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NAVY PUBLICATION	NAVELEX EE 181-AA-OMI-030 / E121 RT1161 M9443
AIR FORCE TECHNICAL ORDER	T.O. 31S9-2FSS9-1-2

TECHNICAL MANUAL

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

TRANSCEIVER, ULTRASONIC MOTION SIGNAL
RT-1 161 / FSS-9(V)
NSN 6350-00-228-2566

PROCESSOR, ULTRASONIC MOTION SIGNAL
MX-9444/ FSS-9(V)
NSN 6350-00-228-2581

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

30 AUGUST 1982

DEPARTMENT OF THE ARMY TECHNICAL MANUAL
DEPARTMENT OF THE NAVY PUBLICATION
DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

TM 5-6350-264-14&P-2
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T.O. 31S9-2FSS9-1-2
C1

CHANGE
No. 1

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

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

TRANSCEIVER, ULTRASONIC MOTION SIGNAL
RT-1161/FSS-9(V)
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TM 5-6350-264-14&P-2/NAVELEX EE181-AA-OMI-030/E121 RT1161 M9443/
T.O. 31S9-2FSS9-1-2, 30 August 1982, 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
i and ii	i and ii
---	iii/iv
1-1 through 1-3/1-4	1-1 through 1-3/1-4
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-5/C-6	C-1 through C-6
---	C-7 through C-12

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

NAVELEX EE181-AA-OMI-03A/E121 RT1161 M9443
T.O. 31S9-2FSS9-1-2
C1

By Order of the Secretaries of the Army, the Navy, and the Air Force:

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DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Operator 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 keyoperated 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.

DEPARTMENT OF THE ARMY TECHNICAL MANUAL
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NSN 6350-00-228-2581

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 Boulevard, 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.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

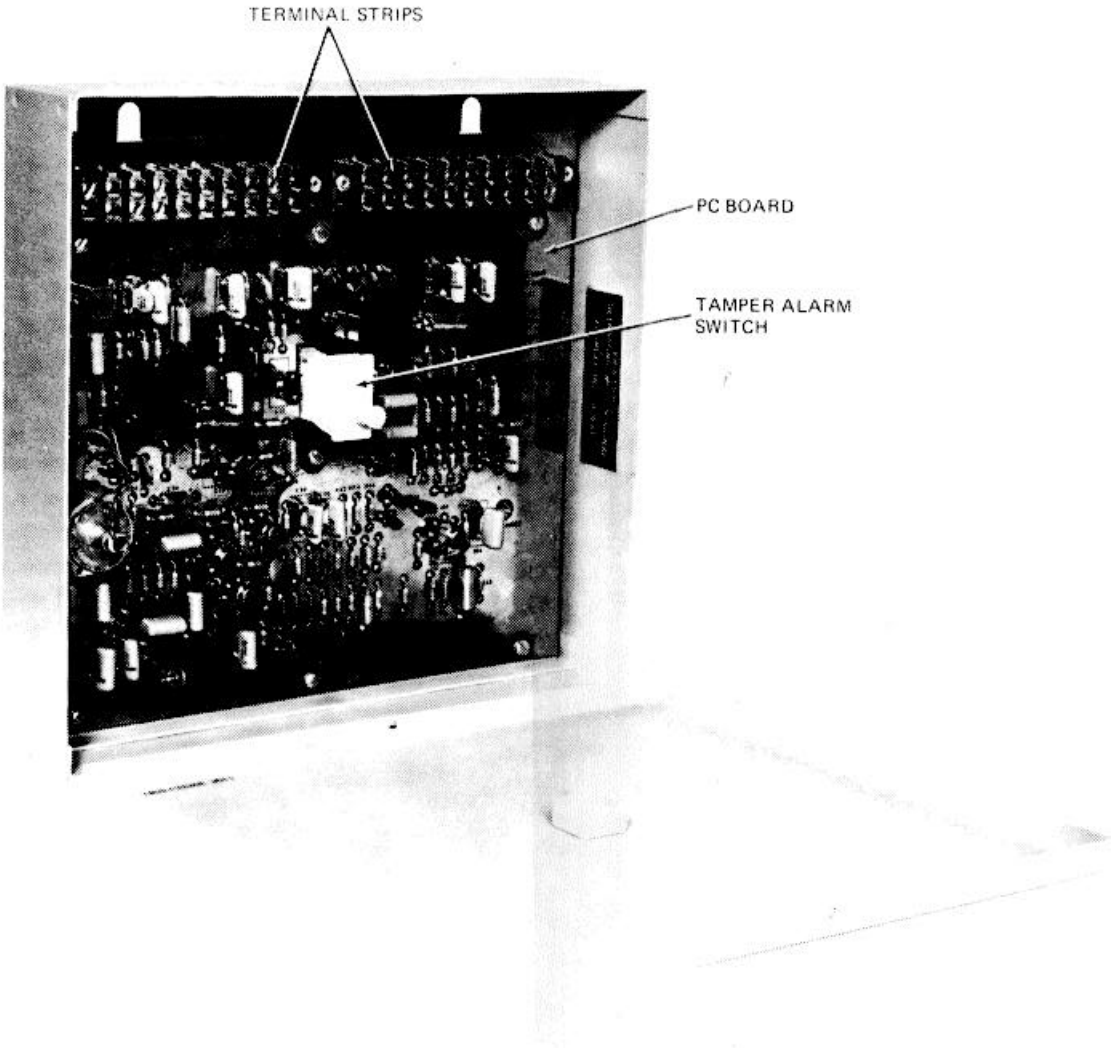


Figure 1-1. Ultrasonic Motion Signal Processor (Access Cover Removed)

CHAPTER 1

INTRODUCTION

Section I. General

1-1. SCOPE This manual is for your use in operating and maintaining the Ultrasonic Motion Signal Processor, MX-9444/FSS-9(V) and Ultrasonic Motion Signal Transceiver, RT-1161/FSS-9(V), under normal operating conditions. When these two units are combined, they form an Ultrasonic Motion Sensor (UMS). The UMS is an integral part of the Joint-Services Interior Intrusion Detection System (J-SIIDS). For information on other 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 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 materiel 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 Ultrasonic Motion Sensor (UMS) consists of a Processor and a Transceiver. 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 chassis. Mounted on the PC board are the tamper alarm switch (TAS), terminal strips for wire connections, and all electronic components. The chassis has a removable cover and access holes where interconnecting wiring is brought in through conduit.

c. The Transceiver (fig. 1-2) consists of a PC board mounted inside a steel chassis. Mounted on the PC board are the range control, TAS, terminal strip for wire connections, and all electronic components. Transmit and receive transducers are supported by mounts inside each end of the chassis. The chassis has a removable cover and access holes where interconnecting wiring is brought in through conduit.

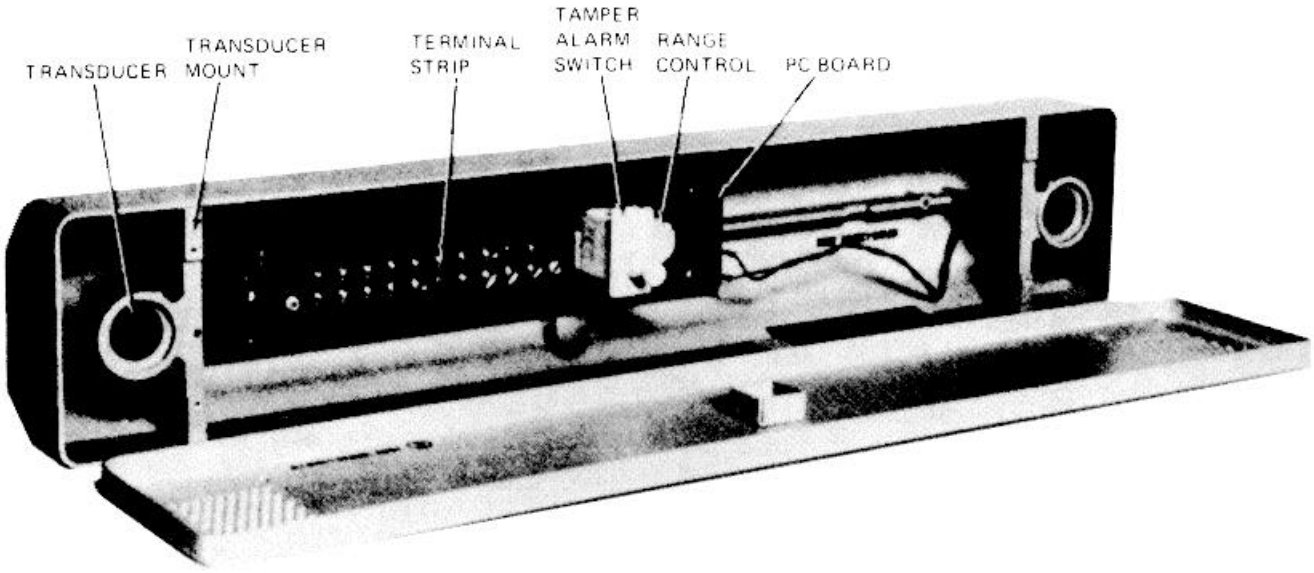


Figure 1-2. Ultrasonic Motion Signal Transceiver

1-9. TABULATED DATA.

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

b. Equipment Characteristics.

Weight

Processor ..... 6.5 pounds (2.9 kg)

Transceiver ..... 6.0 pounds (2.7 kg)

Dimensions (overall)

Processor

Height ..... 9.7 inches (24.6 cm)

Width ..... 10.2 inches (25.9 cm)

Depth ..... 2.1 inches (5.3 cm)

Transceiver

Height ..... 17.9 inches (45.5 cm)

Width ..... 3.4 inches (8.6 cm)

Depth ..... 2.2 inches (5.6 cm)

Color (chassis) Gray per Federal Standard 595, color chip 36440, MIL-C-22751

Environmental (operational)

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

Relative humidity ..... Up to 95%

Environmental (nonoperational and storage)

Temperature range ..... -30° to +165°F (-34° to +740C)

Relative humidity ..... Up to 95%

Shock ..... 20 g for 11 ms duration plus bench handling shock

Vibration ..... Withstands transportation conditions

Sensitivity ..... 65 dB, referenced to 0.0002 microbar, between 25.3 and 27.3 kHz

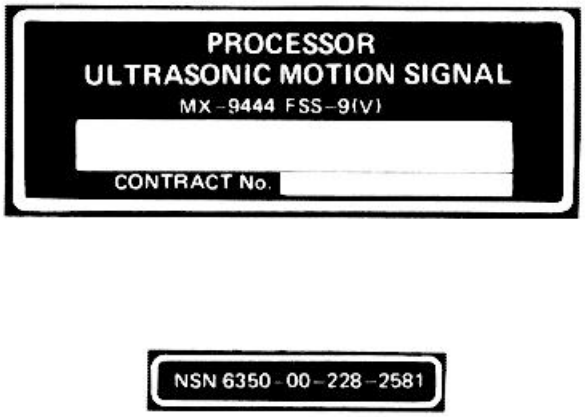


Figure 1-3. Identification Plate, Processor

Figure 1-4. Identification Plate, Transceiver

Power requirements ..... 20 + 2 vdc

Processor .....35 ma (100 ma max for 20 transceivers)

Transceiver 2.5 ma each power supplied by J-SIIDS Control Unit

Alarm circuit

No alarm ..... Less than 2,000-ohm resistance

Alarm .....More than 100,000 ohm ..... resistance

Operating frequency..... 26.3 kHz +130 Hz

Intrusion alarm criteria.....Target velocity of 0.55 fps (0.17 meter/sec) for 1 sec to 17.6 fps (5.4 meter/sec) for 0.3 sec

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

Weather resistance .....Designed for interior installation

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. OPERATING INSTRUCTIONS

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

2-2. NORMAL OPERATING PROCEDURES. The UMS is ready for operation after the Transceiver(s) and Processor are installed, tested, and connected to the J-SIIDS Control Unit. Since the startup and shutdown of the UMS are dependent upon the presence or absence of power from the J-SIIDS 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 (standby) power should be avoided.

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

Section II. THEORY OF OPERATION

2-5. FUNCTIONAL DESCRIPTION. The Processor generates a closely controlled signal of 26.3 kHz. This signal is fed to the Transceiver, where the transmit transducer converts it to ultrasonic sound energy and radiates it into the protected area. The ultrasonic sound is reflected from walls or objects within the area and is picked up by the receive transducer which converts it back to an electrical signal. If there is any movement within the secured area, the reflected sound will be shifted to a higher or lower frequency. The returned signal is amplified by the Transceiver, fed back to the Processor, and compared to the original signal. If the reflected signal matches the original, the UMS does not alarm. If the reflected signal does not match the original, the difference is sensed by the detector circuit and the alarm circuit sends an alarm signal to the J-SIIDS Control Unit. See figure 2-1 for a simplified block diagram. Each Processor can handle up to twenty Transceivers to provide coverage of a larger area or several separate areas. However, the total interconnecting coaxial cable must be limited to 500 feet (152.4 m).

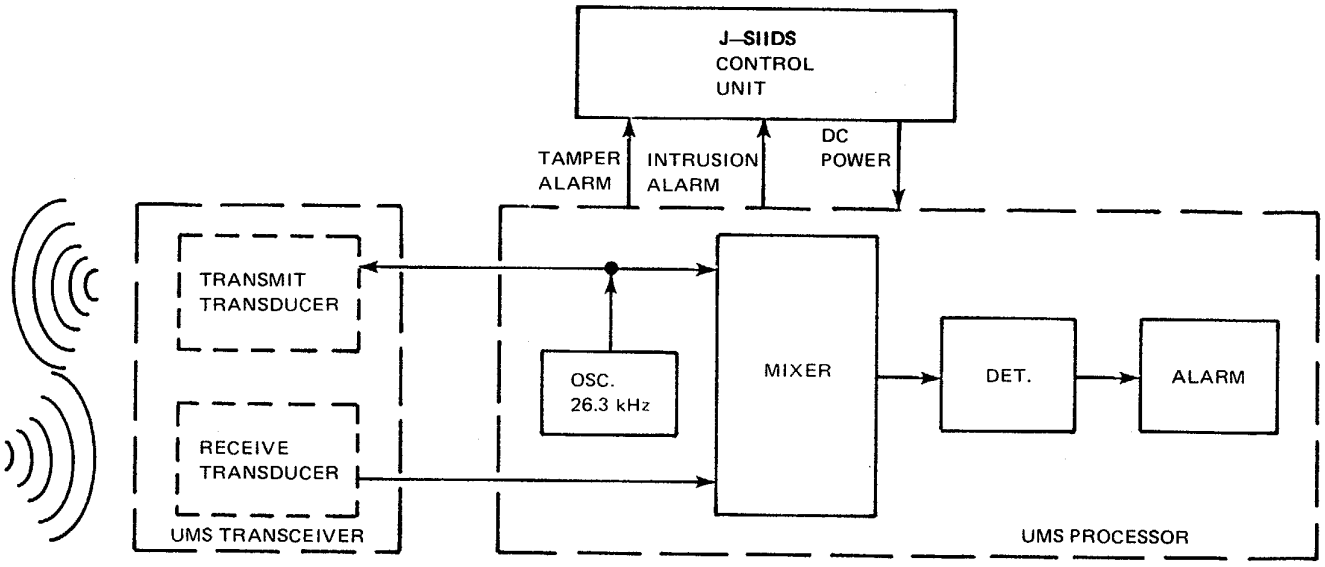


Figure 2-1. Simplified Block Diagram

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 UMS 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 opera tion will be noted for correction during equipment shutdown. Record all deficiencies and corrective actions on DA Form 2404.

Section III. TROUBLESHOOTING

This section is not applicable.

Section IV. MAINTENANCE PROCEDURES

This section is not applicable.

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.	Transceiver chassis	Inspect exterior for damage, properly secured covers, securely attached conduit, and rust or corrosion. Clean exterior surface using a cloth dampened in solution of mild detergent and water. Rinse with 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.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

This chapter is not applicable.

CHAPTER 5

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

5-1. SPECIAL TOOLS. No special tools are required for the Processor and Transceiver (Ultrasonic Motion 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, opening Audible Alarm, removing faceplate, and turning off power switch. After troubleshooting, the Audible Alarm must be reactivated. Activate the Alarm by setting the keyoperated 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 this table, 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 Ultrasonic Motion 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 Ultrasonic Motion 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.

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 found in the troubleshooting table. Step-by-step troubleshooting procedures, including troubles, probable cause, and corrective action, are listed in table 5-1.

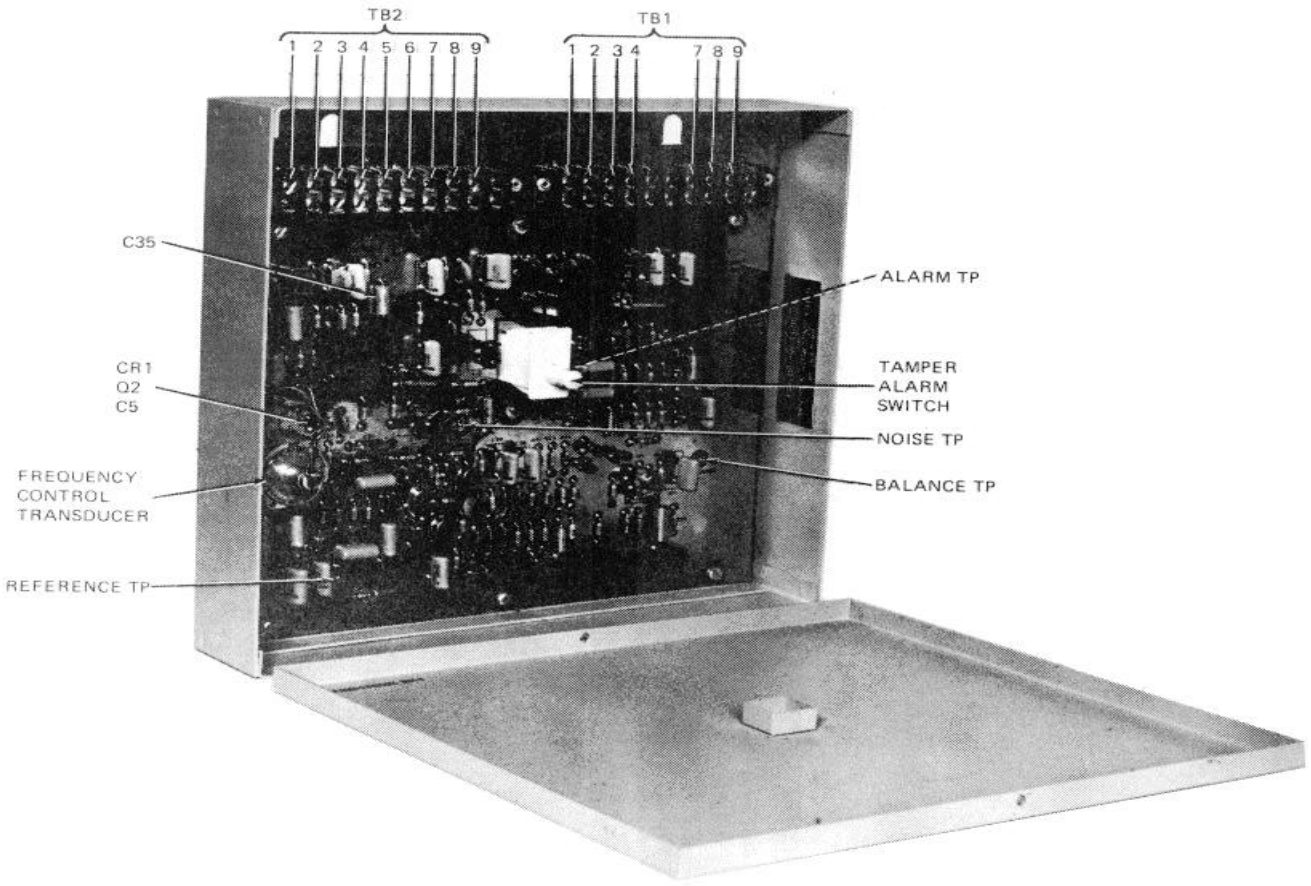


Figure 5-1. Processor, With Troubleshooting Test Points

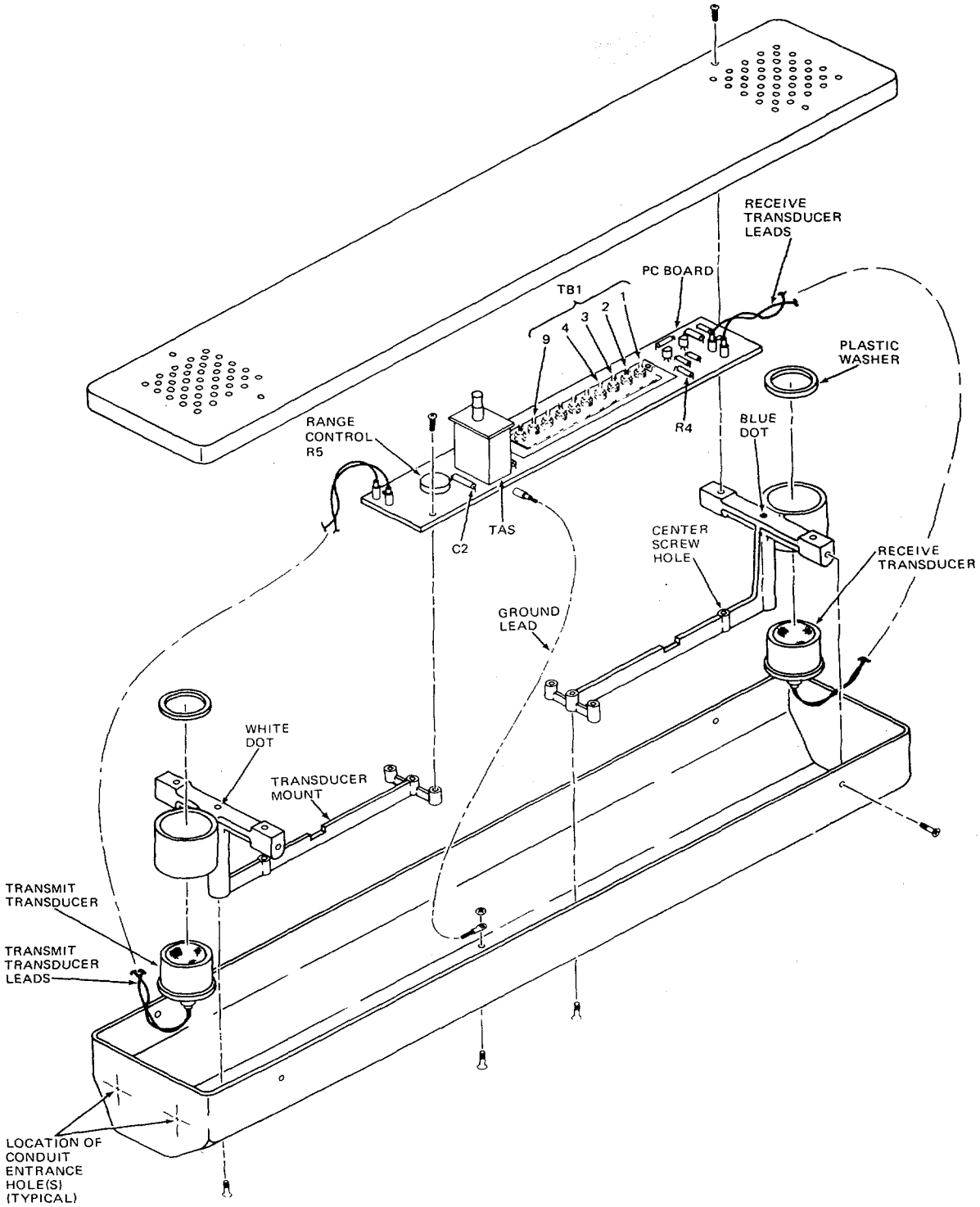


Figure 5-2. Transceiver, With Troubleshooting Test Points

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

Trouble	Probable cause	Corrective action
1. Constant alarm	a. Low voltage to Processor.	a. Set multimeter to dc volts. Connect positive meter lead to TB1-7 and negative lead to TB1-8. b. If voltage is below tolerance, disconnect wires from TB1-7 and 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 are adjacent to conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	b. Open or damaged cover on one or more chassis.	Check all chassis. Make certain that all covers are straight, flat, and tightly closed. Inspect for any debris between the cover and chassis that would interfere with complete closing.
	c. Open wire in tamper alarm circuit.	a. Check interconnecting wiring between Processor and Transceiver. Disconnect wires from TB1-4 and TB1-6 in Processor and from TB1-5 and TB1-6 in the Receiver. Ground wires at one end of the conduit. At the other end use the multimeter set on ohms to read between the wire and conduit. A low or zero indication means a good wire; an indication of infinity means an open circuit. b. If an open wire is found in the tamper alarm circuit, replace the wire.
	d. Bad tamper alarm switch in one or more chassis.	a. Check all tamper alarm switches (TAS). Tap each cover to ensure no switch contacts are floating and causing alarms. Open the Processor chassis cover. Pull the TAS plunger all the way out. Disconnect wire from. TB1-2. Set multimeter to ohms and connect leads to TB1-5 and TB1-6. With all Transceiver covers closed, meter should indicate 2,000 ohms or less. Slowly open the first Transceiver chassis cover. After a movement of less than 1/4 inch (0.635 cm) and while cover flanges are still engaged, the meter indication should change to over 100,000 ohms. Remove cover. Pull the TAS plunger all the way out; the resistance indication should drop to its former level. Repeat the test on remaining Transceivers.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	d. (cont)	b. Use a straightedge across the Processor chassis 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. c. If the TAS on any unit fails, replace the PC board in that unit. (1) To remove Transceiver PC board, tag and disconnect wires from TB1. Disconnect transducer leads from PC board. Disconnect black ground lead from PC board. Remove screws that secure PC board. Remove PC board. (2) To install new PC board, shift board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount. Ensure that black ground wire is not caught under board. Insert screws through PC board and tighten them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board. (3) Recalibrate the system per steps in TM 5-6350-264-14/1. (4) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove screws. Remove PC board. (5) To install new PC board, orient the board so the terminal strips are adjacent to the conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
1. (cont)	e. Bad Processor PC board.	a. Remove wires from TBl-1 and 2 in the Processor. Set multimeter to ohms and connect meter leads to TB1-1 and 2. Meter should indicate less than 2,000 ohms. b. Remove wire from TB1-7 in the Processor. The meter indication should change to over 100,000 ohms. c. If these indications are not correct, 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 the conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2.
2. Nuisance alarms.	a. Excessive noise from air turbulence, machinery, or radio frequency interference.	a. Set multimeter to ac volts. Read between noise TP and reference TP. If meter indicates higher than 0.15 vac, reduce all noise within the secure area. Turn off, one at a time, such noise sources as air conditioners, fans, office equipment, and any other devices that run continually. b. If meter still indicates higher than 0.15 vac, disconnect wires from TB2-3 and 4. c. If meter still indicates higher than 0.15 vac, replace Processor 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
2. (cont)	a. (cont)	(2) To install new PC board, orient the board so the terminal strips are adjacent to the conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. d. If alarm continues, remove Processor cover, and set meter to ac volts. Check between balance TP and reference TP. The meter should fluctuate above and below some point on the scale. If the meter fluctuates more than 0.3 volts above or below this point, disconnect the wires from TB2-1 and TB2-2 and reduce each Transceiver range-control setting to position 1. e. If fluctuations cease, the problem is air turbulence. Check possible sources of turbulence, such as air conditioners, heaters, ventilation ducts, fans, doors, windows, and cracks in floors, walls, or ceilings. Such turbulence can be reduced by baffling ducts and fans, securing doors and windows, and caulking cracks. f. If fluctuations are in one direction only, radio frequency interference (RFI) in or near the secure area is probably the source of trouble. To locate sources of RFI, turn off, one at a time, such items as intercoms and paging units. Check for walkie-talkies or other radios that may be used in the area.
	b. Motion caused by wildlife such as rodents, birds, or insects.	Eliminate wildlife from secure area.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	c. Poor or broken system ground connections.	a. Use the multimeter set on ohms to check between Processor TB1-9, TB2-9, chassis, and conduit. Check between TB2-4 and TB2-8. If any of these indications are not 0 ohms, check the wire connections at the terminal strips, conduit, and PC-board connections to the chassis. b. Use the multimeter set on ohms to check between Transceiver TB1-9, chassis, and conduit. Check between TB1-4 and receive transducer (blue dot), blue lead. If any of these indications are not 0 ohms, check the wire connection at the terminal strip, conduit connection, and PC-board connections to the chassis. Ensure that all transducer leads are making good mechanical connections.
	d. Bad transmit or receive transducer.	a. Set multimeter to ac volts. Connect leads to Transceiver TB1-1 and TB1-2. The meter should indicate 7 to 14 vac. Remove the leads from the transmit transducer (white dot). The meter indication should increase a few volts when the leads are disconnected. b. Obtain two pieces of wire 18 to 28 AWG and about 12 inches (30.6 cm) long. Disconnect all four transducer leads from PC board. Use the two pieces of wire to extend the receive transducer (blue dot) leads so they can be connected to the transmit transducer terminals on the TAS end of the PC board. The meter should indicate 7 to 14 VAC at TBl-1 and 2 in the Transceiver. Disconnect one of the added pieces of wire from the PC board. The meter indication should increase a few volts. c. If the meter indication does not increase when one of the transducers is disconnected, replace that transducer.

Table 5-1. Troubleshooting Procedures - Continued i,

Trouble	Probable cause	Corrective action
2. (cont)	d. (cont)	(1) To remove a transducer, disconnect transducer leads from PC board; disconnect black ground lead from PC board; and remove screws holding PC board to transducer mounts. Remove PC board. Remove and keep hardware that secures chassis to mounting surface. Remove enough conduit clamps to swing Transceiver chassis away from the mounting surface. Remove screws that secure transducer mounts to sides of the chassis. From the rear of the chassis remove screws that secure the transducer mount to the rear of the chassis. Remove the transducer mount. Use a 7/8-inch (2.2-cm) rod, such as a wooden dowel, to press against the screened end of the transducer and press it out of the mount. Remove and keep the plastic washer. Disconnect leads from rear of the transducer. (2) To install a transducer, match dot color on transducer with dot color on mount; blue for receive and white for transmit. Put top side of mount against a flat surface, and align transducer with underside of mount. Use heel of hand to press transducer into mount until shoulder around bottom of transducer is flush against bottom of mount. Use a 7/8-inch (2.2-cm) rod, such as a wooden dowel, to press plastic washer down inside mount until it is flat against screened end of transducer. To match leads to the transducers, note that the transmit transducer (white dot) requires 8-inch (20.5-cm) leads and the receive transducer (blue dot) requires 3 1/2-inch (8.9-cm) leads. Ensure that transducer

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	d. (cont)	leads have approximately one twist per inch (2.5-cm). Connect leads to rear of transducer. Place transducer mount in side chassis and insert screws through rear of the chassis and into mount. Insert screws through sides of chassis and into transducer mount. Tighten screws to secure the mount in the chassis. Swing chassis against mounting surface, secure with mounting hardware, and replace conduit clamps. Shift PC board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount. Ensure that black ground wire is not caught under board. Insert screws through PC board and tighten them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board.
	e. Range control set too high.	a. Set the range control at the lowest setting that will give the necessary coverage. Any setting higher than 7 may cause nuisance alarms. b. To check coverage and range control setting, remove Processor chassis cover and disconnect the wire from TB1-1 in the Processor. Set the multimeter to ohms and connect the leads to TB1-1 and 2. The meter should indicate less than 2,000 ohms. Walk in and out of the secure area. Each time motion is sensed, the meter indication should be over 100,000 ohms. c. Adjust the range control to the lowest setting that will give adequate coverage.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	f. Bad Transceiver PC board.	a. Remove wire from TB1-7 in the Processor. Set the multimeter to ohms, , and check between the R4 lead nearest the edge of the Transceiver PC board and the positive lead of C2 (lead nearest the same side of the board as R4). b. Note the setting of the range control so it may be returned to its original position after testing. Turn the range control as far as it will go in each direction. As the range control is turned, the meter should sweep between 0 and approximately 2,500 ohms. c. If the meter does not sweep between 0 and approximately 2,500 ohms or if the needle moves in a jerky or erratic manner, replace the PC board. (1) To remove Transceiver PC board, remove cover, tag and disconnect wires from TB1. Disconnect transducer leads from PC board. Disconnect black ground lead from PC board. Remove screws that secure PC board. Remove PC board. (2) To install new PC board, shift board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount. Ensure that black ground wire is not caught under board. Insert three screws through PC board and tighten them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board. (3) Recalibrate the system per steps in TM 5-6350-264-14/1.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	g. No SYNC signal between multiple Processors.	a. If more than one Processor is used in the secure area, one unit must be used as the master. Set the multimeter to ac volts, and check for 5 ± 0.5 vac between TB2-7 and TB2-8 in the master Processor. b. If voltage is below tolerance, disconnect wires from TB2-7 and TB2-8 and check voltage on these terminals. c. If voltage is still low, 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 the conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. d. If voltage is within tolerance, check the wires for shorts-to-ground. (1) To check the wiring for shorts, disconnect both ends of the wires from TB2-7 and TB2-8 in the master Processor and TB2-5 and TB2-6 in the slave Processor. Set the multimeter to ohms and check between the wire and conduit and between the wire and shield. An indication of infinity means a good wire. Any indication of less than infinity means a short-to-ground. (2) Replace any wire that checks bad. e. Set multimeter to ac volts. At each slave Processor, check for 5 ± 0.5 vac at TB2-5 and TB2-6.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	g. (cont)	f. If voltage is below tolerance and wiring is good, check slave Processor PC board to verify that the red lead to the frequency control transducer is disconnected and insulated and that a 0.01 μf capacitor is connected between TB2-5 and TB2-6. Set multimeter to ohms and check between TB2-5 and cathode end of CR1. Meter should indicate 0 ohms. g. If modifications have been made correctly and voltage is below tolerance, replace slave Processor PC board. Ensure that modifications have been made to this new board before installation. h. Set multimeter to ac volts, and connect leads to TB2-1 and TB2-2 in the slave Processor. Meter should indicate 7 to 14 vac. Tap PC board to check that the voltage does not fluctuate. i. If voltage at TB2-1 and TB2-2 is not between 7 and 14 volts or if the indication fluctuates when the board is tapped, replace the PC board. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove and keep seven screws. Remove PC board. (2) To install new PC board, orient the board so the terminal strips are adjacent to the conduit entrance holes. Secure the PC board to the chassis with seven screws. Connect wires to TB1 and TB2.
	h. Bad tamper alarm switch in one or more chassis.	a. Check all tamper alarm switches (TAS). Tap each cover to ensure that no switch contacts are floating and causing alarms. Open the Processor chassis cover. Pull the TAS plunger

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	h. (cont)	all the way out. Disconnect wire from TB1-2. Set multimeter to ohms and connect leads to TB1-5 and TB1-6. With all Transceiver covers closed, resistance indication should be 2,000 ohms or less. Slowly open the first Transceiver housing cover. While the cover flanges are still engaged, the meter indication should change to over 100,000 ohms. Remove cover. Pull the TAS plunger all the way out; the resistance indication should drop to its former level. Repeat the test on remaining Transceivers. b. Use a straightedge across the Processor chassis to hold TAS plunger down. Slowly raise the straightedge to simulate opening the cover. A movement of less than 1/4 inch (0.635 cm) should cause the meter indication to change to over 100,000 ohms. c. If the TAS on any unit fails, replace the PC board in that unit. (1) To remove Transceiver PC board, tag and disconnect wires from TB1. Disconnect transducer leads from PC board. Disconnect black ground lead from PC board. Remove screws that secure PC board. Remove PC board. (2) To install new PC board, shift board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount. Ensure that black ground wire is not caught under board. Insert screws through PC board and tighten them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
2. (cont)	h. (cont)	(3) Recalibrate the system per steps in TM 5-6350-264-14/1. (4) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove and keep seven screws. Remove PC board. (5) To install new PC board, orient the board so the terminal strips are adjacent to the conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2.
3. Low sensitivity.	a. Range control set to low.	a. To check coverage and range control setting, disconnect wire from TBl-1 in the Processor. Set multimeter to ohms and connect the leads to TBI-1 and TB1-2. The meter should indicate less than 2,000 ohms. Walk in and out of the secure area. Each time motion is sensed, the meter indication should be over 100,000 ohms. b. Adjust the range control to the lowest setting that will give adequate coverage per steps in TM 5-6350-264-14/1.
	b. Bad PC boards or bad interconnecting wiring.	a. Set meter to ac volts. Connect leads to TB2-1 and TB2-2 in the Processor. Meter should indicate 7 to 14 vac. b. If voltage is low, disconnect wires from TB2-1 and TB2-2 and check voltage on these terminals. c. If voltage is low, 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

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
3. (cont)	b. (cont)	are adjacent to conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. d. If voltage on TB2-1 and TB2-2 is 7 to 14 vac, check interconnecting wiring for shorts-to-ground. e. Disconnect wiring between units to isolate sections of wiring. (1) To check for a grounded circuit, disconnect both ends of the wires from TB2-1 and TB2-2 in the Processor and TB1-1 and TB1-2 in the Transceiver. Set the multimeter to ohms and check between the wires and their shields. An indication of infinity means a good wire. Any indication of less than infinity means a short-to-ground. (2) Replace any wire that checks bad. f. If voltage on TB2-1 and TB2-2 is between 7 and 14 volts and if wiring is good, replace Transceiver PC board. (1) To remove Transceiver PC board, tag and disconnect wires from TB1. Disconnect transducer leads from PC board. Disconnect black ground lead from PC board. Remove screws that secure PC board. Remove PC board. (2) To install new PC board, shift board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount. Ensure that black ground wire is not caught under board. Insert screws through PC board and tighten

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
3. (cont)	b. (cont)	them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board. g. Set multimeter to dc volts. Connect positive lead to TB2-3 and negative lead to TB2-4 in the Processor. The meter should indicate 5 to 7 vdc. h. If voltage is not between 5 and 7 volts, remove wires from TB2-3 and TB24. Measure the voltage on these terminals. i. If voltage is not between 5 and 7 volts, 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 the conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. j. If voltage at TB2-3 and TB2-4 is normal with wires removed, check wiring for shorts. (1) To check wiring for shorts, disconnect both ends of the wires from TB2-3 and TB2-4 in the Processor and TB1-3 and TB1-4 in the Transceiver. Set the multimeter to ohms, and check between the wire and shield and between the wire and conduit. An indication of infinity means a good wire. Any indication of less than infinity means short-to-ground. (2) Replace any wire that checks bad.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
3. (cont)	b. (cont)	k. If voltage on TB2-3 and TB2-4 is between 5 and 7 volts and if wiring is good, replace Transceiver PC board. (1) To remove Transceiver PC board, tag and disconnect wires from TB1. Disconnect transducer leads from PC board. Disconnect black ground lead from PC board. Remove screws that secure PC board. Remove PC board. (2) To install new PC board, shift board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount. Ensure that black ground wire is not caught under board. Insert screws through PC board and tighten them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board.
	c. Bad transmit or receive transducer.	a. Set multimeter to ac volts. Connect leads to Transceiver TB1-1 and TB1-2. The meter should indicate 7 to 14 vac. Remove the leads from the transmit transducer (white dot). The meter indication should increase a few volts when the leads are disconnected. b. Obtain two pieces of wire 18 to 28 AWG and about 12 inches (30.6 cm) long. Disconnect all four transducer leads from PC board. Use the two pieces of wire to extend the receive transducer (blue dot) leads so they can be connected to the transmit transducer terminals on the TAS end of the PC board. The meter should indicate 7 to 14 vac at TB1-1 and TB1-2 in the Transceiver. Disconnect one of the added pieces of wire from

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
3. (cont)	c. (cont)	the PC board. The meter indication should increase a few volts. c. If the meter indication does not increase when one of the transducers is disconnected, replace that transducer. (1) To remove a transducer, disconnect transducer leads from PC board; disconnect black ground lead from PC board; and remove and keep screws holding PC board to transducer mounts. Remove PC board. Remove and keep hardware that secures chassis to mounting surface. Remove enough conduit clamps to swing Transceiver chassis away from the mounting surface. Remove screws that secure transducer mounts to sides of the chassis. From the rear of the chassis remove screws that secure the transducer mount to the rear of the chassis. Remove the transducer mount. Use a 7/8-inch (2.2-cm) rod, such as a wooden dowel, to press against the screened end of the transducer and press it out of the mount. Remove and keep the plastic washer. Disconnect leads from rear of the transducer. (2) To install a transducer, match dot color on transducer with dot color on mount - blue for receive and white for transmit. Put top side of mount against a flat surface, and align transducer with underside of mount. Use heel of hand to press transducer into mount until shoulder around bottom of transducer is flush against bottom of mount. Use a 7/8-inch (2.2-cm) rod, such as a wooden dowel, to

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
3. (cont)	c. (cont)	press plastic washer down inside mount until it is flat against screened end of transducer. To match leads to the transducers, note that the transmit transducer (white dot) requires 8-inch (20.5-cm) leads and the receive transducer (blue dot) requires 3 1/2-inch (8.9-cm) leads. Ensure that transducer leads have approximately one twist per inch (2.5 cm). Connect leads to rear of transducer. Place transducer mount inside chassis and insert screws through rear of the chassis and into mount. Insert screws through sides of chassis and into transducer mount. Tighten the four screws to secure the mount in the chassis. Swing chassis against mounting surface, secure with mounting hardware, and replace conduit clamps. Shift PC board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount. Ensure that black ground wire is not caught under board. Insert screws through PC board and tighten them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board.
	d. Poor or broken system ground connections.	a. Use the multimeter set on ohms to check between Processor TB1-9, TB2-9, chassis, and conduit. Check between TB2-4 and TB2-8. If any of these indications is not 0 ohms, check the wire connections at the terminal strips, conduit, and PC board connections to the chassis.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
3. (cont)	d. (cont)	b. Use the multimeter set on ohms to check between Transceiver TB1-9, chassis, and conduit. Check between TB1-4 and receive transducer (blue dot), blue lead. If any of these indications is not 0 ohms, check the wire connection at the terminal strip, conduit connection, and PC board connections to the chassis. Ensure that all transducer leads are making good mechanical connections.
	e. Bad Transceiver PC board.	a. Remove wire from TB1-7 in the Processor. Set the multimeter to ohms, and check between the R4 lead nearest the edge of the Transceiver PC board and the positive lead of C2 (lead nearest the same side of the board as R4). b. Note the setting of the range control so it may be returned to its original position after testing. Turn the range control as far as it will go in each direction. As the range control is turned, the meter should sweep between 0 and approximately 2,500 ohms. c. If the meter does not sweep between 0 and approximately 2,500 ohms or if the needle moves in a jerky or erratic manner, replace the PC board. (1) To remove Transceiver PC board, remove cover, tag and disconnect wires from TB1. Disconnect transducer leads from PC board. Disconnect black ground lead from PC board. Remove and keep three screws that secure PC board. Remove PC board. (2) To install new PC board, shift board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
3. (cont)	e. (cont)	transducer mount. Ensure that black ground wire is not caught under board. Insert screws through PC board and tighten them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board. (3) Recalibrate the system per steps in TM 5-6350-264-14/1.
4. No alarms.	a. Bad Processor PC board or bad interconnecting wiring.	a. Remove wires from TB1-1 and TB1-2 in the Processor. Set multimeter to ohms and connect meter leads to TB1-1 and TB1-2. Meter should indicate less than 2,000 ohms. b. Remove wire from TB1-7 in the Processor. The meter indication should be over 100,000 ohms. c. If the meter does not match these indications, replace the Processor PC board. d. Set multimeter to ac volts. Check between noise TP and reference TP. Meter should indicate less than 0.15 vac. e. If meter indicates higher than 0.15 vac, disconnect wires from TB2-3 and TB2-4. f. If meter still indicates higher than 0.15 vac, replace Processor PC board. (1) To remove Processor PC board, tag and disconnect wires from TB1 and TB2. Remove and keep seven 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 seven screws. Connect wires to TB1 and TB2.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
4. (cont)	a. (cont)	g. If less than 0.15 vac is present between NOISE TP and REFERENCE TP and there is still no alarm, check between BALANCE TP and REFERENCE TP. The meter needle should fluctuate above and below some point on the scale. h. If meter does not fluctuate, check wiring for open circuits and shorts-to-ground. (1) To check for an open circuit, disconnect wires from TB2-3 and TB2-4 in the Processor and TB1-3 and TB1-4 in the Transceiver. Ground each 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. (2) To check for shorts-to-ground, disconnect both ends of each wire. Set the multimeter to ohms, and check between each wire and its shield. An indication of infinity means a good wire; any indication of less than infinity means a short-to-ground. (3) Replace any wire that checks bad.
	b. Bad transducer ground connections.	Use the multimeter set on ohms to check between Transceiver TB1-9, chassis and conduit. Check between TB1-4 and receive transducer (blue dot) blue lead. If any of these indications are not 0 ohms, check the wire connection at the terminal strip, conduit connections, and PC board connections to the chassis. Ensure that all transducer leads are making good mechanical connections.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
4. (cont)	c. Bad transmit or receive transducer.	a. Set multimeter to ac volts. Connect leads to Transceiver TB1-1 and TB1-2. The meter should indicate 7 to 14 vac. Remove the leads from the transmit transducer (white dot). The meter indication should increase a few volts when the leads are disconnected. b. Obtain two pieces of wire 18 to 28 AWG and about 12 inches (30.6 cm) long. Disconnect all four transducer leads from PC board. Use the two pieces of wire to extend the receive transducer (blue dot) leads so they can be connected to the transmit transducer terminals on the TAS end of the PC board. The meter should indicate 7 to 14 vac at TB1-1 and TB1-2 in the Transceiver. Disconnect one of the added pieces of wire from the PC board. The meter indication should increase a few volts. c. If the meter indication does not increase when one of the transducers is disconnected, replace that transducer. (1) To remove a transducer, disconnect transducer leads from PC board; disconnect black ground lead from PC board; and remove screws holding PC board to transducer mounts. Remove PC board. Remove hardware that secures chassis to mounting surface. Remove enough conduit clamps to swing Transceiver chassis away from the mounting surface. Remove screws that secure transducer mounts to sides of the chassis. From the rear of the chassis remove screws that secure the transducer mount to the rear of the chassis. Remove the transducer mount. Use a 7/8-inch (2.2-cm) rod, such as a wooden dowel, to

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
4. (cont)	c. (cont)	press against the screened end of the transducer, and press it out of the mount. Remove and keep the plastic washer. Disconnect leads from rear of the transducer. (2) To install a transducer, match dot color on transducer with dot color on mount - blue for receive and white for transmit. Put top side of mount against a flat surface, and align transducer with underside of mount. Use heel of hand to press transducer into mount until shoulder around bottom of transducer is flush against bottom of mount. Use a 7/8-inch (2.2-cm) rod, such as a wooden dowel, to press plastic washer down inside mount until it is flat against screened end of transducer. To match leads to the transducers, note that the transmit transducer (white dot) requires 8-inch (20.5-cm) leads and the receive transducer (blue dot) requires 3 1/2-inch (8.9-cm) leads. Ensure that transducer leads have approximately one twist per inch (2.5 cm). Connect leads to rear of transducer. Place transducer mount inside chassis and insert screws through rear of the chassis and into mount. Insert screws through sides of chassis and into transducer mount. Tighten the screws to secure the mount in the chassis. Swing chassis against mounting surface, secure with mounting hardware, and replace conduit clamps. Shift PC board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount.

Table 5-1. Troubleshooting Procedures - Continued

Trouble	Probable cause	Corrective action
4. (cont)	c. (cont)	Ensure that black ground wire is not caught under board. Insert screws through PC board and tighten them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board.

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 PC boards in the Processor and Transceiver and transducers in the Transceiver. On-site adjustment is made on the range control in the Transceiver. Inspection only is made on the chassis.

Section IV. REMOVAL AND REPLACEMENT OF MAJOR COMPONENTS AND ASSEMBLIES

5-5. REMOVAL AND INSTALLATION PROCEDURES.

a. To remove the Processor PC board, remove cover, tag and disconnect wires from TB1 and TB2. Remove screws and PC board.

b. To install new PC board, orient board so the terminal strips are adjacent to the conduit entrance holes. Secure the PC board to the chassis with screws. Connect wires to TB1 and TB2. Replace cover.

c. To remove Transceiver PC board, remove cover, tag and disconnect wires from TB1. Disconnect transducer leads from PC board. Disconnect black ground lead from PC board. Remove screws that secure PC board. Remove PC board.

d. To install new PC board, shift PC board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount. Ensure that black ground lead is not caught under board. Insert screws through PC board, and tighten them to secure board. Connect wires to TB1. Connect transducer leads and black ground lead to PC board. Replace cover.

e. To remove transducer, remove Transceiver cover, tag and disconnect wires from TB1. Disconnect transducer leads from PC board. Disconnect black ground lead from PC board. Remove screws that secure PC board. Remove PC board. Remove and keep hardware that secures chassis to mounting surface.

Remove enough conduit clamps to swing Transceiver chassis away from the mounting surface. Remove screws that secure transducer mounts to sides of the chassis. From the rear of the housing, remove screws that secure the transducer mount to the rear panel of the chassis. Remove the transducer mount. Use a 7/8-inch (2.23 cm) rod, such as a wooden dowel, to press against the screened end of the transducer, and press it out of the mount. Remove the plastic washer. Disconnect leads from rear of the transducer.

f. To replace a transducer, match dot color on transducer with dot color on mount; blue for receive and white for transmit. Put top side of mount against a flat surface, and align transducer with underside of mount. Use heel of hand to press transducer into mount until shoulder around bottom of transducer is flush against bottom on mount. Use a 7/8-inch (2.23 cm) rod, such as a wooden dowel, to press plastic washer down inside mount until it is flat against screened end of transducer. To match leads to the transducers, note that the transmit transducer (white dot) requires 8-inch (20.32 cm) leads and that the receive transducer (blue dot) requires 3 1/2-inch (8.89 cm) leads. Ensure that transducer leads have approximately one twist per inch (2.54 cm). Connect leads to rear of transducer. Place transducer mount inside chassis and insert two screws through rear panel and into mount. Insert screws through sides of chassis and into transducer mount. Tighten the screws to secure the mount in the chassis. Swing chassis against mounting surface, secure with mounting hardware, and replace conduit clamps. Shift PC board off center toward receive transducer (blue dot). Align single screw hole in board with screw hole in center of receive transducer mount. Ensure that black ground wire is not caught under board. Insert screws through PC board, and tighten them to secure board. Connect black ground lead to pin near tamper alarm switch. Connect transducer leads to pins at each end of PC board. Replace Transceiver housing cover.

g. After replacing major components or assemblies, test the UMS for proper operation under worst case conditions, with all noise or turbulence-producing equipment in operation. Ensure that key-operated switch on Control Unit is in access position. Remove the Processor chassis cover, and pull the TAS plunger all the way out. Disconnect the wire from TB1-1. Set multimeter to ohms and connect leads to TB1-1 and TB1-2. Meter should indicate less than 2,000 ohms. Walk into the secure area. The meter indication should change to over 100,000 ohms. Remain motionless for several seconds and the meter indication should return to its original level. Connect wire to TB1-1. Disconnect wire from TB1-2, and connect meter leads to TB1-5 and TB1-6. Meter should indicate less 2,000 ohms. Remove the four screws securing the Transceiver chassis cover. Slowly raise the cover. While the cover flanges are still engaged, the meter indication should change to over 100,000 ohms. Remove cover. Pull TAS plunger all the way out. The meter indication should return to its original level. Replace the Transceiver chassis cover, and secure it with screws. Use a straightedge across the Processor chassis to depress the TAS plunger. The meter should indicate less then 2,000 ohms. Slowly raise the straightedge. When the TAS plunger moves 1/4-inch or less, the meter indication should change to over 100,000 ohms. Disconnect the meter leads from TB1-5 and TB1-6 and connect the wire to TB1-2. Replace the Processor chassis cover and secure it.

CHAPTER 6

REPAIR OF THE ULTRASONIC MOTION 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 U
4. TRI-SERVICE MANUALS	
DMWR 5-6350-264 NAVELEX EE181-AA-MMD-010/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. 3lS9-2FSS9-1-8	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 Selection and Application of Joint NAVELEX EE181-AB-OMI-010/E121 J-SIIDS System AIR FORCE T.O. 31S9-4-1-111	Services Interior Intrusion Detection
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

Page A-3/(A-4 blank) is deleted.

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 con- 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) i. Repair. The application of maintenance f

B-2. MANTENANCE 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 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 parameter.

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 unservicable 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 system

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 service/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.

B-3. 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 of 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

Transceiver (RT-1161) and Motion Processor (NIX-9444)

(1) Group number	(2) Component/assembly	(3) Maint. function	(4) Maint. level C	O	F	H	D	(5) Tool/ equipment	(6) Remarks
01	Transceiver Printed Wiring Board Assy	Test			0.5			1	
		Replace			1.0				
	Transducers	Test			0.3			1	
		Replace			1.0				
	Gain Control	Adjust			0.5				
	Enclosure	Inspect	0.3		0.3			1	
02	Motion Processor Printed Wiring Board Assy	Test			0.5			1	
		Replace			1.0				
	Enclosure	Inspect	0.3						

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

for

Transceiver (RT-1161) and Motion Processor (MX-9444)

(1) REFERENCE CODE	(2) MAINTENANCE CATEGORY	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER	(5) TOOL NUMBER
1.	F	Multimeter	6625-00-019-0815	Vom

Section IV. REMARKS

Maintenance Allocation Chart

Reference code	Remarks

APPENDIX C.

ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE REPAIIR PARTS AND SPECIAL, TOOLS LIST

Section I. INTRODUCTION

1. Scope.

This manual lists and authorizes spares and 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 Ultrasonic Motion 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.

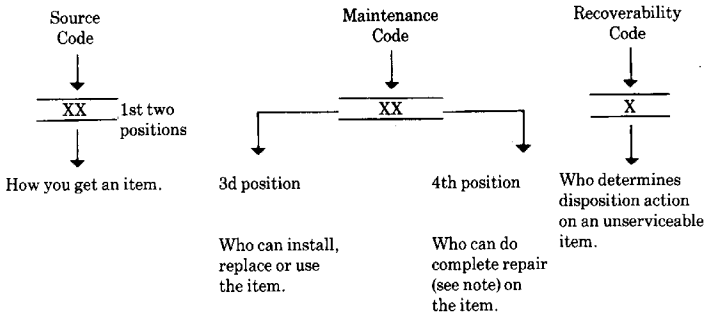
3. Explanation of Columns.

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.

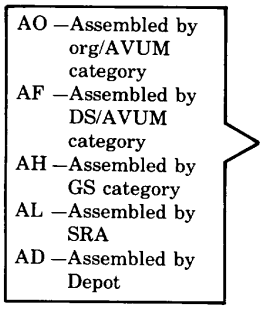
b. SMR CODE (Column (2)). The Source, Maintenance, and Recoverability (SMR) code is a 5-positioncode containing supply/requisitioning information, maintenance category authorization criteria, and disposition instructions, as shown in the following breakout:



*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:

	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 SNI R1 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/ AVUM category MH—Made at GS category ML—Made at Specialized Repair Activity (SRA) 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 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 SNI1 t code. hut the source code indicates it is made at a higher category. order the item from the higher category of maintenance.



Explanation

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 3rd(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 SM It 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 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 -	Nonreparable. No 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 item. When unserviceable. condemn and dispose of the item at the category of maintenance shown in 3d position of SMR Code.
O	Reparable item. When uneconomically reparable, condemn and dispose of the item at organizational or aviation unit category.
F	Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support or aviation intermediate category .
H	Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support category.
D)	Reparable item. When beyond lower category repair capability, return to depot. Condemnation and disposal of item not authorized below depot category.

L	Reparable item. Condemnation 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. critical material. or hazardous material). Refer to appropriate manuals: directives for specific instructions.

c. National Stock Number Column (3)). lists the National Stock Number (NSNI assigned to the item Use the NSN for requests ,'requisitions.

d. FSCNI (Column (4)). The Federal Supply Code for Manufacturer (I'SCNI) 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 mav 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)1. 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., Phv Sec Cl (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 I,ist section. the Basis of Issue ()OI) appears as the last liners in the entry for each special tool, special TMIDE, 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)1. The Unit of Measure (U/Ml) 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. GI,, I,B, 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 1 code listed in the Army Master Data File IAMDF), request the lowest U;I that will satisfy your needs.

h. QTY INC IN UN IT (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
CWQ	R-1161/FSS-9(V)
CWP	MX-9444/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 diivided into the same groups.

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

(3) Third Identity the item (1 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(this figure

b. When National Stock or Part Number is Known:

(1) First Using the Index (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 t he Illustration figure and Item number of the item you are looking for.

NSN

*The NIIN consists of the last 9 digits of the NSN (ie. 530.5 -01-674-1467}.

NIIN

(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

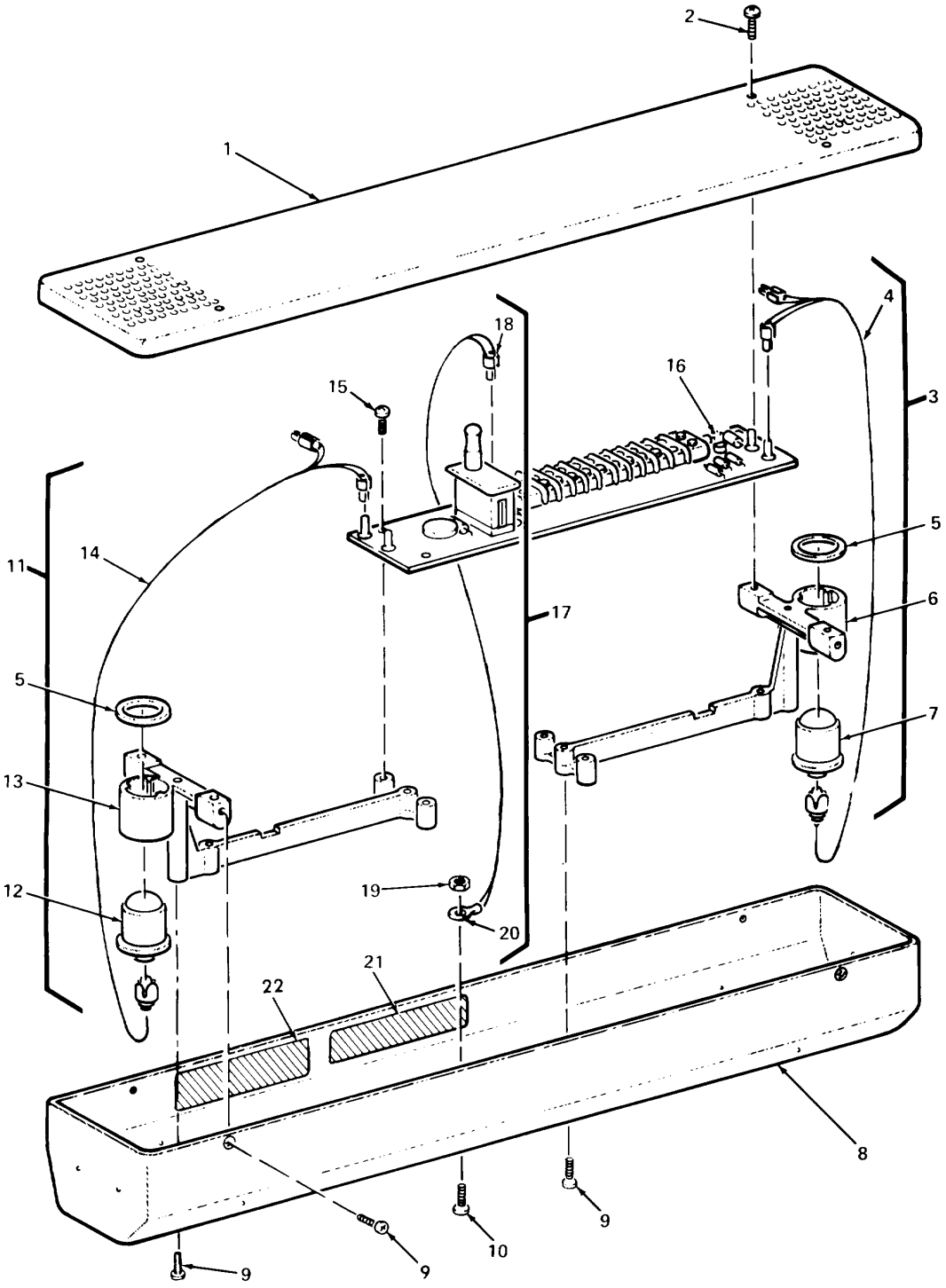


Figure C-1. Ultrasonic Motion Signal Transceiver RT-1161/FSS-9(V)

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 ULTRASONIC,MOTION TRANSCEIVER		
C-1	1	XBFZZ		97403	13220E3231	COVER,TRANSCEIVER.....CWQ	E.A	1
C-1	2	PAFZZ	5305-00-147-3224	96906	MS51861-15C	SCREW,TAPPING,THREAD.....CWQ	EA	4
C-1	3	PAFZZ	6350-00-499-0746	97403	13220E3248	TRANSDUCER ASSEMBLY BL'IE DOT .....CWQ	EA	1
C-1	4	XAFZZ		97403	132203246-1	CABLE ASSY, 3.50L .....CWQ	EA	1
C-1	5	XAFZZ		97403	13220E2978	WASHER,NON-MET ALLIC .....CWQ	EA	2
C-1	6	XAFZZ		97403	132203234-2	SUPPORT,TRANSDUCER .....CWQ	EA	1
C-1	7	XAFZZ		97403	13220E2976-3	TRANSDUCE .....CWQ	EA	1
C-1	8	XBFZZ		97403	13220E3232	CHASSIS,ELECTRICAL .....CWQ	EA	1
C-1	9	PAFZZ	5305-00-052-7489	96906	M524627-13	SCREW,TRPPING,THREAD .....CWQ	EA	8
C-1	10	PAFZZ	5305-00-957-6264	96906	MS35190-225	SCREW,MACHINE-62.....CWQ	EA	1
C-1	11	PAFZZ	6350-00-499-0745	97403	13220E3247	TRANSDUCER ASSEMBLY WHITE DOT.....CWQ	EA	1
C-1	12	XAFZZ		97403	13220E2976-1	TRANSDUCER .....CWQ	EA	1
C-1	13	XAFZZ		97403	13220E3234-1	SUPPORT,TRANSDUCER .....CWQ	EA	1
C-1	14	XAFZZ		97403	13220E3246-2	CABLE ASSY8.00L .....CWQ	EA	1
C-1	15	PAFZZ	5305-00-052-8881	96906	MS24630-13	SCREW,TAPPING,THREAD.....CWQ	EA	3
C-1	16	PAFZZ	6350-00-345-8421	97403	13220E3233	CIRCUIT CARD ASSEMBLY..... CWQ	EA	1
C-1	17	XBFFZ		97403	13220E3245	CABLE.....CWQ	EA	1
C-1	18	PAFZZ	5940-01-108-4429i	91886	103-0042-019	TERMINAL LUG.....CWQ	EA	1
C-1	19	PAFZZ	5310-00-934-97481	96906	M535649-244	NUT,PLAIN-HEXAGON .....CWQ	EA	1
C-1	20	XDFZZ		97403	13220E2996	TERMINAL LUG.....CWQ	EA	1
C-1	21	XDFZZ		97403	13220E3235	PLATE .....CWQ	EA	1
C-1	22	XDFZZ		974003	3220E3230	PLATE .....CWQ	EA	1

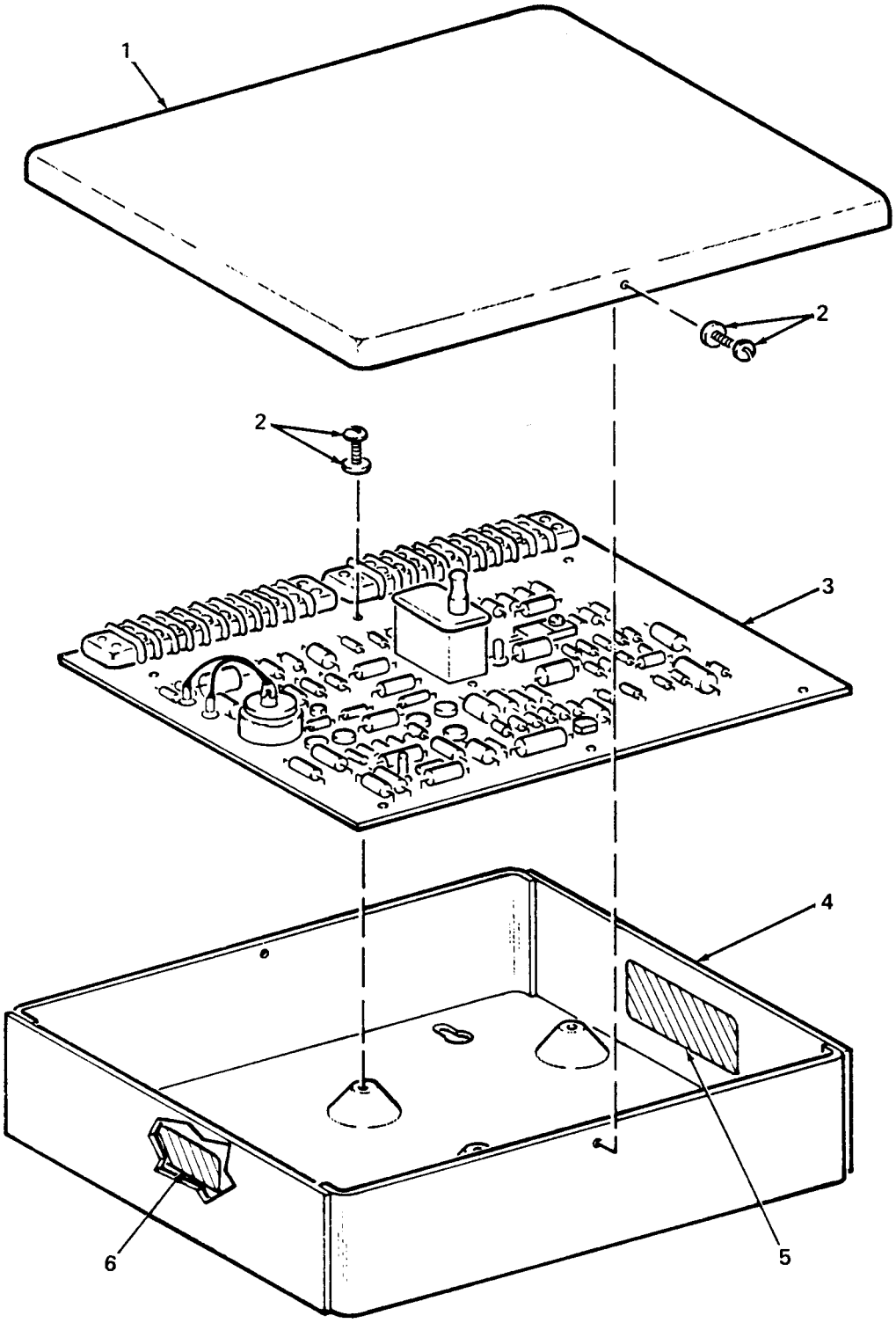


Figure C-2. Ultrasonic Motion Signal Processor Mx-9444/FSS-9(V)

(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 02 ULTRASONIC MOTION PROCESSOR		
C-2	1	XBFZZ	6350-00-140-0787	97403	13220E3011	COVER PROCESSOR .....CWP	EA	1
C-2	2	XBFZZ		97403	13220E2997	SCREW .....CWP	EA	9
C2	3	PAFZZ	6350-00-345-8403	97403	13220E3211	CIRCIT CARD ASSEMBLY.....CWP	EA	1
C-2	4	XBFZZ		97403	13220E3012	CHASSIS,ELECTRICAL .....CWP	EA	1
C-2	5	XDFZZ		97401	13220E3210	PLATE .....CWP	EA	1
C-2	6	XDFZZ		97403	13220E3212	PLATE .....CWP	EA	1

Section III. SPECIAL TOOLS LIST

This section is not applicable.

Section IV. NATIONAL STOCK NUMBER AND PART NUMBER INDEX

STOCK NUMBER	FIGURE NO.	ITEM NO.	STOCK NUMBER	FIGURE NO.	ITEM NO.
5305-00-052-7489	C-1	9	6350-00-499-0745	C-1	11
5305-00-052-8881	C-1	15	6350-00-499-0746	C-1	3
6350-00-140-0787	C-2	1	5310-00-934-974	C-1	19
5305-00-147-3224	C-1	2	5305-00-957-264	C-1	10
b350-00-345-8403	C-2	3	5940-01-108-4429	C1	18
6350-00-345-8421	C 1	16			

FSCM	PART NUMBER	FIGURE NO.	ITEM NO.	FSCM	PART NUMBER	FIGURE NO.	ITEM NO.
96906	MS24627-13	C-1	9	97403	13220E3212	C-2	6
96906	MS24630-13	C 1	15	97433	13220E3230	C-1	22
96906	MS35190-225	C-1	13	91433	13220E3231	C-1	1
96906	MS35649-244	C-1	19	97403	13220E3232	C-1	8
96906	MSI861-1SC	C-1	2	97403	13220F323a	C-1	16
91886	103-0042-09	C-1	1	97403	13220E3234-1	C-1	13
97403	13220E2916-1	C-1	12	97403	13220E3235	C-1	21
97403	1322OE2976-3	C-1	7	97403	13220E3245	C-1	17
97403	13227E2973	C 1	1	9143 3	1322013245	C-1	17
91403	13220E2996	C-2	2	91403	13220E32462	C-1	14
97403	13220E2997	C-2	2	91403	13220E3247	C-1	11
91403	13220E3011	C-2	1	97403	13220E3240	C-1	3
97403	13220E3012	C-2	4	97403	132203234-2	C-1	6
97403	13220E3210	C-2	5	97403	132203246-1	C-1	4
97403	13220E3211	C-2	3				

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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches

1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches

1 Kilometer = 1,000 Meters = 0.621 Miles

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches

1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet

1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches

1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces

1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

5/9 (°F -32) = °C

212° Fahrenheit is equivalent to 100° Celsius

90° Fahrenheit is equivalent to 32.2° Celsius

32° Fahrenheit is equivalent to 0° Celsius

9/5 C° +32 = F°

WEIGHTS

1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces

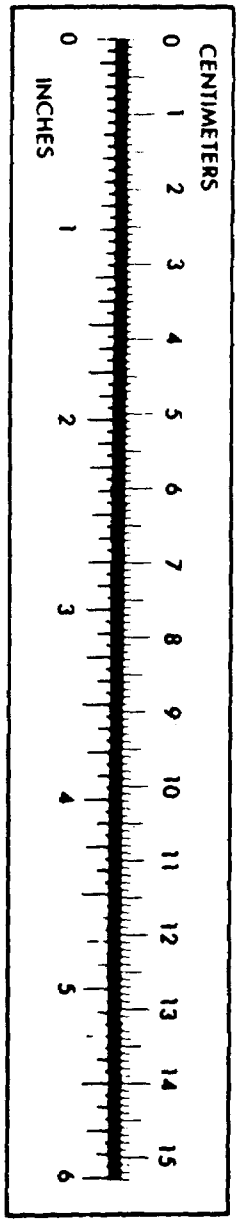
1 Kilogram = 1,000 Grams = 2.2 Lb.

1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621



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