MOD	Model
opng	opening
NIIN	National Item Identification Number (consists of the last 9 digits of the NSN)
RPSTL	Repair Parts and Special Tools List

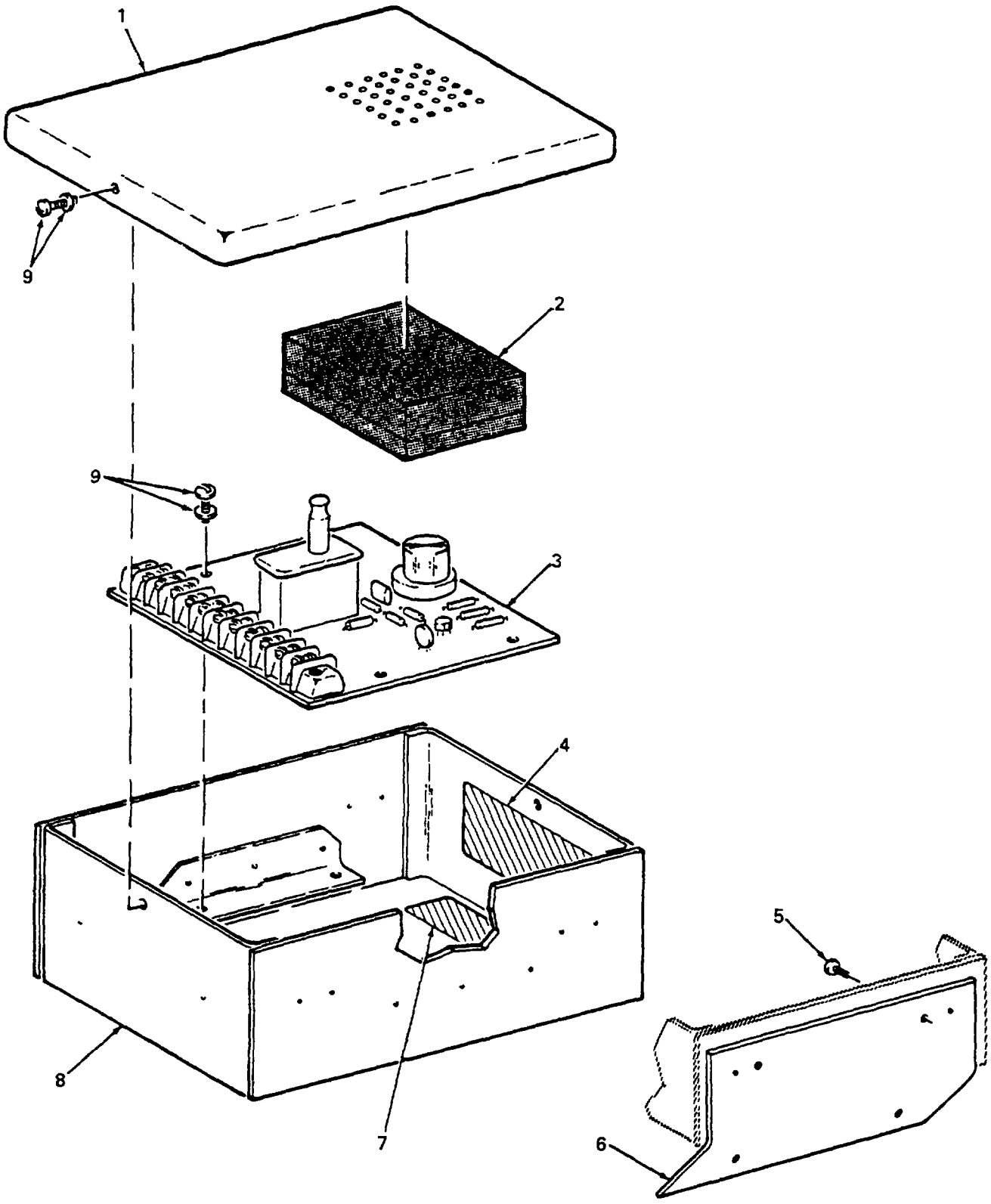


Figure C-1. Passive Ultrasonic Signal Receiver R-1860/FSS-9(V)

Section II. REPAIR PARTS LIST

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION / USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 01 PASSIVE ULTRASONIC RECEIVER		
C-1	1	XBFZZ		97403	13220E3161	COVER,RECEIVER ..... CWM	EA	1
C-2	2	XDFZZ		97403	13220E3165	SCREN,FAOM..... CWM	EA	1
C-3	3	PAFLZZ	6350-00-345-8388	97403	13220E3163	CIRCUIT CARD ASSEMB ..... CWM	EA	1
C-4	4	XDFZZ		97403	13220E3160	PLATE ..... CWM	EA	1
C-5	5	PAFZZ	5305-00-054-6665	96906	MS51957-40	SCREW,MACHNE-PAN ..... CWM	EA	2
C-6	6	XBFZZ		97403	13220E3164	BRACKET, MOUNTING ..... CWM	EA	1
C- 7	7	XDFZZ		97403	13220E3165	PLATE ..... CWM	EA	1
C-8	8	XBFZZ		97403	13220E3162	CHASSIS,ELECTRICAL..... CWM	EA	1
C-9	9	XBFZZ		91403	132202E2997	SCREW, ASSEMBLED ..... CWM	EA	6

Change 1 C-9

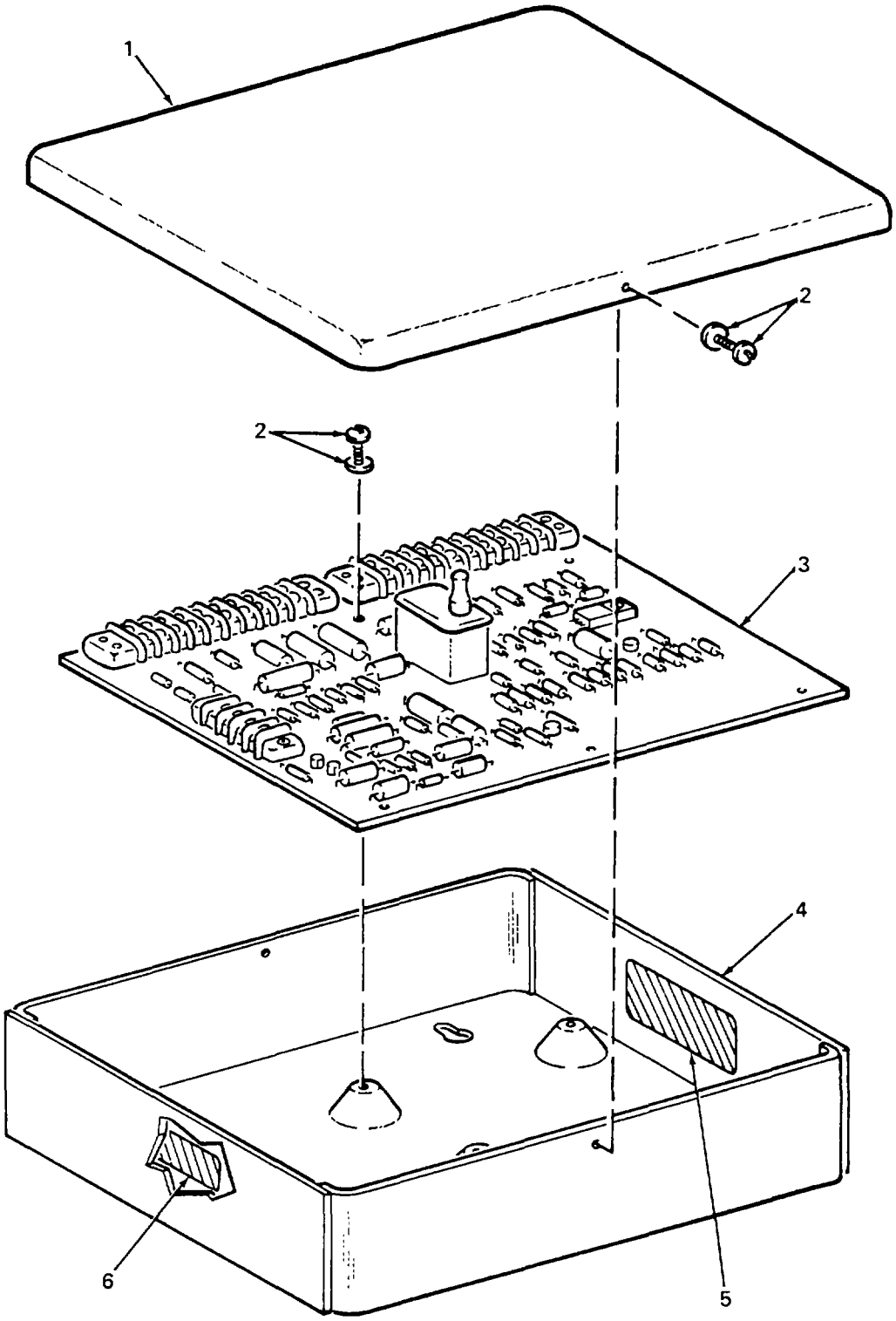


Figure C-2. Passive Ultrasonic Signal Processor MX-9443/FSS-9(V)

Section II. REPAIR PARTS LIST

(1) ILLUSTRATION (a) FIG NO.	(b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 02 PASSIVE ULTRASONIC PROCESSOR		
C-2	1	*XBFZZ*	6350-00-140-0787	97403	13220E3011	COVER,PROCESSOR.....CWN	EA	1
C-2	2	XBFZZ		97403	13220E2997	SCREW, ASSEMBLED .....CWN	EA	9
C-2	3	PAFZZ	6350-00-345-8836	97403	13220E3111	PRINTED CIRCUIT BOA.....CWN	EA	1
C-2	4	XBFZZ		97403	13220E3012	CHASSIS,ELECTRICAL.....CWN	EA	1
C-2	5	XBFZZ		97403	13220E3110	PLATE .....CWN	EA	1
C-2	6	X*BFZZ*		97403	13220E3112	PLATE .....CWN	EA	1

Section III. SPECIAL TOOLS LIST

This section is not applicable.

STOCK NUMBER	FIG. NO.	ITEM NO.	STOCK NUMBER	FIG. NO.	ITEM NO.
5305-00-054-6665	C-1	5	6350-00-345-8386	C-2	3
6350-00- L40-0787	C-2	1	6350-00-345-8388	C-1	3

Section IV. NATIONAL STOCK NUMBER AND PART NUMBER INDEX

FSCM	PART NUMBER	FIGURE NO.	ITEM NO.	FSCM	PART NUMBER	FIGURE NO.	ITEM NO.
96906	MS51957-40	C-1	1	5	97403	13220E3160	C-114
97403	13220E2997	C-1	1	9	97403	13220E3161	C-111
97403	132ZOEZ997	C-2	2	2	97403	13220E3162	C-118
97403	13220E3011	C-2	2	1	97403	13220E3163	C-113
97403	1322OE3012	C-2	2	4	97403	13220E3164	C-116
97403	13220E3110	C-2	2	5	97403	13220E3165	C-112
97403	13220E3111	C-2	2	3	97403	13220E3166	C-117
97403	13220E3112	C-2	2	5			

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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 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 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 milliliters = .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

PIN: 051408-001