ARMY TM 3-6665-321-12&P
AIR FORCE TO 11H2-23-1
MARINE CORPS 10434A-12&P
NAVY (NAVSEA) EE168-DB-OMP-010

TECHNICAL MANUAL

OPERATOR'S AND UNIT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

FOR

ALARM, CHEMICAL AGENT, AUTOMATIC: M22 (NSN: 6665-01-438-6963) (EIC: Y14)

AND

AUXILIARY EQUIPMENT

POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM: M28
(NSN: 6130-01-438-6960) (EIC: Y40)
MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM: M281
(NSN: 6665-01-438-6959) (EIC: Y38)
ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42
(NSN: 6665-00-859-2215) (EIC: 399)

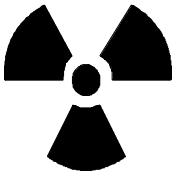
HEADQUARTERS, DEPARTMENTS OF THE ARMY, AIR FORCE, MARINE CORPS, AND NAVY
1 MARCH 1998 **PCN18210434000**

WARNING SUMMARY

The following are general safety precautions and instructions that must be understood and applied during many phases of operation and maintenance to ensure personnel health and safety, and the protection of DoD property. Portions of this may be repeated elsewhere in this publication for emphasis.

WARNING AND CAUTION STATEMENTS

WARNING and **CAUTION** statements have been placed throughout this text prior to operating or maintenance procedures, practices or conditions considered essential to the protection of personnel (WARNING) or equipment and property (CAUTION). A WARNING or CAUTION will apply each time the related step is repeated. Prior to starting any task, the WARNINGS or CAUTIONS included in the text for that task must be reviewed and understood.



This item contains radioactive material. Control of this radioactive material is mandated by federal law. Immediately report any suspected lost or damaged items to your Radiation Protection Officer. If your Radiation Protection Officer cannot be reached, contact the TACOM-ACALA Safety Office during regular duty hours at commercial (309) 782-6499 or DSN 793-6499 or call the Rock Island Police Office at DSN 793-6135 after duty hours.

The sensor assembly inside the M88 Detector contains radioactive material in the form of two Nickel-63 sources. Do not attempt to open the M88 Detector or gain access to the radioactive source.

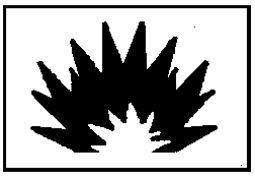
Follow safety procedures for storage, shipment, and disposal in accordance with this manual, local regulation AR 710-3, AR 385-11 and AFI 40-201.

Personal illness or DEATH may result if safety precautions are not observed. Toxic substances may be present in the system components if the M22 Alarm and auxiliary equipment is used during an actual chemical attack. MOPP IV gear should be worn while working with M22 Alarm and auxiliary equipment components that may be contaminated.

Use a M256-series Detector Kit, M8/M9 Detector Paper, or a Chemical Agent Monitor (CAM) to identify chemical agents that may not have been totally removed during decontamination.

High voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions when performing maintenance procedures on the M28 Power Supply.

WARNING SUMMARY (Continued)

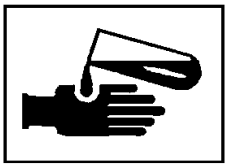


Do not connect or disconnect the M88 Detector and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion.

Ensure power is switched off and the AC power input cable is unplugged from the power source before any connection or disconnection is done.

Surfaces of the M28 Power Supply can reach temperatures of 140°F (60°C) during operation. Do not touch during operation. Switch Off and allow to cool prior to handling.

The M88 Detector inlet can reach temperatures of 140°F (60°C) during operation. Switch Off the M88 Detector and allow the inlet to cool prior to any handling for maintenance.



Acetone is extremely flammable and toxic. To prevent injury or death, use acetone in a well ventilated area. Wear appropriate protective covering and avoid prolonged breathing of fumes or contact with skin.

The M88 Detector uses a Lithium-Sulfur Dioxide battery. This battery is a **FLAMMABLE**, **CORROSIVE** and **VAPOR** hazard. It contains lithium, sulfur dioxide, and an electrolyte. The lithium reacts vigorously when immersed in water. Sulfur dioxide is an irritant gas. The electrolyte is flammable and highly corrosive.

DO NOT immerse the battery in water or decontamination solution.
DO NOT crush or burn the battery.
DO NOT attempt to recharge the battery.
DO NOT store at temperatures above 158°F (70°C).
DISPOSE of batteries according to Air Force TO 00-25-213, Army TB 43-0130, Marine Corps TI 6135-15/3, local SOP and SB 11-6 FSC 6135 Primary Battery Supply and Management Data.

If any of the above precautions are not observed the lithium may rapidly vent out, carrying with it the sulfur dioxide gas and the electrolyte, and may heat up. If this happens, stay away until the smell of sulfur is gone. If you have to move the battery, move it outside by using a shovel or long tongs. Wear suitable protection when handling explosive and corrosive hazards which may cause damage to skin and eyes. If the skin or eyes come in contact with the electrolyte, wash thoroughly with generous amounts of water, and seek medical attention.

FIRST AID

For first aid information refer to FM 21-11, FMFM 11-11, and NAVMED P-5041.

INSERT LATEST UPDATED PAGES/WORK PACKAGES, DESTROY SUPERSEDED DATA

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: The portion of text affected by the updates is indicated by a vertical line in the outer margins of the page. Changes to the RPSTL are also indicated by vertical lines in the margin.

Dates of issue for original and updated pages/work pages are:

Original……March 1998

Change 1.… 21 May 1999

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 269. CONSISTING OF THE FOLLOWING:

Page No.	*Change No.	Page No.	*Change No.	Page No.	* Change No.
Cover	0	2-26	1	4-2 – 4-4	0
a & b	1	2-27	0	4-5 Blank	0
A & B	1	2-28	1	4-6 – 4-8	0
i	1	2-29 – 2-31	0	4-9 Blank	0
ii – vi	0	2-32	1	4-10 – 4-16	0
vii Blank	0	2-33 – 2-39	0	4-17	1
1-0	0	2-40	1	4-18	0
1-1 – 1-4	1	2-41	0	4-19 – 4-28	1
1-5	0	2-42 & 2-43	1	4-29 – 4-32	0
1-6 Blank	0	2-44 & 2-45	0	4-33 Blank	0
1-7 – 1-9	0	2-46	1	4-34 – 4-40	0
1-10	1	2-47 – 2-61	0	4-41 Blank	0
1-11	0	2-62	1	4-42	1
1-12 Blank	0	2-63	1	4-43	0
2-1	0	2-64 Blank	0	4-44	1
2-2	1	3-1	0	4-45	0
2-3 – 2-20	0	3-2	1	4-46	1
2-21 Blank	0	3-3 – 3-12	0	4-47	0
2-22 – 2-25	0	4-1	1	4-48 – 4-64	0

* Zero in this column indicates an original page.

INSERT LATEST UPDATED PAGES/WORK PACKAGES, DESTROY SUPERSEDED DATA

LIST OF EFFECTIVE PAGES/WORK PACKAGES (Continued)

NOTE: The portion of text affected by the updates is indicated by a vertical line in the outer margins of the page. Changes to the RPSTL are also indicated by vertical lines in the margin.

Dates of issue for original and updated pages/work pages are:

Original……March 1998

Change 1.… 21 May 1999

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 269. CONSISTING OF THE FOLLOWING:

Page No.	*Change No.	Page No.	*Change No.	Page No.	* Change No.
4-65 Blank……...0		C-11 – C-17……1		Index-8 Blank…….0	
4-66 – 4-68……..0		C-18 – C-21……0			
4-69 Blank……...0		C-22 – C-24……1			
4-70 – 4-72……..0		D-1 & D-2……..0			
4-73 Blank……...0		D-3 – D-5……1			
4-74 – 4-90……..0		D-6……..0			
4-91……..1		E-1……..1			
4-92 Blank……...0		E-2 Blank……...0			
A-1 & A-2……1		F-1……..0			
A-3……...0		F-2……..……1			
B-1 – B-8…….0		G-1 – G-3……...0			
B-9……...1		G-4 Blank……...0			
B-10…….0		H-1 & H-2……..0			
C-1 – C-8…….0		H-3 Blank……..0			
C-9. 1		NRC Form 3……..0			
C-10…….0		Index 1 – Index-7...…...0			

* Zero in this column indicates an original page.

TM 3-6665-321-12&P
C1

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENTS OF THE ARMY, AIR FORCE,
MARINE CORPS, AND NAVY
WASHINGTON, D.C. 21 May 1999

OPERATOR'S AND UNIT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)
FOR
ALARM, CHEMICAL AGENT, AUTOMATIC: M22
(NSN: 6665-01-438-6963) (EIC: Y14)
AND
AUXILIARY EQUIPMENT
POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM: M28
(NSN: 6130-01-438-6960) (EIC: Y40)
MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM: M281
(NSN: 6665-01-438-6959) (EIC: Y38)
ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42
(NSN: 6665-00-859-2215) (EIC: 399)

TM 3-6665-321-12&P, March 1998, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar in the margin of the page.

Remove Pages	Insert Pages
a and b	a and b
None	A and B
i and ii	i and ii
1-1 thru 1-4	1-1 thru 1-4
1-9 and 1-10	1-9 and 1-10
2-1 and 2-2	2-1 and 2-2
2-25 thru 2-28	2-25 thru 2-28
2-31 and 2-32	2-31 and 2-32
2-39 thru 2-46	2-39 thru 2-46
2-61 and 2-62	2-61 and 2-62
None	2-63/(2-64 Blank)
3-1 and 3-2	3-1 and 3-2
4-1 and 4-2	4-1 and 4-2
4-17 thru 4-28	4-17 thru 4-28
4-41 Blank thru 4-46	4-41 Blank thru 4-46
4-91/(4-92 Blank)	4-91/(4-92 Blank)
A-1 and A-2	A-1 and A-2
B-9 and B-10	B-9 and B-10
C-9 thru C-18	C-9 thru C-18
C-21 thru C-24	C-21 thru C-24
D-3 thru D-6	D-3 thru D-6
E-1/(E-2 Blank)	E-1/(E-2 Blank)
F-1 and F-2	F-1 and F-2

3. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
9913401

MICHAEL E. RYAN
General, U.S. Air Force
Chief of Staff

GEORGE T. BABBITT
General, U.S. Air Force
Commander, AMFC

M. K. HAYDEN
Colonel, USMC
Director, Program Support
Marine Corps Systems Command

DAVID P. ACTON
Life Cycle Manager USN
Code 805Z

DISTRIBUTION:

To be distributed in accordance with initial distribution (IDN) 280834, requirements for special distribution for TM 3-6665-321-12&P

*U.S. GOVERNMENT PRINTING OFFICE: 1998-646-036/60504

TECHNICAL MANUAL

OPERATOR'S AND UNIT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

FOR

ALARM, CHEMICAL AGENT, AUTOMATIC: M22
(NSN: 6665-01-438-6963) (EIC: Y14)

AND AUXILIARY EQUIPMENT
POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM: M28
(NSN: 6130-01-438-6960) (EIC: Y40)
MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM: M281
(NSN: 6665-01-438-6959) (EIC: Y38)
ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42
(NSN: 6665-00-859-2215) (EIC: 399)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS.

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA form 2028-2 located in the back of this manual directly to: Commander, USA SBCCOM, ATTN: AMSSB-RBD-B, Aberdeen Proving Ground, MD 21010-5424. A reply will be furnished to you.

Air Force users submit Air Force Technical Order Form 22 (AFTO Form 22), Technical Order System Publication Improvement Report and Reply, and submit according to TO 00-5-1, Air Force Technical Order System.

Marine Corps users submit NAVMC 10772 to: Commander, Marine Corps Logistics Bases, Code 850, 814 Radford Boulevard, Albany, GA 31704-1128.

Navy users submit NAVSEA TMDER 9086/10 to: Commanding Officer, Naval Ship Weapons Systems Engineering Station, Naval Sea Data Support Activity, Code 5H00, Port Hueneme, CA 93043-5007.

DISCLOSURE NOTICE - This information is furnished upon the condition that it will not be released to another nation without the specific authority of the Department of the Army of the United States, that it will be used for military purposes only, that individual or corporate rights originating in the information, whether patented or not, will be respected, that the recipient will report promptly to the United States, any known or suspected compromise, and that the information will be provided substantially the same degree of security afforded it by the Department of Defense of the United States. Also, regardless of any other markings on the document, it will not be downgraded or declassified without written approval of the originating United States agency.

DISTRIBUTION STATEMENT C - Distribution authorized to U.S. Government agencies and their contractors. This publication is required for administration and operational purposes, as determined 26 March 1993. Other requests for this document shall be referred to: Commander, USA SBCCOM, ATTN: AMSSB-RBD-B, 5183 Blackhawk Road, Aberdeen Proving Ground, Maryland 21010-5424. Marine Corps: Requests for this document must be referred to: Commandant of the Marine Corps (ARD), Washington, D.C. 20380-0001.

WARNING - This document contains export-controlled technical data whose export is restricted by the Arms Export Control Act (Title 22, U.S.C., Sec 2751 et seq) or Executive Order 12470. Violation of these export laws are subject to severe criminal penalties.

DESTRUCTION NOTICE - For unclassified, limited documents, destroy by any method that will prevent disclosure of contents or reconstruction of the document.

HEADQUARTERS, DEPARTMENTS OF THE ARMY, AIR FORCE, MARINE CORPS, AND NAVY
MARCH 1998

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

Page

TABLE OF CONTENTS (Continued)

Page

TABLE OF CONTENTS (Continued)

Page

HOW TO USE THIS MANUAL

This manual has been designed to enable operators and unit maintenance personnel to effectively maintain the ALARM, CHEMICAL AGENT, AUTOMATIC, M22 and supporting auxiliary equipment POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM, M28 and MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM, M281 in the field.

A summary contents listing is provided in the table of contents. A comprehensive cross-referenced index is located at the end of the manual. These listings will help you to locate more detailed information.

CHAPTER 1 contains introductory information. Subtopics of importance to you include: the purpose of the ALARM, CHEMICAL AGENT, AUTOMATIC, M22 and supporting auxiliary equipment POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM, M28 and MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM, M281. This chapter describes the equipment limitations; characteristics, capabilities, and features; location and description of major components; technical principles of operation; safety, care, and handling; and forms, records and reports.

CHAPTER 2 provides you with instructions on how to operate the ALARM, CHEMICAL AGENT, AUTOMATIC, M22 and supporting auxiliary equipment POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM, M28 and MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM, M281; confidence testing; setup, operating and shut down procedures; preparation for storage and transport, emergency and decontamination procedures.

CHAPTER 3 provides you with operator level troubleshooting and maintenance information.

CHAPTER 4 provides you with service upon receipt inspection procedures; unit level troubleshooting and maintenance information. Wipe test procedures in this TM are for use by Air Force, Marine Corps and Navy personnel only.

APPENDIX A is a reference list of frequently used forms and publications.

APPENDIX B contains the Maintenance Allocation Chart for the M22 Alarm, M28 Power Supply, M281 Mounting Kit and M42 Remote Alarm.

APPENDIX C is a Repair Parts and Special Tools List (RPSTL) that 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 operator and unit maintenance.

APPENDIX D lists the Components of End Items (COEI) and the Basic Issue Items (BII).

APPENDIX E lists the Additional Authorized List (AAL) items.

APPENDIX F lists the Expendable and Durable items required to operate or maintain the M22 Alarm.

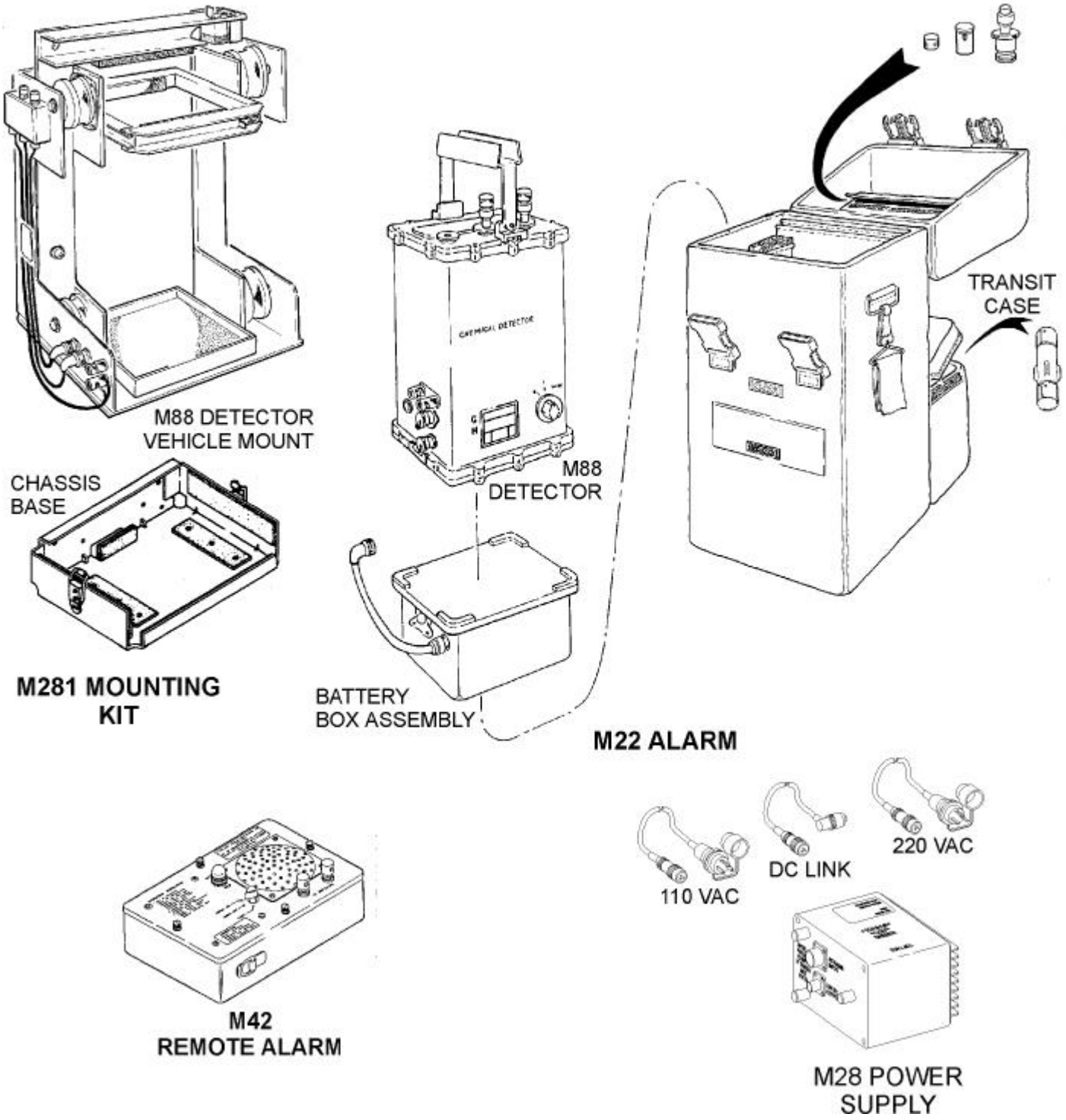
APPENDIX G is an illustrated list of manufactured items.

APPENDIX H is an example of the U.S. Nuclear Regulatory Commission form.

The Index follows the appendixes. You will find it useful in locating page numbers about specific information or procedures.

Army form, DA Form 2028-2, is provided in the back of this manual for your use in making recommended improvements to this manual. Marine Corps and Navy users should submit NAVMC 10772 when making recommended improvements to this manual.

WARNING and CAUTION statements have been placed throughout this text prior to operating or maintenance procedures, practices or conditions considered essential to the protection of personnel (WARNING) or equipment and property (CAUTION). A WARNING or CAUTION will apply each time the related step is repeated. Prior to starting any task, the WARNINGS or CAUTIONS included in the text for that task must be reviewed and understood.



M22 Alarm and Auxiliary Equipment

CHAPTER 1
INTRODUCTION

SECTION I. GENERAL INFORMATION

1.1 **SCOPE**. The scope of this manual is described in the following subparagraphs.

1.1.1 **Type of Manual**. This manual covers the operator's and unit maintenance (including repair parts and special tools list) for the ALARM, CHEMICAL AGENT, AUTOMATIC: M22 (NSN 6665-01-438-6963) and auxiliary equipment including the Power Supply: Chemical Agent Automatic Alarm, M28 (NSN 6120-01-438-6994); MOUNTING KIT: Chemical Agent Automatic Alarm, M281 (NSN 6665-01-438-6959) and the ALARM UNIT: Chemical Agent Automatic, ABCA-M42 (NSN 6665-00-859-2215).

1.1.2 **Equipment Model Number and Name**. ALARM, CHEMICAL AGENT, AUTOMATIC: M22

1.1.3 **Purpose of Equipment**. The ALARM, CHEMICAL AGENT, AUTOMATIC: M22 detects and senses chemical warfare nerve (G-Series) and blister (H-Series) agents in the air and provides a visual and audible warning via the built-in display and audible alarm or the ABCA-M42 Alarm Unit. The M22 bar-graph display indicates the concentration levels of the hazardous agent vapors detected by agent class.

1.2 **MAINTENANCE FORMS, RECORDS, AND REPORTS**.

1.2.1 Army personnel will use Department of the Army forms and procedures used for equipment maintenance prescribed by DA Pam 738-750 (The Army Maintenance Management System (TAMMS)) (Maintenance Management Update).

1.2.2 Air Force personnel will comply with Air Force Technical Order (TO) 11W-1-10 and Air Force (AF) Form 105 for maintenance actions.

1.2.3 Marine Corps personnel refer to the on-line Marine Corps Publication Distribution System (MCPDS) or Marine Corps Stock list SL-1-2 Index of Technical Publications. Marine Corps personnel will use TM 4700-15/1, (Equipment Record Procedures).

1.2.4 Navy personnel will comply with OPNAVINST 4790.4C for required maintenance actions and reporting.

1.3 **REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)**.

If your M22 or auxiliary equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design or performance. Document it on an SF 368 (Product Quality Deficiency Report). Mail your completed SF 368 to:

Army: Commander
U.S. Army Soldier and Biological Chemical Command (SBCCOM)
Integrated Material Management Center (IMMC)
ATTN: AMSSC-I-LO-E
Kansas Street
Natick, MA 01760-5052
DSN 256-4484, Commercial (508) 233-4484, FAX ext 4471

Office of the Project Manager for NBC Defense Systems
ATTN: AMSCB-PM-NNJ/ACADA Team
Aberdeen Proving Ground, MD 21010-5424
DSN 584-5628, Commercial (410) 436-5628 or 5940, FAX ext 6526

Air Force: HSC/YAC
8107 13th Street
Brooks AFB, TX 78235-5218
DSN 240-2374

1.3 **REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)**. (Continued)

Marine Corps: Submit an SF 368 In Accordance With (IAW) MCO 4855.10 directly to:
Commander
Marine Corps Logistics Bases
ATTN: Code G316-1, 814 Radford Boulevard
Albany, GA 31704-1128

Navy: Commander
CODE 805D
NAVSURFWARCENDIV
300 Highway 361
Crane, IN 47522-5001

1.4 **CORROSION PREVENTION AND CONTROL (CPC)**.

1.4.1 Corrosion Prevention and Control (CPC) of Army material is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements made to prevent the problems in the future.

1.4.2 While corrosion is typically associated with rusting metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

1.4.3 If a corrosion problem is identified, it shall be reported using a Standard Form (SF) 368, Product Quality Deficiency Report IAW Appendix A. Use of keywords such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem.

1.5 **DESTRUCTION OF MATERIAL TO PREVENT ENEMY USE**. Destroy the M22 and auxiliary equipment (except vehicle mounts) IAW TM 43-0002-31, Procedures for Destruction of Alarm Systems. Destruction of vehicle mounts is accomplished when the vehicle to which they are attached is destroyed.

1.6 **PREPARATION FOR STORAGE OR SHIPMENT**. Preparation for storage or shipment shall be accomplished IAW Chapter 4, Section V of this manual.

1.7 **WARRANTY INFORMATION**. The ALARM, CHEMICAL AGENT, AUTOMATIC: M22 (NSN 6665-01-438-6963) and auxiliary equipment including the Power Supply: Chemical Agent Automatic Alarm, M28 (NSN 6120-01-438-6994); and the MOUNTING KIT: Chemical Agent Automatic Alarm, M281 (NSN 6665-01-438-6959) are warranted for 3 years. The Sieve Pack Assembly, P/N 0614-2331, which is a spare part of the M88 Detector (M88 is a component of M22), has a limited warranty of time/usage base.

1.7.1 **Army Warranty Information**: The user initiates the warranty process by documenting failures on a SF-368, Product Quality Deficiency Report (PQDR), and submits in accordance with paragraph 1.3 The user will also send a copy of the PQDR to the ACADA Team via FAX at DSN 584-6526 or Commercial (410) 436-5628 or 5940. The user will then be contacted and provided disposition instructions. If failure is associated with the M88 Detector, the reading on the hour meter or an estimate if unable to read the hour meter **must be recorded on the PQDR in block 13 (Single Item) or under block 22 (Multiple Items)**. This information is crucial in determining if the item is covered under warranty.

1.7.2 **Air Force Warranty Information**. Contact the item manager as described in paragraph 1.3. Submit a copy of the PQDR via FAX to the ACADA team as described above in paragraph 1.7.1.

1.7.3 **Navy Warranty Information**. Contact the In-Service Engineering Agent (ISEA) as described in paragraph 1.3, telephone DSN 482-5740 or 812-854-5740, fax 812-854-5828. Submit a copy of the PQDR via FAX to the ACADA team as described above in paragraph 1.7.1.

1.7.4 **Marine Corps Warranty Information**. Contact Commander, ATTN: Code 835-3, Marine Corps Logistics Bases, 814 Radford Boulevard, Albany, GA 31704-1128, DSN 567-6736. Submit a copy of the PQDR via FAX to the ACADA team as described above in paragraph 1.7.1.

1.8 **NOMENCLATURE CROSS-REFERENCE LIST**.

Common Name	Official Nomenclature
M22 Alarm	Alarm, Chemical Agent, Automatic: M22
Pad	Pad, Cushioning
M88 Detector	DETECTOR, CHEMICAL AGENT, AUTOMATIC: M88
Handle	Handle Replacement
M42 Remote Alarm	ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42
Inlet	Inlet Nozzle
Rain Cap	Cap, Protective, Dust and Moisture Seal
Protective Caps	Cap, Protective, Dust and Moisture Seal
Switch	Three-way Rotary Switch
Vehicle Mount	Vehicle Mount Assembly
Vibration Mount	Vibration Mounting Kit
M42 Mount	Base, Chassis
Power Supply	M28 Power Supply
DC Power Cable	Cable Assembly, Power
AC Power Cable	Cable Assembly, Power
Catch	Rim Latch
Slide Latch	Latch Replacement Kit
Lens	Lens, Light
Lamp	Lamp, Incandescent
Strike	Catch Plate
Transit Case	Transit Case Assembly
Field Wire	Cable, Telephone
M28 Power Supply Connector	AC Mains Input

1.9 **LIST OF ABBREVIATIONS**.

Abbreviation	Term
AC	Alternating Current
DC	Direct Current
CAM	Chemical Agent Monitoring
CPC	Corrosion Prevention and Control
CW	Chemical Warfare
CWA	Chemical Warfare Agent
G	Nerve Agent
H	Blister Agent
IAW	In Accordance With
LED	Light Emitting Diode
MAC	Maintenance Allocation Chart
Mbq	Megabequerel
MCi	Millicure
MTOE	Modified Table of Equipment
NRC	Nuclear Regulatory Commission
NRMP	Navy Radioactive Materials Permit
OIC	Officer in Charge
PQDR	Product Quality Deficiency Report
RADIAC	Radiation Indicating and Computation
RIC	Radioisotope Committee
RPO	Radiation Protection officer

1.9 **LIST OF ABBREVIATIONS**. (Continued)

Abbreviation	Term
RPSTL	Repair Parts and Special Tools List
RSO	Radiation Safety Officer
SOP	Standard Operating Procedure
TAMMS	The Army Maintenance Management System
TOE	Table of Equipment
VAC	Volts Alternating Current

1.10 **SAFETY, CARE, AND HANDLING**.

WARNING

Do not open the detector case. The M88 Detector contains two identical nominal 10 millicure (370 megabequerel (Mbq)), foil Nickel-63 radioactive sources (a total of a nominal 20 mCi (740 Mbq)) per M88 Detector.

1.10.1 **Rules and Regulations**. The radioactive sources in the M22 are controlled by the United States Nuclear Regulatory Commission (NRC), Title 10, Code of Federal Regulations and are registered with the NRC. Army Regulation (AR) 385-11, AR 700-64, Air Force Instruction (AFI) 40-201, and Marine Corps Order (MCO) 5104.3 implement NRC regulations.

1.10.1.1 Army-wide possession and use of cell modules is authorized by NRC Byproduct Materials License (12-00722-06) issued to the Department of the Army, US Army Armament and Chemical Acquisition and Logistics Activity (AMSTA-AC-CTC-D), Rock Island, IL 61299-6000. The license is issued on the basis of statements concerning procedures established for the life-cycle control of the items. Established Army supply procedures are augmented by radiological control procedures. All serial numbers of detector modules shall be kept in accountable property books of owning activities per AR 710-2, para 2-90. Serial numbers of cells must be reported through the Radiation Testing and Tracking System (RATTS) per AR 710-3, para 4-24 through 4-39 during any transaction of the cell.

1.10.1.2 Air Force-wide possession and use of cell modules is authorized by NRC Master Materials License (42-23539-01AF) issued to the USAF Radioisotope Committee (RIC), HQ AFMOA/SGBR, Brooks AFB, TX 78235. Air Force equipment management procedures will be used to ensure accountability and control of the M22. Authorized units shall maintain accountability of the M22 using Air Force standard base supply procedures for equipment management. Each Air Force unit in possession of an M22 will maintain a Radioisotope Materials (RAM) permit registered with the RIC.

1.10.1.3 Navy possession and use of cell modules is authorized by Navy Radioactive Materials Permit (NRMP-13-00164-T1NP) issued by Navy Radiation Safety Committee (NRSC) pursuant to authority as stated in OPNAVINST 6470.3, to Crane Division, Naval Surface Warfare Center (NAVSURFWARCENDIV Crane), 300 Highway 361, Crane, IN 47522-5000, under NRC authorization of Specific License of Broadscope to the Department of Navy, Master Materials License (MML-45-23645-01NA). All serial numbers on the detector modules shall be monitored by licensee. Activities authorized to hold the M22 shall maintain accountability using standard Navy procedures for equipment management. Serial numbers must be reported through the radiation leak tests required semi-annually by the NRMP.

1.10.1.4 Marine Corps-wide possession and use of cell modules is authorized by Navy Radioactive Materials Permit (NRMP) No. 10-67004-T2NP issued to the Commander, Marine Corps Logistics Bases, Albany, GA 31704-1128. The NRMP requires tracking of the cell modules, a component of the ACADA, throughout its life-cycle. All serial numbers shall be recorded on receipt transaction cards by the unit responsible officer. Serial numbers of cells must be reported to COMMARCORLOGBASES, Albany, GA (Code 835) for any transaction of the cell, including initial receipt.

1.10.2 **NRC Posting Requirements**. Federal law requires certain notices and standards be made available to all users of licensed radioactive material. Appendix H contains instructions about regulations and NRC Form 3, Notice to Employees. Obtain a copy of the NRC Form 3 from your local Radiation Protection Officer (RPO) or Radiation Safety Officer (RSO). This information will be posted/displayed on bulletin boards in work areas where operator and/or unit maintenance actions are performed.

1.10.3 **Emergency Procedures**.

1.10.3.1 In a fire emergency, the basic concern is airborne contamination carried out by flames by heated air and in smoke. Fire should be fought with fire fighting personnel standing upwind of the fire. Fire fighters should wear portable air systems. After the fire has been extinguished, debris shall be surveyed for presence of equipment containing Ni-63 sources as well as contamination that may have spread by burning. A suitable Radiation Indicating and Computation (RADIAC) device such as a AN/PDR-27, VDR-2, or ADM-300 is used for detecting the location of Ni-63; however, wipes must be taken and evaluated by a liquid scintillation spectrometer (or equivalent) to detect the presence of contamination. Use the appropriate RADIAC to determine a radioisotope hazard IAW instructions from the local RPO/RSO or applicable RADIAC technical manuals/orders. Follow-up evaluation of wipes on suitable laboratory equipment (liquid scintillation spectrometer or equivalent) must be made. Double bag any suspect items or pieces that may have contamination on them.

1.10.3.2 **Army Notification Procedures**. If your M88 Detector is lost or stolen, notify both the local Radiation Protection Officer (RPO) and ACALA RPO as soon as the loss is discovered. The ACALA RPO may be contacted by calling 793-2965/6228/2995. Check for contamination per their directions. If contamination is found, label the parts as directed by the local RPO and turn them into depot for disposal as radioactive waste.

1.10.3.3 **Air Force Notification Procedures**. Notify both the local Radiation Safety Officer (RSO) local Bio-Environmental Office, and the USAF RIC. The USAF RIC may be contacted by calling DSN 240-3331 or Commercial (210) 536-3331. Follow the directions from the RIC and local RSO for packaging and returning the parts to the appropriate depot for disposal.

1.10.3.4 **Navy Notification Procedures**. Notify OIC, local Radiation Safety Officer (RSO)/Radiation Health Officer (RHO) and the CRANE COMMAND RSO, DSN 482-3578/1625, or commercial 812-854-3578/1625. Follow all directions and clear personnel from area if contamination is present. If contamination is present, double bag equipment and proceed with directions from Crane for return shipping.

1.10.3.5 **Marine Corps Notification Procedures**. Notify both the local Radiation Safety Officer (RSO) and the USMC Logistical Radiation Safety Officer (LRSO). The USMC LRSO may be contacted by calling DSN 567-6213 or Commercial (914) 439-6213. Follow the directions of the USMC LRSO and local RSO for packaging and returning the parts to the appropriate depot for disposal.

1.10.3.6 **Accidental Destruction**. In an equipment destruction emergency, parts of equipment must be retrieved, and surveys for possible contamination must be accomplished.

1.10.3.7 **General Accident Response Procedures**.

1.10.3.7.1 Remove Injured and Spectators.

1.10.3.7.2 Notify emergency response forces IAW local standard operating procedures (SOP).

1.10.3.7.3 Isolate the area.

1.10.3.7.4 Notify the appropriate Army, Air Force, Navy, and Marine Corps authorities (see paragraph 1.10.3.2, 1.10.3.3, 1.10.3.4 and 1.10.3.5).

1.11 **CALIBRATION**. Air Force see TO 00 33K-1-100. This is not applicable to Army, Navy, and Marine Corps.

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1.12 **EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**.

1.12.1 **Characteristics**.

1.12.1.1 Operates in fixed, portable, or vehicle mounted configurations.

1.12.1.2 All-weather operational.

1.12.1.3 Fully functional under dusty conditions.

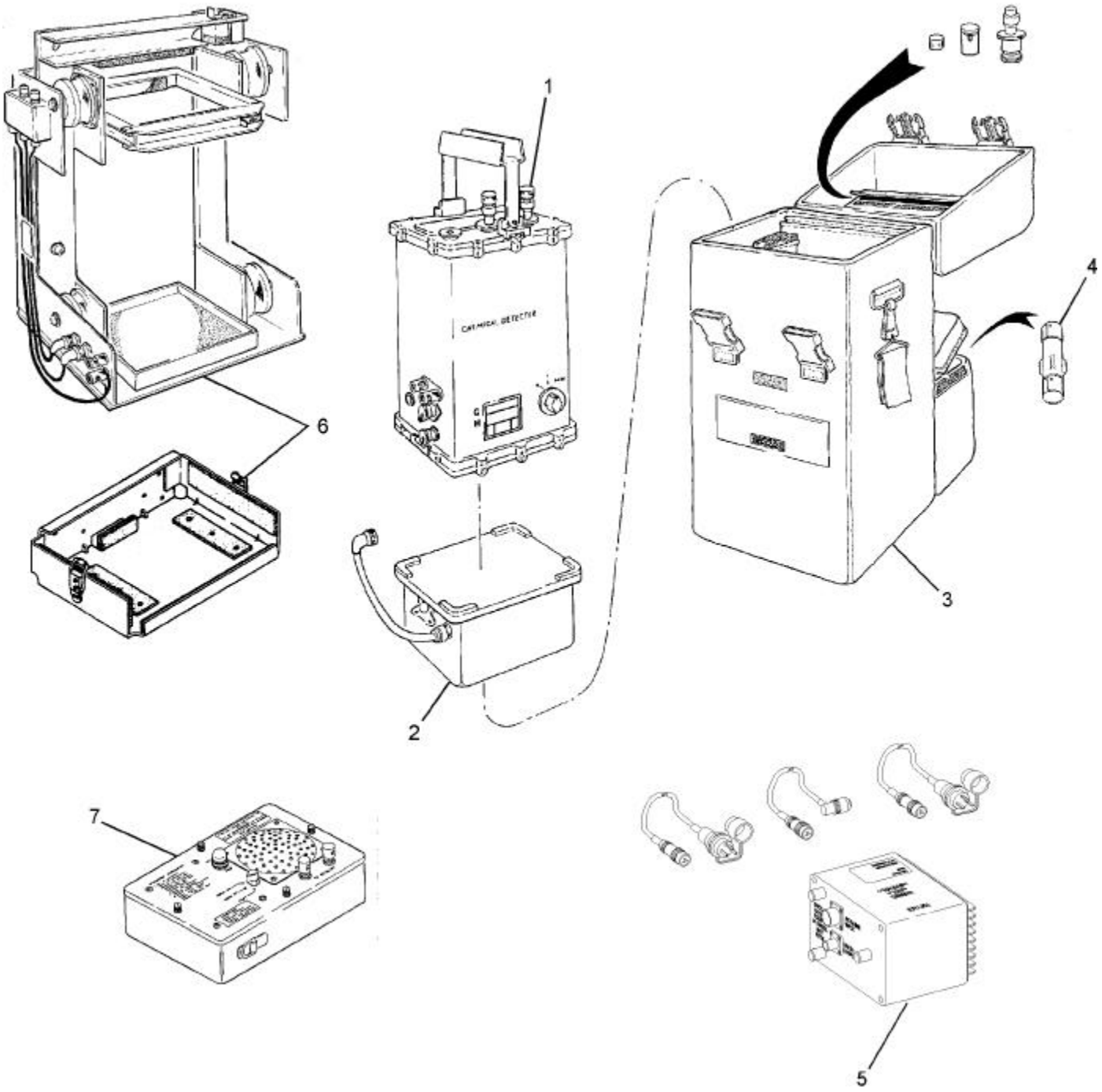
1.12.2 **Capabilities and Features**.

1.12.2.1 Automatically senses nerve and blister agents in the air and provides a visual and audible warning.

1.12.2.2 Can be connected to a remote alarm unit.

1.12.2.3 Operational from various electrical power sources.

1.13 **LOCATION AND DESCRIPTION OF MAJOR COMPONENTS AND AUXILIARY EQUIPMENT**.



MAJOR M22 COMPONENTS

1. DETECTOR UNIT, CHEMICAL AGENT, AUTOMATIC: M88. Senses chemical warfare agents in the air and gives a warning that can be heard or transmitted by field wires to a remote alarm. The M88 Detector also provides a visual warning and display and identifies the level of agents in the air indicating the hazardous level and the class of chemical agent detected.
2. BATTERY BOX. The Battery Box attaches to the bottom of the M88 Detector. With battery installed, provides 24 VDC power to the M88 Detector.
3. TRANSIT CASE. The Transit Case houses the M88 Detector, Battery Box, confidence sample, M42 Remote Alarm, protective caps, rain caps, spare inlet, and the operator's and unit maintenance manual. The Transit Case has a single strap for shoulder carry.
4. CONFIDENCE SAMPLE. The simulants used in the confidence sample are considered non-hazardous both because of the limited quantities and because they are contained within the confidence sample. The H simulant active ingredient is Methyl Salicylate. The G simulant active ingredient is Dipropylene Glycol Monomethyl Ether.

AUXILIARY EQUIPMENT

5. POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM: M28. Provides 24 VDC power to the M88 Detector when AC power (Mains) is available. Accepts 110 VAC or 220 VAC input.
6. MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM: M281. Provides a quick release frame to hold the M88 Detector and attached Battery Box to a vehicle while providing a connection block for remote alarms and alternative vehicle power. Provides a quick release frame to hold the M42 Remote Alarm to a Vehicle Mount.
7. ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42. Provides warning at a remote location via a warning light and/or audible horn. The audible horn can be switched off if desired. The M42 Remote Alarm is connected to the M88 Detector via up to 400 meters of field wire.

1.14 **EQUIPMENT DATA**.

Table 1-1. Dimensions and Weights

Component	Length		Width		Height		Weight	
	in.	cm	in.	cm	in.	cm	lb.	kg
M22								
M88 Detector	6.5	16.51	7.0	17.78	10.75	27.30	10.63	4.8
Battery Box (with battery)	6.0	15.24	7.0	17.78	3.0	7.6	3.3*	1.5*
Transit Case	14.5	36.8	8.9	22.6	15.75	40.1	4.84	2.2
M22 Total Weight							18.77	8.5
Auxiliary Equipment								
M28 Power Supply	6.38	16.19	3.88	9.84	4.63	11.75	3.74	1.7
Vehicle Mount	7.9	20.0	12.95	32.9	16.1	40.9	16.5	7.5
M42 (with batteries)	8.8	22.4	6.0	15.2	6.0	15.2	3.8	1.7

NOTE: The dimensions and weights listed are for an empty Transit Case and vehicle mounts.
*This includes the battery that weighs 2.2 lb.
All the dimensions above exclude the allowances for cable connections and cable bends.

1.14 **EQUIPMENT DATA**. (Continued)

1.14.1 **M22 Alarm Operating and Performance Ranges**. The M22 Alarm and its auxiliary equipment will operate from -22°F to 125°F (-30°C to 52°C) and a relative humidity range of 5 to 100%.

1.14.2 **M22 Alarm Storage Ranges**. The allowable storage temperature for the M281 Mounting Kit, the M42 Alarm, and the M22 Alarm, which includes the M88 Detector Unit, ranges from -80°F to 160°F (-62°C to 71°C). The M28 Power Supply storage temperature range is -67°F to 158°F (-55°C to 70°C). The allowable relative humidity for storage of the M22 Alarm and all its auxiliary equipment ranges from 5 to 100%.

NOTE

At temperatures of -18ºC and lower the M88 Detector may not respond to the H simulant confidence sample. The M88 Detector is still working properly.

1.14.3 **M22 Alarm Power Requirements.** The M88 Detector requires a nominal 24 +/- 5 VDC, with a 0.6 ampere nominal at 68°F (20°C) average and 1.85 ampere maximum. The M28 Power Supply requires 96 to 136 VAC, or 190 to 256 VAC, 47 to 60 Hz, at 200 watts maximum; and will supply 24 VDC +/- 1 VDC at 2 ampere hours.

1.14.4 **Battery Types/Battery Life.** The Battery Box is designed to hold one BA-5590/U non-rechargeable lithium-sulfur dioxide battery or one BB-390A/U rechargeable nickel metal hydride battery. The BA-5590/U battery has an operational temperature range of -22°F to 122°F (-30°C to 50°C) and the BB-390A/U battery has an operational temperature range of -4°F to 125°F (-2°C to 50°C). The BA 5590/U and the BB-390A/U provide the following hours of normal operation with respect to temperature:

Temperature	BA-5590/U	BB-390A/U
-22°F (-30°C)	3 hours	not operational
32°F (0°C)	6 hours	4 hours
76°F (25°C)	12 hours	7 hours
122°F (50°C)	18 hours	11 hours

SECTION III. THEORY OF OPERATION

1.15 **INTRODUCTION**. The M88 Detector samples air in the vicinity of the nozzle for the presence of nerve and blister chemical agents. Air sample conditions a short distance away from the M88 Detector may be quite different, and a change in wind direction could quickly bring a hazardous level of agent vapor to a previously safe area.

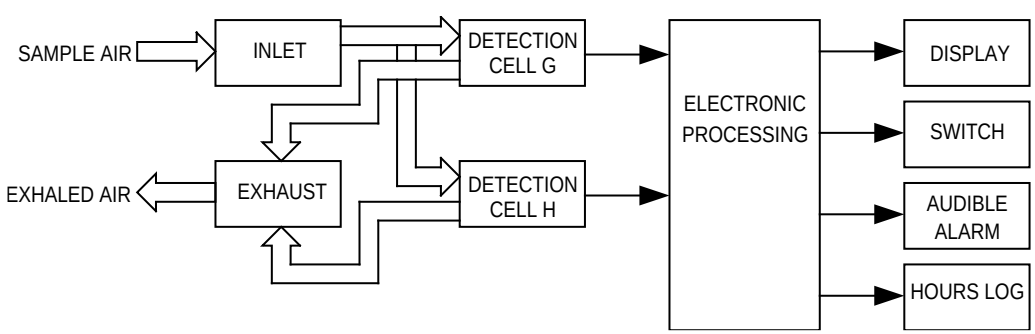
1.16 **DETAILED THEORY OF OPERATION**.

An internal motor/pump assembly (sample pump) continually draws air in through the inlet. The air is then passed over a heated membrane assembly before being exhausted back into the atmosphere via an exhaust vent at the side of the inlet. Any agent vapor present in the air permeates the membrane assembly and the cell assembly. In the cell assembly, the vapor molecules can be detected. These charged particles are used to produce an electronic signal by means of a process called Ion Mobility Spectrometry (IMS).

Agent ions in the cell assembly are swept towards a collector electrode that produces an electrical impulse for each ion received. The current produced by this electrode is analyzed by a microprocessor that drives the display assembly. From the characteristics of this signal, the M88 Detector determines the concentration of the nerve or blister agent vapor present and indicates the vapor hazard by displaying a number of bars on the display assembly.

The closed cell assembly system air is circulated by a recirculating pump through molecular sieves that keep the system dry and chemically clean.

Clear-down Process. If the level of agent vapor detected exceeds a pre-set level, the M88 Detector will perform a “clear-down” operation. When this occurs, the M88 Detector will stop sampling external air so that it can recover from the high level of vapor ingested. When the M88 Detector has performed clear-down to a lower detection level, external air sampling will resume.



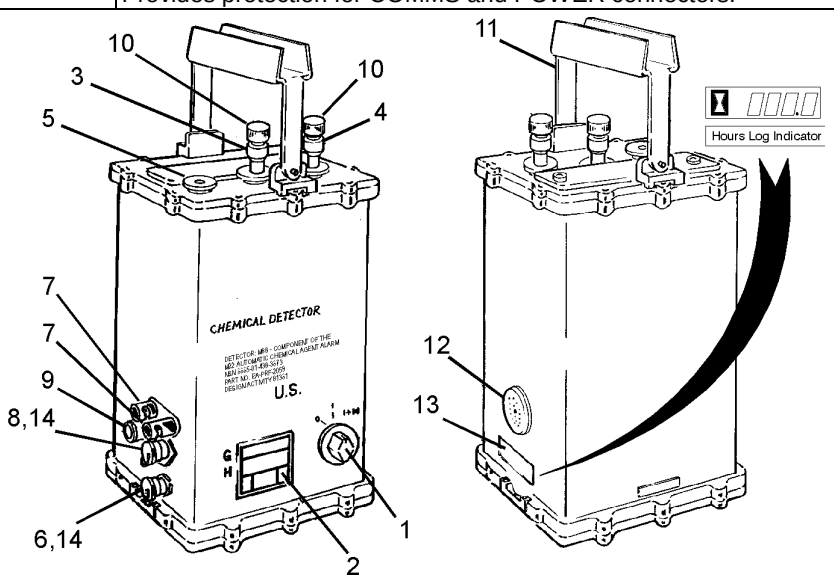
CHAPTER 2
OPERATING INSTRUCTIONS

SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2.1 **M88 DETECTOR**.

2.1.1 **M88 Detector Operator Controls and Indicators**.

Key	Control or Indicator	Function
1	Selector Switch	Select the following mode: 0 = OFF 1 = ON (NO Audible Alarm) 1 + ◀ = ON (WITH Audible Alarm)
2	Display	Shows the hazardous level of agent vapor in a bar display. Operational status. Visual alarm.
3	INLET	Port where air sample is drawn into M88 Detector.
4	EXHAUST	Port where air sample is exhaled from M88 Detector.
5	BREATHER TEST POINT	Depot level maintenance only.
6	POWER Connector	Power input connector.
7	REMOTE ALARM Connectors	Binding posts for connection of M42 Remote Alarm.
8	COMMS Connector	Data communication connector.
9	VENT	Compensates for changes in atmospheric conditions.
10	Protective Caps	Protective INLET and EXHAUST.
11	Handle	Used to carry M88 Detector.
12	Audible alarm	Produces an audible alarm when selector switch (1) is in 1+◀ position.
13	HOURS LOG	Indicates elapsed run time indicator (Flashing hour glass indicates it is counting).
14	Connector Caps	Provides protection for COMMS and POWER connectors.



2.1 **M88 DETECTOR**. (Continued)

2.1.2 **M88 Detector Display**. The display consists of numerous Light Emitting Diodes (LEDS) arranged in the following patterns: A nerve agent bargraph (1) (marked by the letter G), a blister agent bargraph (2) (marked by letter H), the sampling light (5) (marked by letter S), the wait light (7) (marked by the letter W), and the ALARM light (6).

Each of the two bargraphs consists of eight bars (LEDS). The lighting of three or more bars in either of the two bargraphs indicates that the detectors detect that class of chemical warfare agent (CWA) (or something which simulates it). The bars light progressively from left to right to indicate a higher concentration of CWA vapor.

The sample light (5) (marked by the letter S) is constantly lit during normal operation but flashes on and off during the clear-down process to show that the M88 Detector is not sampling external air.

The ALARM light (6) is normally not lit but flashes on and off when three or more of the G/H bars are lit.

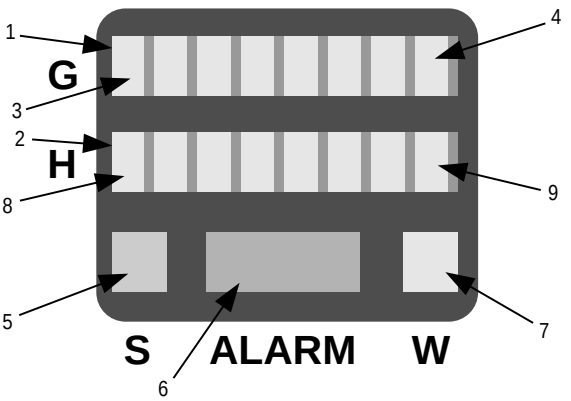
The wait light (7) (marked by the letter W) is not lit during normal operation but is constantly lit for approximately two minutes during initial power on and during internal self checks. The light will flash on and off for approximately 10 seconds once every hour to verify pump operation. It will also flash on and off if M88 Detector is switched on in a below freezing temperature environment, and will flash on and off if a fault is detected during normal operation.

NOTE

The letters G, H, S, W and the word ALARM are all painted in black on the M88 Detector adjacent to the associated light.

Key	Control or Indicator	Function
1	G Bargraph	Nerve agent bargraph consisting of 8 bars that are Yellow when lit.
2	H Bargraph	Blister agent bargraph consisting of 8 bars that are Yellow when lit.
3	Bar (G1) (yellow when lit)	Bars (LEDs that light) light up progressively on detection of nerve agent(s) to show the hazardous level of agent vapor (more bars lit, means a higher hazardous level of agent vapor). At initial power on this bar will flash on and off during internal self checks.
4	Bar (G8) (yellow when lit)	Bars (LEDs that light) light up progressively on detection of nerve agent(s) to show the hazardous level of agent vapor. When this LED is lit, all 8 bars in the G bargraph will be on to show the maximum detected hazardous level of agent vapor. The exception to this, at initial power on, is the bar will flash on and off during internal self checks.
5	Sample light (S) (green when lit)	Constantly lit during normal operation but flashes on and off during the clear-down process to indicate that the M88 Detector is not sampling external air.
6	ALARM light (Red when lit)	Normally not lit but flashes on and off when in alarm condition (three or more bars lit in either G/H bargraph).
7	Wait Light (W) (Yellow when lit)	Not lit during normal operation but: 1 Constantly lit for approximately 2 minutes during internal self checks at initial power on. 2 Flashes on and off for 10 seconds (approx.) during self checks and following this every hour to verify pump operation. 3 Flashes on and off if the M88 Detector is switched on in a cold environment (below freezing temperature), showing the internal temperature is being raised. 4 Flashes on and off during normal operation to show a fault.

8	Bar (H1) (yellow when lit)	Bars (LEDs that light) light up progressively on detection of blister agent(s) to show the hazardous level of agent vapor (more bars lit, means a higher hazardous level of agent vapor). At initial power on, this bar will flash on and off during internal self checks.
9	Bar (H8) (yellow when lit)	Bars (LEDs that light) light up progressively on detection of blister agent(s) to show the hazardous level of agent vapor. When this LED is lit, all 8 bars in the H bargraph will be on to show the maximum detected hazardous level of agent vapor. At initial power on, this bar will flash on and off during internal self checks.



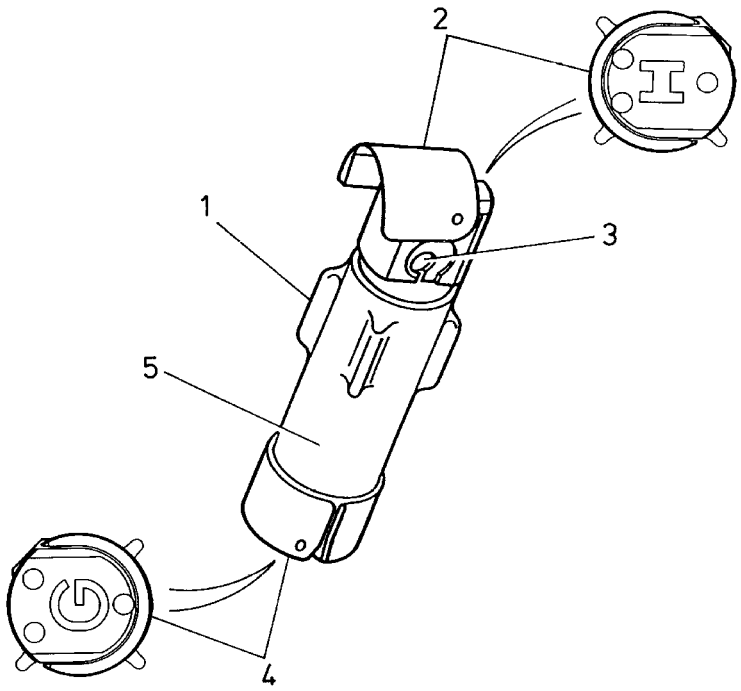
2.2 **CONFIDENCE SAMPLE**.

When the confidence sample vapor vent (3) is placed in contact with the inlet of the M88 Detector, the confidence sample simulates chemical warfare agents to confirm M88 Detector operation.

NOTE

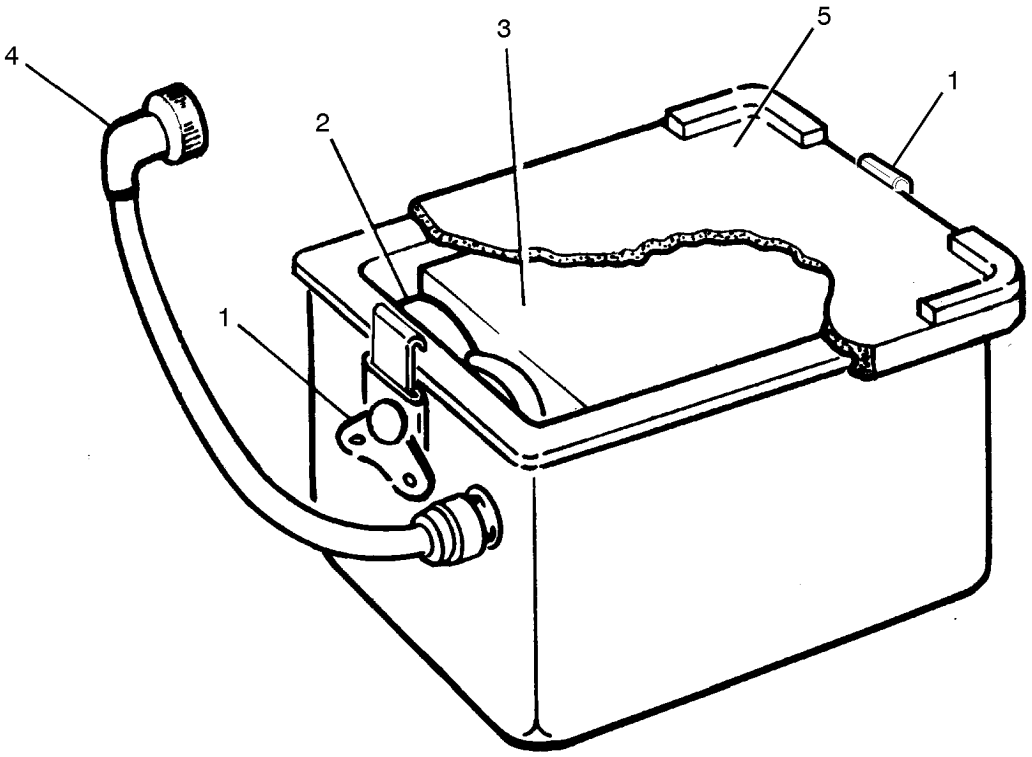
The simulants used in the confidence sample are considered non-hazardous.

Key	Indicator	Function
1	H	Three raised ribs indicates H end of the confidence sample. H end contains a blister agent simulant.
2	H Vapor Shroud	Moves internal plunger up and down. Plunger opens seal to permit sampling of H simulant.
3	Vapor Vent	Vapor vent aligns with the M88 Detector inlet to allow testing.
4	G Vapor Shroud	Moves internal plunger up and down. Plunger opens seal to permit sampling of G simulant.
5	G	Round cross-sectional area indicates G end of the confidence sample. G end contains a nerve agent simulant.



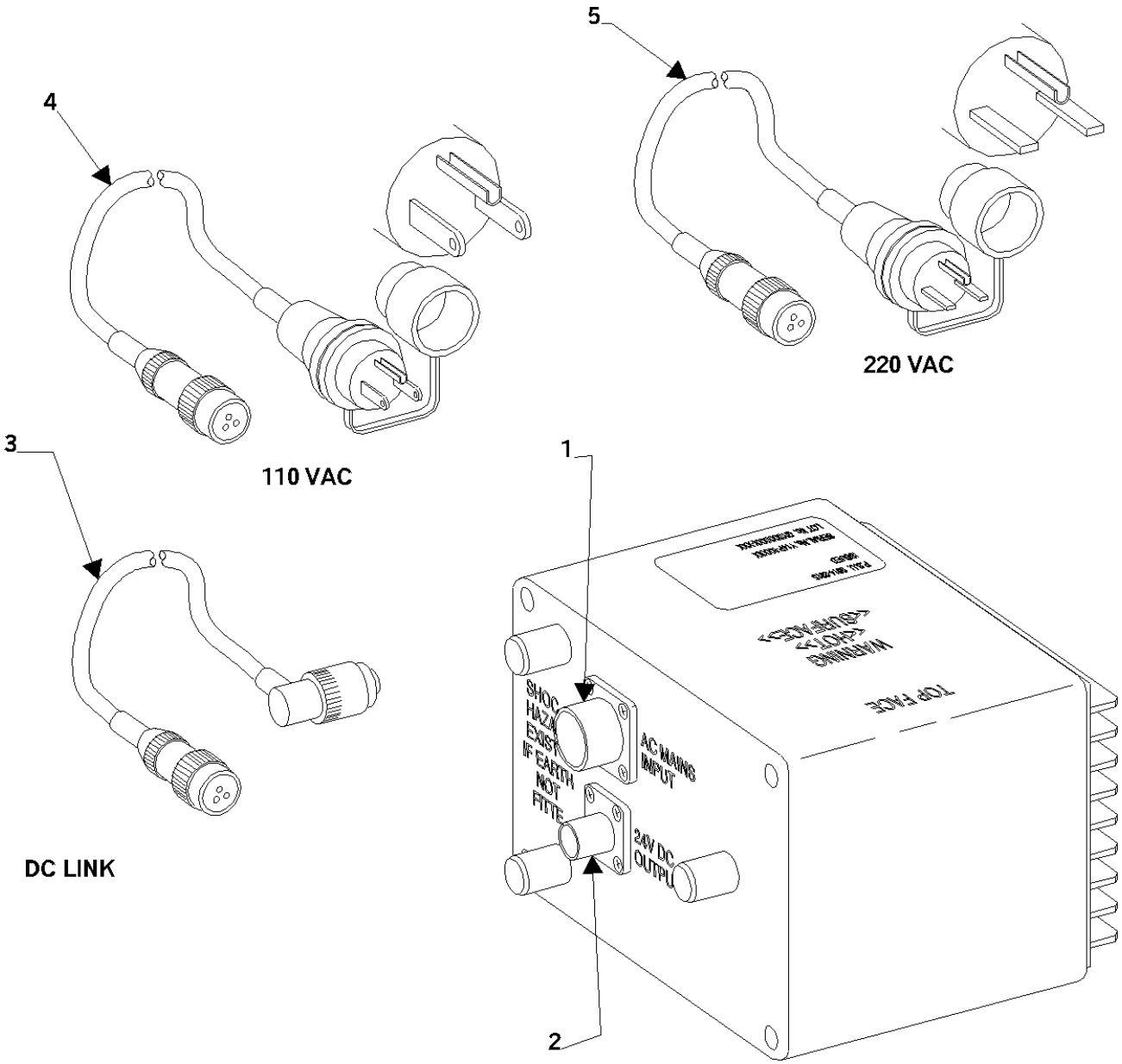
2.3 **BATTERY BOX**.

Key	Control or Indicator	Function
1	Catches	Secures Battery Box to M88 Detector.
2	Battery Connector	Connects the battery to the input power connector cable.
3	Battery	Provides power source (Type BA5590/U).
4	Power Connector	Battery Box output of 24 VDC can be connected to M88 Detector input POWER connector.
5	Battery Box Cover	Provides protection to the battery compartment against entry of moisture and dirt.



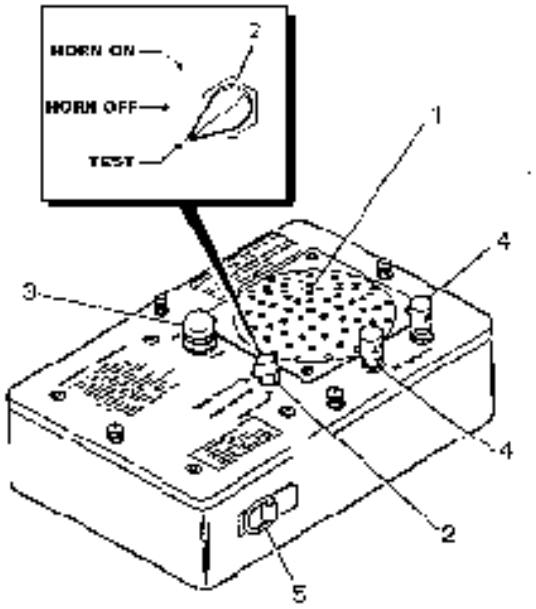
2.4 **M28 POWER SUPPLY**.

Key	Control or Indicator	Function
1	AC MAINS INPUT	Connection for input source power (110 VAC / 220 VAC).
2	24 VDC OUTPUT connector	Connection for DC Power Cable (24 VDC).
3	DC Power Cable	Connects the M28 Power Supply to the M88 Detector.
4	AC Power Cable (110 VAC)	Connects the M28 Power Supply to the AC power source (110 VAC).
5	AC Power Cable (220 VAC)	Connects the M28 Power Supply to the AC power source (220 VAC).


5
4
220 VAC
110 VAC
3
1
DC LINK
2
AC MAINS INPUT
24V DC OUTPUT
TOP FACE

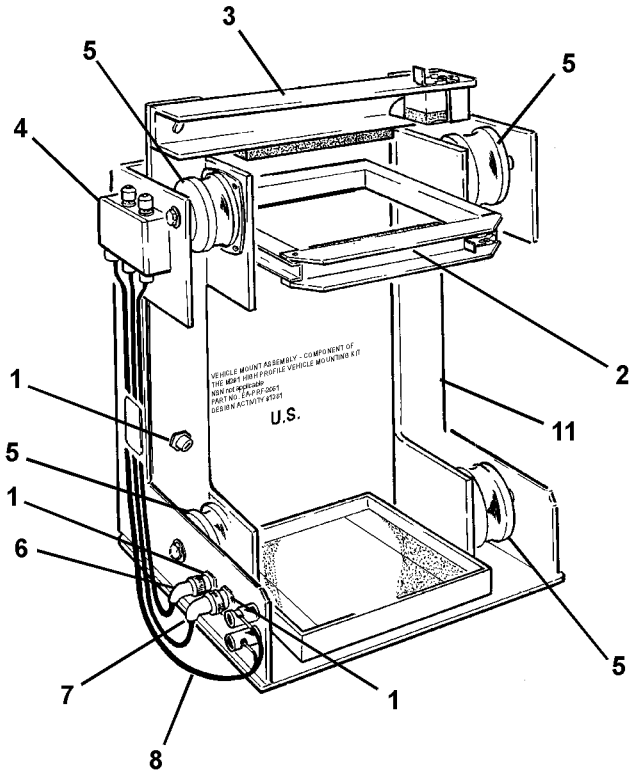
2.5 **M42 REMOTE ALARM**.

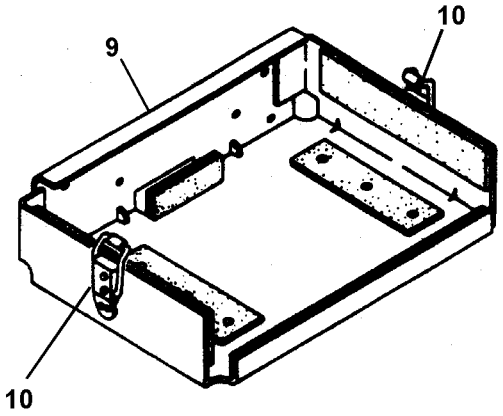
Key	Control or Indicator	Function
1	Horn	Sounds alarm when the M88 Detector alarms.
2	Selector switch	Selects operational mode: HORN ON, HORN OFF and TEST.
3	ALARM RED Lamp	Flashes when M88 Detector is in alarm condition.
4	Binding posts (2)	Used to connect the M42 Remote Alarm to the M88 Detector, using field wire.
5	D-ring	Provides a way of securing field wire to the M42 Remote Alarm.



2.6 **M281 MOUNTING KIT**.

Key	Control or Indicator	Function
1	Dummy receptacles	Provides convenient storage for cable connector when cable is not in use.
2	Front clamp bar	Secures M88 Detector with Battery Box in Vehicle Mount.
3	Top clamp bar	Secures M88 Detector with Battery Box in Vehicle Mount.
4	Junction Box	Provides connection to vehicle power, remote alarm, and COMMS interface.
5	Vibration mount	Isolates M88 Detector from vehicle vibrations.
6	Power Supply cable	Provides connection from power source to the M88 Detector.
7	COMMS Cable	Provides communication connection from vehicle to the M88 Detector.
8	M42 Remote Alarm cable	Provides remote alarm connection from vehicle to the M88 Detector.
9	M42 Mount	Secures M42 Remote Alarm to vehicle.
10	Catches	Secures M42 Remote Alarm to M42 Mount.
11	Vehicle Mount	Secures M88 Detector to vehicle.





SECTION II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) AND MANDATORY REPLACEMENT PARTS

2.7 **INTRODUCTION**.

2.7.1 **General**. Table 2-1, the Preventive Maintenance Checks and Services (PMCS) table, has been provided so you can keep your equipment in good operating condition and ready for its primary mission.

2.7.2 **Warnings and Cautions**. Always observe the WARNINGS and CAUTIONS appearing in your PMCS table. Warnings and cautions appear before applicable procedures. You must observe these WARNINGS and CAUTIONS to prevent serious injury to yourself and others and to prevent damage to your equipment.

2.7.3 **Explanation of Table Entries**.

2.7.3.1 **Item Number Column**. Numbers in this column are for reference. When completing DA Form 2024 (Equipment Inspection and Maintenance Worksheet), include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

2.7.3.2 **Interval Column**. This column tells you when you must do the procedure in the procedure column. BEFORE procedures must be done before you operate or use the equipment for its intended mission. DURING procedures must be done during the time you are operating or using the equipment for its intended mission. AFTER procedures must be done immediately after you have operated or used the equipment.

2.7.3.3 **Item to Check/Service Column**. This column identifies the item to be checked or serviced.

2.7.3.4 **Procedures Column**. This column gives the procedure you must do to check or service the item listed in the Item to Check/Service column. This will verify that the equipment is ready and available for its intended mission or operation. You must do the procedure at the time stated in the interval column.

2.7.3.5 **Not Fully Mission Capable If: Column**. Information in this column indicates what faults will keep your equipment from being capable of performing its primary mission. If you make check and service procedures that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

2.7.3.6 **Other Table Entries**. Observe all special information and notes that appear in your table.

2.7.3.7 If your equipment does not perform as required, refer to Chapter 3 under Troubleshooting Procedures for possible problems. Report any malfunctions or failures on the proper DA Form 2404, DA Pam 738-750, or SF 368.

Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
		M88 DETECTOR		
1	Before	Exterior	Inspect outside of M88 Detector (1) for broken or missing parts.	Parts are broken or missing.
2	Before	POWER Connector	Remove POWER connector protective cap (2). Check for bent or broken pins.	Pins are bent or broken.
3	Before	COMMS connector	Remove COMMS connector protective cap (3). Check for bent or broken pins.	Pins are bent or broken.

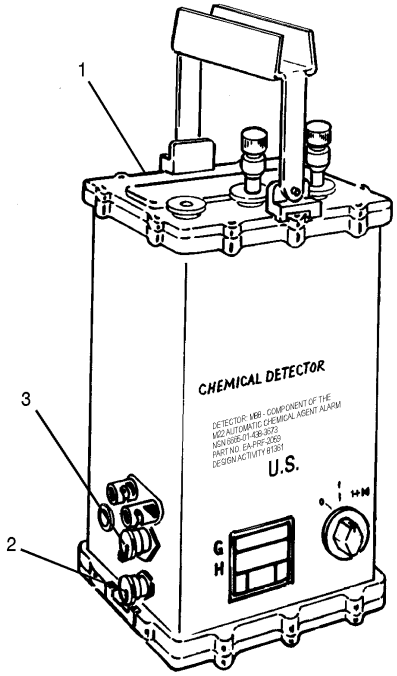


Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment (Continued)

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
		BATTERY BOX		
1	Before	External	Check Battery Box (1) for breaks, and for missing parts.	Battery box is not usable, if broken, cracked or parts are missing.
2	Before	Cover	Check the cover (2) for tears.	Cover is torn.
3	Before	Cable	Check cable (3) for cuts, mashed or frayed insulation. Check cable connectors for damage.	Cable is visibly damaged or bare wires can be seen. Connectors are damaged.

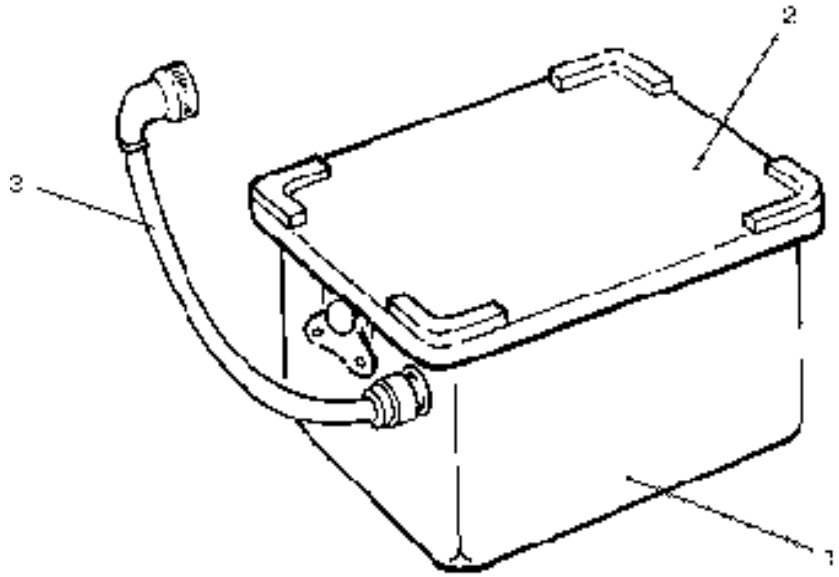


Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment (Continued)

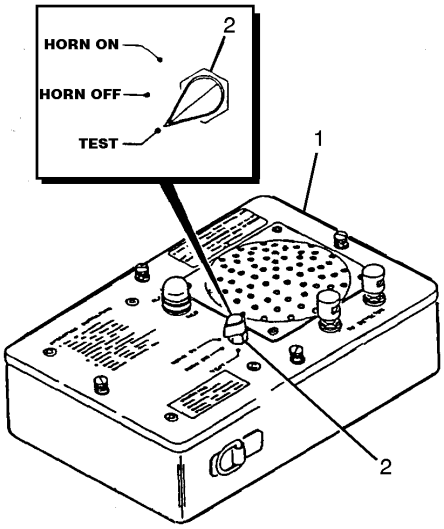
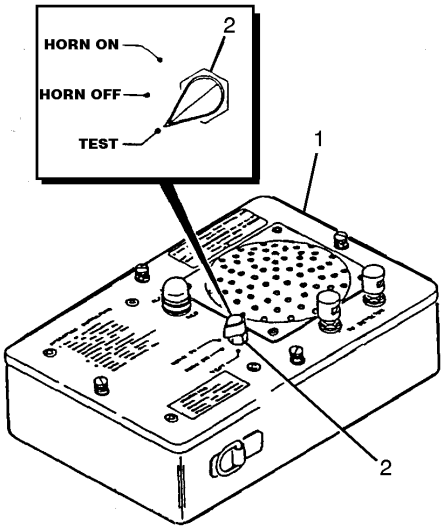
Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
		M42 REMOTE ALARM		
1	Before	Exterior	Check the outside of M42 Remote Alarm (1) for dirt, corrosion and broken or missing parts.	Parts broken or missing.
2	Before		Set selector switch (2) to HORN OFF.	
				
			Loosen four knurled screws (3) and separate panel assembly (4) from housing (5).	
				

Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment (Continued)

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
			Release spring-tension clip (6) and open hinge cover of battery retainer (7).	

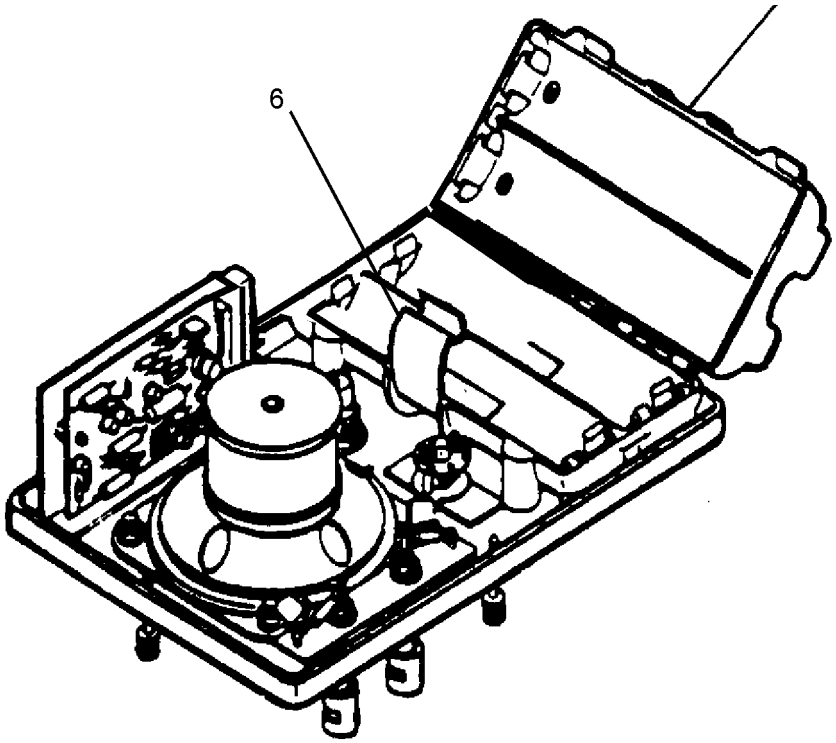


Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment (Continued)

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
2 (Cont)			Obtain four BA3030 Batteries (Appendix F, Item 5). **NOTE** See labels in bottom of battery retainer for correct positioning of batteries. Install batteries (12) (Appendix F, item 5) in battery retainer (10). Close hinged cover (7) and secure it with spring tension clip (6). Position panel assembly (9) on housing (5). Secure by tightening four knurled screws (8).	

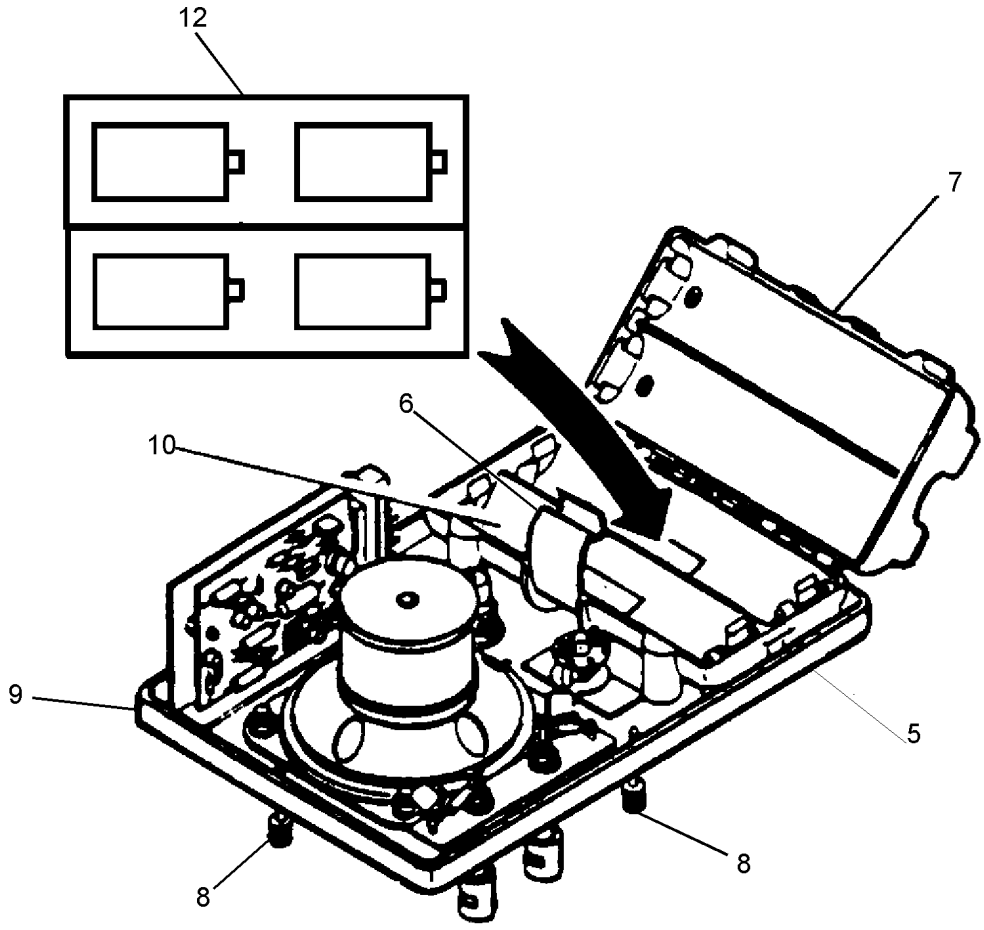
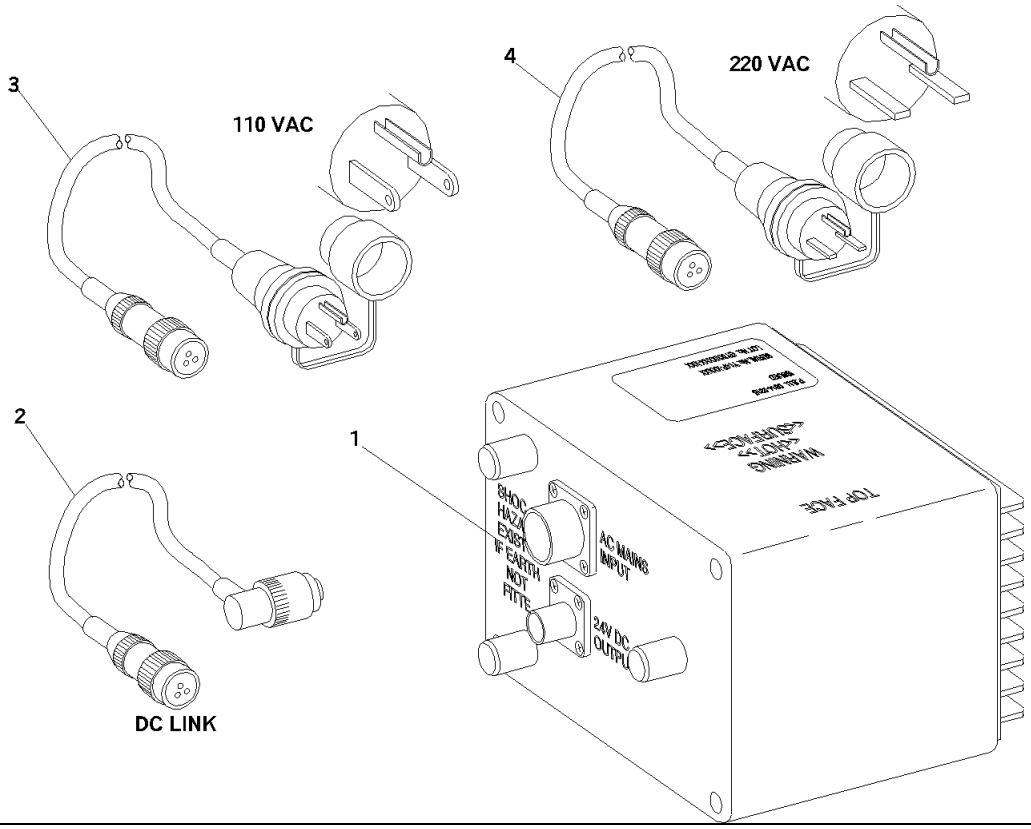


Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment (Continued)

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
		M28 POWER SUPPLY		
1	Before	Exterior	Check exterior (1) for: damaged, loose or missing parts; dirt and corrosion.	Parts are broken or missing.
2	Before	Cables	Check cables (2,3,4) for cuts, mashed or frayed insulation. Check cable connectors for damage.	Cable is visibly damaged or bare wires can be seen. Connectors are damaged.

Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment (Continued)

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:

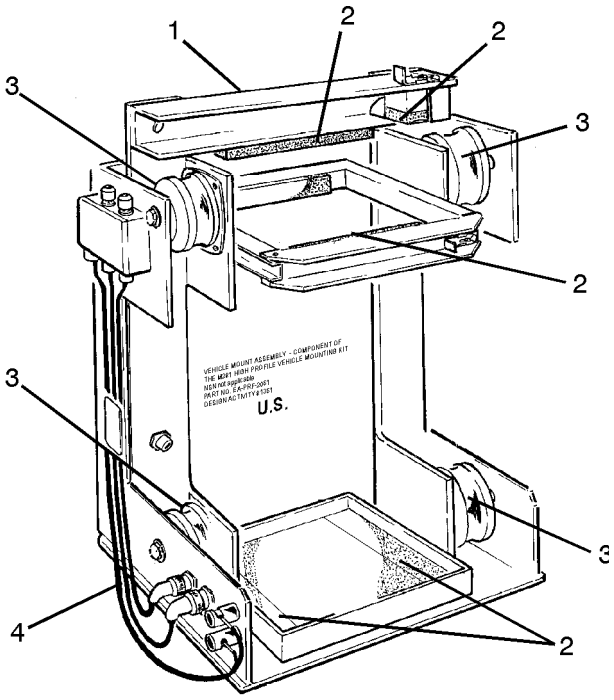


NOTE

All three cables shown will be provided with the system.

Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment (Continued)

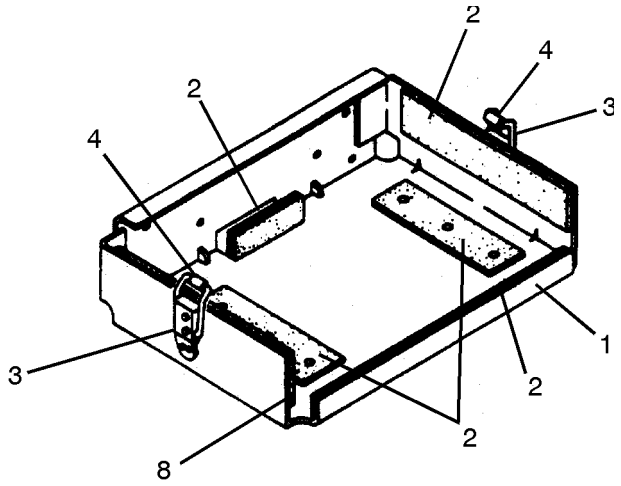
Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
		VEHICLE MOUNT		
1	Before	Exterior	Inspect the mount (1) for dirt, corrosion, and broken or missing parts.	Parts are broken or missing.
2	Before	Rubber Pads	Check the five rubber pads (2) located on the top clamp bar, front clamp bar, and bottom tray.	Rubber pads are missing or in poor condition.
3	Before	Vibration Mounts	Check the four vibration mounts (3) for damage. Inspect for tears to the rubber boot and leakage of silicone oil as unserviceable indicators	Vibration mounts are damaged.
4	Before	Cables	Check three cable assemblies (4) for cuts, mashed or frayed insulation. Check cable connectors for damage.	Cable is visibly damaged or bare wires can be seen. Connectors are damaged.



Vehicle Mount

Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment (Continued)

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
		M42 MOUNT		
1	Before	Interior / Exterior	Inspect mount (1) for dirt, corrosion, and broken or missing parts.	Parts are broken or missing.
2	Before	Rubber Pads	Check that the six rubber pads (2) are present and in good condition.	Rubber pads are missing or in poor condition.
3	Before	Retaining Clips	Inspect retaining clips (3) for broken or missing parts.	Parts are broken or missing.
4	Before	Rubber Insulator	Check that two rubber insulators (4) are present and in good condition.	Rubber insulators are missing or in poor condition.



M42 Mount

Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment (Continued)

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
		M42 REOMTE ALARM		
1	Before/ During	Horn, Light, and Battery Test	**NOTE** Alert personnel within hearing range that the M42 Remote Alarm will be tested. Install batteries. Set selector switch (1) to TEST. Horn should sound and ALARM RED light (2) should flash. If test fails, take unit to unit maintenance.	Horn does not sound or ALARM RED does not flash.

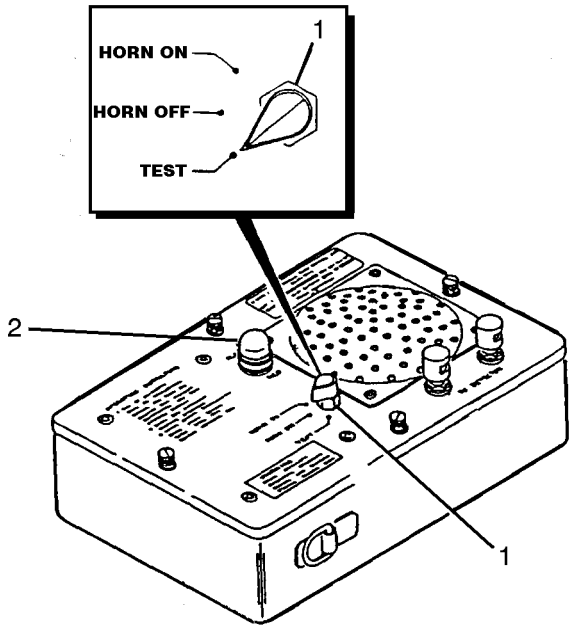


Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment
(Continued)

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
		M88 DETECTOR		
1	During	Display	Check display (4) for indications (See paragraphs 2.9 2.9 through 2.102.10.3). **NOTE** Monitor the display carefully because it is the only means that will indicate that the detector is not operating properly and will not detect chemical warfare agents. The display will give very little or no warning when the detector battery is low; and the M42 Remote Alarm provides no indication of detector failures or shutdown (such as low battery).	If malfunction indications are displayed, refer to troubleshooting (paragraph 3.33.3).
2	After	M88 Detector	If the power shutdown procedures in paragraph 2.10 are not followed, perform initial power on and self-test paragraph 2.9.3, then perform shutdown IAW paragraph 2.10.	Two or more bars are shown on display.
3	After	Exterior	Inspect exterior of M88 Detector (1) for broken or missing parts.	Parts are broken or missing.
4	After	POWER Connector	Remove POWER connector protective cap (2). Inspect for cracks or breakage. Reinstall cap.	Insulation is cracked, broken, or pins are bent.
5	After	COMMS Connector	Remove COMMS connector protective cap (3). Inspect communication insulation for breakage. Reinstall cap.	Insulation is cracked, broken, or pins are bent.

Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment
(Continued)

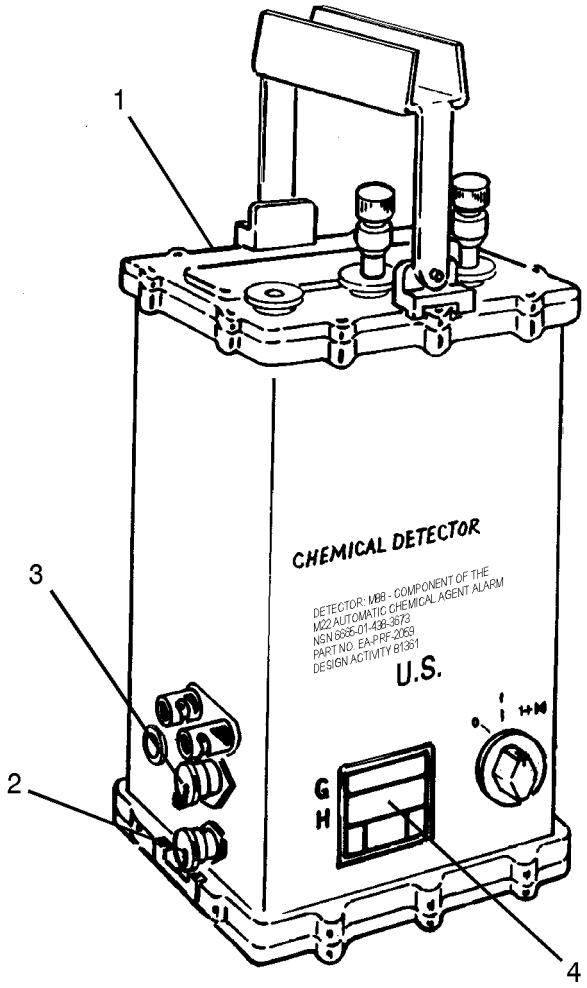
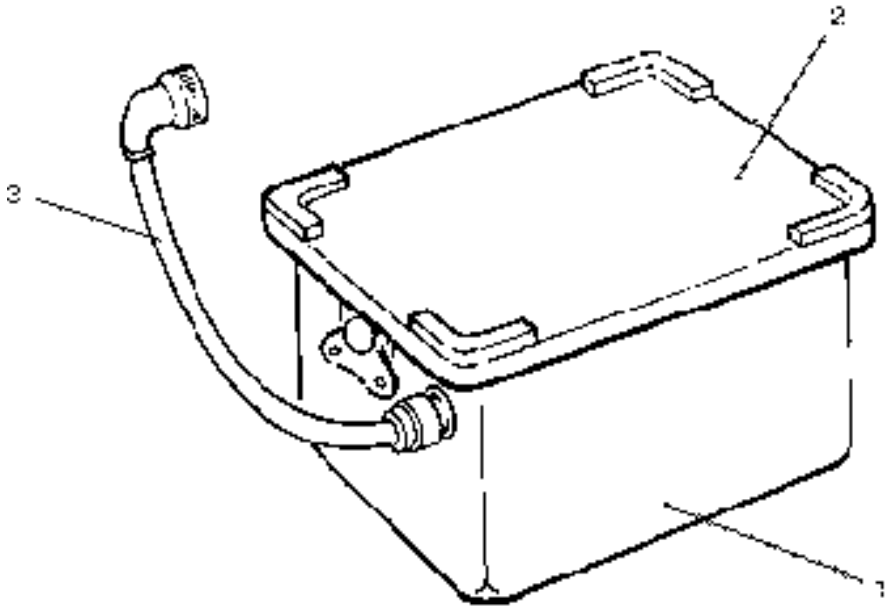
Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
				

Table 2-1. Preventive Maintenance Checks and Services (PMCS) for the M22 Alarm and Auxiliary Equipment
(Continued)

Item No.	Interval	Location Item to Check/Service	Procedures	Not Fully Mission Capable If:
		BATTERY BOX		
1	After	External	Check Battery Box (1) for breaks and cracks that could prevent proper use of battery, and check for missing parts. **NOTE** Battery will be inserted during initial start-up.	Broken, cracked or parts are missing.
2	After	Cover	Check the cover (2) for tears and wear.	Cover is worn or torn.
3	After	Cable	Check cable (3) for cuts, mashed or frayed insulation. Check cable connectors for damage.	Cable is visibly damaged or bare wires can be seen. Connectors are damaged.



SECTION III. OPERATION UNDER USUAL CONDITIONS

The following section provides procedures for operation of the M88 Detector in the normal configuration. The normal configuration consists of the M88 Detector operated as a stand-alone unit powered by the battery. This section details the following:

- Assembly and preparation for use (paragraph 2.8).
- Operating Procedures (paragraphs 2.9 and 2.10).
- Disassembly and preparation for storage or shipment (paragraph 2.11).

NOTE

PMCS (Preventive Maintenance Checks and Services) should be performed before and after each operation/mission (paragraph 2.7).

2.8 **ASSEMBLY AND PREPARATION FOR USE**.

NOTE

Use of the M42 Remote Alarm is optional in all three M88 Detector operational modes.

If M88 Detector is to be operated using battery power, battery life is dependent on the operating environment temperature. For battery life expectancy under varied temperature conditions, refer to paragraph 1.14.1.6.

M88 Detector does not indicate remaining battery life. Replace battery if condition is unknown.

If M88 Detector is to be operated using M28 Power Supply, connect M28 Power Supply as detailed in paragraph 2.8.3.1 through 2.8.3.2 and continue with the procedures detailed in paragraph 2.8.4.

If M88 Detector is to be operated in Vehicle Mount configuration, assemble as detailed in paragraph 2.8.5.1 through 2.8.5.7 and continue with procedures detailed in paragraph 2.8.4.

2.8.1 **Overview of Assembly**.

The following procedures will prepare the M22 Alarm for use in your particular application. Refer to paragraph 2.8.2 for battery operation, 2.8.3 for M28 Power Supply operation, 2.8.4 for connecting the M42 Remote Alarm to the M88 Detector, and 2.8.5 for installation into the M281 mounting kit.

Assembly for Battery Operation.

WARNING

Lithium-Sulfur Dioxide Batteries

DO NOT immerse in water or decontamination solution.
DO NOT crush or burn batteries.
DO NOT attempt to recharge batteries
DO NOT store at temperatures above 158°F (70°C).
DISPOSE of batteries according to Army TB 43-0130, Air Force TO 00-25-213, Marine Corps TI 6135-15/3, local SOP and SB 11-6 FSC 6135 Primary Battery Supply and Management Data.

Do not connect or disconnect the M88 Detector and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion and death or injury to personnel.

To prevent possible injury to personnel and damage to equipment, M88 Detector must be switched to off "0" position prior to any connections or disconnections.

2.8.2.1 If connected, disconnect the DC Power cable connector (1) from the M88 Detector POWER connector (16), by turning the outer ring counterclockwise and gently pulling the connector away.

2.8.2.2 Lift both catch handles (3) and turn counterclockwise one half turn.

2.8.2.3 Disengage catches from M88 Detector strikes (4) and lift M88 Detector (2) clear using carrying handle. Ensure Battery Box catches have completely disengaged leaving Battery Box (5) behind. Carefully, set down M88 Detector.

2.8.2.4 Lift corner of Battery Box cover (6) and remove.

2.8.2.5 If installed, remove old battery by lifting battery (7) out until access is gained to battery connector (8). Pull the battery connector from battery. Remove battery and discard in accordance with TB 43-0130, SB 11-6, AFTO 00-25-213 and local SOP.

NOTE

Use of M42 Remote Alarm is optional.

2.8.2.6 Obtain and unpack a new battery (Appendix F, Item 4).

2.8.2.7 Align battery connector (8) with socket on battery (7) and gently push connector into battery socket.

2.8.2.8 Match battery (7) with four alignment ridges (9) on inside of Battery Box (5) and place battery in proper position.

NOTE

These ridges are offset to one side.

2.8.2.9 Install Battery Box cover (6), ensuring the four corner ridges (10) are aligned with corners of battery top. Align Battery Box cover (6) in one corner and roll lip (11) over Battery Box edge (12). Press cover down completely around Battery Box.

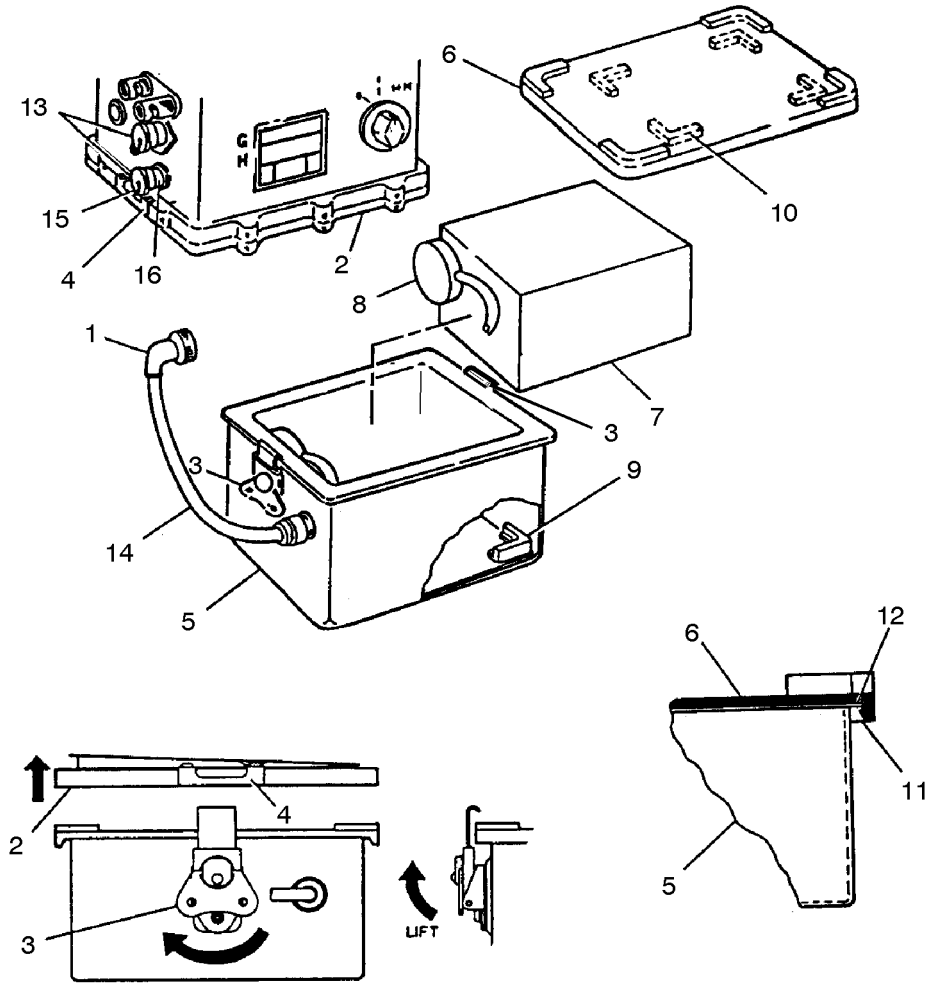
2.8.2.10 Align M88 Detector (2) on Battery Box (5) ensuring connectors (13) are on same side as battery cable (14). Ensure M88 Detector is aligned with four ridges on upper side of Battery Box cover (6).

2.8.2.11 Ensure catch handles (3) are turned fully counterclockwise, then engage catches on the M88 Detector strikes (4).

2.8.2.12 Lift both catch handles (3) and turn them clockwise one half turn.

2.8.2.13 On M88 Detector, remove POWER connector protective cap (15) by turning cap counter clockwise.

2.8.2.14 Connect DC Power cable connector (1) from Battery Box (5) to M88 POWER connector (16). Lock into place by turning the outer ring clockwise.



2.8.3 **Assembly for M28 Power Supply Operation**.

WARNING

Do not connect or disconnect the M88 Detector and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion and death or injury to personnel.

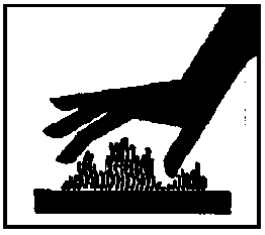
CAUTION

Ensure mains power is disconnected from the power source before any connection/disconnection is made. Failure to do so may cause damage to equipment

NOTE

All electrical connections detailed below are made by aligning with the associated socket or plug and turning and gently pushing the outer ring of the connector clockwise until it locks into place.

2.8.3.1 Connect DC Power cable (5) to M88 Detector (3) POWER connector (4) and other end to M28 Power Supply (2) 24 VDC OUTPUT connector (6).

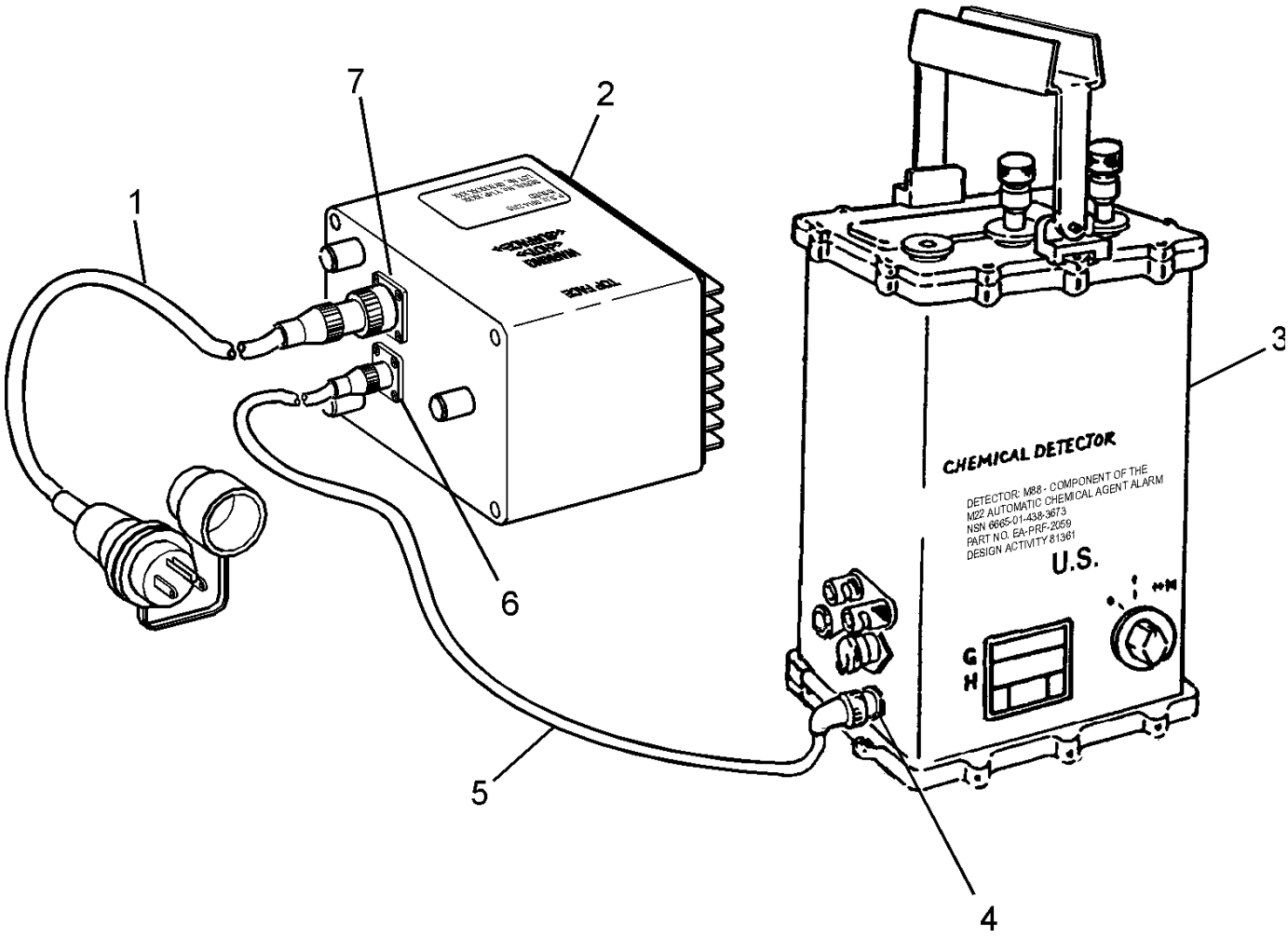


The Power Supply unit surface can reach temperatures of 140°F (60°C) during operation. Do Not touch during operation. Shutdown and allow to cool prior to handling.

NOTE

M28 Power Supply is capable of operating from 110 or 220 VAC. You must select the appropriate cable for your power application.

2.8.3.2 Connect one end of appropriate AC Power Cable (1) to M28 Power Supply connector (7). Connect other end of the AC Power cable (1) to appropriate AC power source (110 V/220V) only when ready to operate unit.


7
2
1
3
CHEMICAL DETECTOR
DETECTOR: M88 - COMPONENT OF THE
M22 AUTOMATIC CHEMICAL AGENT ALARM
NSN 6665-01-438-3673
PART NO. EA-PRF-2059
DESIGN ACTIVITY 81361
U.S.
G
H
6
5
4

2.8.4 **Connect M42 Remote Alarm to M88 Detector (Use of M42 Remote Alarm is optional)**.

NOTE

Use of M42 Remote Alarm is optional. Proceed to paragraph 2.9 when not using the Alarm.

To connect M42 Remote Alarm (1) to M88 Detector (2) proceed as follows:

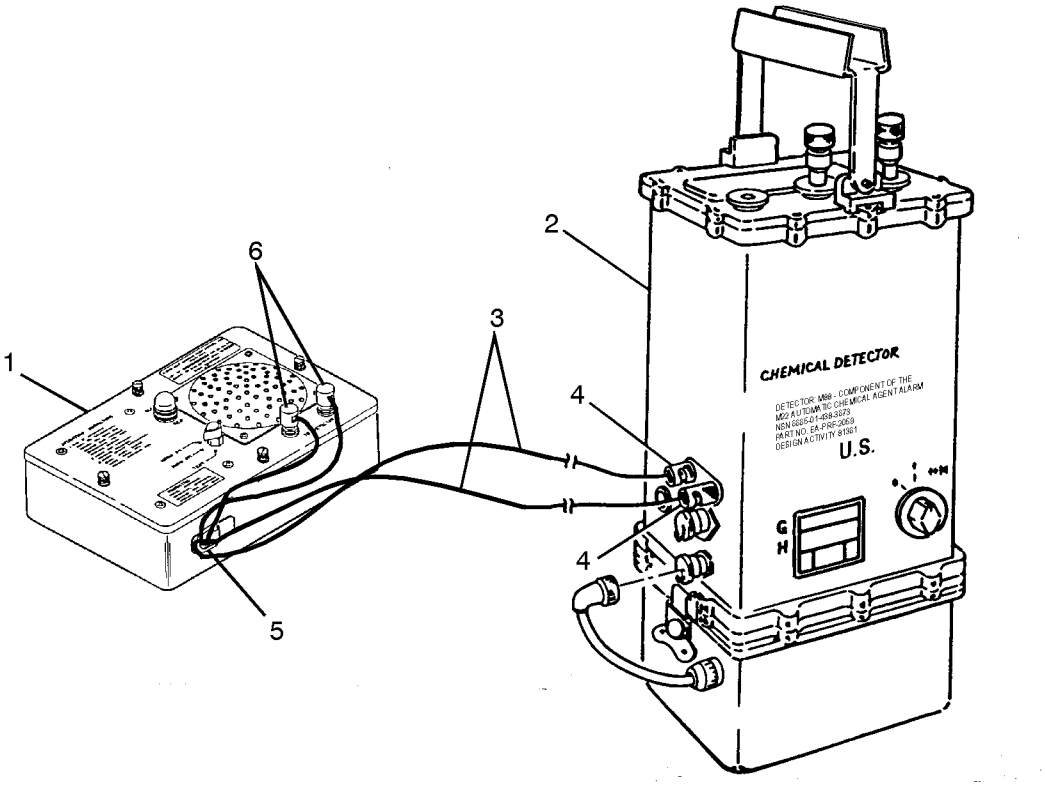
2.8.4.1 Obtain required lengths of field wire (3), (Appendix F, Item 7). Ensure approximately 1 inch of insulation is removed from all wire ends.

2.8.4.2 On M88 Detector (2) press down REMOTE ALARM binding post (4) and insert bare field wire (3) into slot and release binding post. Repeat this step for second binding post (4).

NOTE

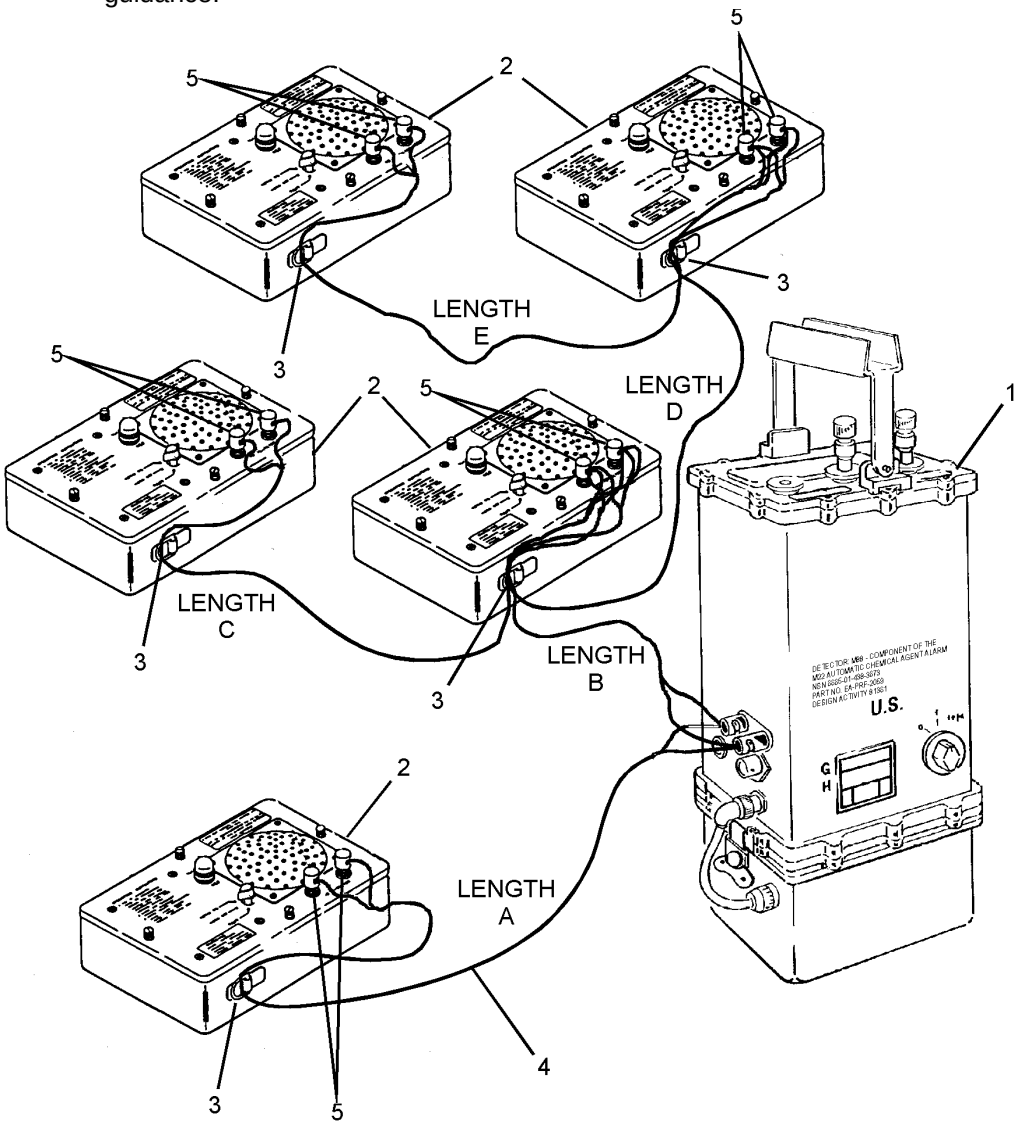
M42 Remote Alarm binding posts are not sensitive to electrical polarity (+ or -).

2.8.4.3 At 9 inches from end of the field wires (3), tie field wires to D-ring (5) on M42 Remote Alarm (1). Connect bare ends of field wires (3) to M42 Remote Alarm by pressing the two binding posts (6) and inserting a field wire in each.



NOTE

Up to five M42 Alarms may be connected to one M88 Detector. To connect more than one M42 Alarm, refer to the following illustration for guidance:



2.8.4.4 Allowing approximately 1 foot of slack on the end of each wire, string field wire (4) (Appendix F, Item 7), between M88 Detector (1) and M42 Alarm (2) as shown in illustration.

2.8.4.5 Approximately 9 inches from end of field wire (4), tie each field wire to D-ring (3) on M42 Alarm (2)

NOTE

Length A must not exceed 400 meters.
Length B + Length C must not exceed 400 meters.
Length B + Length D + Length E must not exceed 400 meters.

2.8.4.6 Strip approximately 1 inch insulation from end of each field wire (4) to be connected. Connect bare ends of field wire to M42 Remote Alarm (2) by pressing the two binding posts (5) and inserting a field wire in each.

2.8.5 **Installation into M281 Mounting Kit**.

The M281 mounting kit provides separate anti-vibration mounts for mounting the M88 Detector and the M42 Remote Alarm. Install the M88 Detector and the M42 Remote Alarm into the M281 mounting kit.

To install the M88 Detector into the Vehicle Mount:

2.8.5.1 Release top clamp bar (1) on Vehicle Mount (11) by sliding latch (2) away from latch post. Pivot clamp bar away from opening on mount. Repeat this step for front clamp bar (3) and latch (4).

WARNING

Do not connect or disconnect the M88 Detector and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion that could injure personnel and damage the equipment.

CAUTION

Connecting or disconnecting power cable with power turned on can damage the M88 Detector and power cable. Ensure external power is turned off and M88 Detector is turned off before connecting or disconnecting power cable.

NOTE

The Battery Box must be installed on the M88 Detector to fit properly in Vehicle Mount.

If external power from Vehicle Mount is being used, skip paragraph 2.8.5.2.

For the Nuclear-Biological-Chemical Reconnaissance System (NBCRS) FOX, M93, NSN: 6665-01-323-2582 specific operation, refer to TM 9-6665-342-10 and for NBCRS FOX, M93A1, NSN: 6665-01-372-1303 specific operation, refer to TM 3-6665-339-10.

2.8.5.2 Perform Assembly for Battery Operation (paragraph 2.8.2).

NOTE

If battery power is being used, skip paragraph 2.8.5.3.

2.8.5.3 Perform paragraphs 2.8.2.10 through 2.8.2.12 of Assembly for Battery Operation.

2.8.5.4 Place M88 Detector into Vehicle Mount (11) and push carrying handle down towards EXHAUST port.

2.8.5.5 Close front clamp bar (3) and slide latch (4) onto latch post (4). Repeat this step for top clamp bar (1) and latch (2).

NOTE

If battery power is being used, skip paragraph 2.8.5.6 through 2.8.5.8.

2.8.5.6 Disconnect battery cable (8) from M88 Detector POWER connector (5) on the by turning outer ring counterclockwise and carefully pulling connector.

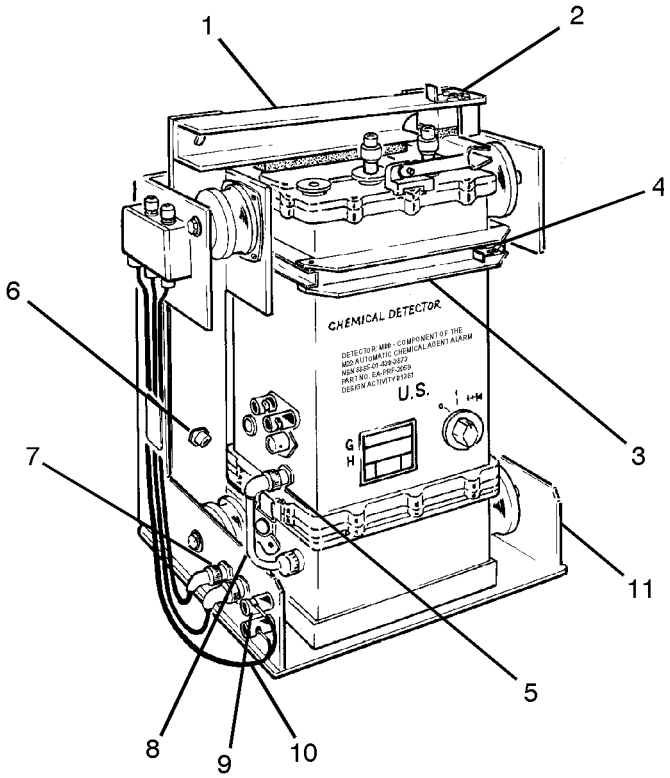
2.8.5.7 Stow battery cable (8) by pushing battery cable connector onto Vehicle Mount dummy connector (6). Lock into place by turning outer ring clockwise.

2.8.5.8 Disconnect power cable (7) that is stowed on side of Vehicle Mount (11) by turning the outer ring counter clockwise and carefully pulling the connector from the dummy receptacle.

2.8.5.9 Match the power cable connector (7) with the POWER connector (5) on the M88 Detector. Lock into place by turning the outer ring clockwise.

To connect the M42 Remote Alarm proceed as follows:

2.8.5.10 Push on dummy binding posts (9) on Vehicle Mount to release stowed wire jacks (10).



NOTE

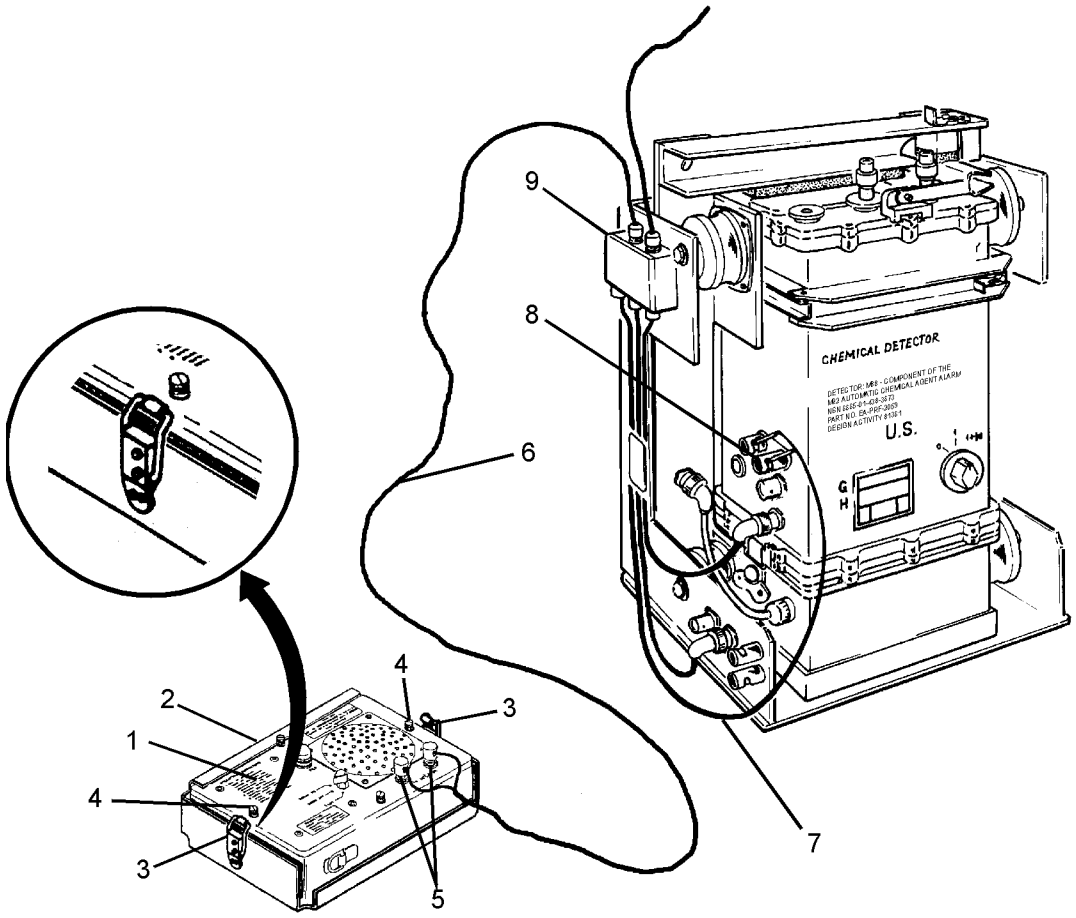
Binding posts are not sensitive to electrical polarity (+ or -).

Ensure slot on electrical cap is properly aligned on binding post.

2.8.5.11 Push on binding posts (8) on M88 Detector and insert wire jacks (7) into slots.

2.8.5.12 Place M42 Remote Alarm (1) into M42 Mount (2) bracket so it is snug against rubber pads. Hook two mounting bracket clamping catches (3) over two knurled screws (4) on M42 Remote Alarm and press down to lock into place.

2.8.5.13 Connect loose ends of wire (6) running from top of junction box (9) to M42 Remote alarm binding posts (5).



2.9 **OPERATING PROCEDURES**.

NOTE

Preventive Maintenance Checks and Services (PMCS) should be performed before, during, and after each operation/mission (paragraph 2.7).

2.9.1 The following procedures are required to place your M88 Detector into normal operation, and to shutdown the M88 Detector after operations are complete:

2.9.2 **Initial Checks**.

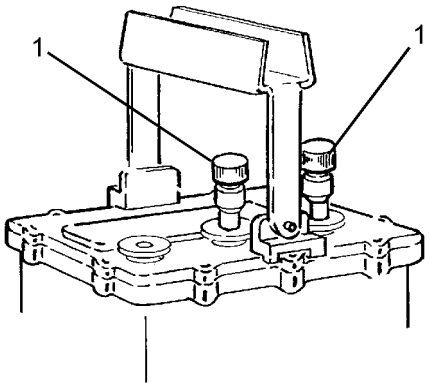
Prior to starting Initial Power On and Self-test, ensure the M22 Alarm is prepared for use.

2.9.2.1 **Remove Protective Caps**.

NOTE

In rain or dusty conditions, rain caps must be installed as soon as protective caps are removed.

2.9.2.1.1 Remove and discard M88 Detector protective caps (1) by pulling gently and turning counter clockwise.



2.9.2.1.2 In rain or dusty conditions, install rain caps (paragraph 2.13).

2.9.2.1.3 Perform Initial Power On and Self-test (2.9.3).

2.9.3 **Initial Power On and Self-Test**.

NOTE

M88 Detector is not ready for deployment until it alarms with confidence sample (G and H).

Start-up may be 30 minutes. Notify personnel within audible range that a start-up test is being performed.

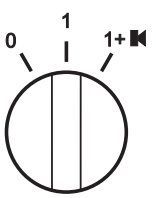
Once switch is set to on (1+ ◀) position, indications detailed in sequence 1 through 10 will take less than 20 seconds.

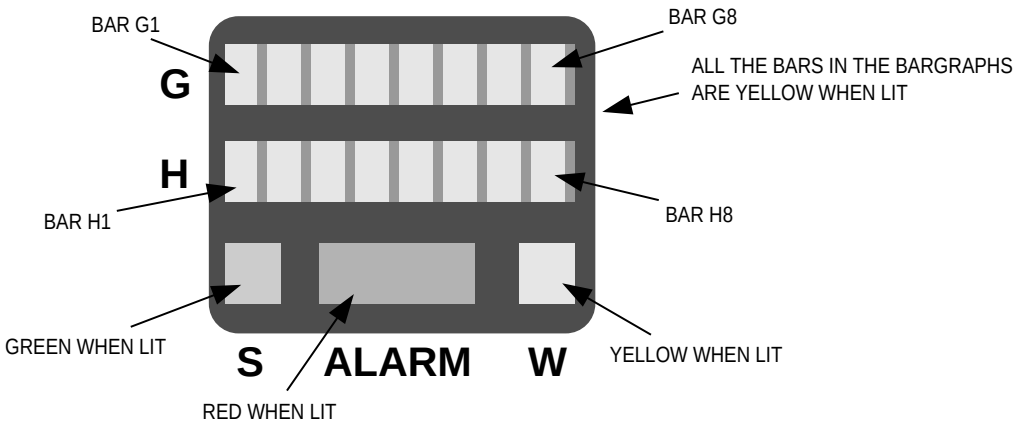
It is important to know the indications to expect before switch is set to on (1+◀) position.

2.9.3.1 Prior to turning on M88 Detector, review power on and self-test sequence 1 through 12 below.

Sequence	Indicator(s)	Action
1	All Indicators	Lit for 1 second (approx.) and then extinguish.
2	Bar G1 through G8; (yellow)	Each bar lights up until all G Bars are lit.
3	Bar H1 through H8; (yellow)	Each bar lights up until all H Bars are lit.
4	S (Sampling) (green)	Lit. If flickering side to side, refer to troubleshooting.
5	ALARM (red)	Lit. If flickering side to side, refer to troubleshooting.
6	M88 Audible Alarm	Sounds for 1 short beep (switch set to 1+ ◀).
7	M42 Remote Alarm	Alarm sounds and alarm indicator lights, if connected.
8	W (Wait) (yellow)	Lit, If flashing and conditions are cold. If flickering side to side, refer to troubleshooting.
9	All Indicators	All indicators are extinguished approximately 5 seconds after step 2.
10	Bars G1 and H8 and then Bars G8 and H1	Lit alternately every second for approximately 10 seconds. Longer than 20 seconds, refer to troubleshooting.
11	W (Wait) (yellow)	Lit constantly, lasting a minimum of 2 minutes. Longer than 30 minutes, refer to troubleshooting. Flashes approximately 15 seconds before extinguishing.
12	W (Wait) (yellow) S (Sampling) (green)	W (Wait) light (yellow) will extinguish and the S (Sampling) light (green) will be lit constantly, indicating sample air is being drawn into M88 Detector for analysis.

2.9.3.2 Set switch to position 1+ ◀.





NOTE

Observe display indicators for the proper sequence. If any sequence does not complete or any indicator does not light at the proper time, refer to troubleshooting (paragraph 3.3, malfunction 6). Sequence 1 through 10 will take less than 20 seconds.

2.9.3.3 Wait 5 minutes after green sampling light is lit constantly before performing confidence sample (paragraph 2.9.4).

2.9.4 **Confidence Sample Testing**.

NOTE

M88 Detector must be tested using a confidence sample to verify correct operation. Detector is ready to test 5 minutes after S (Sampling) indicator (green) is on continuously.

Simulants used in confidence sample are non-hazardous because of limited quantities used and they are contained within confidence sample container.

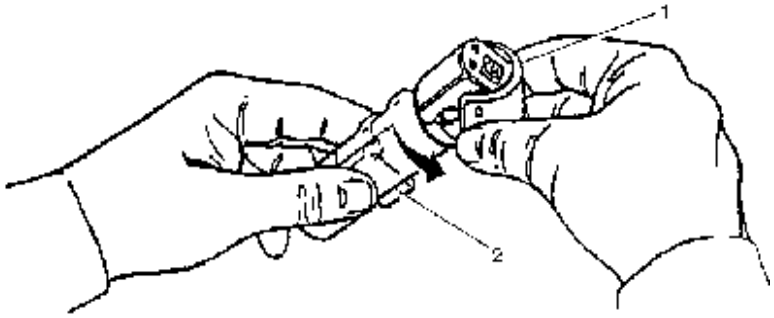
If confidence sample testing is to be performed in cold weather, place confidence sample inside outer clothing to keep warm.

2.9.4.1 If M42 Remote Alarm(s) is connected to M88 Detector, verify that M42 Remote ALARM RED Lamp flashes when the M88 Detector alarms. Also, the M42 Remote Alarm(s) horn will sound with selector switch to HORN ON position. The horn will not sound with the selector switch set to HORN OFF position.

2.9.4.2 **G Simulant Confidence Test**.

2.9.4.2.1 Remove inlet rain cap (if installed) before doing the confidence sample test.

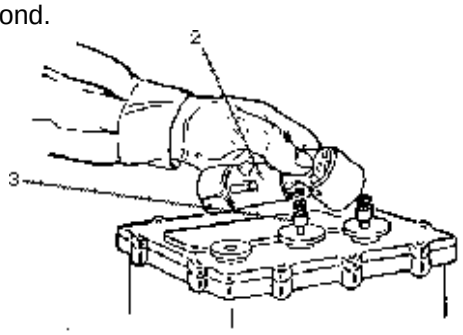
2.9.4.2.2 Open G vapor shroud (1) of confidence sample (2).



NOTE

Confidence sample should be applied to the M88 Detector, for only a BRIEF MOMENT (approximately 1/4 of a second). The vapor vent should be placed on the INLET and IMMEDIATELY REMOVED. Do not wait for bars to display or alarm to sound.

2.9.4.2.3 Place G end vapor vent of confidence sample (2) in contact with INLET (3) for approximately 1/4 of a second.



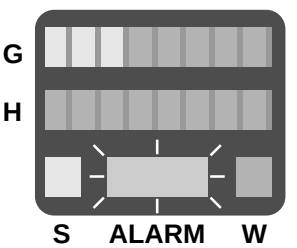
2.9.4.2.4 Withdraw confidence sample and close vapor shroud.

2.9.4.2.5 Reinstall rain caps, if operating in wet or dusty conditions.

NOTE

If humidity conditions inside M88 Detector are very dry, both bargraphs will respond to confidence sample. The M88 Detector is still working properly.

2.9.4.2.6 After a few seconds have elapsed, verify that at least three G bars are lit, ALARM light is lit (flashing), and audible alarms on both M88 Detector and M42 Remote Alarm sound. If alarm light is flashing, proceed to paragraph 2.9.4.2.10.



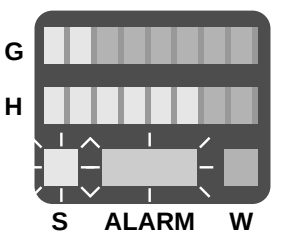
2.9.4.2.7 If less than 3 G bars were displayed during test, wait 5 minutes and repeat procedures, detailed in paragraphs 2.9.4.2.1 through 2.9.4.2.4.

2.9.4.2.8 If less than 3 G bars continue to be displayed, set selector switch to “0” position and repeat initial checks, self-test, and confidence sample procedures detailed in paragraphs 2.9.2 through 2.9.4.2.6.

2.9.4.2.9 If less than 3 G bars continue to be displayed, leave M88 Detector switched ON for 30 minutes. Then repeat confidence sample test as detailed in paragraph 2.9.4.2.1 through 2.9.4.2.4. If less than 3 bars continue to be displayed, M88 Detector should be shutdown (paragraph 2.10). Refer to troubleshooting (paragraph 3.3, malfunction 7).

2.9.4.2.10 Alarm light will flash and audible alarm will sound (if switch is set to 1+◀) for the duration, if either G or H bar graph lights 3 or more bars. If more than 5 bars are displayed in either G or H bar graph, unit will enter clear-down and may need up to 5 minutes to clear. The highest level will be displayed until M88 Detector finds a level of 3 bars or less. If excessively dosed, clear-down may take longer than 5 minutes.

The following events will occur during 5 minute clear-down period:



- S (Sample) indicator (green) is flashing.
- M88 Detector stops sampling external air and internally recirculates sample air through a filter pack.
- After clear-down, normal external sampling will re-start.
- Levels of 3 bars or less allow detector to start sampling.
- S (Sample) indicator (green) stops flashing and is lit continuously.
- Alarm and lights on both M88 Detector and M42 Remote Alarm will continue to sound and flash.

2.9.4.2.11 If M88 Detector continues to alarm for more than 10 minutes after withdrawing confidence sample (paragraph 2.9.4.2.4), refer to troubleshooting (paragraph 3.3, malfunction 5).

2.9.4.2.12 M88 Detector is ready for H simulant confidence test when red ALARM light is no longer lit and S (Sample) indicator is lit continuously (not flashing).

2.9.4.3 **H Simulant Confidence Test**.

CAUTION

Do not allow the M88 Detector to sample the confidence sample for more than one second or damage to equipment may occur.

NOTE

If confidence sample has just been removed from a sealed package, it is possible for M88 Detector to display bars on G agent bargraph during the H simulant confidence test. The two simulants may mix in package.

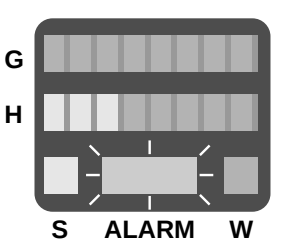
2.9.4.3.1 Repeat procedures detailed in paragraphs 2.9.4.2.1 through 2.9.4.2.5 using H end simulant of the confidence sample. Do not expose simulant to the inlet for more than one second.

NOTE

If humidity conditions inside M88 Detector are very dry, both bargraphs will respond to the confidence sample. M88 detector is still working properly.

At temperatures of -18ºC and lower the M88 Detector may not respond to the H simulant confidence check. The M88 Detector is still working properly. Proceed to paragraph 2.9.4.3.4.

2.9.4.3.2 After a few seconds, verify at least three H bars are lit, ALARM light is lit (flashing), and audible alarm on both M88 detector and M42 Remote Alarm are sounding. If alarm light is flashing, proceed to 2.9.4.3.2.3.



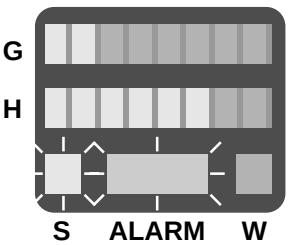
2.9.4.3.2.1 If less than 3 bars are displayed, repeat paragraphs 2.9.4.3.1 and 2.9.4.3.2.

2.9.4.3.2.2 If less than 3 bars continue to be displayed, shutdown M88 Detector (paragraph 2.10). Refer to troubleshooting (paragraph 3.3, malfunction 7).

2.9.4.3.2.3 ALARM light will flash and audible alarm will sound (if switch is set to 1+), for the duration if either G or H bar graph lights 3 bars or more.

2.9.4.3.2.4 If more than 5 bars are displayed in either G or H mode, unit will enter clear-down and may need up to 5 minutes to clear. The highest level will be displayed until M88 Detector finds a level of 3 bars or less. If excessively dosed, clear down may take longer than 5 minutes.

The following events will occur during the 5 minute clear-down period:



- S (Sample) indicator (green) is flashing.
- M88 Detector stops sampling external air and internally recirculates sample air through a filter pack.
- After clear-down, normal external sampling will re-start.
- Levels of 3 bars or less allow detector to start sampling.
- S (Sample) indicator (green) stops flashing and is lit continuously.
- Alarm and light on both M88 Detector and M42 Remote Alarm will continue to sound and flash.

2.9.4.3.3 If M88 Detector continues to alarm for more than 10 minutes after withdrawing confidence sample, refer to troubleshooting (paragraph 3.3, malfunction 5).

2.9.4.3.4 M88 Detector is ready for operation when red ALARM light is no longer lit and S (Sample) indicator is lit continuously (not flashing).

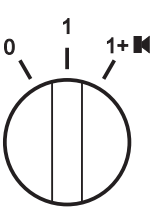
NOTE

If the following weather or climate conditions change during M88 Detector operation, perform the following procedures immediately.

2.9.4.3.5 In rain, ensure rain caps are installed (paragraph 2.13).

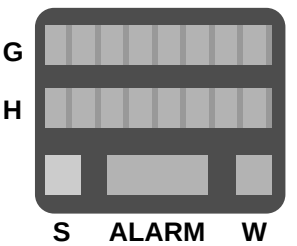
2.9.5 **Audible Alarm Disabled**.

If audible alarm is not required for operation, set selector switch to 1. Only the visual alarm will be displayed during alarm conditions. If selector switch is set to 1, and M88 Detector alarms, M88 Detector audible alarm WILL NOT SOUND. If M42 Remote Alarms are connected, they will alarm either audibly or visually depending on the M42 Remote Alarm selector switch setting.



2.9.6 **Detector Operations**.

When S (Sample) indicator (green) is continuously lit, and correct operation has been validated by both G and H confidence sample tests, the M88 Detector will detect agents.



2.9.6.1 If M88 Detector is turned off for any reason (such as battery replacement, etc.), G and H confidence sample tests must be conducted again. M88 Detector must be restarted (paragraph 2.9.3).

NOTE

M88 Detector will alarm when any of the following nerve or blister agents are detected:

- GA, GB, GD, and VX will light 3 or more G lights.
- HD and L will light 3 or more H lights.

The following material vapors will cause a nerve (G lights) false alarm if detected:

- JP8 Fuel
- Brake Fluid
- Aqueous Fire Fighting Foam (AFFF)
- Malathion Insecticide
- Ben Gay and Oil of Wintergreen (Muscle Rubs)
- M18 Marking Grenade (Red) NSN 1330-00-289-6852
- M18 Marking Grenade (Violet) NSN 1330-00-289-6853
- Tear Gas

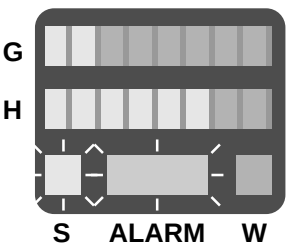
2.9.6.2 If the M88 Detector Unit detects agent or simulant vapor, it will alarm. Alarm is indicated by the red Alarm Light Flashing, sounding of the detector Audible Alarm (if switch is set to 1+), and the activation of the remote M42 Alarm. When alarming, three or more G and/or H bars will light indicating the class of agent that has been detected.

2.9.6.3 If you get an alarm, immediately perform protective measures described in FM 3-4, FMFM 11-9, AFI 45-2001, or local SOP.

NOTE

Alarm light will flash and audible alarm will sound (if switch is set to 1+) for the duration, if either G or H bar graph lights 3 or more bars. If more than 5 bars are displayed in either G or H bar graph, unit will enter clear-down and may need up to 5 minutes to clear. The highest level will be displayed until M88 Detector finds a level of 3 bars or less. If excessively dosed, clear-down may take longer than 5 minutes.

The following events will occur during the 5 minute clear-down period:



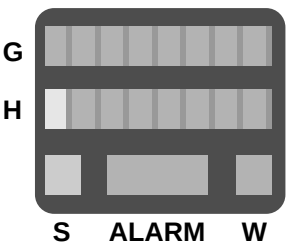
- S (Sample) indicator (green) is flashing.
- M88 Detector stops sampling external air and internally recirculates sample air through a filter pack.
- After clear-down, normal external sampling will re-start.
- Levels of 3 bars or less allow detector to start sampling.
- S (Sample) indicator (green) stops flashing and is lit continuously.
- Alarm and lights on both M88 Detector and M42 Remote Alarm will continue to sound.

2.9.6.4 Wait indicator will flash every hour as an internal pressure test is being conducted.

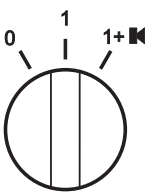
2.10 **SHUTDOWN PROCEDURES**.

NOTE

If operational requirements do not allow time for M88 Detector to clear-down, it can be turned off with bars lit. When time is available, M88 Detector must be turned back on (paragraph 2.9) and allowed to clear-down.



2.10.1 Ensure one bar or less is lit in both G and H bar graphs before setting selector switch to "0".



2.10.2 If more than one bar is displayed, M88 Detector should be run until display shows one or zero bars (approximately 5 minutes).

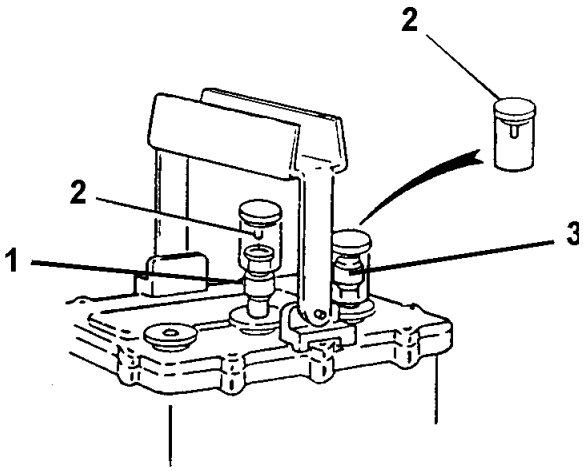
2.10.3 If display does not reduce to one bar or less in 10 minutes, refer to troubleshooting (paragraph 3.3, malfunction 13).

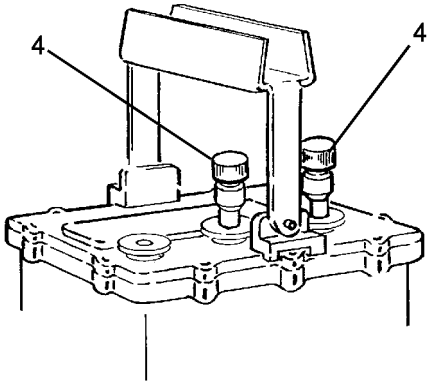
NOTE

To avoid possible contamination to M88 Detector, do not touch underside of protective caps.

2.10.4 If rain caps (2) are installed, remove and stow them in transit case.

2.10.5 Insert new protective caps (4), (Appendix D, Item 2, Table D-1), one in each inlet (1) and exhaust (3).


2
2
1
3


4
4

2.11 **DISASSEMBLY AND PREPARATION FOR STORAGE OR SHIPMENT**.

WARNING

Do not connect or disconnect the M88 Detector and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion and death or injury to personnel. Power cable should be disconnected from power source to avoid injury to personnel.

CAUTION

Disconnecting power cable with power on can damage M88 Detector and power cable. Ensure external power is off and M88 Detector is turned off before disconnecting power cable.

NOTE

If M88 Detector is mounted in a Vehicle Mount, skip paragraphs 2.11.1 through 2.11.6.

2.11.1 Ensure M88 Detector (1) is off by setting selector switch to “0".

NOTE

If M88 Detector is battery powered, skip paragraphs 2.11.2 and 2.11.3.

2.11.2 Ensure M28 Power Supply (9) is off by unplugging AC Power Cable (8) from power outlet.

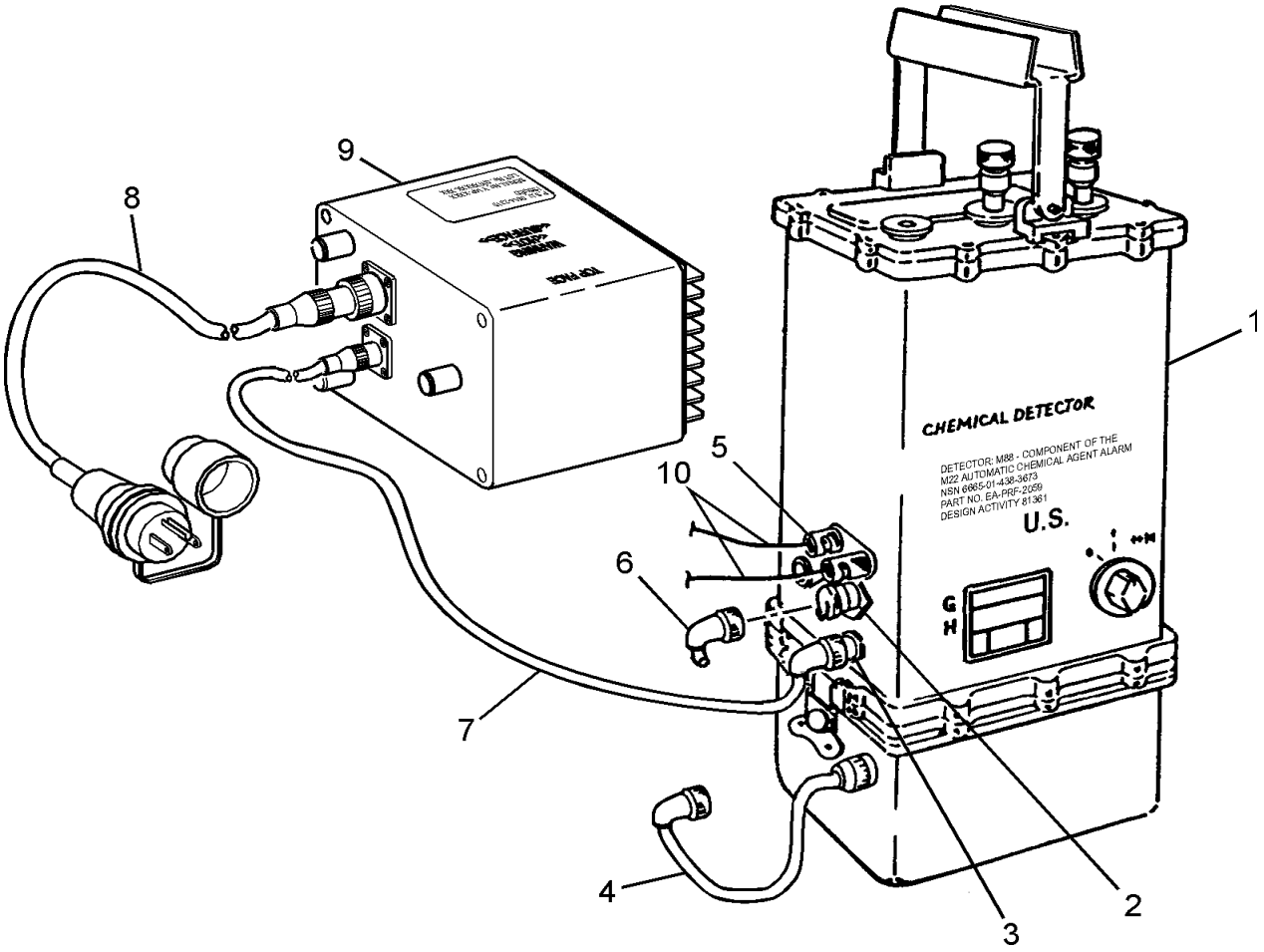
2.11.3 Disconnect M28 DC Power Cable (7) from M88 Detector POWER connector (3). Place connector cap on POWER connector.

NOTE

If M88 Detector is powered by M28 Power Supply, skip paragraph 2.11.4.

2.11.4 Disconnect battery cable (4) from M88 Detector POWER connector (3) by turning outer ring counterclockwise and carefully pulling the connector. Push connector cap onto POWER connector by turning clockwise.

2.11.5 Push on M88 Detector REMOTE ALARM binding posts (5) and remove field wire (10).


1
2
3
4
5
6
7
8
9
10
CHEMICAL DETECTOR
DETECTOR: M88 - COMPONENT OF THE
M22 AUTOMATIC CHEMICAL AGENT ALARM
NSN 6665-01-438-3673
PART NO. EA-PRF-2059
DESIGN ACTIVITY 81361
U.S.
G
H

NOTE

If M88 Detector is not mounted in a Vehicle Mount, skip paragraphs 2.11.6 through 2.11.24.

2.11.6 Ensure M88 Detector (5) is off by setting selector switch to “0".

NOTE

If M88 Detector is battery powered, skip paragraphs 2.11.7 through 2.11.10.

2.11.7 Ensure external DC power is off to Vehicle Mount Junction Box (18).

2.11.8 Disconnect Junction Box power cable (9) from M88 Detector POWER connector (8). Place connector cap on POWER connector.

2.11.9 Connect Junction Box power cable (9) to dummy power connector (13) on Vehicle Mount.

2.11.10 Disconnect M88 Detector battery cable (15) from dummy connector (16) on Vehicle Mount.

NOTE

If M88 Detector is powered from Vehicle Mount, skip paragraph 2.11.11.

2.11.11 Disconnect battery cable (15) from M88 Detector POWER connector (8). Place connector cap on POWER connector.

2.11.12 Disconnect Junction Box communications cable (14) from COMMS connector (7). Place connector cap on COMMS connector.

2.11.13 Push on M88 Detector REMOTE ALARM binding posts (17) and remove Junction Box wire pair (10).

2.11.14 Connect Junction Box wire pair (10) to dummy binding posts (11) on Vehicle Mount.

2.11.15 Open front clamp bar (4) on Vehicle Mount by releasing slide latch (3) from latch post.

2.11.16 Pivot front clamp bar away from Vehicle Mount.

2.11.17 Open top clamp bar (19) on Vehicle Mount by releasing slide latch (1) from latch post.

2.11.18 Pivot top clamp bar away from Vehicle Mount.

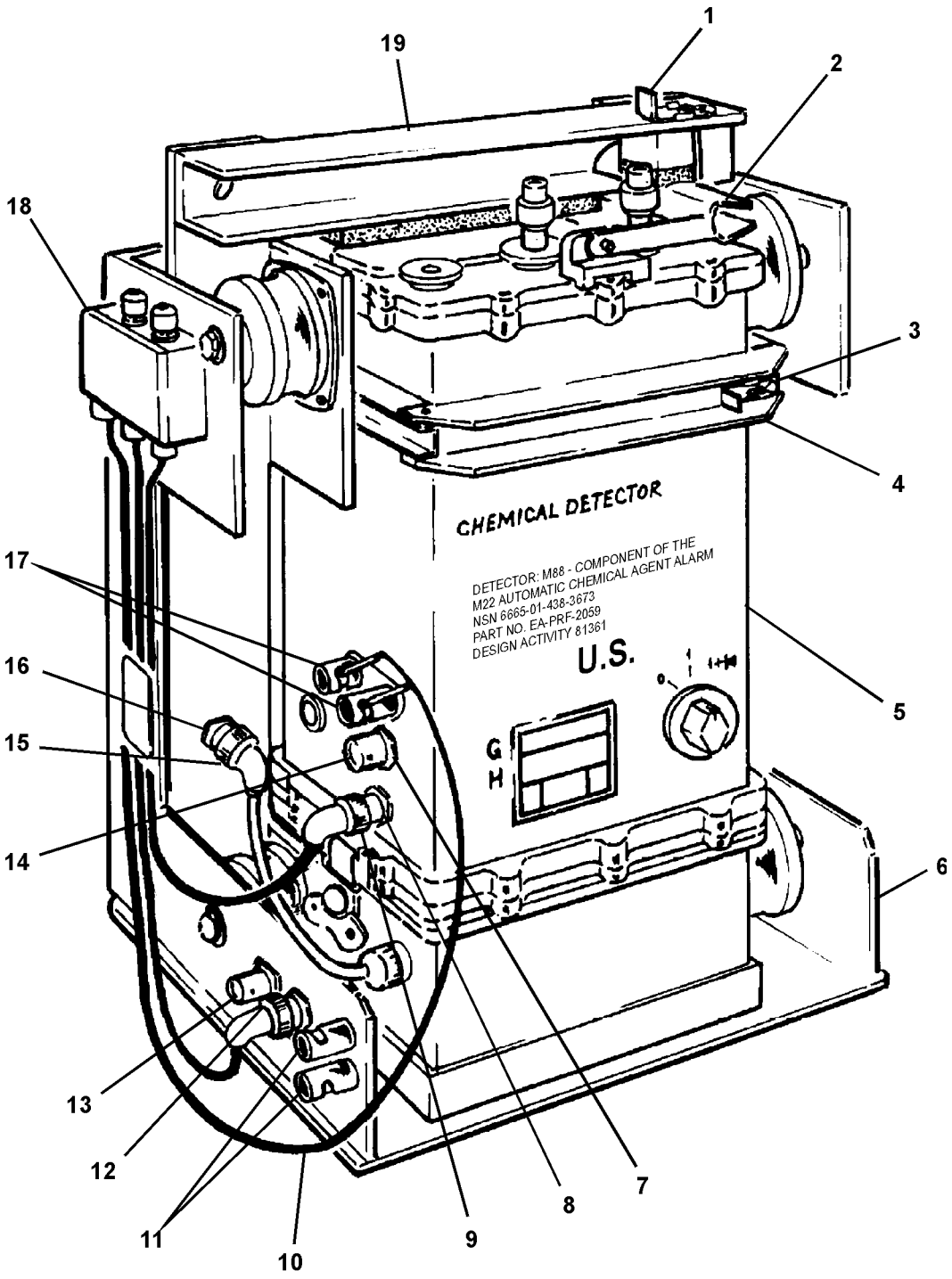
2.11.19 Remove M88 Detector (5) from Vehicle Mount (6) by grasping carrying handle (2).

2.11.20 Close top clamp bar (19) on Vehicle Mount by pivoting top clamp bar toward mount.

2.11.21 Fasten slide latch (1) to latch post on Vehicle Mount.

2.11.22 Close front clamp bar (4) on Vehicle Mount by pivoting front clamp bar toward mount.

2.11.23 Fasten slide latch (3) to latch post on Vehicle Mount.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
CHEMICAL DETECTOR
DETECTOR: M88 - COMPONENT OF THE
M22 AUTOMATIC CHEMICAL AGENT ALARM
NSN 6665-01-438-3673
PART NO. EA-PRF-2059
DESIGN ACTIVITY 81361
U.S.
G
H

WARNING

Lithium-Sulfur Dioxide Batteries

DO NOT immerse in water or decontamination solution.
DO NOT crush or burn batteries.
DO NOT attempt to recharge batteries.
DO NOT store at temperatures above 158°F (70°C).
DISPOSE of batteries according to Air Force TO 00-25-213 Army **TB 43-0130**, Marine Corps TI 6135-15/3, local SOP and **SB 11-6 FSC 6135** Primary Battery Supply and Management Data.

CAUTION

To prevent damage to Battery Box from battery leakage, ensure Lithium battery is removed from Battery Box. if equipment is stored or not operated for more than 30 days.

2.11.24 Lift both Battery Box catch handles (10) and turn counterclockwise one half turn.

2.11.25 Disengage catches from M88 Detector (2) catch plates (11) and lift M88 Detector clear using carrying handle. Ensure Battery Box catches have completely disengaged leaving Battery Box (8) behind. Carefully, set down M88 Detector.

2.11.26 Remove Battery Box cover (1) by lifting up on corner of cover and lifting it clear.

2.11.27 Remove old battery (4) by lifting battery out until access is gained to battery connector (3). Disconnect battery connector from battery. Discard battery in accordance with TB 43-0130 and local SOP.

2.11.28 Place Battery Box cover (1) on one corner and roll lip (7) over Battery Box edge (6). Press cover in place completely around Battery Box (8).

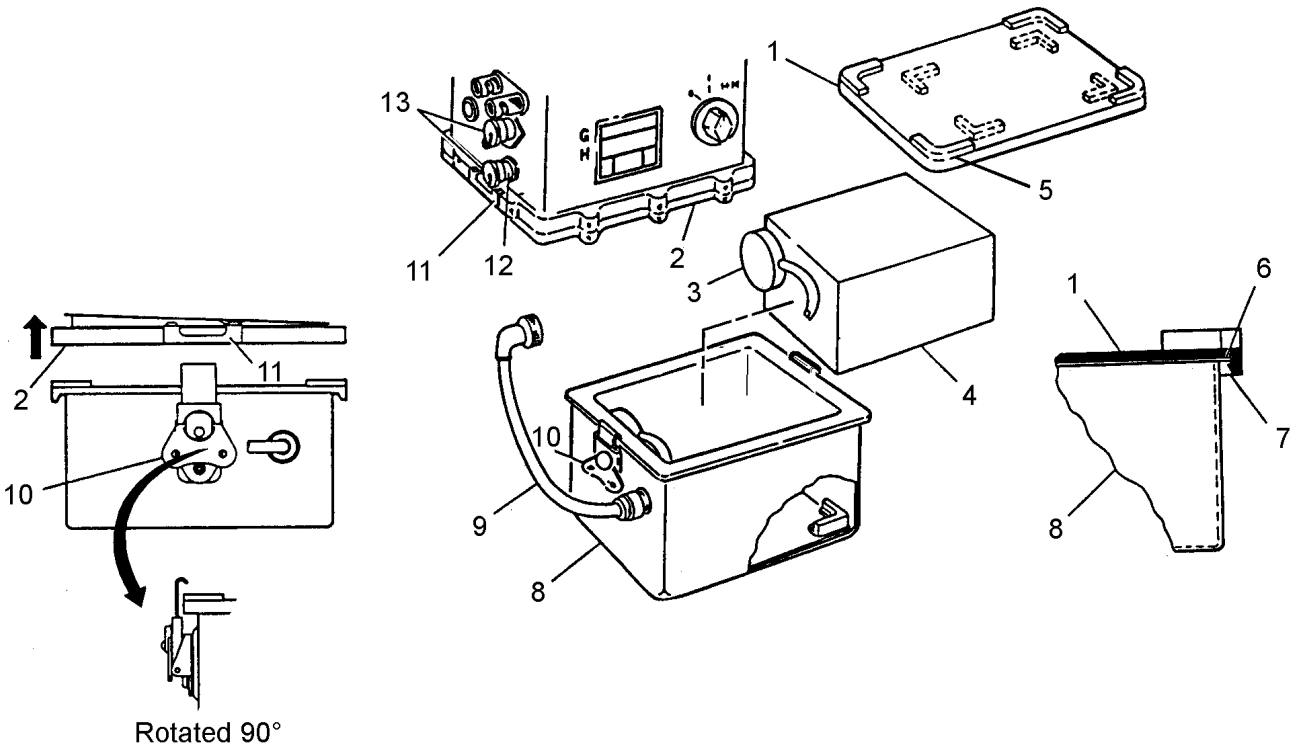
2.11.29 Align M88 Detector (2) with Battery Box (8) ensuring POWER connector (12) is on same side as battery cable (9). Ensure M88 Detector matches four stop(s) on upper side of Battery Box cover (1).

2.11.30 Ensure Battery Box catch handles (10) are turned fully counterclockwise.

2.11.31 Engage catches to M88 Detector catch plates (11). Lift both catch handles (10) and turn clockwise one half turn.

2.11.32 Remove connector cap (13) from power connector (12).

2.11.33 Connect battery cable (9) to M88 Detector POWER connector (12).


1
13
5
11
12
2
3
4
1
6
7
8
10
9
8
2
11
10
Rotated 90°

WARNING

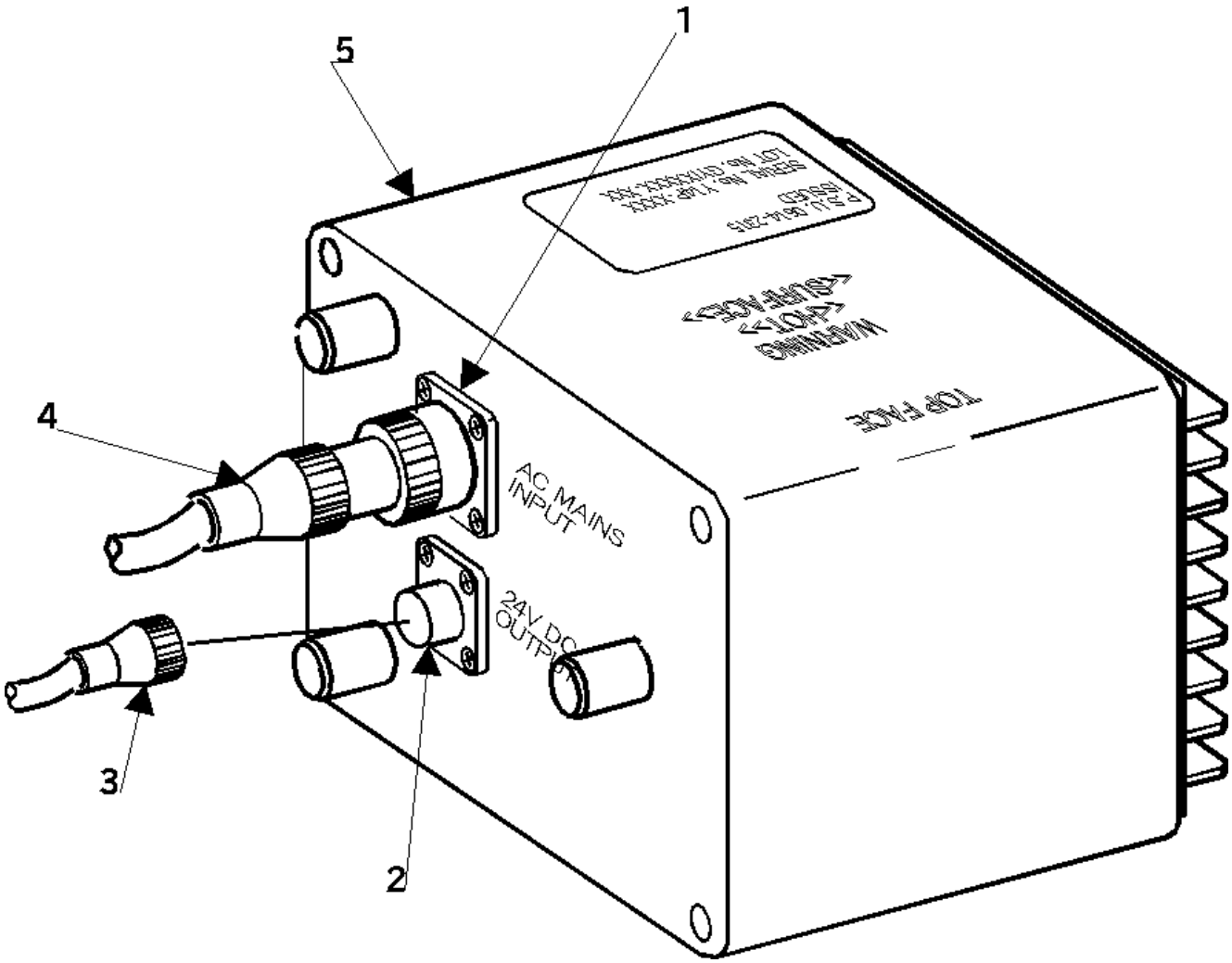
Cover of Power Supply can reach a temperature of 140°F (60°C) during operation. Do not touch cover during operation. Shutdown Power Supply and allow to cool before handling.

NOTE

If M88 Detector was battery powered or powered from Vehicle Mount, skip paragraphs 2.11.34 and 2.11.35.

2.11.34 Disconnect AC Power Cable (4) from M28 Power Supply (AC MAINS INPUT) connector (1). Install protective cover on cable connector.

2.11.35 Disconnect power cable link (3) from 24V DC OUTPUT connector (2) on M28 Power Supply (5).

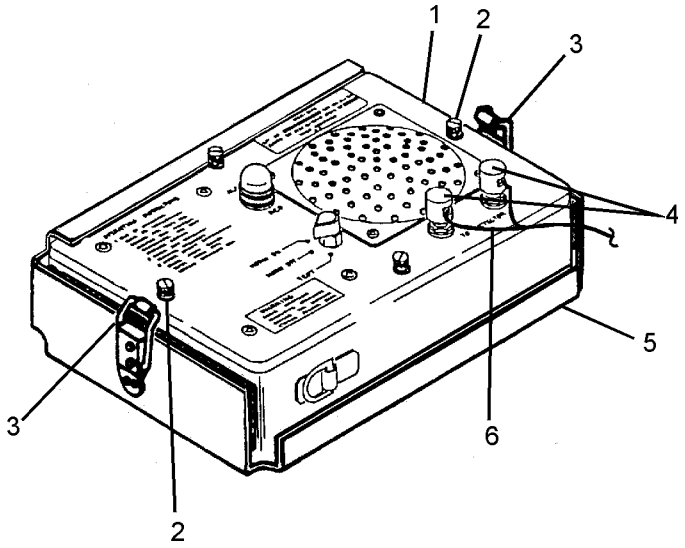


2.11.36 Release field wires (6) from M42 Remote Alarm binding posts (4).

NOTE

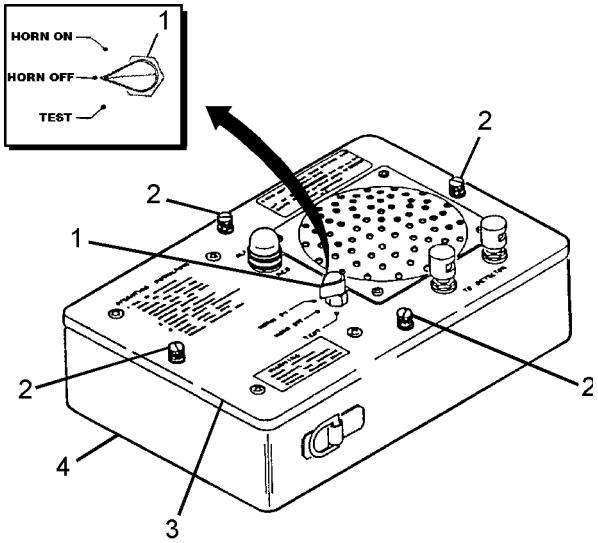
If M42 Remote Alarm is not mounted in M42 Mount, skip paragraph 2.11.37.

2.11.37 Remove M42 Remote Alarm (1) from M42 Mount (5) by releasing two catches (3) from two knurled screws (2). Remove M42 Remote Alarm from mount.



2.11.38 Ensure selector switch (1) on M42 Remote Alarm is set to HORN OFF.

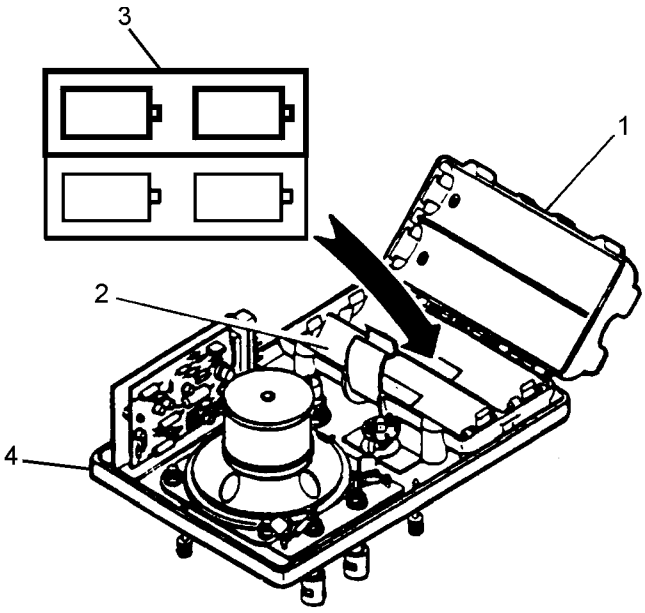
2.11.39 Loosen four knurled screws (2) and separate panel assembly (3) from housing (4).



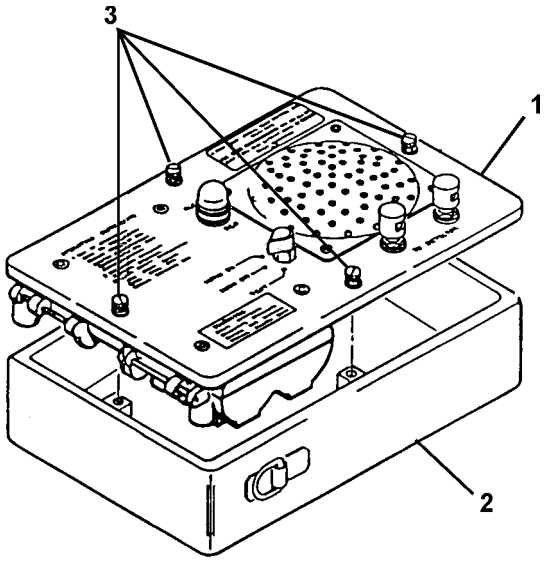
2.11.40 Release spring-tension clip (2) and open hinged cover (1) of battery retainer (4).

2.11.41 Remove batteries (3) from battery retainer and discard IAW local SOP.

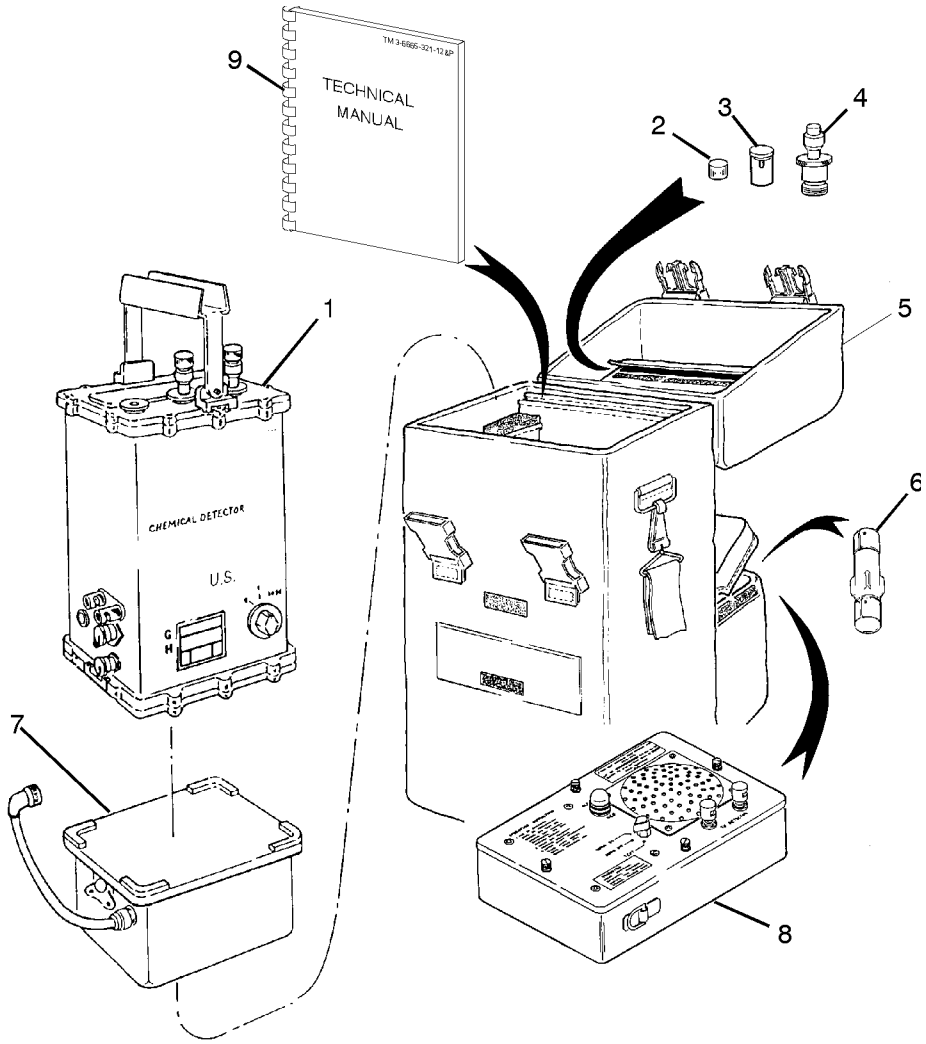
2.11.42 Close hinged cover (1) of battery retainer (4) and fasten spring tension clip (2).



2.11.43 Place panel (1) in housing (2) and tighten four knurled screws (3)



2.11.44 Place M88 Detector (1) with Battery Box (7), confidence sample (6), spare protective caps (2), rain caps (3), M42 Remote Alarm (8), spare inlet (4), and TM 3-6665-321-12&P (9) in Transit Case (5). Close and fasten Transit Case lid.



NOTE

If equipment is to be shipped, skip paragraph 2.11.45.

2.11.45 Transit Case and stowed contents, M28 Power Supply, 110 VAC, 220 VAC, 24 VDC output cables are now ready to be packaged for shipment.

NOTE

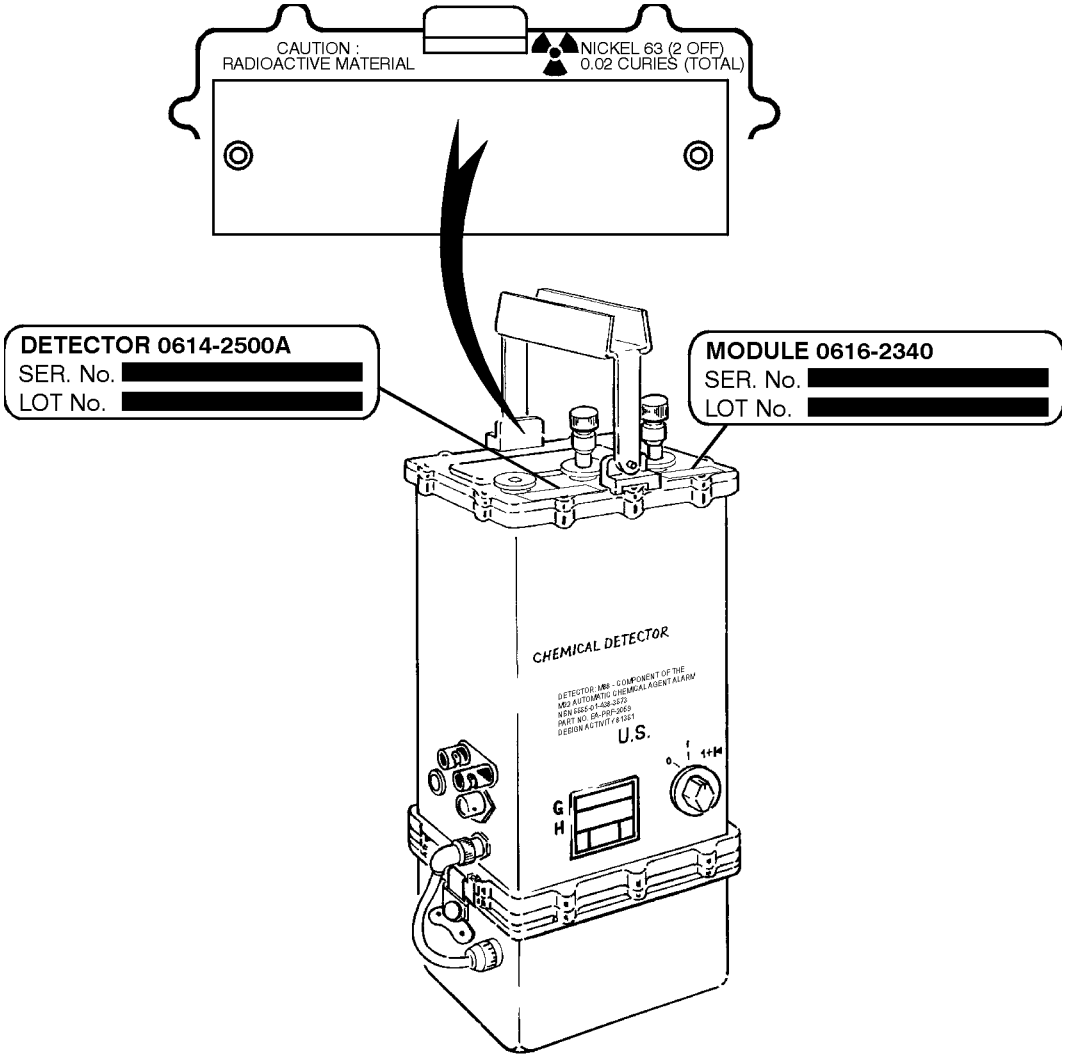
If equipment is to be stored, skip paragraph 2.11.46.

2.11.46 Transit Case and stowed contents and M28 Power Supply, 110 VAC, 220 VAC, 24 VDC output cables are now ready to be packaged for shipment.

2.12 **DECALS AND LABELS**.

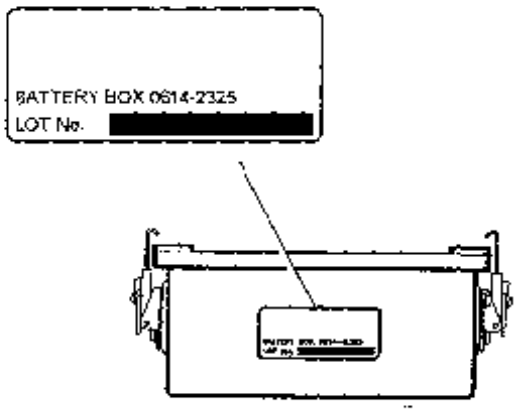
The decals and labels are as follows:

2.12.1 **M88 Detector**.



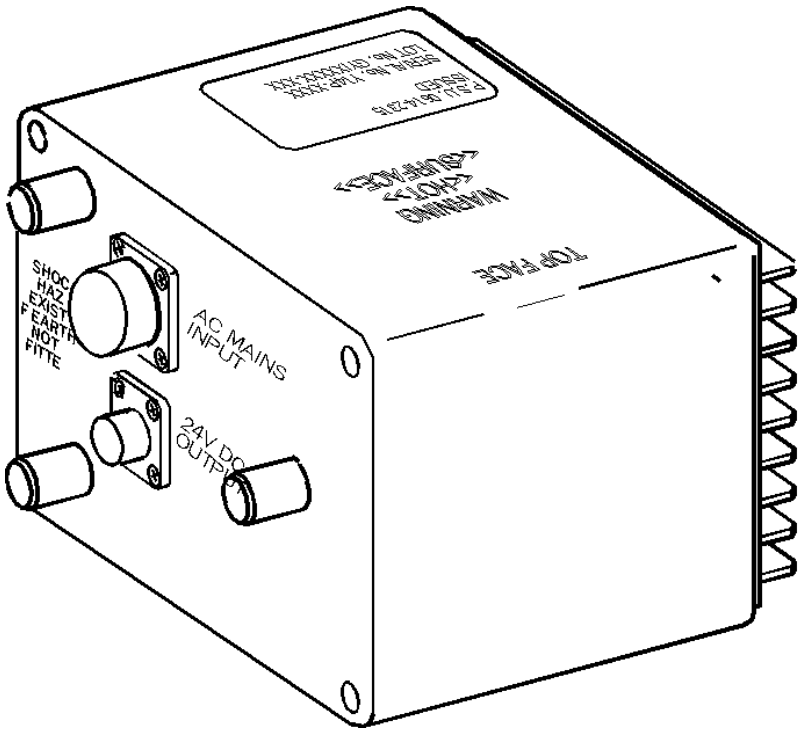
2.12 **DECALS AND LABELS.** (Cont'd)

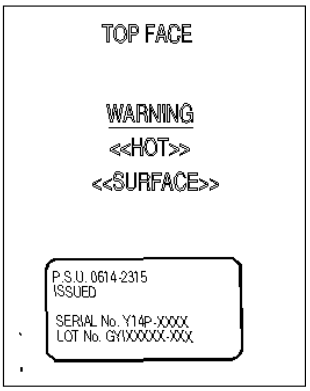
2.12.2 **Battery Box**.



2.12 **DECALS AND LABELS.** (Cont'd)

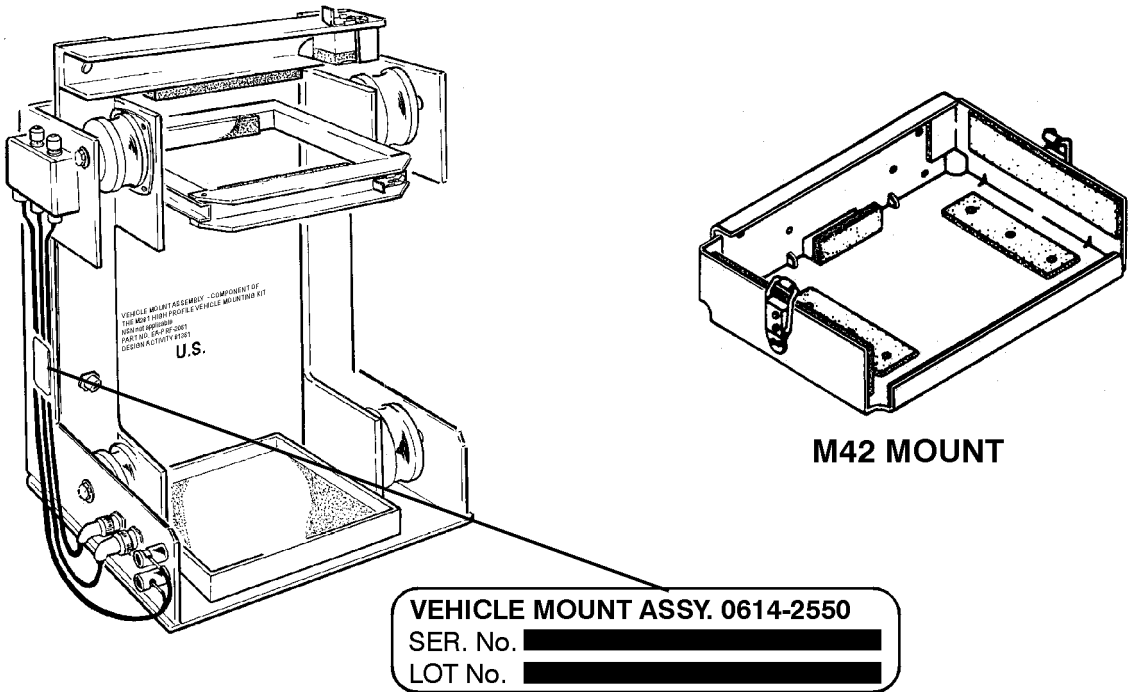
2.12.3 **M28 Power Supply**.





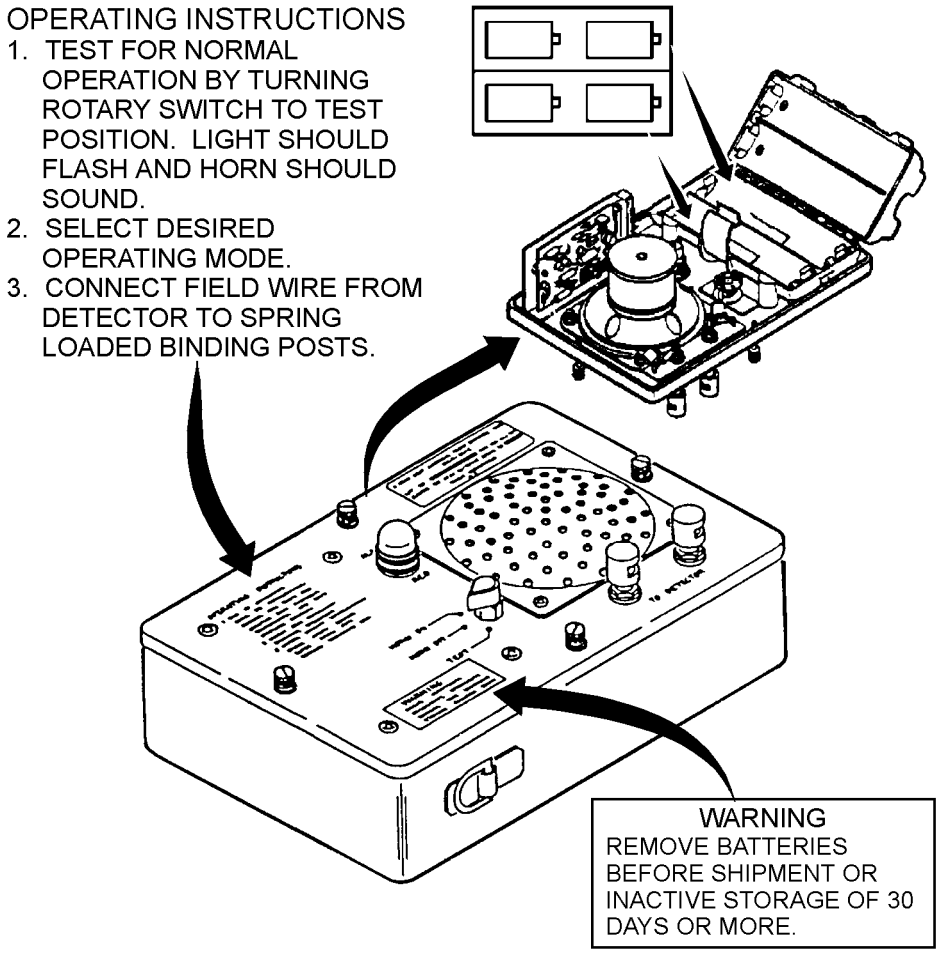
2.12 **DECALS AND LABELS.** (Cont'd)

2.12.4 **M281 Mount Assembly**.



2.12 **DECALS AND LABELS.** (Cont'd)

2.12.5 **M42 Remote Alarm**.



SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS

The following section details procedures associated with M88 Detector operation. These are:

- Operating in wet or dusty conditions (paragraph 2.13)
- Emergency procedures (paragraph 2.14)
- Decontamination procedures (paragraph 2.15)

2.13 **OPERATING IN WET OR DUSTY CONDITIONS**.

If there is a possibility of the M88 Detector operating in rain, damp or dusty conditions, the M88 Detector must be fitted with rain caps as follows:

CAUTION

If the rain caps are to be fitted, the M88 Detector must be in the upright position with the nozzles uppermost at all times.

NOTE

Once rain caps are fitted to the M88 Detector (except during the Confidence Sample Testing), they will remain in place until shutdown when protective caps are installed. During Confidence Sample Testing, only the inlet rain cap is removed and only long enough to apply simulant from the Confidence Sample.

2.13.1 Prepare the M88 Detector for operation (paragraphs 2.7 through 2.9.2.1.1).

2.13.2 Locate the two rain caps (1) in the pocket (2) of the transit case lid.

2.13.3 Gently push the center of each rain cap (1) onto the inlet and exhaust.

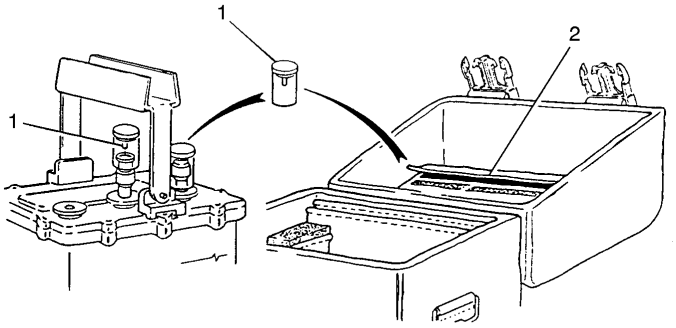
2.13.4 Perform operating procedures (paragraph 2.9.2.1.3 through 2.9.4.3.5).

2.13.5 Remove rain caps.

2.13.6 Continue with confidence sample test (2.9.4 through 2.9.4.3.5).

2.13.7 Reinstall rain caps.

2.13.8 Proceed with operation (2.9.5).



2.14 **EMERGENCY PROCEDURES**.

2.14.1 **Power Failure**. If your M88 Detector is being powered by the M28 Power Supply, the Battery Box (Appendix D, Item 7) can be used in case of a power failure. Set selector switch to off "0" position. Disconnect the M28 DC Power Cable from the M88 Detector POWER connector. Assemble for battery operation (paragraph 2.8.2). Perform the Initial Power On and Self-Test (paragraph 2.9.3) and Confidence Sample Test (paragraph 2.9.4).

2.14.2 **M42 Remote Alarm Failure**. If the M42 Remote Alarm fails, the M22 can still be used if a person is within audible range of the audible alarm on the M88 Detector. Ensure the Selector switch is set to 1 + ◀.

2.14.3 **Broken Audible Alarm on M88 Detector**. If the audible alarm on the M88 Detector is broken, the M88 Detector can still be used as there is a visual alarm warning. If the audible alarm is required, connect the M42 Remote Alarm to the REMOTE binding posts of the M88 Detector (paragraph 2.8.4).

2.15 **NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION**.

After a chemical attack and before decontamination of the outside of the M22 Alarm and auxiliary equipment, the procedures detailed below should be followed in conjunction with the procedures outlined in Army FM 3-5, Air Force TO 11C15-1-3, and Marine Corps FMFM 11-10.

NOTE

The M281 Mounting Kit will be decontaminated using the specific procedures for the vehicle it is mounted on.

The M88 Detector, its Battery Box and the M42 Remote Alarm will be removed from the M281 Mounting Kit prior to decontamination of either component.

2.15.1 Set selector switch to off “0” position.

2.15.2 Install the protective caps (2.10.5) (packaged) located in the pocket in the transit case lid.

2.15.3 Install connector caps (2.11) on all exposed electrical connectors of the M88 Detector and M281 Mounting Kit.

2.15.4 Decontaminate all external surfaces of M88 Detector and its Battery Box.

2.15.4.1 Start by dusting the entire M88 Detector and its Battery Box with a decon mitt from a M295 Individual Equipment Decontamination Kit. Use the procedures found in TM 3-4230-235-10 “Operator’s Manual for Decontamination Kit, Individual Equipment: M295.”

NOTE

If liquid contamination is still suspected or detected, get another decon mitt and repeat this step.

2.15.4.2 Follow this step with a good scrubbing of hot soapy water to remove the decon powder.

WARNING

M295 Kit only removes the liquid hazard. Decontaminated items may still present a vapor hazard. Do not unmask until it has been determined safe to do so.

2.15.4.3 Rinse with clean water (contamination free) and apply household bleach, scrubbing to get the liquid in all crevices. Allow the bleach to remain on all surfaces for at least 30 minutes.

NOTE

Decontamination solutions used on the M88 Detector and its Battery Box should be limited to household bleach and hot soapy water. The household bleach should remain on all surfaces for at least 30 minutes.

2.15.4.4 Rinse the M88 Detector and Battery Box with clean water (contamination free) and allow to completely dry.

NOTE

If contaminated with VX or thickened GD (TGD) an additional aeration period of up to 96 hours, dependent upon weather conditions, may be needed to allow the M88 Detector and its Battery Box to be handled without a Chemical Protective Glove. At a temperature of 70ºF or higher, the aeration period is 96 hours. At temperatures below 70ºF, a longer period may be required. The M88 Detector and Battery Box will have to be checked for effectiveness of decontamination with M256-series Detector Kits, or if available, a Chemical Agent Monitor (CAM) or an Improved Chemical Agent Monitor (ICAM).

To aid the decontamination process, the inlet nozzle can be changed by the operator and the rubber electrical caps on the binding posts and the rubber battery box cover can be replaced at the unit level.

2.15.4.5 After decontamination, perform the initial Power On and Self-test (paragraph 2.9.3) to verify that no contaminant remains inside the M88 Detector. Remaining contaminants may cause the M88 Detector to alarm.

2.15.4.6 During normal operation one or two bars may be lit on the G and/or H bargraphs due to background levels of CW agent contamination. If three or more bars are lit, the detector should be run for 30 minutes to clear the bar display. If the display does not clear to less than one bar, check effectiveness of decontamination with M256-series Detector Kit, M8/M9 Detector Paper, or if available, a CAM.

CHAPTER 3
OPERATOR MAINTENANCE PROCEDURES

SECTION I. LUBRICATION INSTRUCTIONS

3.1 **GENERAL**.

No lubrication is required.

SECTION II. TROUBLESHOOTING PROCEDURES

3.2 **INTRODUCTION**.

3.2.1 Paragraph 3.3 lists malfunctions that you may find when using your M22 Alarm. Locate the equipment symptom in the index and then turn to the referenced page for the troubleshooting procedure.

3.2.2 User Observed Malfunctions, lists common faults which you may find during the operation or maintenance of the M22 Alarm.

3.3 **USER OBSERVED MALFUNCTIONS**.

The following faults can be observed and identified by the User. Use this index to locate trouble symptoms. Perform the troubleshooting procedures on the page listed.

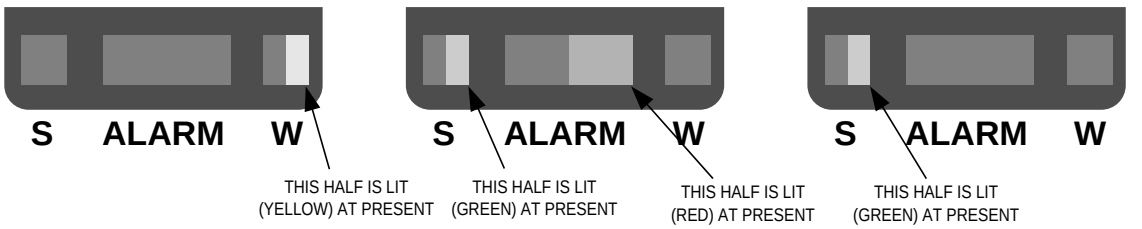
Index of Symptoms

Table 3-1. Operator Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. M88 DETECTOR SAMPLE, ALARM, OR WAIT DISPLAY LIGHTS FLICKER FROM SIDE TO SIDE.

The input voltage is low, if the Sample / Alarm / Wait light(s) start to flicker from side to side as illustrated below.



Step 1. Check if M88 Detector is powered by battery or external power source. Is M88 detector powered by battery?

Yes : a. Turn M88 Detector switch to “0”.
b. Replace Lithium battery (paragraph 2.8.2) and restart M88 Detector (paragraph 2.9.3).
c. If problem is not corrected, notify Unit Maintenance.
No : Notify Unit Maintenance.

2. NONE OF THE DISPLAY LIGHTS ON THE M88 DETECTOR WILL LIGHT AFTER POWER ON.

NOTE

The display lights are difficult to observe when the detector is in direct sunlight. Shield the display lights with your hand or remove from sunlight to see if the display lights are visible. If still not visible, then continue with this malfunction.

If M88 Detector is powered by external DC power source from the Vehicle Mount or M28 Power Supply, skip Step 1.

Step 1. Check M88 Detector Battery Box cable. Is Battery Box cable connected to M88 Detector POWER connector ?

Yes: a. Replace M88 Detector Lithium battery (paragraph 2.8.2)
b. If problem is not corrected, notify Unit Maintenance.
No : a. Make sure power is off (“0”) at M88 Detector.
b. Connect Battery Box cable to M88 Detector POWER connector .

NOTE

If M88 Detector is powered by Lithium battery or M28 Power Supply, skip Step 2.

Table 3-1. Operator Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Check Vehicle Mount power cable from the Junction Box. Is power cable connected to M88 Detector POWER connector ?

Yes: a. Make sure external DC power source connected to the Vehicle Mount Junction Box is turned on.
b. If problem is not corrected, notify Unit Maintenance.
No : a. Turn off external DC power source to Vehicle Mount Junction Box.

NOTE

b. Connect Vehicle Mount power cable to M88 Detector POWER connector .
If M88 Detector is powered by Lithium battery or external DC power source from the Vehicle Mount, skip Step 3.

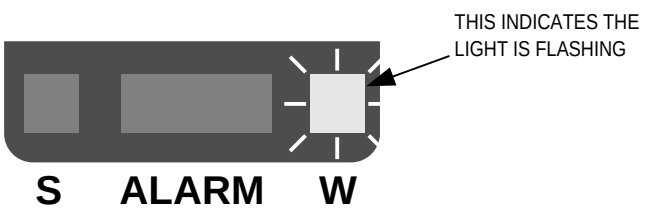
Step 3. Check M28 DC Power Supply Installation (paragraph 2.8.3). Is M28 Power Supply installed according to the procedure?

Yes: a. Connect M28 Power Supply AC power cable to a known good 110 VAC or 220 VAC power outlet.
b. If problem is not corrected, notify Unit Maintenance.
No : Install M28 Power Supply properly (paragraph 2.8.3).

3. ONE OR MORE OF THE DISPLAY LIGHTS ON THE M88 DETECTOR WILL NOT LIGHT DURING INITIAL SELF-TEST.

Notify Unit Maintenance

4. M88 DETECTOR WAIT LIGHT WILL NOT STOP FLASHING EVERY SECOND.



Step 1. Check Inlet and Exhaust.
a. If Rain Caps are installed, do Step 2.
b. Are Protective Caps removed from each?

Yes: a. Replace Inlet (paragraph 3.4.1) with sealed spare part.
b. If fault is not corrected, notify Unit Maintenance.
No : a. Remove Protective Caps from Inlet and Exhaust.
b. If fault is not corrected, replace inlet (paragraph 3.4.1) with sealed part.
c. If fault is not corrected, notify unit maintenance.

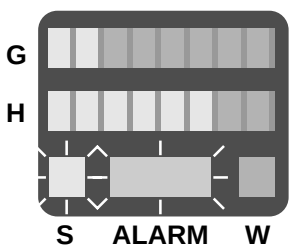
Table 3-1. Operator Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2. Remove Rain Caps from Inlet and Exhaust. Does WAIT light stop flashing?

Yes: Replace Rain Caps through Unit Maintenance.
No : a. Replace Inlet (paragraph 3.4.1) with sealed spare part.
b. If fault is not corrected, notify Unit Maintenance.

5. M88 DETECTOR TAKES MORE THAN 10 MINUTES TO RESUME SAMPLING AFTER ALARM OR CLEAR-DOWN.

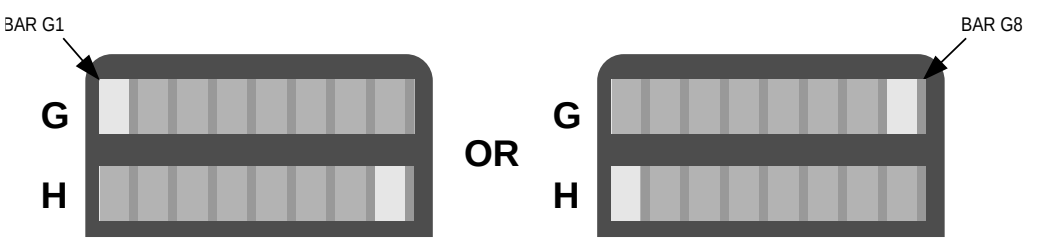


Step 1. Relocate M88 Detector. Does M88 Detector start sampling within 10 minutes?

Yes: Notify your supervisor to check for contamination at previous location.
No : Do Step 2.

Step 2. a. Replace Inlet (paragraph 3.4.1) and retest.
b. If fault is not corrected, notify supervisor and forward to Unit Maintenance.

6. M88 DETECTOR G AND H BAR DISPLAYS KEEP ALTERNATING BETWEEN THE SAME TWO LIGHT PATTERNS AND INITIAL SELF-TEST CANNOT BE COMPLETED.



Step 1. Shutdown the M88 Detector (paragraph 2.10).

Step 2. Do Initial Power On and Self-test (paragraph 2.9.3).

Step 3. If fault is not corrected, notify Unit Maintenance.

Table 3-1. Operator Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

7. M88 DETECTOR WILL NOT RESPOND TO CONFIDENCE SAMPLE TESTING.

   Notify Unit Maintenance.

8. M88 DETECTOR ELAPSED TIME DISPLAY STAYS BLANK AFTER POWER ON.

   Notify Unit Maintenance.

9. M88 DETECTOR DOES NOT SOUND DURING INITIAL SELF-TEST OR ALARM MODE.

   Step 1. Check if the M88 Detector power switch is in "1+" position. Is power switch in the "1+" position?

   Yes: Notify Unit Maintenance.
   No : Set power switch to "1+" position and retest.

10. M42 REMOTE ALARM DOES NOT RESPOND WHEN M88 DETECTOR ALARMS.

   Step 1. Place selector switch to TEST. Does horn sound and lamp flash?

   Yes: Do Step 2.
   No : a. Replace batteries (paragraph 3.4.2).
   b. If problem is not corrected, notify Unit Maintenance.

   Step 2. Inspect M42 Remote Alarm and M88 Detector binding posts to ensure wires are clean and clamped tight, and posts are free of corrosion. Are wires clean and clamped tight, and are posts free of corrosion?

   Yes: Do step 3.
   No : a. Clean corrosion from wires and posts.
   b. If posts will not clamp wires, notify Unit Maintenance.

   Step 3. Check wire connection between M88 Detector and M42 Remote Alarm for damage. Is wire in good condition?

   Yes: Do Step 4.
   No : a. If wire comes from Junction Box on Vehicle Mount, notify Unit Maintenance.
   b. Replace field wire.

   Step 4. Put M88 Detector in alarm mode by doing Initial Power On and Self-test (paragraph 2.9.3) or Confidence Sample Testing (paragraph 2.9.4). Does horn sound and lamp flash on M42 Remote Alarm?

   Yes: M42 Remote Alarm is operational.
   No : Notify Unit Maintenance.

Table 3-1. Operator Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

11. M42 REMOTE ALARM LAMP DOES NOT FLASH, BUT HORN SOUNDS.

Step 1. Rotate selector switch on M42 Remote Alarm to TEST. Does ALARM RED indicator flash when horn sounds?

Yes: M42 Remote Alarm is operational.
No : Notify Unit Maintenance.

12. M42 REMOTE ALARM LAMP FLASHES BUT HORN DOES NOT SOUND.

Step 1. Rotate selector switch on M42 Remote Alarm to TEST. Does horn sound when ALARM RED indicator flashes?

Yes: M42 Remote Alarm is operational.
No : Notify Unit Maintenance.

13. M88 DETECTOR DISPLAYS TWO OR MORE BARS FOR 10 MINUTES PRIOR TO SHUTDOWN.

Step 1. Relocate M88 Detector. Does M88 Detector clear to one bar or less?

Yes: Notify supervisor to check for contamination in previous location.
No : Proceed to Step 2.

Step 2. Replace the inlet nozzle assembly (paragraph 3.4.1). Does M88 clear to one bar or less?

Yes: M88 Detector is operational, continue with shutdown (paragraph 2.10).
No : If fault is not corrected, notify supervisor and forward to Unit Maintenance.

14. M88 DETECTOR WAIT LIGHT STILL LIT AFTER 30 MINUTES.

Notify Unit Maintenance.

SECTION III. OPERATOR MAINTENANCE PROCEDURES

3.4 **GENERAL**.

This section contains information and instructions for operator maintenance of the M42 Automatic Chemical Agent Alarm and Auxiliary equipment. The index below is provided for quick reference to Operator Maintenance Procedures.

3.4. **GENERAL**. (Continued)

3.4.1 **M88 Detector Inlet**.

This task covers: Removal, Installation.

INITIAL SETUP

Materials/Parts: Inlet (Onboard Spare)
Lint-free Cleaning Cloth (Appendix F, Item 8)

a. **Removal**.

WARNING

The Inlet can reach temperatures of 140°F (60°C) during operation of the M88 Detector. Do Not touch Inlet during operation. Shutdown M88 Detector (paragraph 2.10) and allow Inlet to cool prior to any handling for maintenance.

CAUTION

This procedure must be performed in a clean and dry environment. Do not use any tools during removal or installation of the Inlet. If Inlet cannot be unscrewed using fingers, send M88 Detector to Unit Level Maintenance.

(1) Shutdown M88 Detector (paragraph 2.10).

(2) Clean area of top plate and around base of Inlet with a lint-free cleaning cloth (Appendix F, Item 8) to avoid dirt entering into M88 Detector.

WARNING

If M88 Detector has been exposed to actual agents, removed Inlet must be disposed of as contaminated waste in accordance with local regulations.

(3) Using fingers, unscrew Inlet (1) counterclockwise gripping knurled area at the base. Discard Inlet.

b. **Installation**.

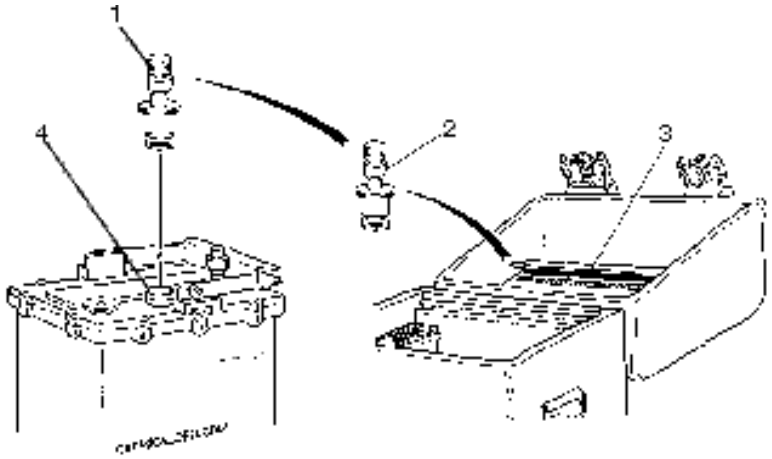
NOTE

To avoid contaminating Inlet, use inside surface of Inlet packaging to hold Inlet. Perform replacement as quickly as possible. Ensure Inlet does not come in contact with anything other than inside surface of packaging.

(1) Obtain packaged replacement Inlet (2) from pocket (3) on transit case lid. Open package containing replacement Inlet (2).

(2) Using packaging, position Inlet (1) in line with INLET opening.

(3) Using packaging, screw in replacement Inlet (2) clockwise. No tools are required. Tighten Inlet only finger tight against seal (4) around Inlet opening.



(4) Perform Initial Power On and Self-test (paragraph 2.9.3).

3.4.2 **M42 REMOTE ALARM BATTERIES**.

This task covers: Removal, Installation

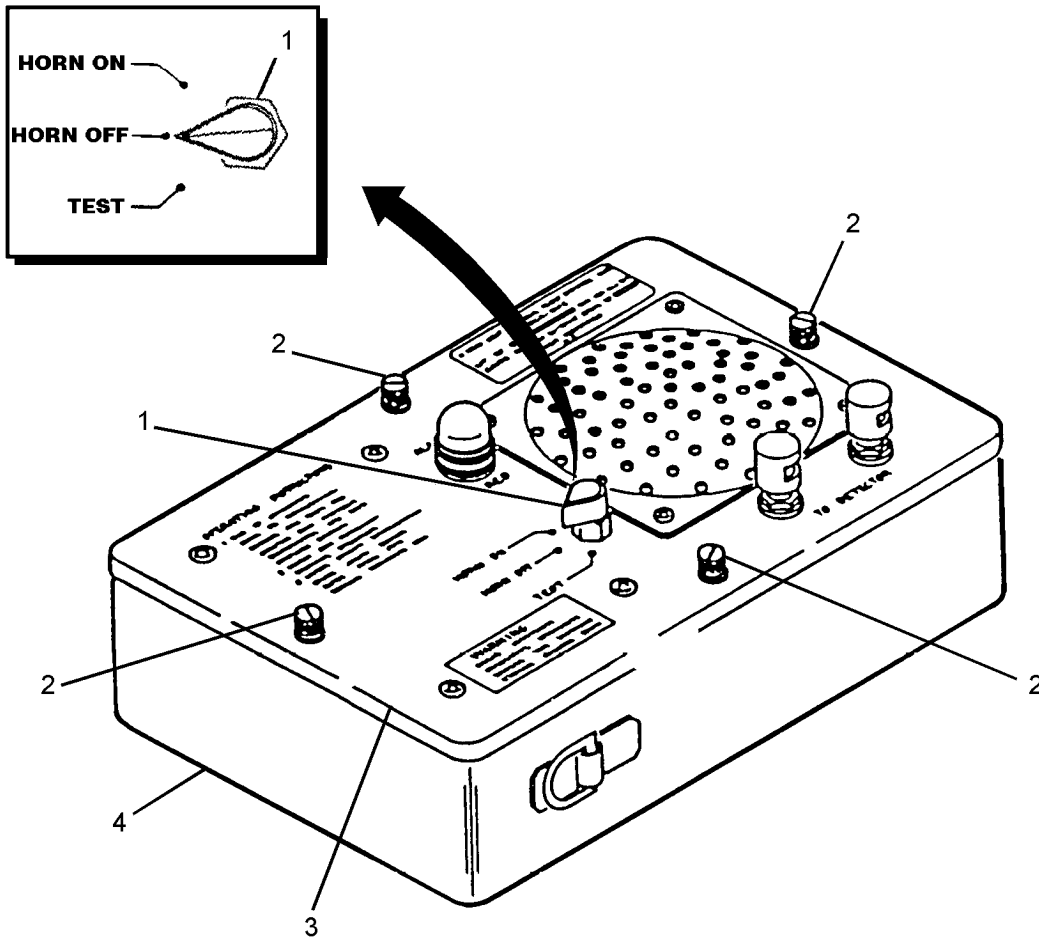
INITIAL SETUP

Materials/Parts: Non-rechargeable Batteries (Appendix F, Item 5)

a. **Removal**.

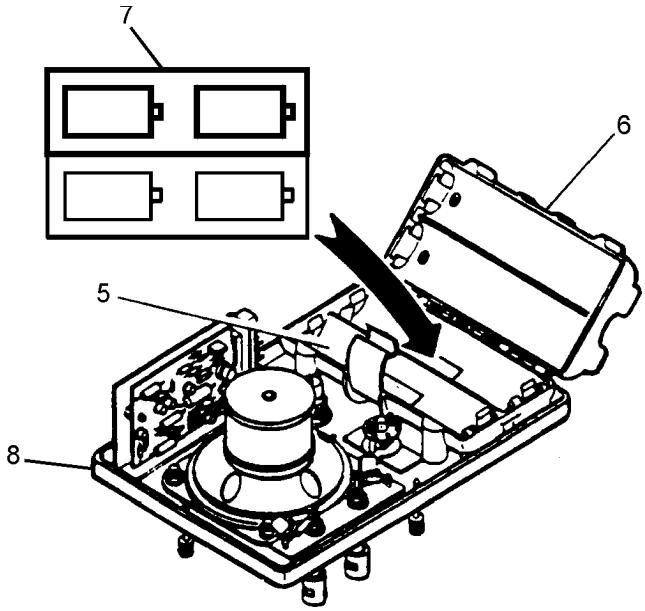
(1) Turn selector switch (1) to HORN OFF.

(2) Loosen four knurled screws (2) and separate panel assembly (3) from housing (4).



(3) Release spring-tension clip (5) and open hinged cover (6) of battery retainer (8).

(4) Remove batteries from battery retainer (8) and discard IAW local SOP.



b. **Installation**.

(1) Obtain four batteries (Appendix F, Item 5).

NOTE

Refer to labels (7) in bottom of battery retainer (8) for correct positioning of batteries.

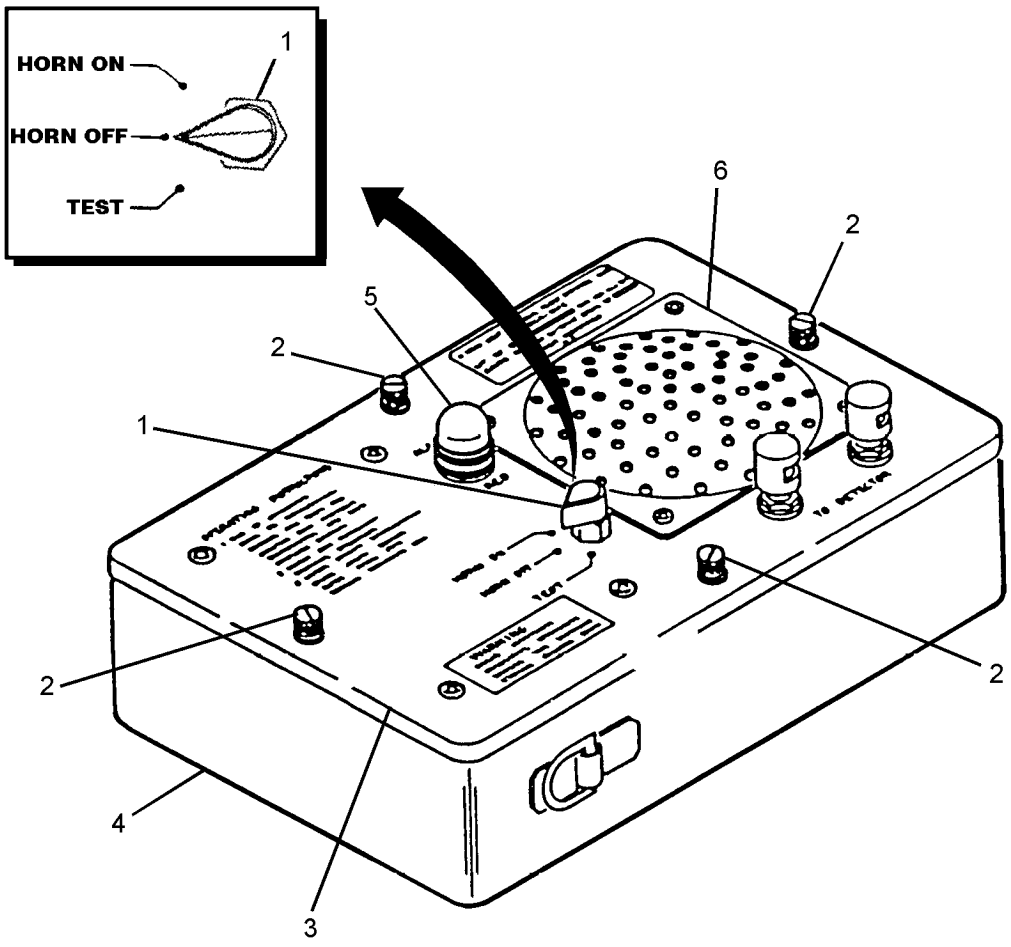
(2) Install batteries in battery retainer (8), close hinged cover (6), and secure with spring tension clip (5).

(3) Position panel assembly (3) on housing (4).

(4) Secure by tightening four knurled screws (2).

(5) Turn selector switch (1) to TEST. ALARM-RED indicator (5) will flash and horn (6) will sound.

(6) Turn selector switch (1) to HORN OFF.



CHAPTER 4
UNIT MAINTENANCE PROCEDURES

SECTION I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

4.1 **COMMON TOOLS AND EQUIPMENT**.

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

4.2 **SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT**.

Test equipment is listed in the Maintenance Allocation Chart (MAC) in Appendix B. No special tools or support equipment are required.

No special Test Measurement and Diagnostic Equipment (TMDE) is required to maintain the M22 Alarm.

4.3 **REPAIR PARTS**.

Repair parts are listed and illustrated in Repair Parts and Special Tools List (RPSTL), Appendix C, of this manual.

SECTION II. SERVICE UPON RECEIPT

4.4 **INTRODUCTION**.

This section provides information that the maintenance technician needs to inspect and service the M22 Alarm, Chemical Agent Detector, Automatic and Auxiliary equipment before issuing it to the operator.

a. Inspect equipment for cracks, dents, holes or corrosion incurred during shipment. If the equipment has been damaged or has corrosion. report this on SF Form 364, Report of Discrepancy. Marine Corps users refer to MCO P4610.19.

b. Check equipment against the packing slip to see if the shipment is complete. Report all discrepancies In Accordance With (IAW) instructions of AFM 67-1, MCO 4430.3, and DA Pam 738-50 (TAMMS) as contained in the Maintenance Management Update.

c. Upon receipt, perform inspection procedures in Table 4-1. Marine Corps users refer to TI 10010-15/1B for serviceability standards.

WARNING

The sensor assembly inside the M88 Detector contains two Nickel-63 sources of radioactive material. Do not attempt to open the M88 Detector. Opening the M88 Detector may cause injury to personnel.

NOTE

Army wipe testing will only be performed at Direct Support or higher maintenance level (TB 3-6665-321-30). Air Force, Marine Corps, and Navy wipe testing will be accomplished at Unit Level Maintenance. Air Force uses procedures in paragraph 4.15. Marine Corps uses procedures in paragraph 4.16, Navy uses procedures in paragraph 4.17.

Table 4-1. Inspection Procedures

Location	Item	Action
Clean, Dry Work Area		**PREPARATION OF WORK AREA** 1. Vacuum the work surface. 2. Cover work surface with paper. 3. Secure paper to work surface with tape.
Work Area	**SHIPPING CARTON**	**UNPACKING** **NOTE** The M22 Alarm, M28 Power Supply and Vehicle Mount are transported in separate shipping containers. Each shipping container has an outer wooden box, inner carton and additional packaging around the end item if needed. a. Place wooden box (1), (4) or (7) on covered work surface. b. Inspect external surfaces of wooden box for damage incurred during shipment. If damage is noted, report it on SF 364, Report of Discrepancy. c. Open wooden box (1), (4) or (7) from top. d. Lift out inner carton (2) from wooden box (1), inner carton (5) from wooden box (4) or inner carton (8) from wooden box (7). e. Inspect external surfaces of inner carton for damage incurred during shipment. If damage is noted, report it on SF 364, Report of Discrepancy. f. Open inner shipping carton (2), (5) or (8) from top. g. Lift each end item from applicable shipping carton and set it aside: 1.) M22 Alarm, packed in Transit Case (3), from carton (2). 2.) M28 Power Supply (6) from carton (5). 3.) Vehicle Mount (9) from carton (8). **NOTE** Pack an unserviceable end item in the same manner the replacement was packed. h. If end items (3), (6) or (9) are replacements for unserviceable end items, pack the unserviceable end Item in the proper inner and outer shipping carton: 1.) M22 Alarm, packed in Transit Case (3), in wooden box (1) and carton (2). 2.) M28 power Supply (6) in wooden box (4) and carton (5). 3.) Vehicle Mount (9) in wooden box (7) and carton (8). i. Check each end item of equipment against the proper Components Of End Item List (Appendix D). Report all discrepancies IAW the instructions of DA PAM 738- 750 and MCO 4430.3. j. Inspect external surfaces of each end item for damage incurred during shipment. If damage is noted, report it on SF 364, Report of Discrepancy.

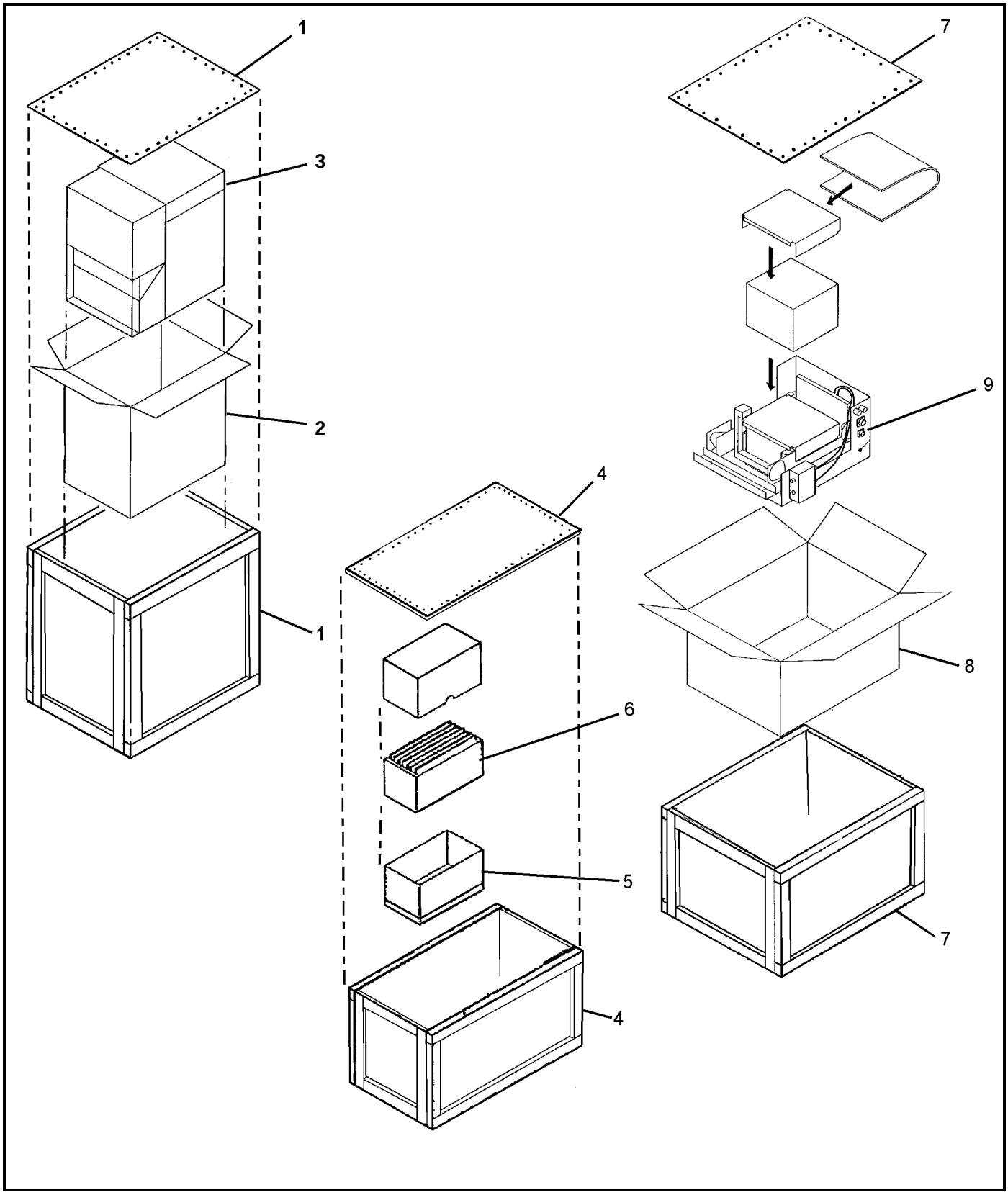

1
3
2
1
4
6
5
4
7
9
8
7

Table 4-1. Inspection Procedures - (Continued)

Location	Item	Action
Work Area	**TRANSIT CASE**	**ITEM INVENTORY AND INSPECTION** a. Remove the following items from Transit Case (2): M88 Detector (packaged) (6) Battery Box (5) Confidence Sample (3) Protective Caps (12 each, packaged 2 each in six bags total) (7) Rain Caps (2 each) (4) Inlet (1) Operator's and Unit Maintenance Technical Manual (9) b. Check Transit Case (2) for tears and damage that could prevent it from protecting the M88 Detector and other items contained in the case. c. Check that the lid fastening clips secure the lid when it is closed. d. Check that the fastening strips on all the pouches attach and detach easily. e. Check the strap (8) for tears and damage. f. Remove the vapor proof barrier from Confidence Sample (3).
	External & Internal Fastenings Straps Confidence Sample	

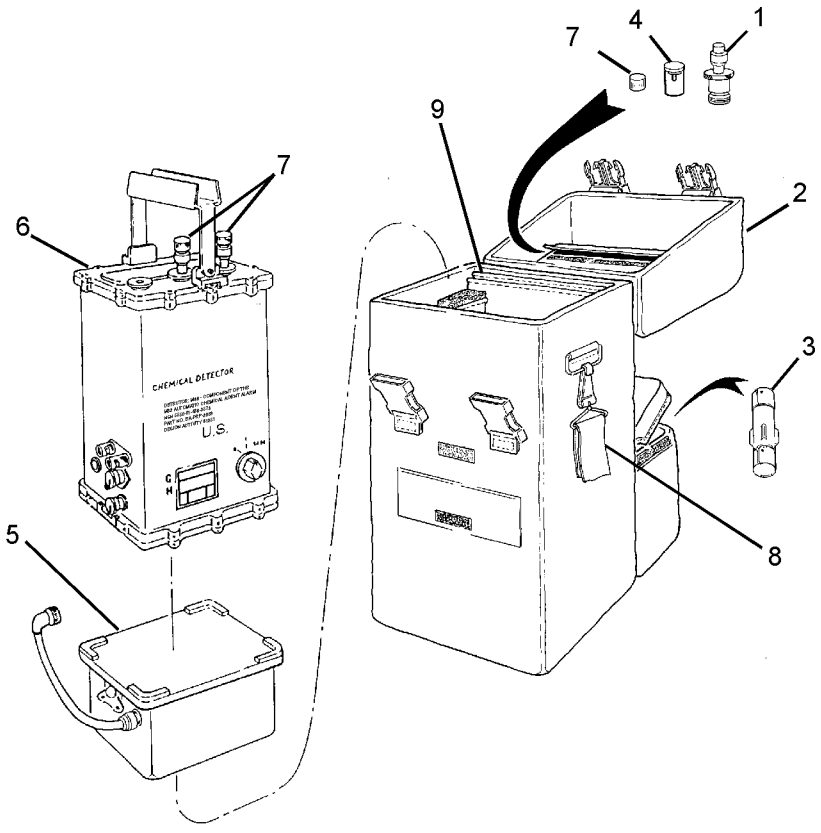


Table 4-1. Inspection Procedures - (Continued)

Location	Item	Action
Work Area	**M88 DETECTOR**	**INSPECTION**
	Wipe test	a. Army: Turn in M88 Detector to direct support maintenance for wipe test. Air Force: Conduct wipe test on M88 Detector IAW paragraph 4.15. Marine Corps: Conduct wipe test on M88 Detector IAW paragraph 4.16. Navy: Conduct wipe test on M88 Detector IAW paragraph 4.17.
	Packaging & Exterior	b. Inspect outside of M88 Detector (1) for broken or missing parts. **WARNING** Do not attempt to open the M88 Detector. The sensor assembly inside the M88 Detector contains two Nickel-63 sources of radioactive material. Opening the M88 Detector may cause injury to personnel.
	Handle	c. Check that the Handle (8) hinges up and down.
	Connectors	d. Remove protective caps (2,3). Inspect connector for damage. Reinstall caps.
	Binding post	e. Check that two remote binding posts (4) are not broken off or severely bent. Check electrical caps (9) for damage. Press binding posts to check for spring action.
	Selector Switch	f. Check that Selector switch (5) is not broken. Select each option in turn to ensure the switch clicks into each position.
	Display	g. Visually inspect display (6) window for cracks.
	Catch strikes	h. Check that two catch strikes (7) are not broken or missing.

Table 4-1. Inspection Procedures - (Continued)

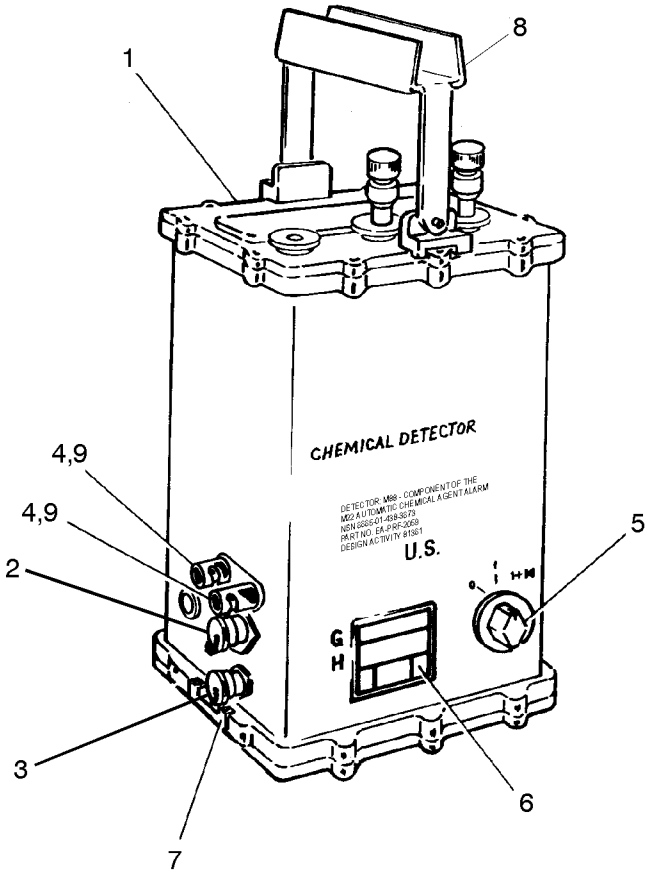
Location	Item	Action
		

Table 4-1. Inspection Procedures - (Continued)

Location	Item	Action
Work Area	**BATTERY BOX**	**INSPECTION**
	Exterior	a. Check battery box (3) for breaks and cracks that could prevent proper use of battery.
	Cover & Compartment	b. Remove the Battery Box cover (1) and check for tears and wear. Check battery compartment for damage.
	Cable	c. Check cable (4) for cuts, mashed or frayed insulation. Check cable connector (5) for damage.
	Connector	d. Check the four connecting and two locating pins on the battery connector (2) for damage.

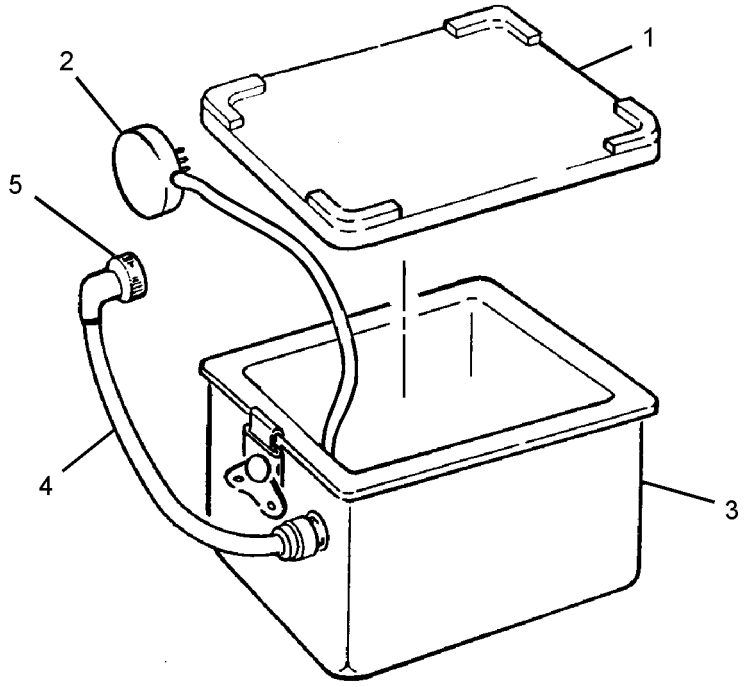
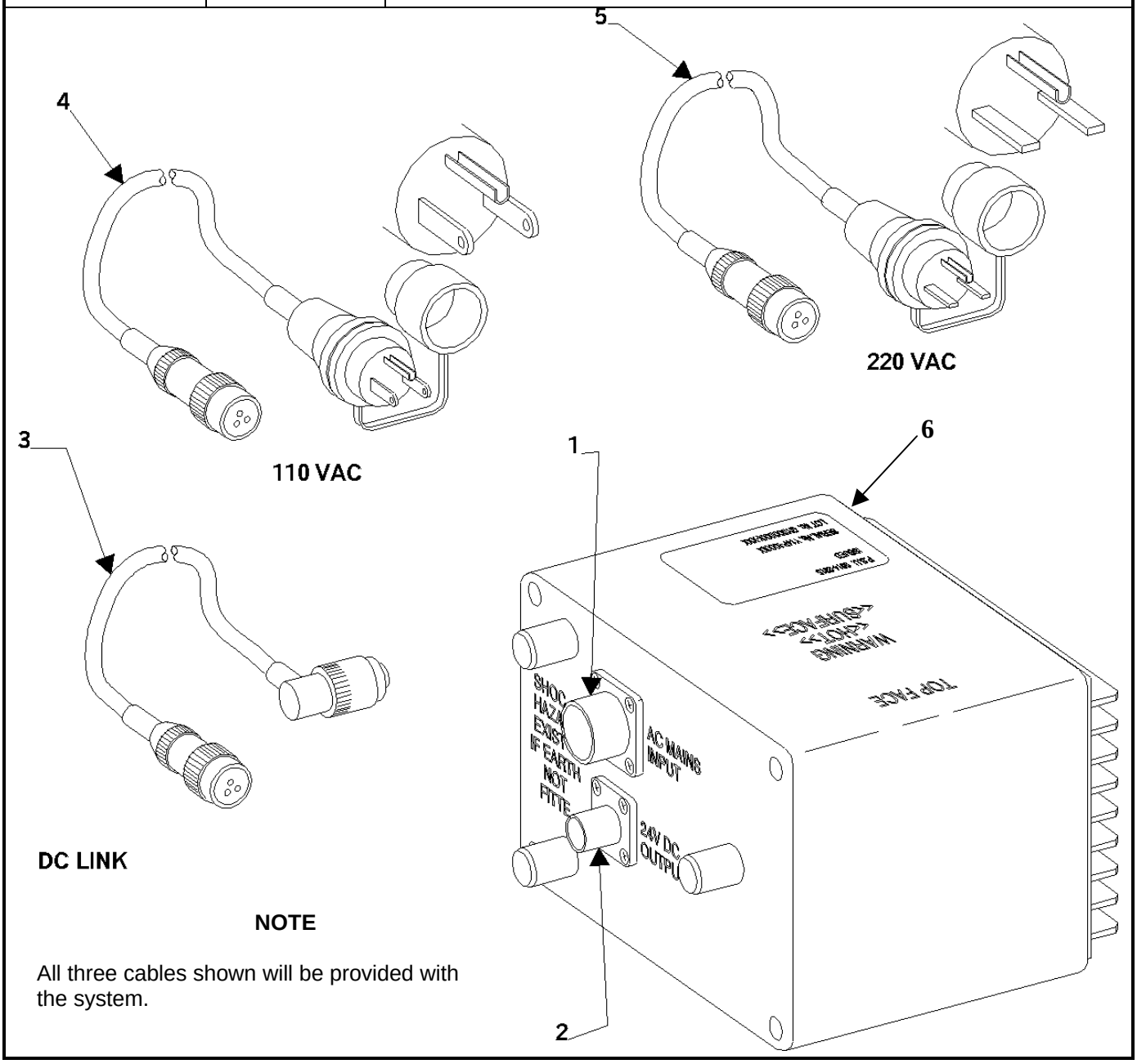


Table 4-1. Inspection Procedures - (Continued)

Location	Item	Action
Work Area	**M28 POWER SUPPLY**	**INSPECTION**
	Exterior	a. Check exterior of power supply (6) for damaged, loose or missing parts; dirt and corrosion.
	Cables	b. Check cables (3,4,5) for cuts, mashed or frayed insulation and their connectors for damage.
	Connectors	c. Check AC power and DC power connectors (1,2) for damage.
		d. Connect M28 Power Supply (6) to M88 Detector (paragraph 2.8.3).
	Operation	e. Perform Initial Power On and Self-test (paragraph 2.9.3). If M88 Detector fails, refer to troubleshooting (paragraph 4.5).

Table 4-1. Inspection Procedures - (Continued)

Location	Item	Action

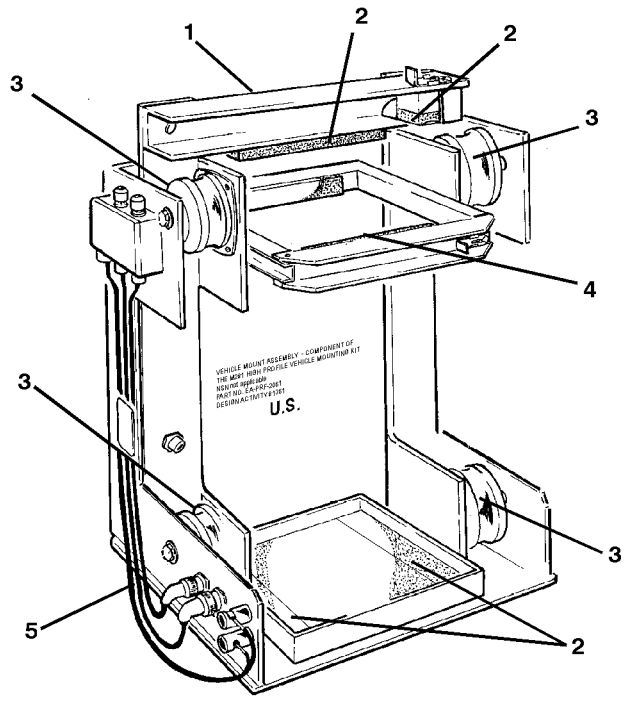


NOTE

All three cables shown will be provided with the system.

Table 4-1. Inspection Procedures - (Continued)

Location	Item	Action
Work Area	**M281 MOUNTING KIT VEHICLE MOUNT**	**INSPECTION**
	Exterior	a. Inspect the mount (1) for dirt, corrosion, and broken or missing parts.
	Rubber Pads	b. Check that the rubber pads (2) are present and in good condition.
	Vibration Mounts	c. Check the four vibration mounts (3) for loose or missing mounting hardware, cracks, or other damage.
	Rubber Liners	d. Check that rubber liners (4) are present on the top and front clamp bars and are in good condition.
	Cable	e. Check that cable assemblies (5) are properly secured to the vehicle mount. f. Inspect the cables for damaged insulation.
	Connectors	g. Inspect the cable connectors for damage.
	M42 MOUNT Exterior	h. Inspect the mount (6) for dirt, corrosion and broken or missing parts.
	Rubber Pads	i. Check that rubber pads (7) on bottom of bracket are present and in good condition.
	Rubber Liners	j. Check that rubber liners (8) are present and in good condition.



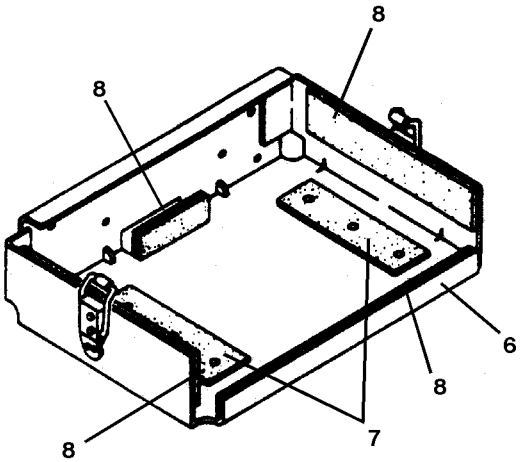
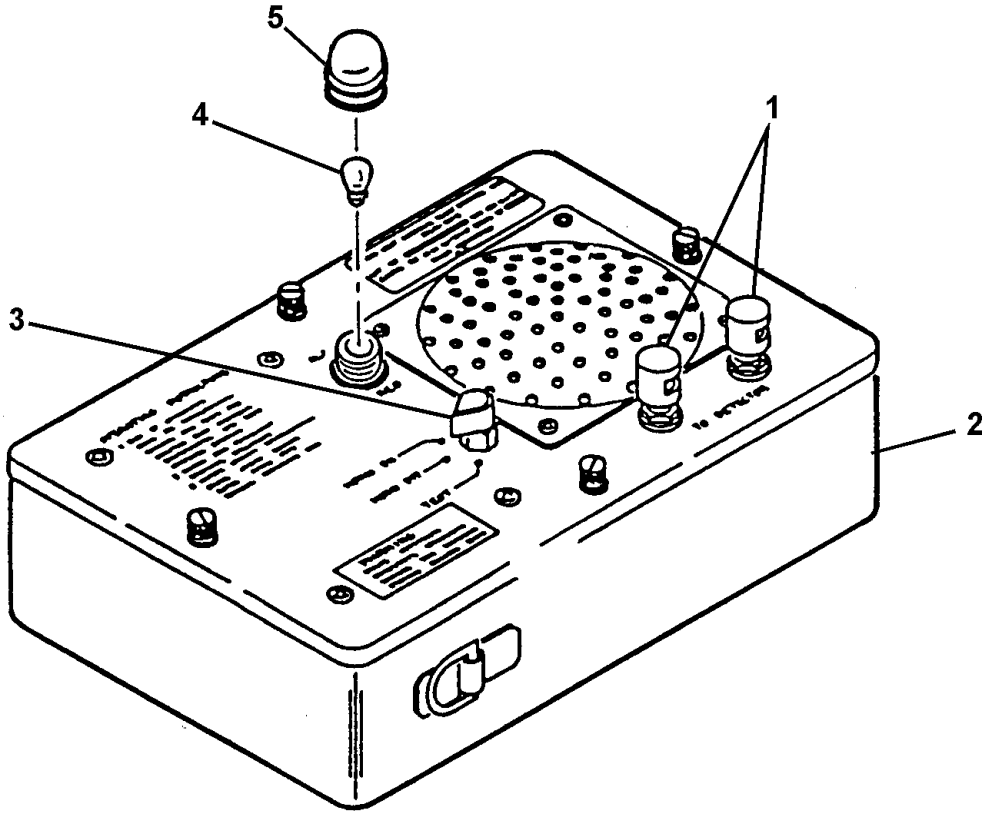


Table 4-1. Inspection Procedures - (Continued)

Location	Item	Action
Work Area	**M42 REMOTE ALARM**	**INSPECTION**
	Exterior	a. Check the outside of M42 Remote Alarm (2) for dirt, corrosion and broken or missing parts.
	Indicator Lamp	b. Unscrew lens (5) and ensure lamp holder contains lamp (4). Reinstall lens.
	Binding Post	c. Check that binding posts and electrical caps (1) are not broken, bent, or damaged. Press the top of each terminal post to check for spring action.
		NOTE Notify personnel within hearing range, when the M42 Remote Alarm is to be tested.
	Horn, Light, and Battery Test	d. Install batteries (paragraph 3.4.2). e. Turn selector switch (3) to TEST and observe the following: Horn should sound and ALARM red light should flash. Turn selector switch (3) to HORN OFF. If M42 Remote Alarm fails this test, refer to paragraph 4.6.



SECTION III. TROUBLESHOOTING PROCEDURES

4.5 **INTRODUCTION**.

Paragraph 4.6 lists malfunction symptoms that you may find when using your M22 Alarm. Locate the equipment symptom that best describes the malfunction in the index and then turn to the referenced page for the troubleshooting procedure. Perform the actions in the order listed.

4.6 **SYMPTOM INDEX**.

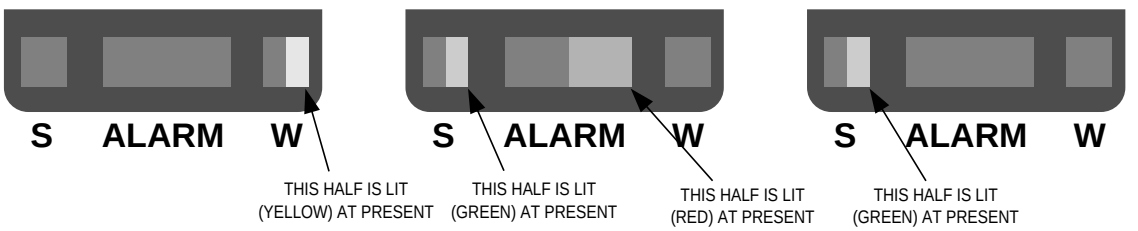
Use this index to locate trouble symptoms. Perform the troubleshooting procedures on the page listed.

Index of Symptoms

Table 4-2. Unit Level Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. M88 DETECTOR SAMPLE, ALARM, OR WAIT DISPLAY LIGHTS FLICKER FROM SIDE TO SIDE.



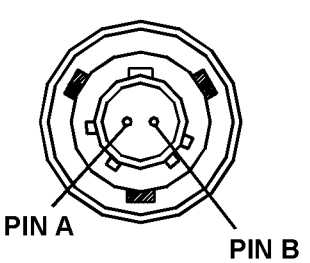
CAUTION

Connecting or disconnecting battery cable with power on can damage M88 Detector and battery cable. Ensure M88 Detector is off before connecting or disconnecting battery cable.

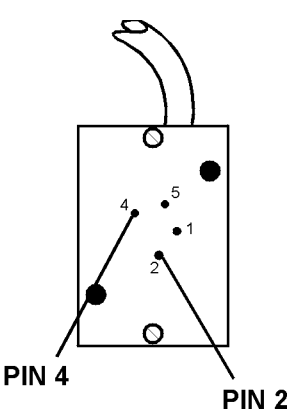
NOTE

If M88 Detector gets power from Vehicle Mount or M28 Power Supply, skip Step 1.

Step 1. a. Remove Battery Box from M88 Detector (paragraphs 2.11.26 and 2.11.27).
b. Remove Lithium battery from Battery Box (paragraphs 2.11.28 and 2.11.29).
c. Check battery cable connectors for corrosion and damaged contacts.
d. If connector contacts are corroded, clean corrosion from contacts.
e. If connector contacts are damaged or cannot be cleaned, replace Battery Box.
f. Using multimeter and illustration, check continuity of battery cable.



FROM	TO
PIN A	PIN 4
PIN B	PIN 2



g. Does continuity check good?

Yes: Replace M88 Detector.
No : Replace Battery Box.

Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

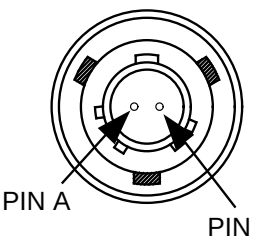
CAUTION

Connecting or disconnecting Power Cable with power on can damage the M88 Detector and Power Cable. Ensure external power is off and M88 Detector is off before connecting or disconnecting Power Cable.

NOTE

If M88 Detector gets power from Lithium battery or M28 Power Supply, skip Step 2 through Step 7.

Step 2. a. Set M88 Detector selector switch to **"**0**"** (off).
b. Turn off external DC power source to Vehicle Mount.
c. Disconnect Junction Box Power Cable from M88 Detector POWER connector.
d. Turn on external DC power source to Vehicle Mount.
e. Using multimeter and illustration, check DC voltage between Junction Box Power cable contacts A and B.



JUNCTION BOX POWER CABLE PLUG

f. Does voltage read between +23.0 to +33.0 VDC between contacts A and B?

Yes: Replace M88 Detector (paragraph 2.8.5).
No : Do Step3.

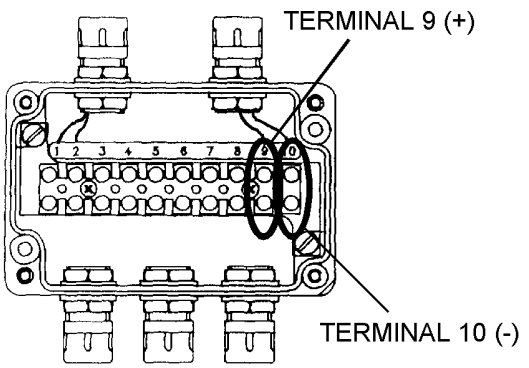
Step 3. a. Turn off external DC power source to Vehicle Mount.
b. Disconnect Power Cable from external power source.
c. Turn on external DC power source.
d. Using multimeter, check DC voltage between external power source output + and - terminals.
e. Does voltage read between +23.0 to +33.0 VDC between + and - terminals?

Yes: Do Step 4.
No : a. Replace external DC power source.
b. If external DC power source cannot be replaced, notify maintenance supervisor.

Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

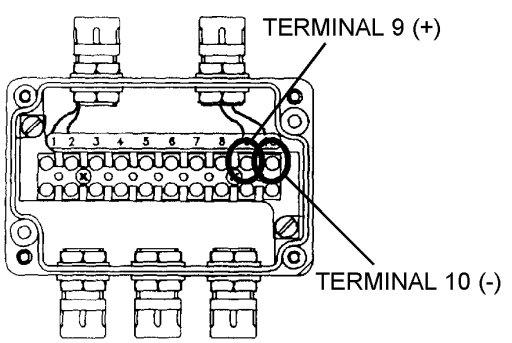
Step 4. a. Remove cover from Vehicle Mount Junction Box by loosening four captive screws.
b. Check if input (top) and output (bottom) Power Cable connections are clean and tight at Junction Box terminals 9 (+) and 10 (-).



c. Are terminal connections clean and tight?

Yes: Do Step 5.
No : a. Clean the bare wire ends of the external DC power source cable (top row terminals) and Junction Box Power Cable (bottom row terminals).
b. Install the wires on Junction Box terminals 9 (+) and 10 (-).

Step 5. a. Connect Power Cable to external power source.
b. Turn on external DC power source.
c. Using multimeter and illustration, check DC voltage between upper row Junction Box terminals 9 (+) and 10 (-).



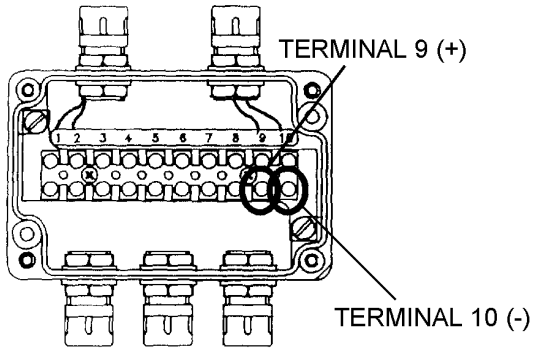
d. Does voltage read between +23.0 to +33.0 VDC on terminal 9 (+) and 10 (-)?

Yes: Do Step 6.
No : Notify maintenance supervisor. Power cable from external DC power source to Vehicle Mount must be replaced.

Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

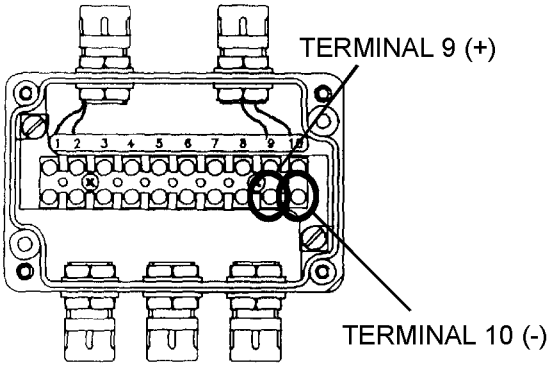
Step 6. a. Using multimeter and illustration, check DC voltage between lower row Junction Box terminals 9 (+) and 10 (-).



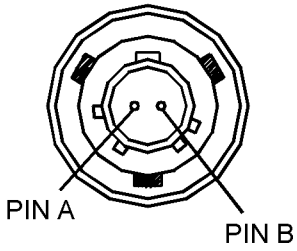
b. Does voltage read between +23.0 to +33.0 VDC on terminal 9 (+) and 10 (-)?

Yes: Do Step 7.
No : Replace Junction Box (paragraph 4.12.2).

Step 7. a. Using multimeter and illustration, check DC voltage between PIN A and PIN B.



FROM	TO
TERM 9	PIN A
TERM 10	PIN B



b. Does voltage read between +23.0 to +33.0 VDC between PIN A and PIN B?
c. Reconnect M88 Detector and perform initial start.

Yes: a. Install Junction Box lid.
b. Connect to M88 Detector.
c. Perform initial start up (paragraph 2.9.3).
No : Replace Junction Box (paragraph 4.12.2).

Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

WARNING

High voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions when performing maintenance procedures on the M28 Power Supply.

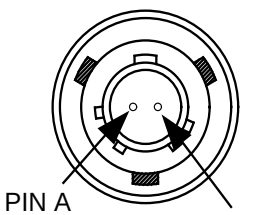
Connecting or disconnecting energized M28 Power Supply AC Power Cable can injure personnel and damage the M28 Power Supply. Ensure external power is removed before connecting or disconnecting AC Power Cable to M28 Power Supply.

To prevent electrical shock, use extreme care when testing energized circuits.

NOTE

If M88 Detector gets power from Lithium battery or Vehicle Mount, skip Step 8 through Step 11.

Step 8. a. Turn off M28 Power Supply by unplugging AC Power Cable from power source.
b. Disconnect M28 Power Supply DC Power Cable from M88 Detector POWER connector.
c. Turn on M28 Power Supply by plugging AC Power Cable into proper AC power outlet.
d. Using multimeter and illustration, check DC voltage between contacts A and B of M28 Power Supply DC Power Cable.



JUNCTION BOX POWER CABLE PLUG

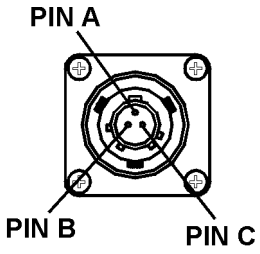
e. Does voltage read between contacts A and B?

Yes: Replace M88 Detector (paragraph 2.8.5)
No : Do Step 9.

Step 9. a. Turn off M28 Power Supply by unplugging AC Power Cable from power source.
b. Disconnect M28 Power Supply DC Power Cable from M28 Power Supply 24V DC OUTPUT connector.
c. Turn on M28 Power Supply by plugging AC Power Cable into proper AC power source.
d. Using multimeter and illustration, check DC voltage between contacts A and B of M28 Power Supply 24V DC OUTPUT connector.

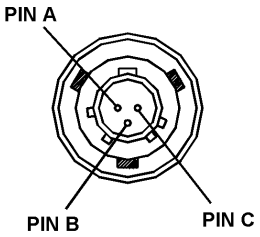
Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION



e. Does voltage read between contacts A and B?
Yes: Replace M28 Power Supply DC Power Cable (paragraph 4.11.2)
No : Do Step 10.

Step 10. a. Turn off M28 Power Supply by unplugging AC Power Cable from power source.
b. Disconnect M28 Power Supply AC Power Cable from M28 Power Supply (AC MAINS INPUT) connector.
c. Connect AC Power Cable into proper AC power source.
Using multimeter and illustration, check AC voltage between contacts A and B of M28 Power Supply 110V AC Power Cable or 220V AC Power Cable.



PL2

CABLE	CONTACTS	FROM	TO
110V AC	A-B	108 VAC	132 VAC
220V AC	A-B	208 VAC	232 VAC

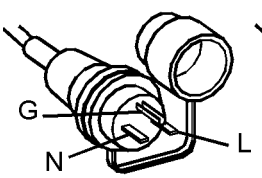
e. Does voltage read within the proper range shown in the illustration?

Yes: Replace M28 Power Supply (paragraph 4.11.1).
No: Do Step 11.

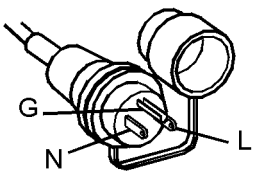
Step 11. a. Remove power from M28 Power Supply 110V AC Power Cable or 220V AC Power Cable by unplugging AC Power Cable from power source.
b. Using multimeter and illustration, check continuity of M28 Power Supply 110V AC Power Cable or 220V AC Power Cable.

Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

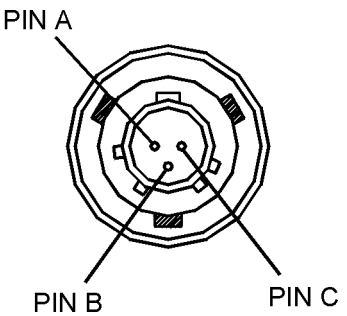


220 VAC POWER CABLE PL1



110 VAC POWER CABLE PL1

FROM	TO
PL1-L	PL2-A
PL1-N	PL2-B
PL1-G	PL2-C



PL2

c. Is continuity good for 110V AC Power Cable or 220V AC Power Cable?

Yes: Change M28 Power Supply 110V AC Power Cable or 220V AC Power Cable to a proper, known good power source.
No : Replace M28 Power Supply 110V/220V AC Power Cable (paragraph 4.11.3).

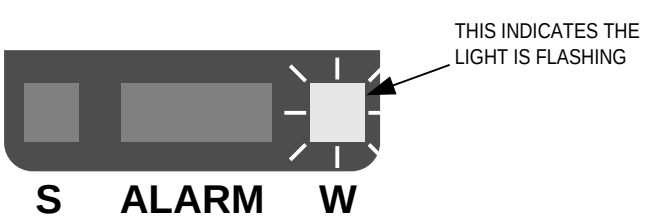
2. NONE OF THE DISPLAY LIGHTS ON THE M88 DETECTOR WILL LIGHT AFTER POWER ON.

Perform troubleshooting **MALFUNCTION** (paragraph 4.6, malfunction 1)

3. ONE OR MORE OF THE DISPLAY LIGHTS ON THE M88 DETECTOR WILL NOT LIGHT DURING INITIAL SELF-TEST.

Replace M88 Detector.

4. M88 DETECTOR WAIT LIGHT WILL NOT STOP FLASHING EVERY SECOND.



Step 1. a. Check Inlet and Exhaust.
b. If Rain Caps are installed on nozzles, do Step 2.
c. Are Protective Caps removed from each nozzle?

Yes: a. Replace Inlet Nozzle (paragraph 3.4.1) with sealed spare part.
b. If fault is not corrected, replace M88 Detector.
No : a. Remove Protective Caps from Inlet and Exhaust.
b. If fault is not corrected, replace M88 Detector.

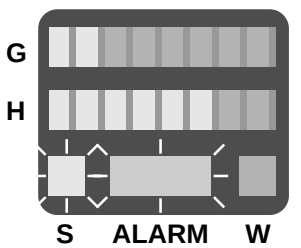
Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Remove Rain Caps from each nozzle. Does WAIT light stop flashing?

Yes: Replace Rain Caps (paragraph 2.13).
No : a. Replace Inlet Nozzle (paragraph 3.4.1) with sealed spare part.
b. If fault is not corrected, replace M88 Detector.

5. M88 DETECTOR TAKES MORE THAN 10 MINUTES TO RESUME SAMPLING AFTER ALARM OR CLEAR-DOWN.

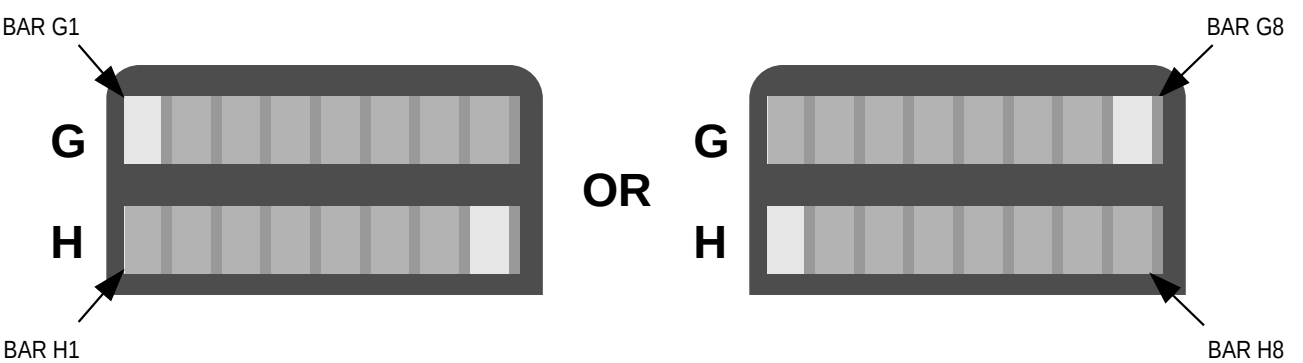


Step 1. Relocate M88 Detector. Did M88 Detector start sampling within 10 minutes?

Yes: Notify your maintenance supervisor about contamination at previous location.
No : Do Step 2.

Step 2. a. Replace Inlet nozzle (paragraph 3.4.1).
b. Perform Initial Power On and Self-Test (paragraph 2.9.3).
c. If fault is not corrected, replace M88 Detector.

6. M88 DETECTOR G AND H BAR DISPLAYS KEEP ALTERNATING BETWEEN SAME TWO LIGHT PATTERNS AND INITIAL SELF-TEST CANNOT BE COMPLETED.



Step 1. Shutdown M88 Detector (paragraph 2.10).

Step 2. Perform Initial Power On and Self-test (paragraph 2.9.3).

Step 3. If fault reappears, replace M88 Detector.

Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

7. M88 DETECTOR WILL NOT RESPOND TO CONFIDENCE SAMPLE TESTING.

   Step 1. Obtain good Confidence Sample.

   Step 2. a. Perform Confidence Sample Testing (paragraph 2.9.4).
   b. Does M88 Detector respond to Confidence Sample Testing?

   Yes: Replace faulty Confidence Sample.
   No : Replace M88 Detector.

8. M88 DETECTOR ELAPSED TIME DISPLAY STAYS BLANK AFTER POWER ON.

   Replace M88 Detector.

9. M88 DETECTOR DOES NOT SOUND DURING INITIAL SELF-TEST OR ALARM MODE.

   Step 1. Ensure M88 Detector selector switch is set to **"1+◀"** position.

   Step 2. Put M88 Detector in alarm mode by performing Initial Power On and Self-test (paragraph 2.9.3) or Confidence Sample Testing (paragraph 2.9.3). Is horn activated by Self-test or alarm?

   Yes: M88 Detector horn is operational.
   No : Replace M88 Detector (paragraph 2.8.2, 2.8.3, or 2.8.5).

10. M42 REMOTE ALARM DOES NOT RESPOND WHEN M88 DETECTOR ALARMS.

   Step 1. Remove batteries and ensure they are positioned correctly (paragraph 3.4.2).

   Step 2. Place selector switch to TEST. Does horn sound and light flash?

   Yes: Do Step 3.
   No : a. Replace batteries (paragraph 3.4.2) and retest.
   b. If retest fails, replace M42 Remote Alarm and forward for maintenance.

   Step 3. Inspect M42 Remote Alarm and M88 Detector binding posts to ensure wires are clean, clamped tight and posts are free of corrosion. Are wires clean and clamped tight, and are posts free of corrosion?

   Yes: Do step 4.
   No : Clean corrosion from wires and posts. If posts will not clamp wires, replace M42 Remote Alarm and forward for maintenance.

NOTE

If wire connection from M42 Remote Alarm to M88 Detector goes to Vehicle Mount Junction Box, skip Step 4.

Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

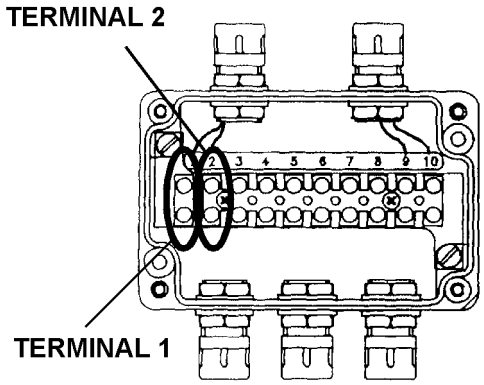
Step 4. Check wire connection between M88 Detector and M42 Remote Alarm. Use multimeter to check continuity. Are wires in good condition with proper continuity?

Yes: Skip Steps 5 through 7.
No : Replace wire.

CAUTION

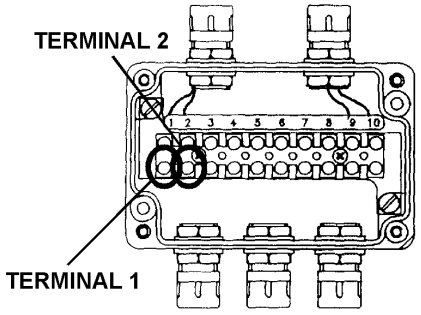
Connecting or disconnecting Power Cable with power on can damage M88 Detector and Power Cable. Ensure external power is off and M88 Detector is off before connecting or disconnecting Power Cable.

Step 5. a. Turn off external DC power source.
b. Remove cover from junction box (paragraph 4.12.2).
c. Check if input and output remote alarm wires are clean and tight at Junction Box terminals 1 and 2.
d. Are terminal connections clean and tight for external remote alarm wires and Junction Box remote alarm wires?

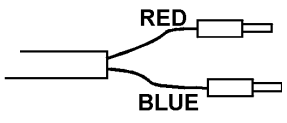


Yes: Do step 6.
No : a. Clean the bare wire ends of the external remote alarm wires and Junction Box remote alarm wires.
b. Install the wires in proper position on Junction Box terminals 1 and 2.

Step 6. a. Using multimeter and illustration, check continuity of Junction Box remote alarm wires.



FROM	TO
TERM 1	RED
TERM 2	BLUE



JUNCTION BOX
REMOTE ALARM
CABLE PLUGS

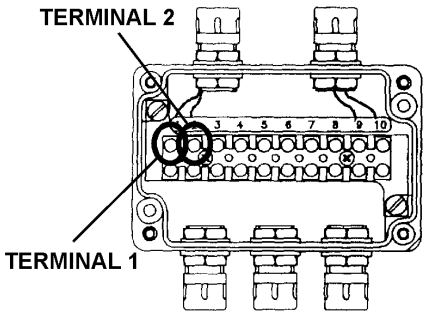
Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

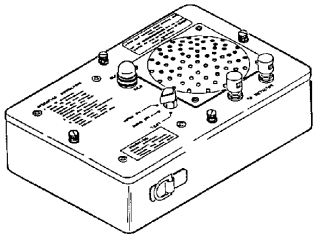
b. Does continuity check good?

Yes: Do Step 7.
No : Replace Junction Box (paragraph 4.12.2).

Step 7. a. Using multimeter and illustration, check continuity of remote alarm wires from Junction Box to M42 Remote Alarm.



FROM	TO
TERM 1	M42 BINDING POST
TERM 2	M42 BINDING POST



b. Does continuity check good?

Yes: Do Step 8.
No : Replace remote alarm wire.

Step 8. Put M88 Detector in alarm mode by performing Initial Power On and Self-test (paragraph 2.9.3) and Confidence Sample Test (paragraph 2.9.4). Does horn sound and lamp flash on M42 Remote Alarm?

Yes: M42 Remote Alarm is operational.
No : Replace M42 Remote Alarm Panel (paragraph 4.14.2).

11. M42 REMOTE ALARM LAMP DOES NOT FLASH, BUT HORN SOUNDS.

Step 1. Rotate selector switch on M42 Remote Alarm to TEST. Does ALARM RED Lamp flash when horn sounds?

Yes: M42 Remote Alarm is operational.
No : a. Replace Lamp (paragraph 4.14.3) and retest.
b. If fault is not corrected, replace M42 Remote Alarm and forward for maintenance.

12. M42 REMOTE ALARM LAMP FLASHES, BUT HORN DOES NOT SOUND.

Step 1. Set M42 Remote Alarm selector switch to TEST. Does horn sound when ALARM RED lamp flashes?

Yes: M42 Remote Alarm is operational.
No : Replace M42 Remote Alarm and forward for maintenance.

Table 4-2. Unit Level Troubleshooting (Continued)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

13. M88 DETECTOR DISPLAYS TWO OR MORE BARS FOR 10 MINUTES PRIOR TO SHUTDOWN.

Step 1. Relocate M88 Detector. Does M88 Detector clear to one bar or less?

Yes: Notify supervisor to check for contamination in previous location.
No : Proceed to Step 2.

Step 2. Replace the inlet nozzle assembly (paragraph 3.4.1). Does M88 clear to one bar or less?

Yes: M88 Detector is operational, continue with shutdown (paragraph 2.10).
No : Replace M88 Detector and forward for maintenance.

14. M88 DETECTOR WAIT LIGHT STILL LIT AFTER 30 MINUTES.

Replace M88 Detector and forward for maintenance.

SECTION IV. UNIT MAINTENANCE PROCEDURES

Page

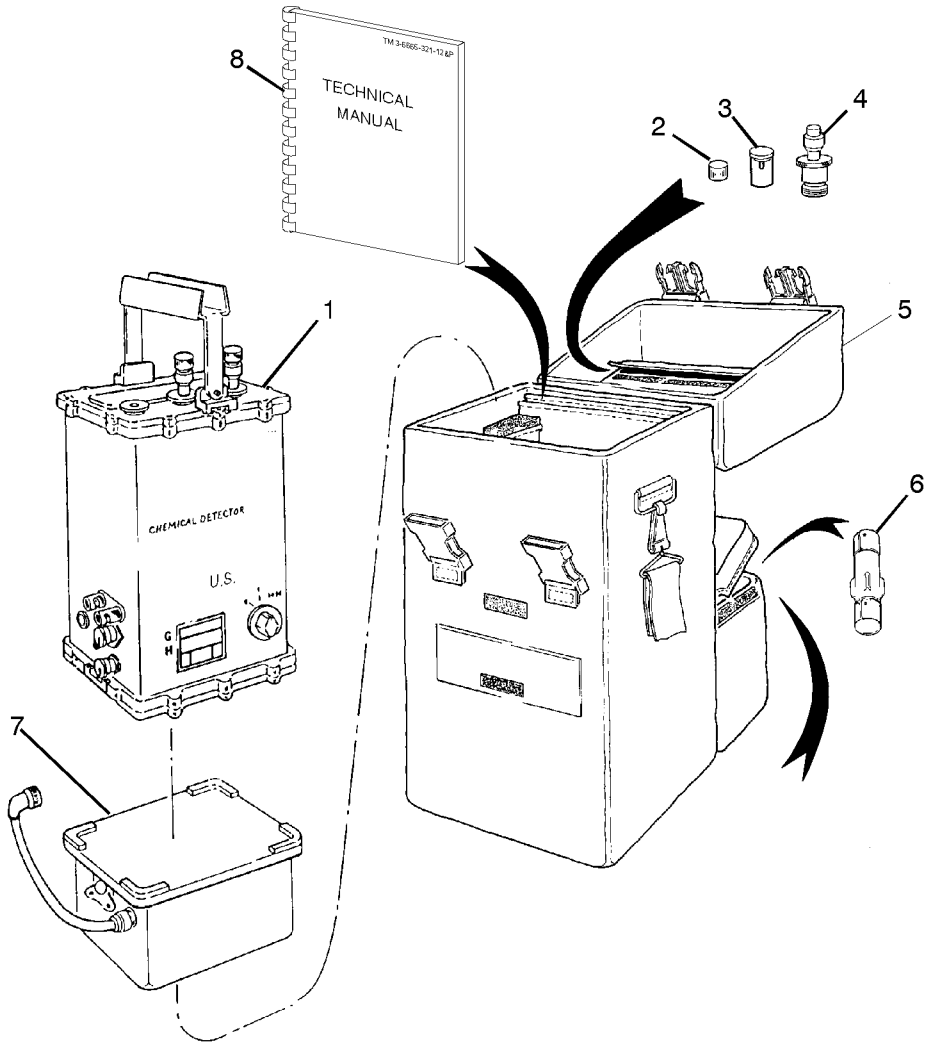
4.7 **M22 AUTOMATIC ALARM**.

4.7.1 **Transit Case**.

This task covers: Replacement

If Transit Case needs replacing, remove all items from old Transit Case (5) and transfer items to replacement Transit Case.

M88 Detector (1)
Battery Box (7)
Confidence Sample (6)
Rain Caps (2 each) (3)
Spare Inlet (4)
Spare Protective Cap (12 each, six packages with two caps in each package) (2)
TM 3-6665-321-12&P (8)



4.8 **M88 DETECTOR**.

4.8.1 **Switch Knob**.

This task covers: Removal, Installation

INITIAL SETUP

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**.

(1) Place selector switch to “0” position.

(2) Remove plastic cap (5) from center of pointer knob (3).

(3) Remove slotted screw (4) from pointer knob (3).

(4) Remove pointer knob (3) and metal collet (2) from switch shaft (1).

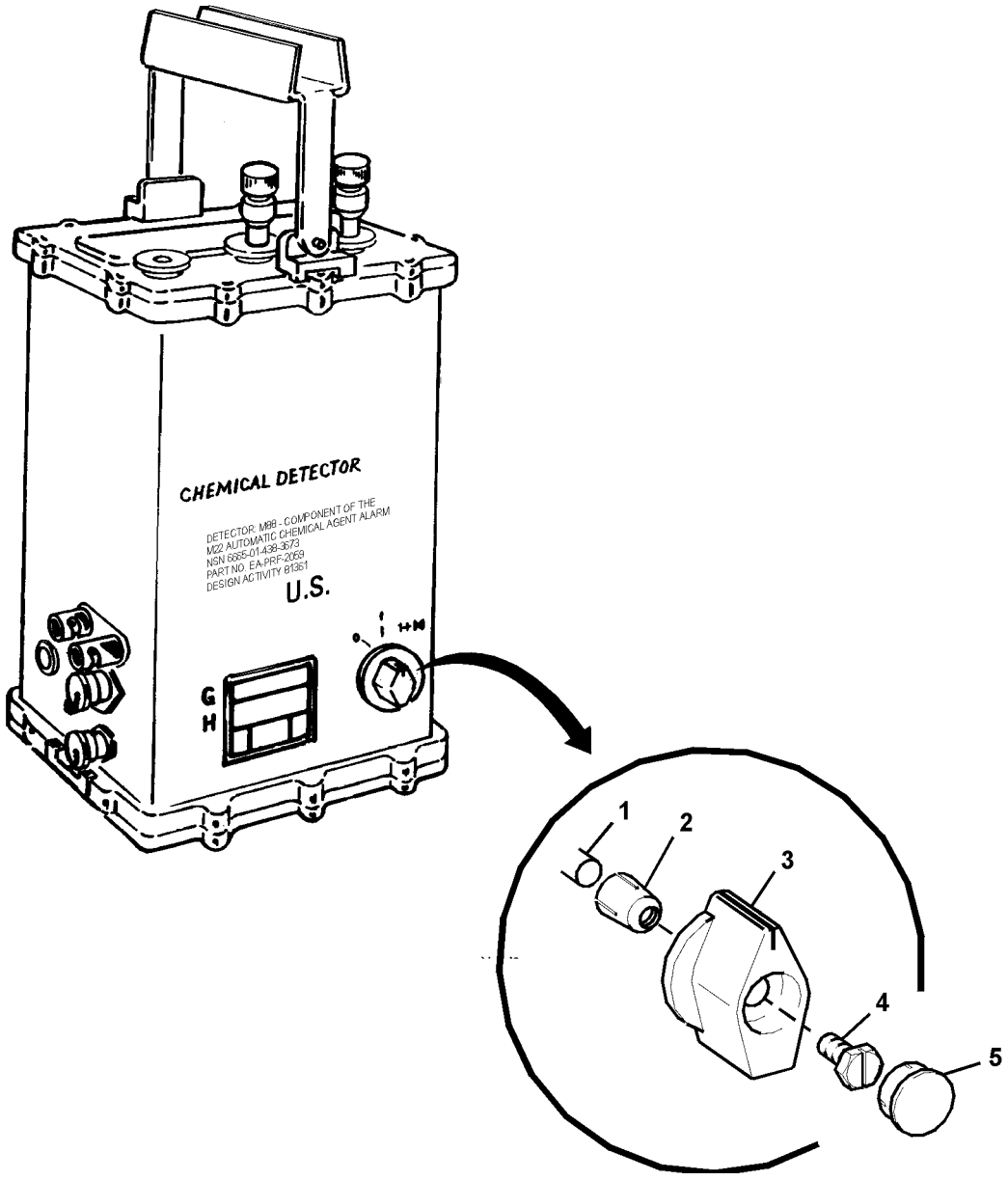
b. **Installation**.

(1) Install metal collet (2) and pointer knob (3) on switch shaft (1).

(2) Align knob pointer to the “0” position.

(3) Install and tighten slotted screw (4) in pointer knob.

(4) Press plastic cap (5) into center of pointer knob.


CHEMICAL DETECTOR
DETECTOR, M98 - COMPONENT OF THE
M22 AUTOMATIC CHEMICAL AGENT ALARM
NSN 6665-01-438-3673
PART NO. EA-PRF-2059
DESIGN ACTIVITY 81361
U.S.
G
H
1
2
3
4
5

4.8.2 **Electrical Cap**.

This task covers: Removal, Installation

NOTE

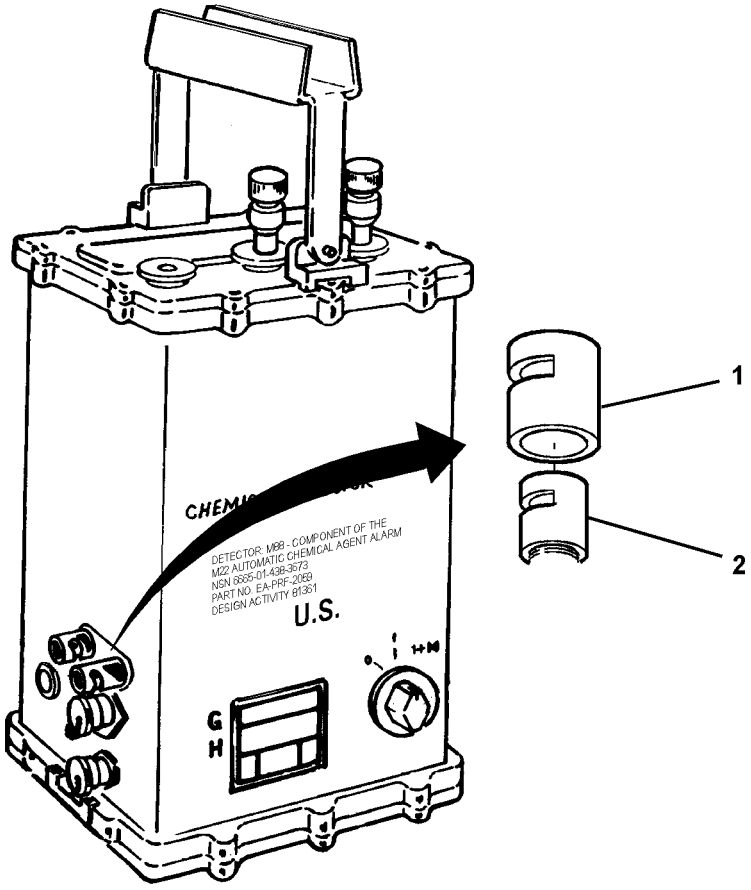
This procedure is applicable to both binding post electrical caps.

a. **Removal**

(1) Slide electrical cap (1) off end of binding post (2) and discard.

b. **Installation**

(1) Slide electrical cap (1) over end of binding post (2), aligning electrical cap slot with binding post slot.



4.8.3 **Handle**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M88 Detector removed from Vehicle Mount (paragraphs 2.11.7 through 2.11.25)

Parts/Material: Bearing Gel (Appendix F, Item 6)
Tools: Electronic Equipment Tool Kit TK-101/G
Metric Socket Head Screw Key Set NSN-5120-01-046-5079

a. **Removal**.

(1) Remove M88 Detector from Vehicle Mount (paragraph 2.11.7 through 2.11.25).

(2) Remove two shoulder screws (3) and two crinkle washers (2) attaching Handle (1) to Handle mounting blocks (4).

(3) Discard screws, washers and Handle.

(4) Remove and retain two socket head cap screws (5) attaching two Handle mounting blocks (4) to M88 Detector (6).

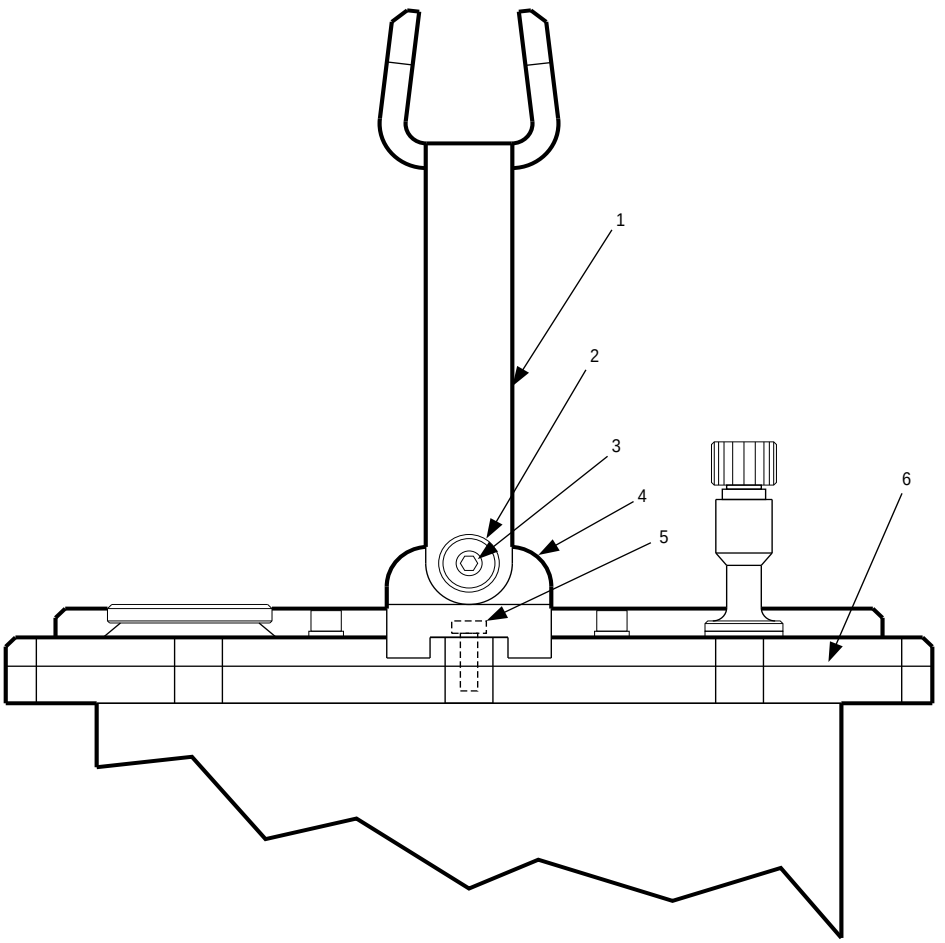
(5) Discard Handle mounting blocks.

b. **Installation**.

(1) Apply bearing gel (Appendix F, Item 6) to threads of two socket head cap screws (5), parallel surfaces of two new shoulder screws (3), and mating surfaces of two new Handle mounting blocks (4) and Handle (1).

(2) Install two Handle mounting blocks (4) onto M88 Detector (6) using two socket head cap screws (5).

(3) Attach Handle (1) to two handle mounting blocks (4) using two shoulder screws (3) and two new crinkle washers.


1
2
3
4
5
6

4.8.4 **Connector Cap**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M88 Detector disconnected from M28 Power Supply (paragraphs 2.11.2 and 2.11.3).
M88 Detector removed from Vehicle Mount (paragraphs 2.11.7 through 2.11.25).
Battery Box removed (paragraphs 2.11.26 and 2.11.27).

Tools: Metric Socket Head Screw Key Set NSN-5120-01-046-5079

a. **Removal**.

(1) Detach connector cap restraining chains (2) from case assembly striking plate (5) by removing screw (1).

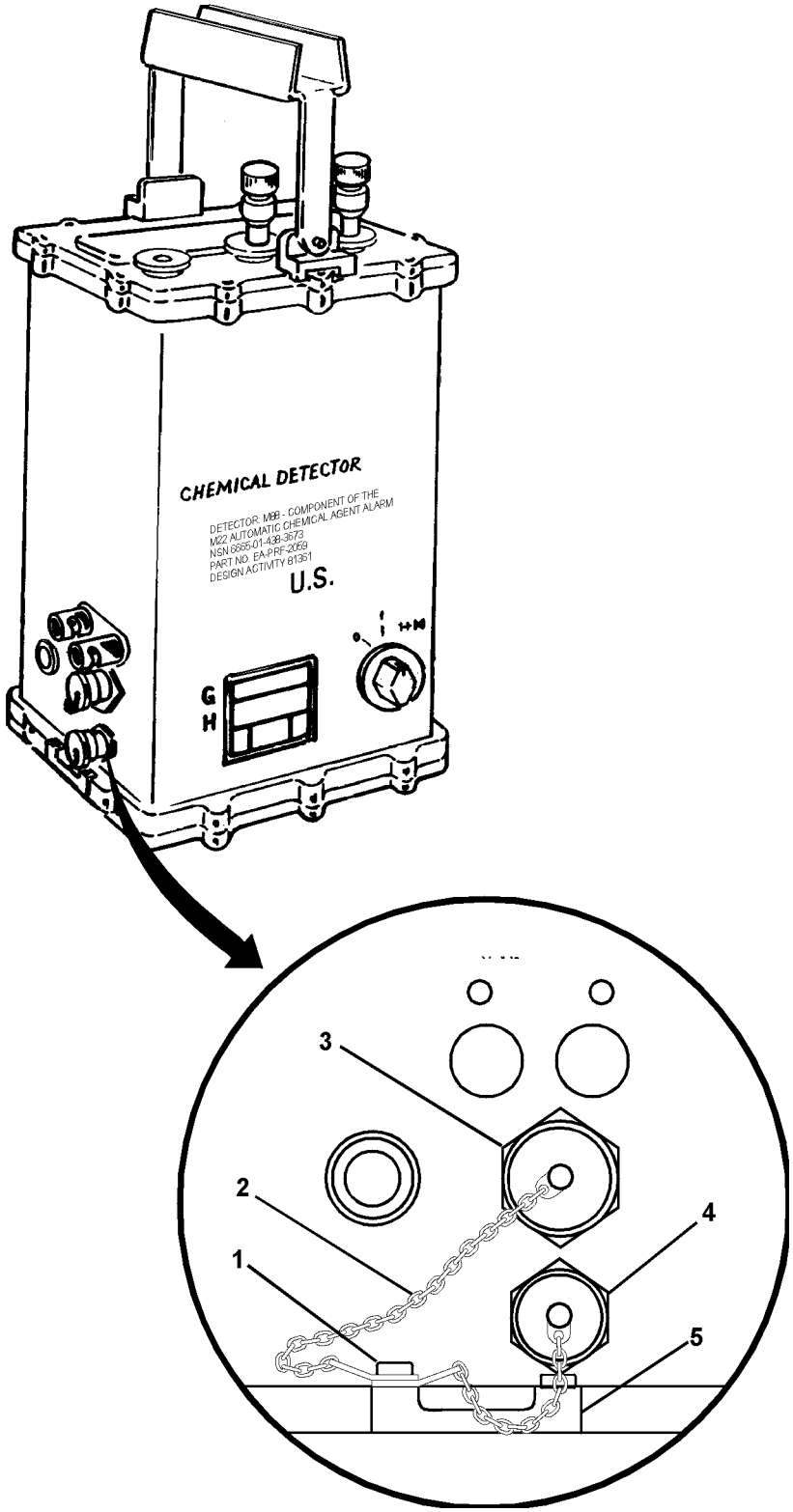
(2) Disconnect defective connector cap (3) or (4) from its respective connector by turning counterclockwise.

(3) Discard defective connector cap and associated restraining chain.

b. **Installation**.

(1) Install new connector cap (3) or (4) on its respective connector and tighten by turning clockwise.

(2) Attach new connector cap restraining chains (2) to case assembly striking plate (5) with screw (1). Tighten screw.


CHEMICAL DETECTOR
DETECTOR, M68 - COMPONENT OF THE
M22 AUTOMATIC CHEMICAL AGENT ALARM
NSN 6665-01-439-3673
PART NO. EA-PRF-2059
DESIGN ACTIVITY 81361
U.S.
G
H
1+M
3
2
4
1
5

4.9 **BATTERY BOX**.

4.9.1 **Rim Latch**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: Battery Box removed (paragraphs 2.11.26 and 2.11.27)
Battery removed (paragraphs 2.11.28 and 2.11.29)

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**.

(1) Remove Battery Box cover (6) from Battery Box (4).

(2) Remove and discard two pan head screws (1), two nuts (5) and six nylon washers (2) attaching rim latch (3) to battery box (4).

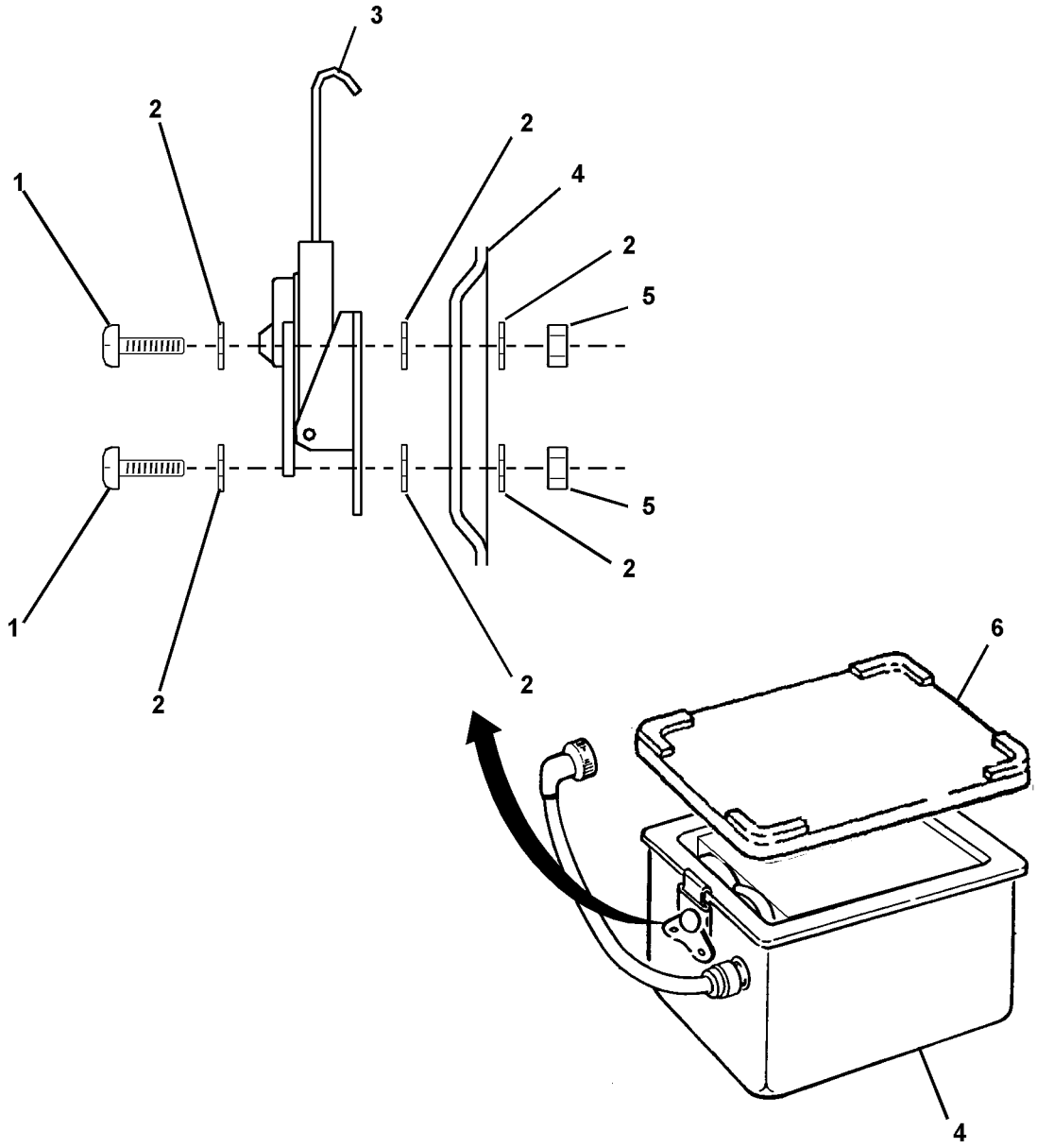
b. **Installation**.

NOTE

Rim latch and attaching hardware are contained in Battery Box Rim Latch Replacement Kit.

(1) Attach rim latch (3) to Battery Box (4) by installing two pan head screws (1), six nylon washers (2) and two nuts (5).

(2) Install Battery Box cover (6) onto Battery Box (4).


3
2
2
4
2
5
1
5
2
1
2
2
6
4

4.10 **TRANSIT CASE**.

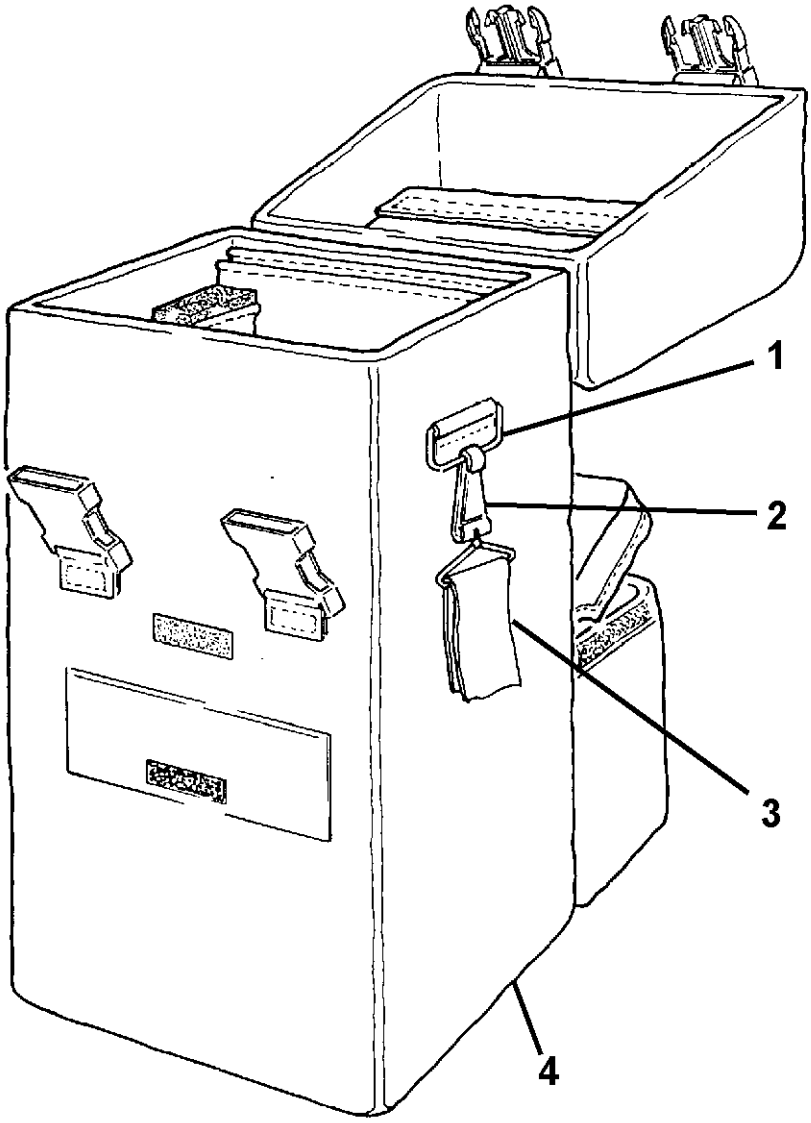
4.10.1 **Strap**.

a. **Removal**.

(1) Remove strap (3) from Transit Case (4) by releasing snap-hooks (2) from Transit Case strap rings (1).

b. **Installation**.

(1) Attach replacement strap (3) to Transit Case (4) by connecting strap snap-hooks (2) to Transit Case strap rings (1).



4.11 **M28 Power Supply**.

4.11.1 **M28 Power Supply**.

This task covers: Removal, Installation

a. **Removal**.

WARNING

Do not connect or disconnect the M22 Alarm and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion and death or injury to personnel.

Ensure main power is disconnected from power source before any connection/disconnection is made.

The M28 Power Supply cover can reach a temperature of 140 degrees F (60 degrees C) during operation. Do not touch cover during operation. Shutdown M28 power supply and allow to cool prior to handling.

(1) Disconnect AC Power Cable (4) from power source (110V/220V).

(2) Disconnect other end of AC Power Cable from M28 Power Connector (AC MAINS INPUT) (1) on M28 Power Supply.

(3) Disconnect DC Power Cable (3) from 24V DC OUTPUT connector (2) on M28 power supply.

(4) Disconnect other end of DC Power Cable from M88 Detector POWER connector.

(5) The M28 Power Supply can now be removed from M22 Alarm system.

b. **Installation**.

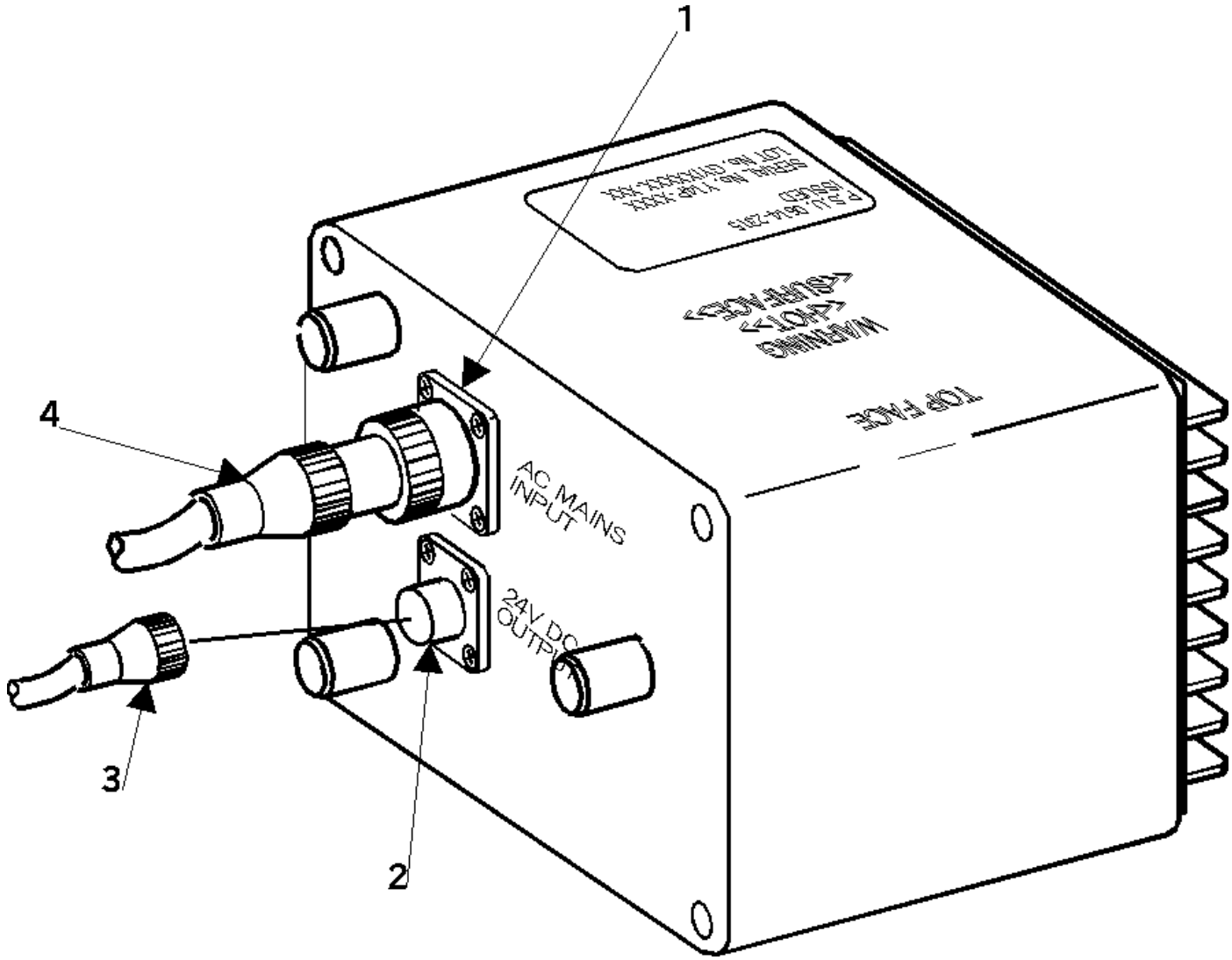
(1) Connect DC Power Cable (3) to M88 Detector POWER connector.

(2) Connect other end of DC Power Cable (3) to M28 Power Supply 24V DC OUTPUT connector (2).

(3) Connect AC Power Cable (4) to M28 Power Connector (AC MAINS INPUT) (1) on power supply.

(4) Connect other end of AC Power Cable to a suitable power source (110V/220V) only when ready to operate.

(5) The M28 Power Supply is now connected to M22 Alarm system.


1
4
3
2
AC MAINS INPUT
24V DC OUTPUT
TOP FACE

4.11.2 **DC Power Cable**.

This task covers: Removal, Installation

a. **Removal**.

WARNING

Do not connect or disconnect the M88 Detector and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion and death or injury to personnel.

Ensure main power is disconnected from power source before any connection/disconnection is made.

The M28 Power Supply cover can reach a temperature of 140 degrees F (60 degrees C) during operation. Do not touch cover during operation. Shutdown M28 power supply and allow to cool prior to handling.

(1) Disconnect AC Power Cable (3) from power source (110V/220V).

(2) Disconnect DC Power Cable (2) from 24V DC OUTPUT connector (1).

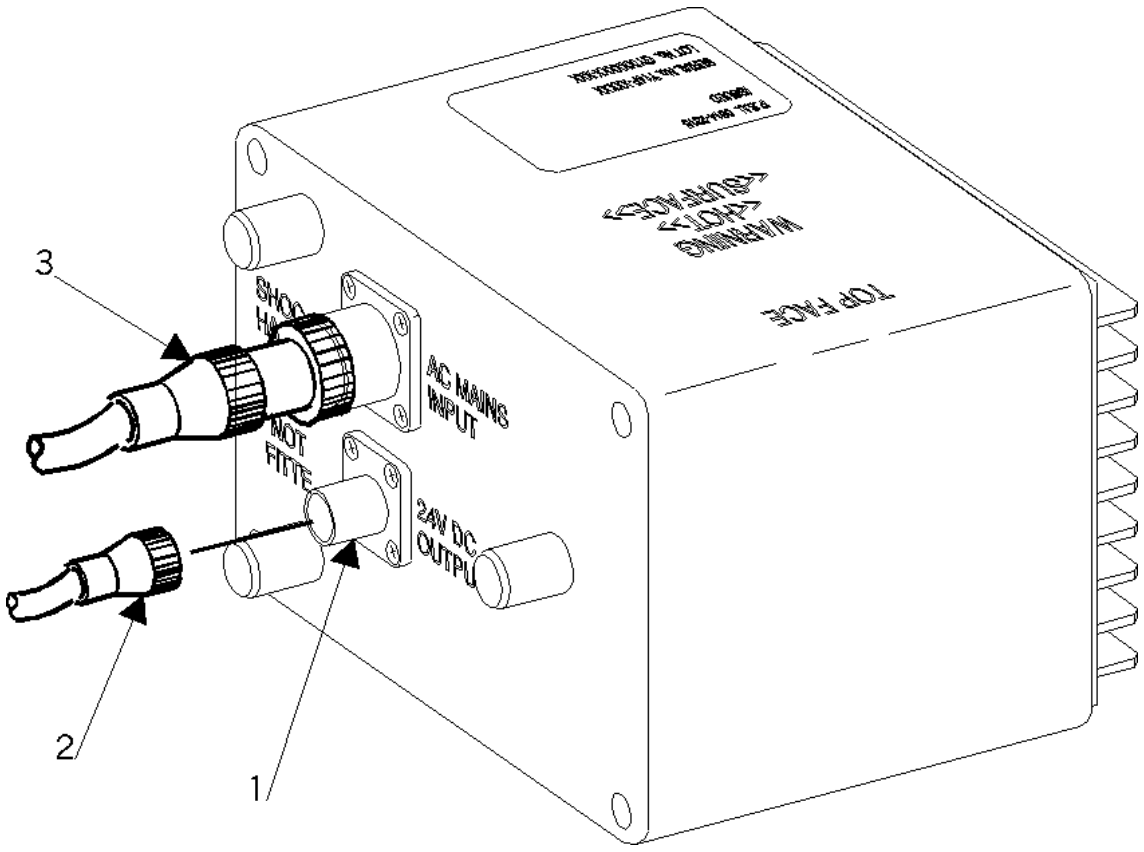
(3) Disconnect other end of DC Power Cable (2) from M88 Detector POWER connector.

b. **Installation**.

(1) Connect DC Power Cable (2) to M88 Detector POWER connector.

(2) Connect other end of DC Power Cable (2) to 24V DC OUTPUT connector (1).

(3) Connect AC Power Cable (3) to power source (110V/220V) only when ready to operate.


3
2
1
AC MAINS INPUT
NOT FITTE
24V DC OUTPU
TOP FACE

4.11.3 **AC Power Cable (110V/220V)**.

This task covers: Removal, Installation

a. **Removal**

WARNING

Do not connect or disconnect the M88 Detector and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion and death or injury to personnel.

Ensure main power is disconnected from power source before any connection/disconnection is made.

The M28 Power Supply cover can reach a temperature of 140 degrees F (60 degrees C) during operation. Do not touch cover during operation. Shutdown M28 power supply and allow to cool prior to handling.

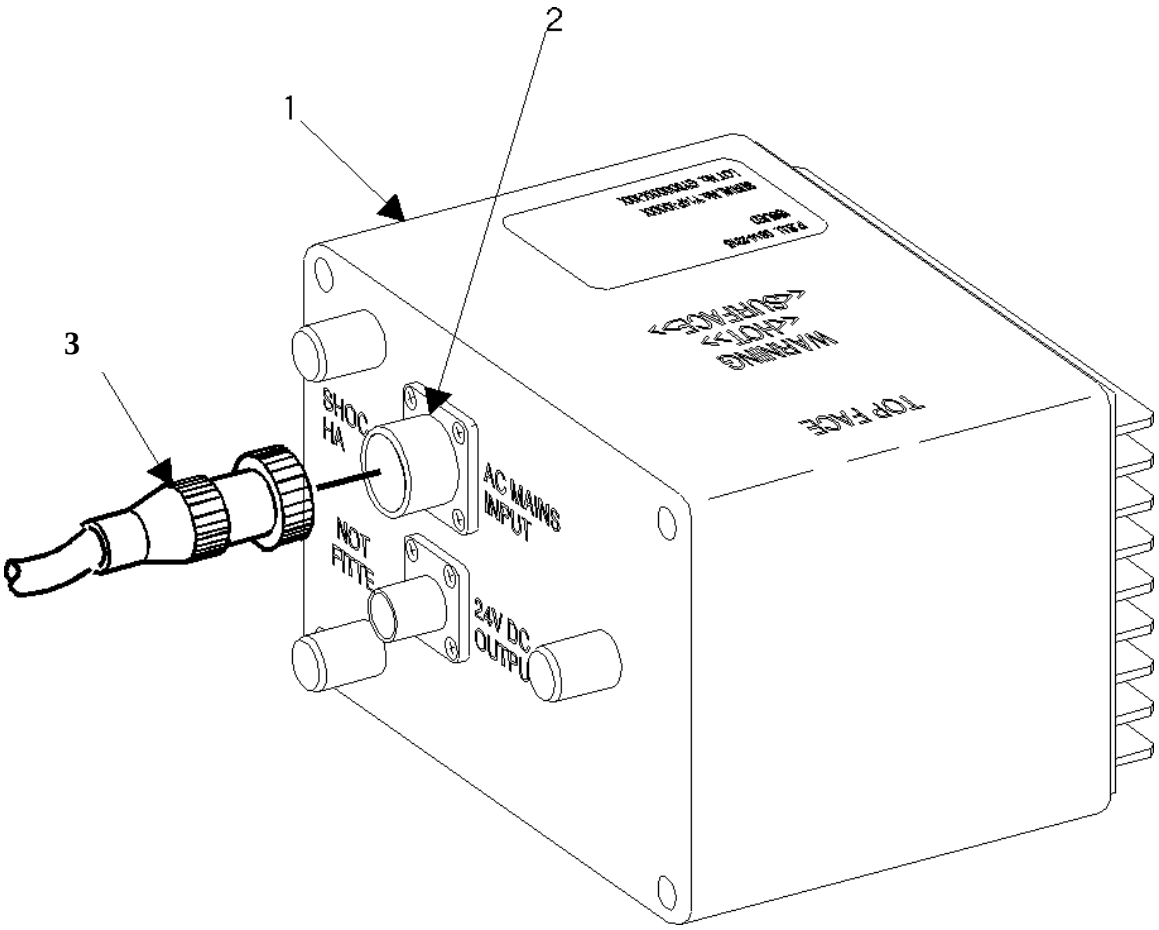
(1) Disconnect AC Power Cable (3) from power source (110V/220V).

(2) Disconnect other end of AC Power Cable from M28 Power Supply (1), M28 Power connector (AC MAINS INPUT) (2).

b. **Installation**.

(1) Connect AC Power Cable (3) to M28 Power Supply (1), M28 Power connector (AC MAINS INPUT) (2).

(2) Connect other end of AC Power Cable (3) to power source (110V/220V) only when ready to operate.


1
2
3
SHOC
HA
AC MAINS
INPUT
NOT
FITTE
24V DC
OUTPU
TOP FACE

4.12 **VEHICLE MOUNT**.

4.12.1 **Vehicle Mount**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M88 Detector removed from Vehicle Mount (paragraphs 2.11.7 through 2.11.25).

Tools: Electronic Equipment Tool Kit TK-101/G
Digital Multimeter AN/PSM-45A

WARNING

Do not connect or disconnect M88 Detector and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion and death or injury to personnel.

Connecting or disconnecting Power Cable with power on can injure personnel. Ensure external power is off before connecting or disconnecting Power Cable.

a. **Removal**.

(1) Turn off external DC power source to Vehicle Mount.

(2) Remove lid on Junction Box (4) by loosening the four captive screws (5).

(3) Loosen two Junction Box cable glands (1) by turning counterclockwise.

(4) Tag and disconnect all external DC Power Cable input wires and remote alarm input wires (2) from terminal block (3). Pull disconnected wires out through cable glands.

(5) Install plastic plugs into cable glands.

(6) Install and fasten lid to Junction Box (4) by tightening four captive screws (5).

(7) Unbolt and remove Vehicle Mount (6) from vehicle.

b. **Installation**.

(1) Install bolt on Vehicle Mount (6) to vehicle.

(2) Remove lid from Junction Box (4) by loosening four captive screws (5).

(3) Remove plastic plugs from two upper cable glands (1).

(4) Feed tagged external DC Power Cable input wires and remote alarm input wires (2) through proper cable glands (1) on top of Junction Box (4).

(5) Connect external DC power input wires and remote alarm input wires (3) to terminal block (3) as shown in illustration.

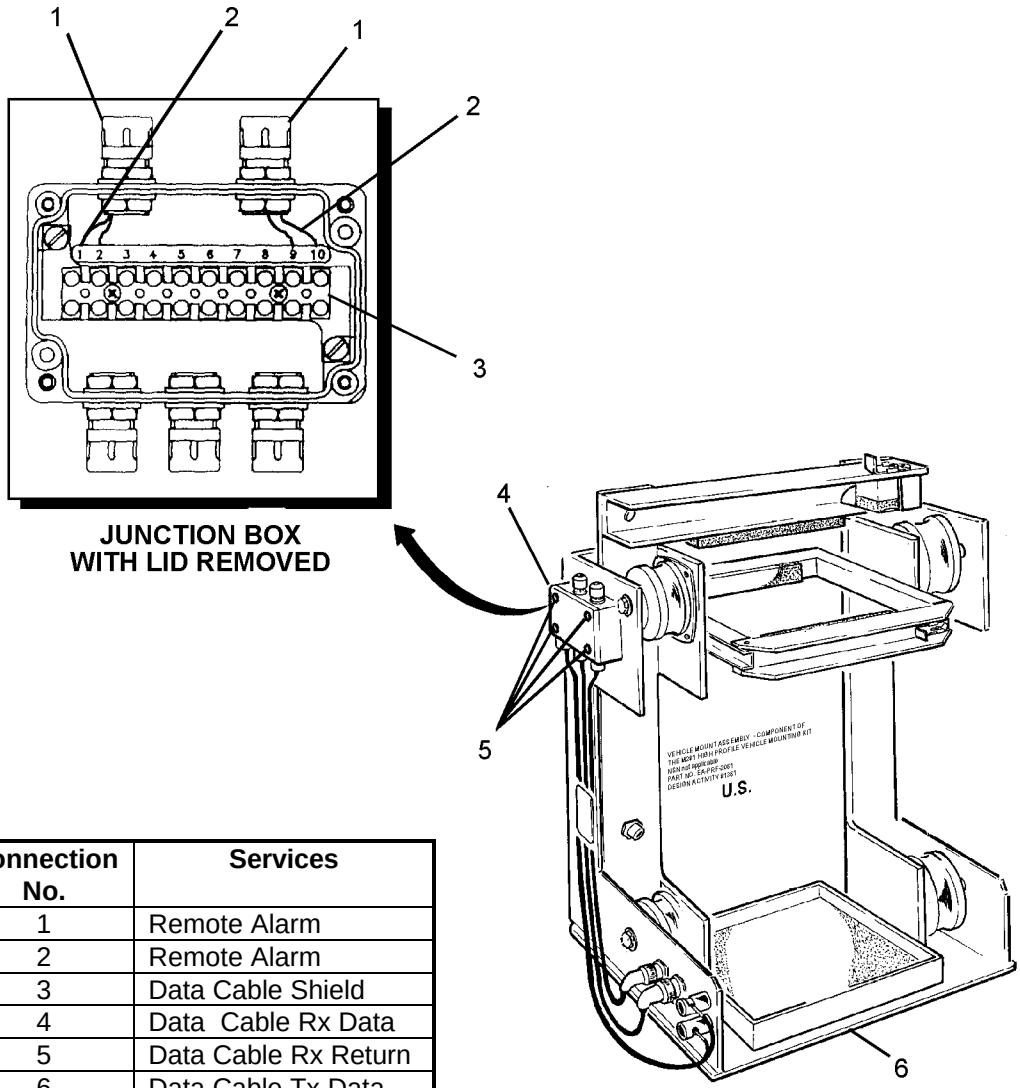
(6) Tighten two upper cable glands finger tight by turning clockwise.

(7) Using multimeter and following illustration, check continuity of remote alarm wires from Junction Box to M42 Remote Alarm. If continuity check fails, refer to troubleshooting (paragraph 4.6, Malfunction 10).

(8) (a) Turn on external DC power source to Junction Box.

(b) Using multimeter and following illustration, check for +23.0 to +33.0 VDC on terminal 9 of Junction Box. If voltage is incorrect, refer to troubleshooting (paragraph 4.6, Malfunction 1).

(9) Install Junction Box lid (4) on Junction Box (6) and tighten four captive screws (5).



Connection No.	Services
1	Remote Alarm
2	Remote Alarm
3	Data Cable Shield
4	Data Cable Rx Data
5	Data Cable Rx Return
6	Data Cable Tx Data
7	Data Cable Tx Return
8	Power Cable Shield
9	Power Cable +24VDC
10	Power Cable 0 VDC

4.12.2 **Junction Box**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: Vehicle Mount removed (paragraph 4.12.1).

Tools: Electronic Equipment Tool Kit TK-101/G
Digital Multimeter AN/PSM-45A

Materials/Parts: Sealing Compound (Appendix F, Item 17)
Wire Brush (Appendix F, Item 18)

WARNING

Do not connect or disconnect M88 Detector and associated equipment in an explosive atmosphere. An arc of electricity between connectors could cause an explosion and death or injury to personnel.

Connecting or disconnecting Power Cable with power on can injure personnel. Ensure external power is off before connecting or disconnecting Power Cable.

a. **Removal**.

(1) Remove and discard lid (1) from Junction Box (2) by loosening four captive screws (3).

(2) Disconnect Power Cable (9) from dummy power connector (10) on Vehicle Mount (4).

(3) Disconnect communications cable (8) from dummy comms connector (7) on Vehicle Mount (4).

(4) Disconnect remote alarm wires (6) from dummy binding posts (5) on Vehicle Mount (4).

(5) Remove and retain two pan head screws (11) attaching Junction Box (2) to Vehicle Mount (4).

(6) Discard Junction Box.

b. **Installation**.

(1) Using wire brush, clean sealing compound residue from two pan head screws (11) threads and apply sealing compound sparingly to screw threads.

(2) Remove lid (1) from replacement Junction Box (2) by loosening four captive screws (3).

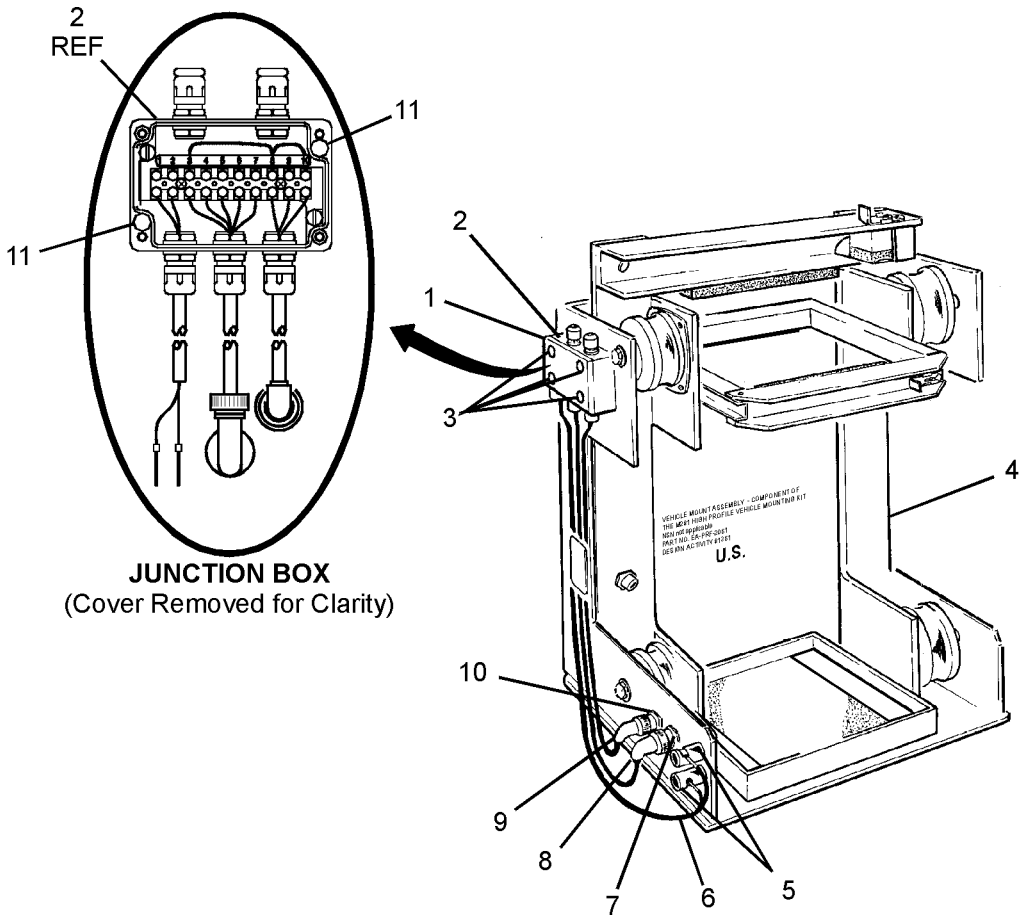
(3) Position Junction Box on Vehicle Mount (4), aligning two Junction Box mounting holes with two mating mount holes.

(4) Install two pan head screws (11) through Junction Box into Vehicle Mount and tighten screws.

(5) Connect communications cable (8) to dummy comms connector (7) on Vehicle Mount (4).

(6) Connect Power Cable (9) to dummy power connector (10) on Vehicle Mount (4).

(7) Connect remote alarm wires (6) to dummy binding posts (5) on Vehicle Mount (4).


2
REF
11
11
JUNCTION BOX
(Cover Removed for Clarity)
2
1
3
4
10
9
8
7
6
5
U.S.

4.12.3 **Top Clamp Bar**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: Vehicle Mount removed (paragraph 4.12.1).

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**.

(1) Remove two screws attaching slide latch (2) to top clamp bar (1). Retain slide latch and attaching hardware.

(2) Remove pad block (4) from top clamp bar (1) by removing two screws (3). Retain pad block and screws.

(3) Using fingers, pull top part of safety fastener (7) toward end of pivot pin (6) while pushing downward to slide safety fastener out of pivot pin groove. Discard safety fastener (7), pivot pin (6), and top clamp bar (1).

b. **Installation**.

(1) Install new pad (8) on new top clamp bar (1).

(2) Place pad block (4) on top clamp bar (1), install two mounting screws (3) and tighten.

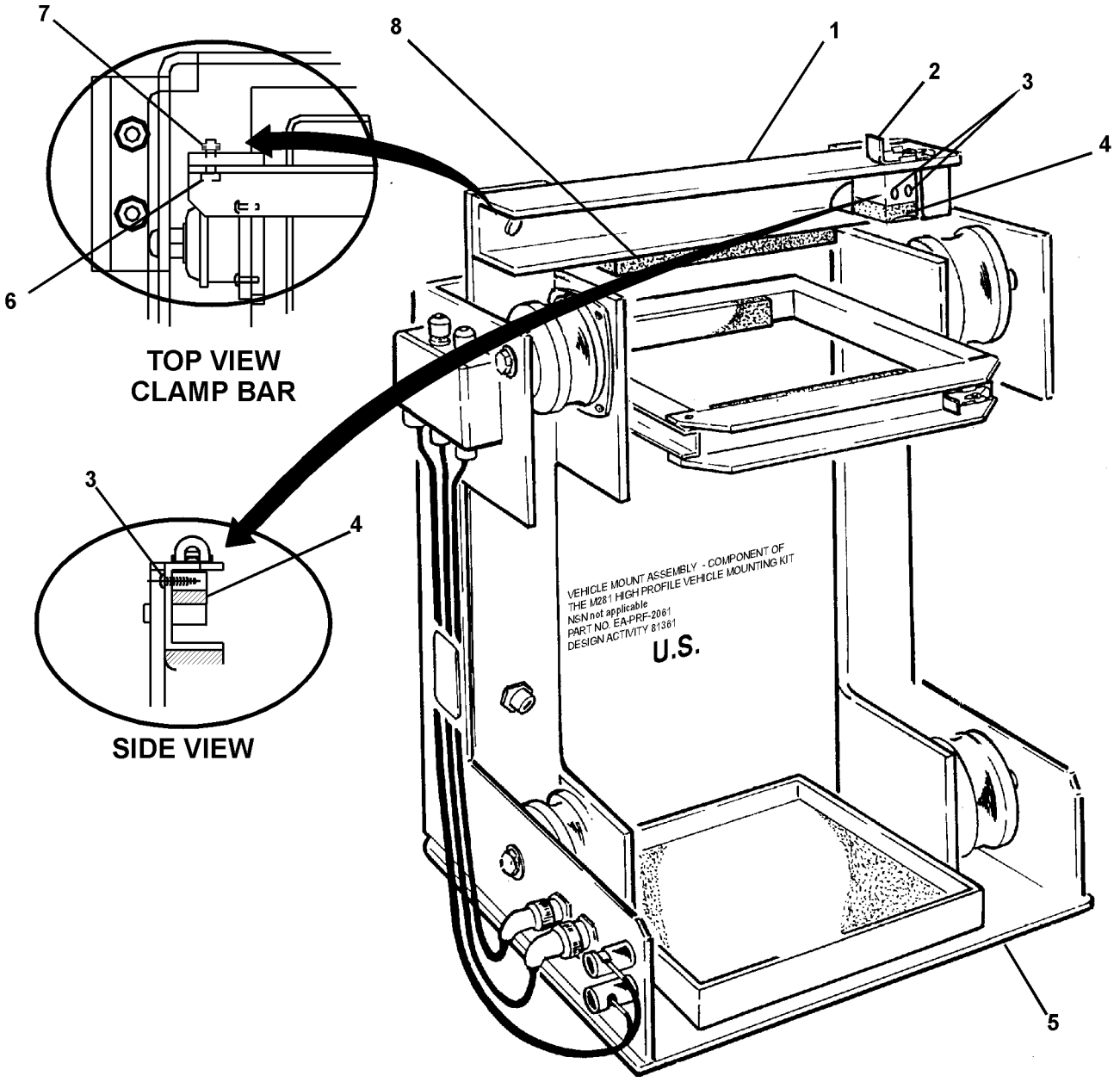
(3) Install slide latch (2) on top clamp bar (1).

(4) Insert new pivot pin (6) into top clamp bar (1), ensuring shoulder of pivot pin is flush against clamp bar.

(5) Install top clamp bar (1) on Vehicle Mount (5) by inserting pivot pin through clamp bar mounting hole.

(6) Using fingers, push new safety fastener (7) onto pivot pin (6) until it snaps into pivot pin groove.

(7) Close top clamp bar and fasten slide latch (2).


7
8
1
2
3
4
6
TOP VIEW
CLAMP BAR
3
4
SIDE VIEW
VEHICLE MOUNT ASSEMBLY - COMPONENT OF
THE M281 HIGH PROFILE VEHICLE MOUNTING KIT
NSN not applicable
PART NO. EA-PRF-2061
DESIGN ACTIVITY 81361
U.S.
5

4.12.4 **Front Clamp Bar**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: Vehicle Mount removed (paragraph 4.12.1).

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**.

(1) Remove two screws attaching slide latch (2) to front clamp bar (3). Retain slide latch and attaching hardware.

(2) Using fingers, pull top part of safety fastener (5) toward end of pivot pin (6) while pushing downward to slide safety fastener out of pivot pin groove. Discard safety fastener (5), pivot pin (6), front clamp bar (3), and pad (1).

b. **Installation**.

(1) Install new pad (1) on new front clamp bar (3).

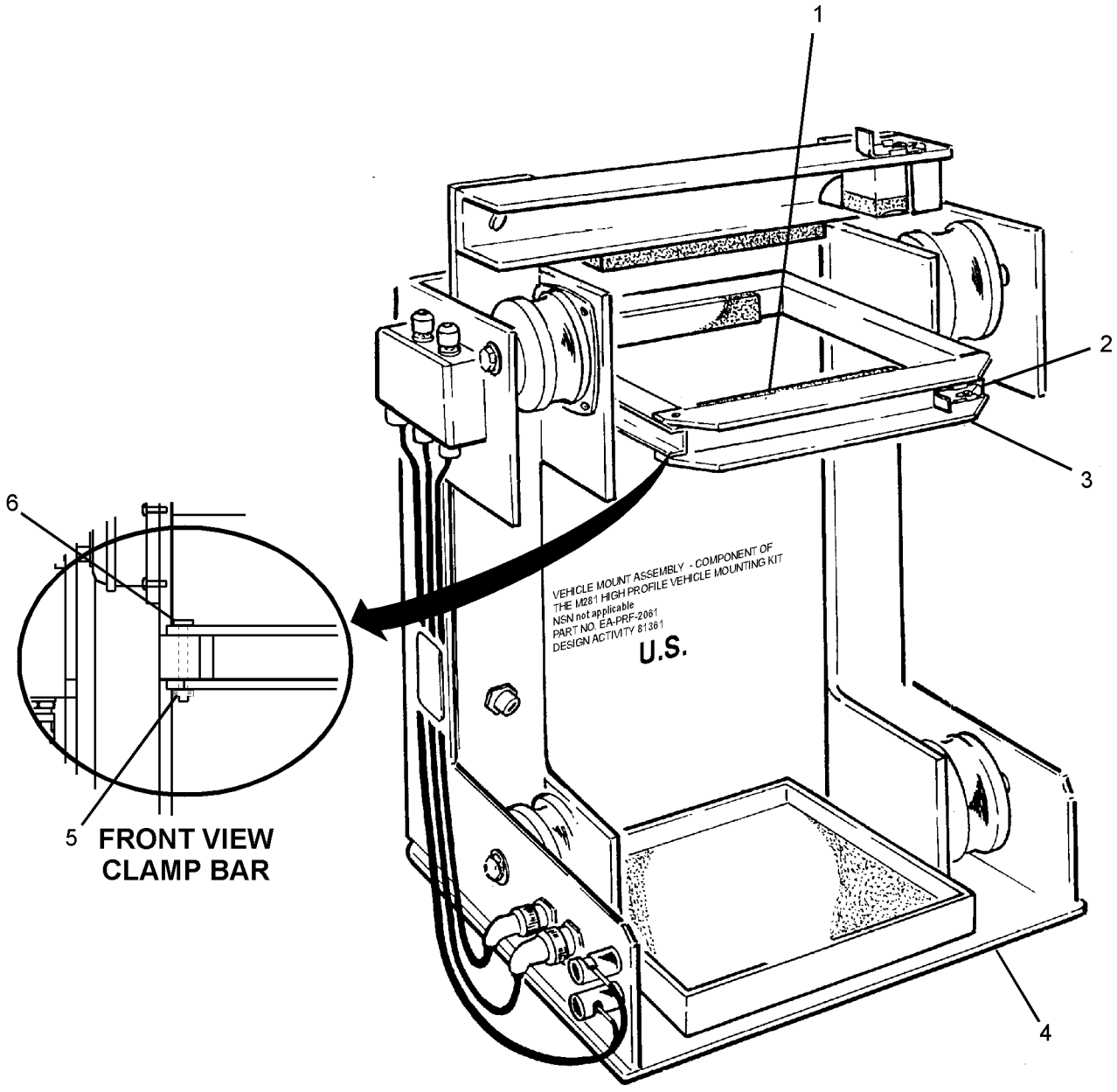
(2) Install slide latch (2) on front clamp bar (3) (paragraph 4.12.6.b).

(3) Insert pivot pin (6) into front clamp bar (3), ensuring shoulder of pivot pin is flush against clamp bar.

(4) Install front clamp bar (3) on Vehicle Mount (4) by inserting pivot pin (6) through clamp bar mounting hole.

(5) Using fingers, push new safety fastener (5) onto pivot pin (6) until it snaps into pivot pin groove.

(6) Close front clamp bar and fasten slide latch (2).


1
2
3
4
5
6
FRONT VIEW
CLAMP BAR
VEHICLE MOUNT ASSEMBLY - COMPONENT OF
THE M281 HIGH PROFILE VEHICLE MOUNTING KIT
NSN not applicable
PART NO. EA-PRF-2061
DESIGN ACTIVITY 81361
U.S.

4.12.5 **Pad**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M88 Detector removed (paragraphs 2.11.7 through 2.11.25)
Vehicle Mount removed (paragraph 4.12.1).

Materials/Parts: Technical Acetone (Appendix F, Item 1)
Cleaning Cloth (Appendix F, Item 8)

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**.

WARNING

Acetone is extremely flammable and toxic. To prevent injury or death use acetone in a well ventilated area. Wear appropriate protective covering and avoid prolonged breathing of fumes or contact with skin.

NOTE

This procedure applies to all five Vehicle Mount Pads. Pads are adhesive backed, and to remove must be pried from Vehicle Mount.

Remove and replace only defective pads.

(1) Using a pocket knife, and if defective remove and discard the following pads:

(a) Pad (4) from pad block (3).

(b) Top Clamp bar Pad (5) from top clamp bar (8).

(c) Front Clamp bar Pad (1) from front clamp bar (2).

(d) Two bottom Pads (6) from bottom plate (7).

(2) Remove adhesive residue thoroughly from all Vehicle Mount surfaces using acetone and cleaning cloth.

b. **Installation**.

NOTE

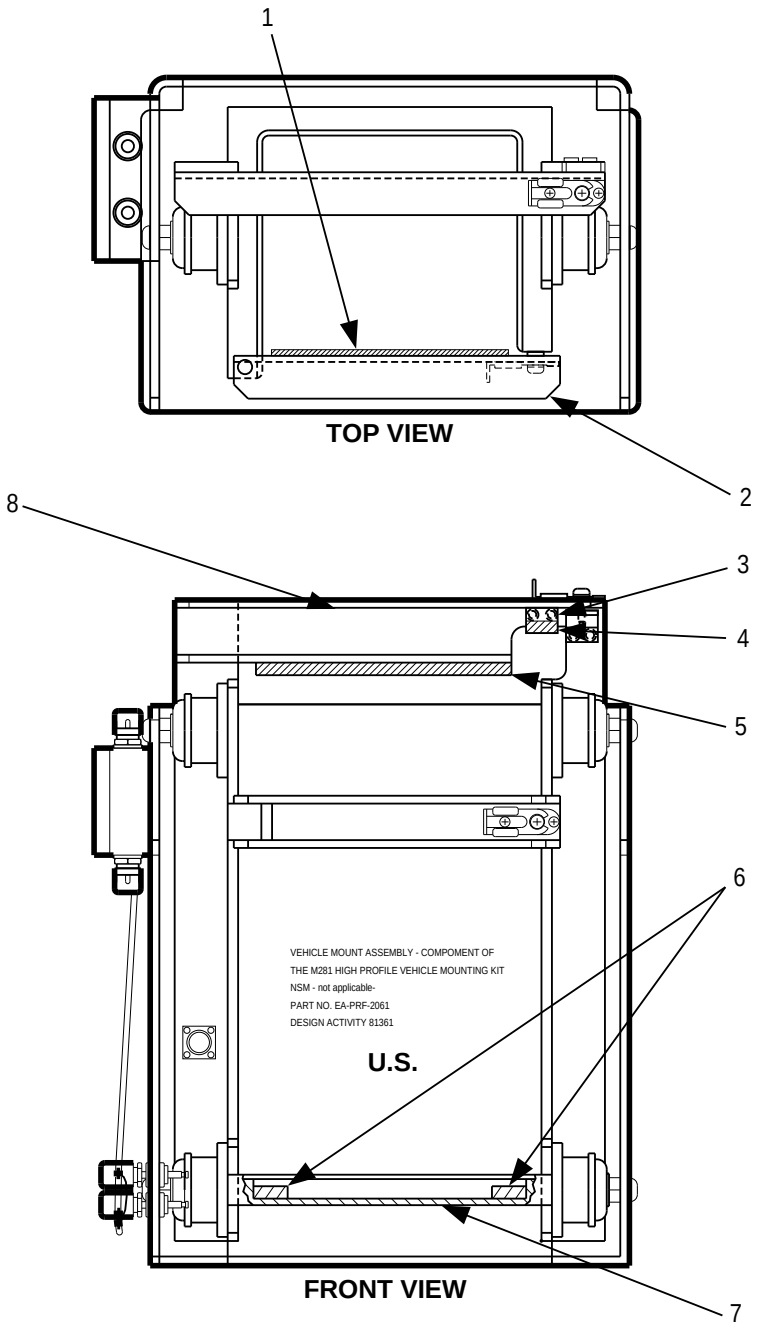
Make sure that surfaces are thoroughly dry before applying adhesive backed pads.

(1) Remove tape from following adhesive backed pads and install by pressing pads firmly down onto respective mating surfaces:

(a) Pad (4) to pad block (3).

(b) Top Clamp bar pad (5) to top clamp bar (8).

(d) Two bottom pads (6) to bottom plate (7).



4.12.6 **Slide Latch**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M88 Detector removed from Vehicle Mount (paragraphs 2.11.7 through 2.11.25)
Vehicle Mount removed (paragraph 4.12.1)

Tools: Electronic Equipment Tool Kit TK-101/G

NOTE

This procedure applies to both the top and front clamp bar slide latches.

Remove and replace only the defective slide latch.

a. **Removal**.

(1) Unfasten clamp bar (6) or (7) with defective slide latch (5).

(2) Remove two screws (2) attaching slide latch (5) to clamp bar. Discard slide latch and screws.

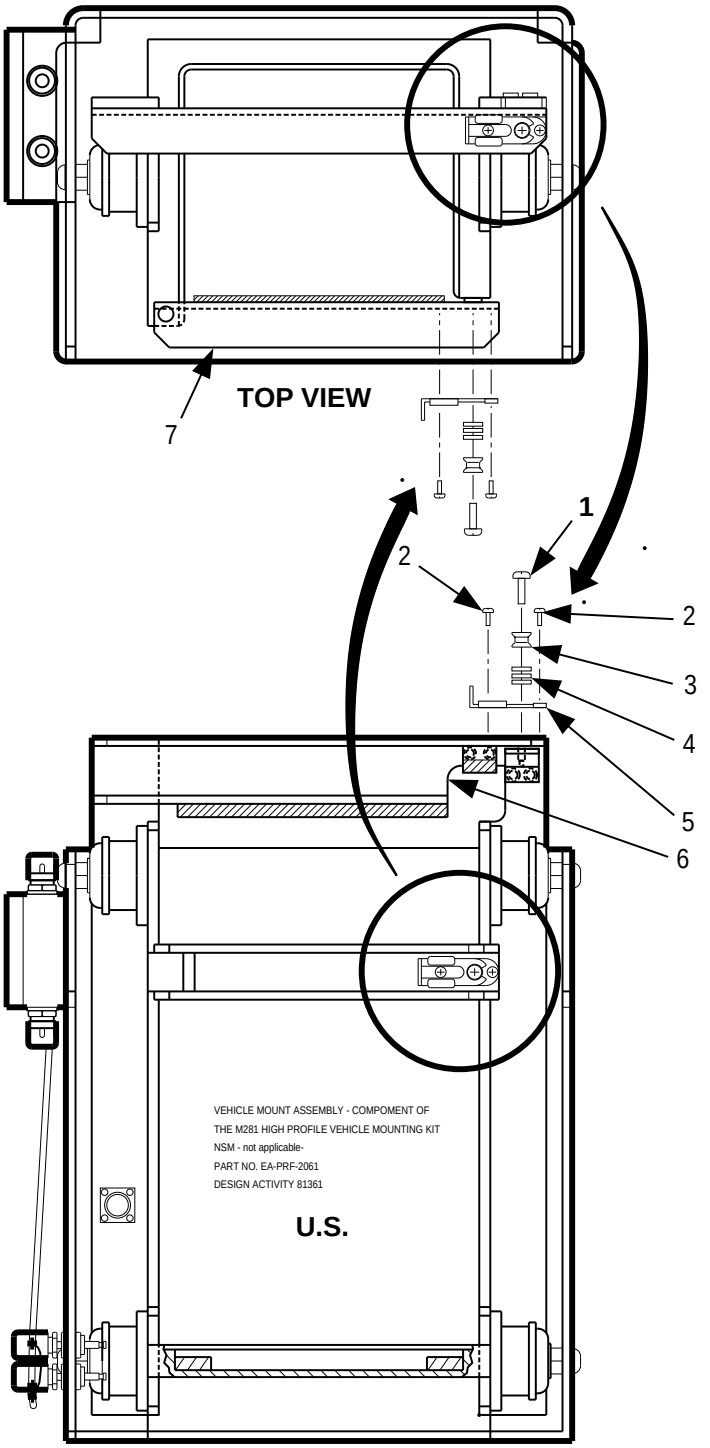
(3) Remove and discard screw (1), post (3) and three spacers (4) from Vehicle Mount.

b. **Installation**.

(1) Install three new spacers (4) , new post (3) and new screw (1) on Vehicle Mount and tighten screw.

(2) Place new slide latch (5) on clamp bar (6) or (7) aligning mating holes.

(3) Using two new screws (2), secure slide latch to clamp bar.


TOP VIEW
7
1
2
2
3
4
5
6
VEHICLE MOUNT ASSEMBLY - COMPOMENT OF
THE M281 HIGH PROFILE VEHICLE MOUNTING KIT
NSM - not applicable-
PART NO. EA-PRF-2061
DESIGN ACTIVITY 81361
U.S.

FRONT VIEW

4.12.7 **Vibration Mount**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M88 Detector removed from Vehicle Mount (paragraphs 2.11.7 through 2.11.25). Vehicle Mount removed (paragraph 4.12.1).

Materials/Parts: Sealing Compound (Appendix F, Item 17)

Tools: Electronic Equipment Tool Kit TK-101/G

NOTE

This procedure is for removal and installation of all four vibration mounts.

a. **Removal**.

(1) On Vehicle Mount, remove and discard four pan head screws (3) from securing mounting frame (5).

(2) Separate mounting frame (5) from inner frame (1) by pulling inner frame straight up.

(3) Remove and discard sixteen pan head screws (4) securing four vibration mounts (2) to inner frame (1).

(4) Discard four vibration mounts.

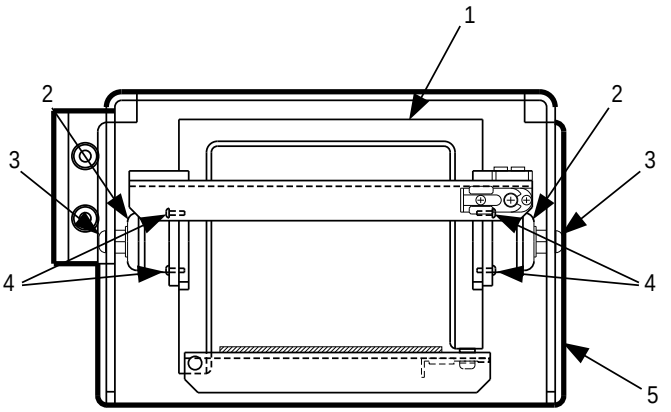
b. **Installation**.

(1) Install four new vibration mounts (2) on inner frame (1) by applying sealing compound sparingly to threads of sixteen new pan head screws (4).

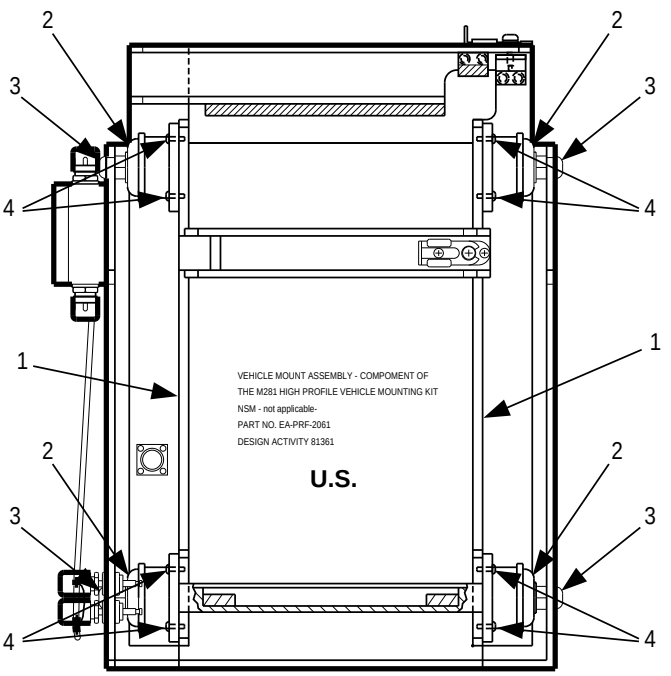
(2) Slide inner frame (1) into top of mounting frame (5) aligning four vibration mounting holes.

(3) Apply sealing compound sparingly to threads of four pan head screws (3).

(4) Install and tighten four new pan head screws (3) securing inner frame to the mounting frame.



TOP VIEW



FRONT VIEW

4.12.8 **Binding Post**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M88 Detector removed from Vehicle Mount (paragraphs 2.11.7 through 2.11.25).

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**.

NOTE

This procedure applies to both binding posts.

(1) If electrical cable from Junction Box is connected to binding post, release cable by pushing inward on binding post.

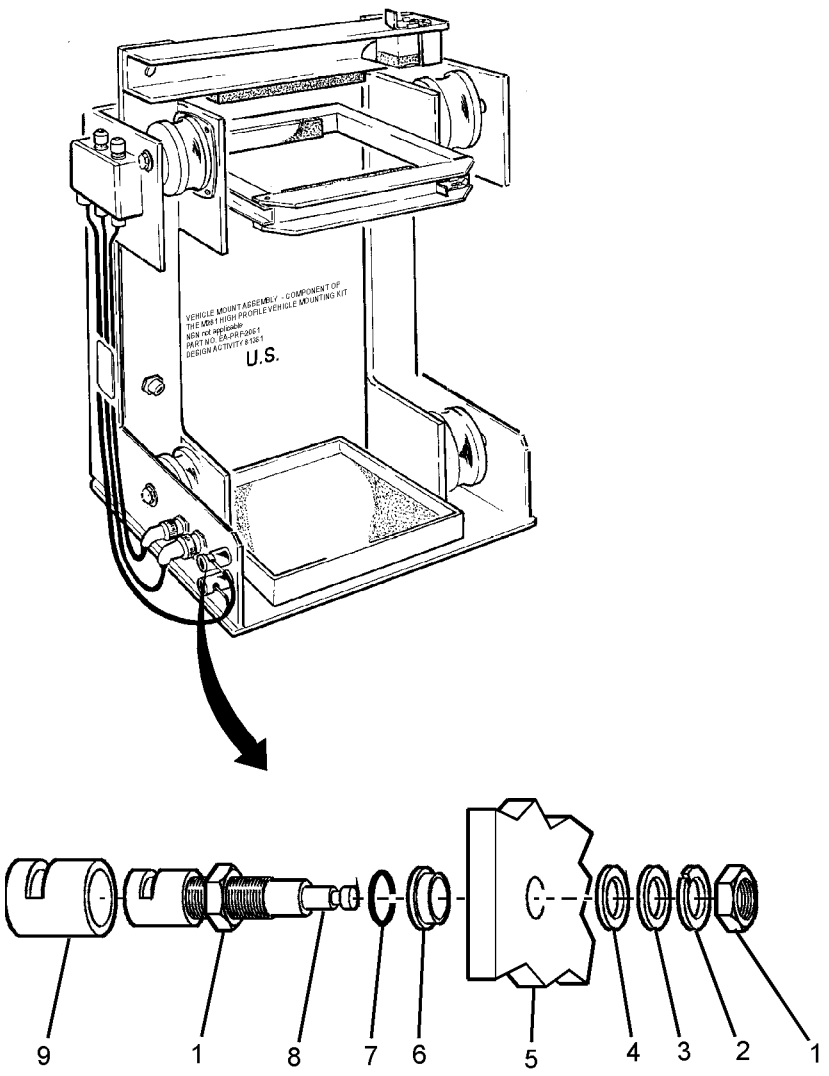
(2) Remove and discard nut (1), lock washer (2), flat washer (3), and insulator (4) from binding post (8).

(3) Remove and discard binding post (8) with electrical cap (9), insulator (6) and O-ring (7) from mounting frame (5).

b. **Installation**.

(1) Place new electrical cap (9), new insulator (6) and new O-ring (7) onto new binding post (8) and insert binding post through hole in mounting frame (5).

(2) Install new insulator (4), new flat washer (3), new lock washer (2) and new nut (1) onto binding post. Position binding post such that wire clinching slot faces upward, then tighten nut.


VEHICLE MOUNT ASSEMBLY - COMPONENT OF
THE M961 HIGH PROFILE VEHICLE MOUNTING KIT
NSN [illegible]
PART NO. EX-PIF-2461
DESIGN ACTIVITY 81361
U.S.
9
1
8
7
6
5
4
3
2
1

4.12.9 **Electrical Cap**.

This task covers: Removal, Installation

NOTE

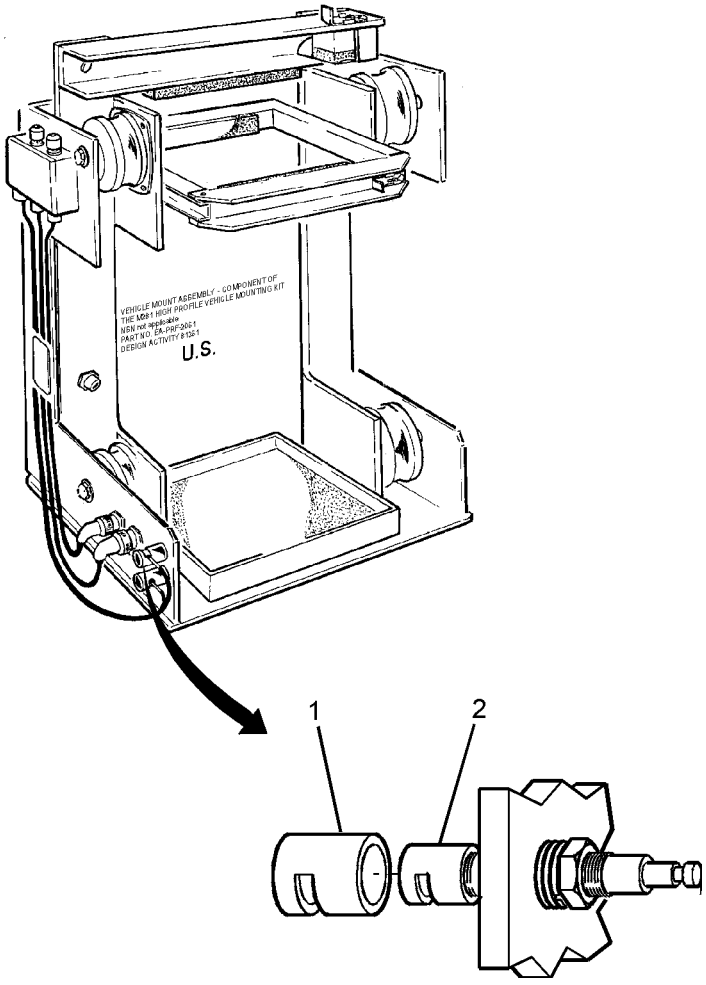
This procedure is applicable to both binding post electrical caps.

a. **Removal**.

(1) Slide defective electrical cap (1) off end of binding post (2) and discard.

b. **Installation**.

(1) Slide new electrical cap (1) over end of binding post (2), aligning electrical cap slot with binding post.



4.12.10 **Cable Gland**.

NOTE

This procedure applies to all five cable glands.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: Vehicle Mount removed (paragraph 4.12.1).

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**.

(1) Remove lid (7) from Junction Box (9) by loosening four captive screws (8).

(2) At terminal block (6), tag and disconnect all electrical cable wires feeding through defective cable gland (2).

(3) Loosen defective cable gland (2) restraining nut (1) and pull disconnected electrical cable wires through cable gland until clear of Junction Box.

(4) Remove and discard nut (5)and flat washer (4) from underside of cable gland (2) and remove cable gland and flat washer (3) from Junction Box.

b. **Installation**.

(1) Install new flat washer (3) on new cable gland (2) and insert cable gland through the Junction Box mounting hole.

CAUTION

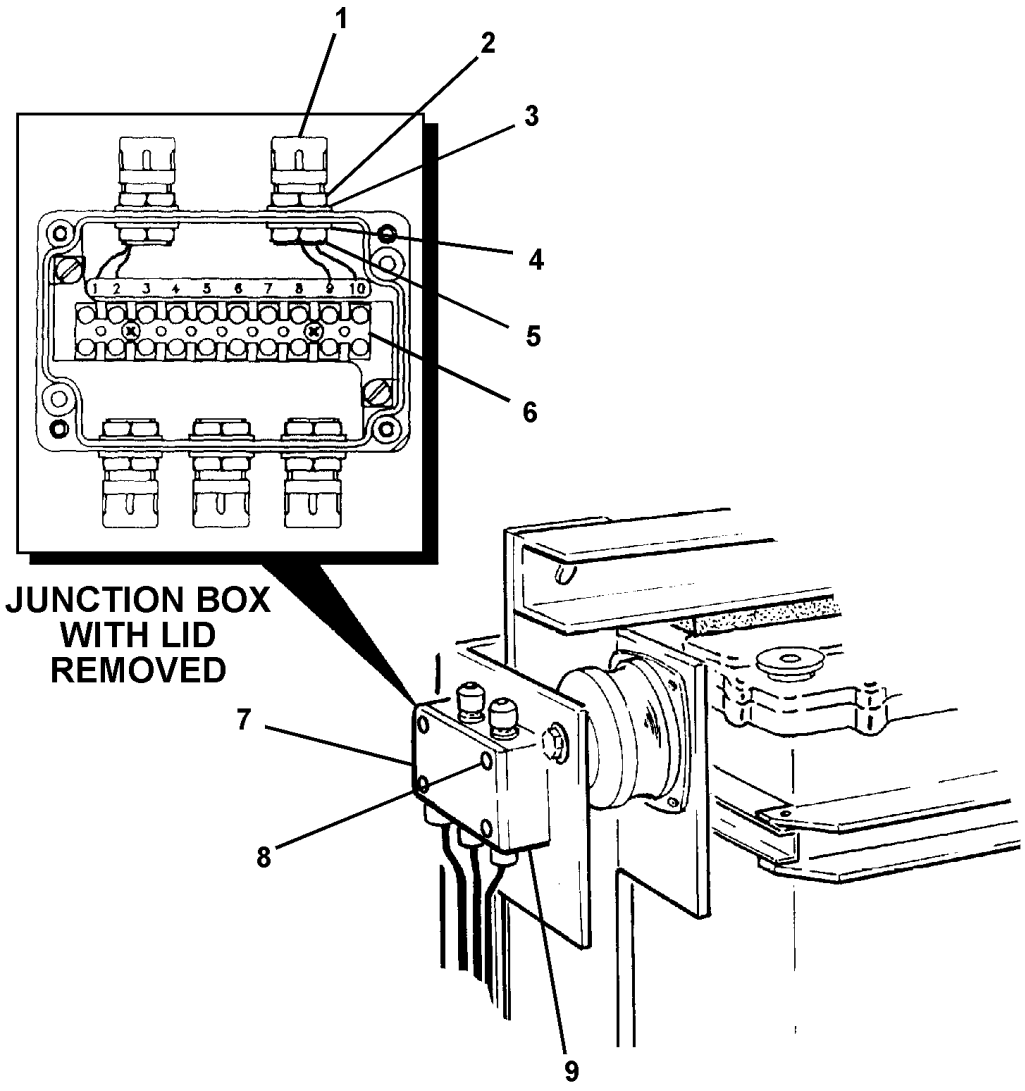
Do not overtighten cable gland plastic nut. Overtightening may damage plastic nut.

(2) Install new flat washer (4) and new nut (5) on underside of cable gland (2) and tighten nut.

(3) Loosen cable gland restraining nut (1), feed previously tagged electrical cable wires through cable gland and connect to terminal block (6) as tagged.

(4) Provide electrical cable wires with sufficient service length between cable gland and terminal block. Tighten cable gland restraining nut (1) finger tight only.

(5) Place lid (7) on Junction Box (9) and tighten four captive screws (8).


1
2
3
4
5
6
1 2 3 4 5 6 7 8 9 10
JUNCTION BOX
WITH LID
REMOVED
7
8
9

4.13 **M42 MOUNT**.

4.13.1 **M42 Mount**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M42 Remote Alarm removed (paragraph 4.14.1).

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**

(1) Remove existing M42 Mount from vehicle and retain existing hardware.

b. **Installation**

(1) Position M42 Mount on vehicle, align mounting holes, and secure with existing hardware.

4.13.2 **Insulator, Liner and Pad**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M42 Mount removed (paragraph 4.13.1).

Materials/Parts: Technical Acetone (Appendix F, Item 1)
Lint Free Cleaning Cloth (Appendix F, Item 8)
Rubber Adhesive (Appendix F, Item 2)

Tools: Electronic Equipment Tool Kit TK-101/G

NOTE

Remove and replace only defective parts.

a. **Removal**.

(1) Remove insulator (6) from clamp catch (7).

(2) Remove rubber liner (1), (2), or (4) from M42 Mount (5).

(3) Remove rubber pad (3) from M42 Mount (5).

WARNING

Acetone is extremely flammable and toxic. To prevent injury or death, use acetone in well ventilated area. Wear appropriate protective covering and avoid prolonged breathing of fumes or contact with skin.

(4) Remove adhesive residue thoroughly from all M42 Mount surfaces with acetone and cleaning cloth.

b. **Installation**.

(1) Replace defective insulator (6) as follows:

(a) Fabricate insulator (6) IAW Appendix G, paragraph G-1.

NOTE

Ensure surface is thoroughly dry before applying adhesive.

(b) Apply adhesive to clamp catch (7).

(c) Slip insulator (6) over clamp catch (7). Wipe off excessive adhesive.

(2) Replace defective liner (1), (2), and/or (4) as follows:

(a) Fabricate liner(s) IAW Appendix G, paragraph G-2.

(b) Roughen one side of replacement liner to be installed.

NOTE

Ensure surface is thoroughly dry before applying adhesive.

(c) Apply thin coat of adhesive to mounting surface bracket and to roughened side of liner, allow to dry until tacky.

(d) Apply liner to mounting surface and press firmly and smoothly from center of liner to edge.

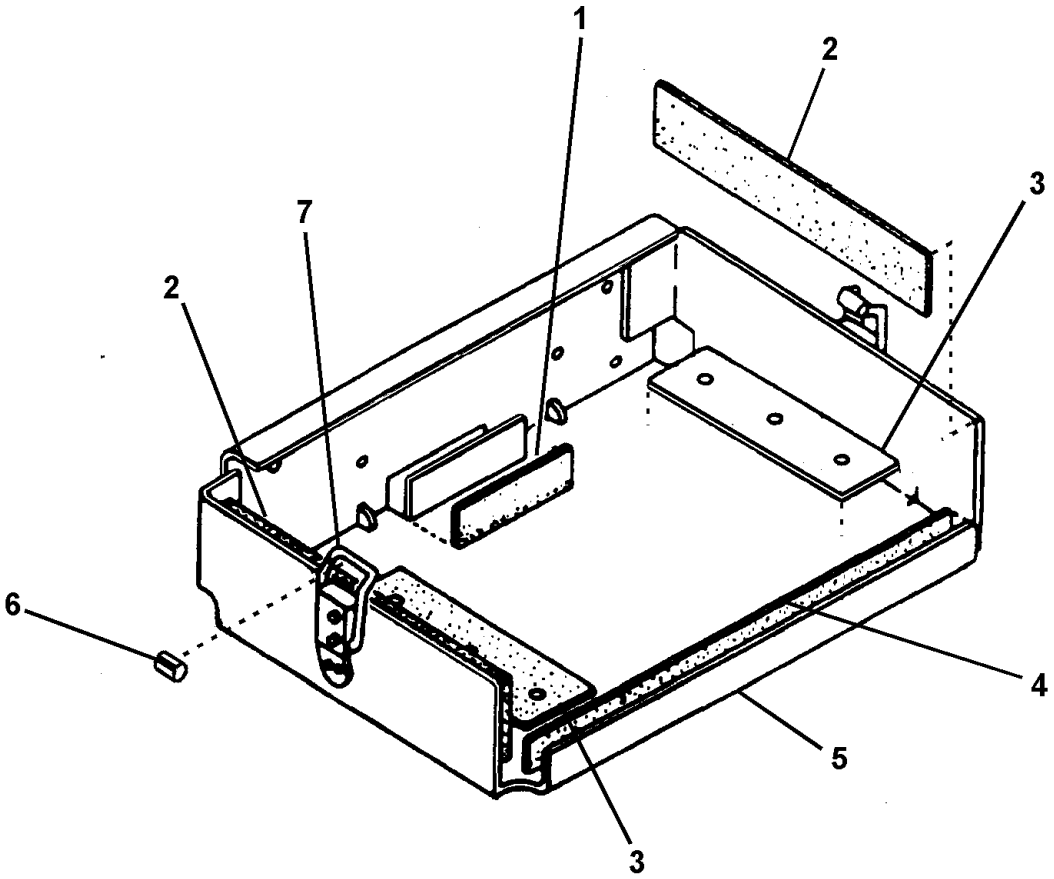
(3) Replace defective pad (3) as follows:

(a) Fabricate rubber pad (3) IAW Appendix G, paragraph G-3.

NOTE

Ensure surface is thoroughly dry before applying adhesive.

(b) Remove backing from rubber pad (3) and apply rubber pad to bracket and press firmly and smoothly from center of pad to edge.



4.14 **M42 REMOTE ALARM**.

4.14.1 **M42 Remote Alarm**.

This task covers: Removal, Installation

WARNING

Ensure source power is switched off or disconnected before any connection/disconnection is made.

a. **Removal**.

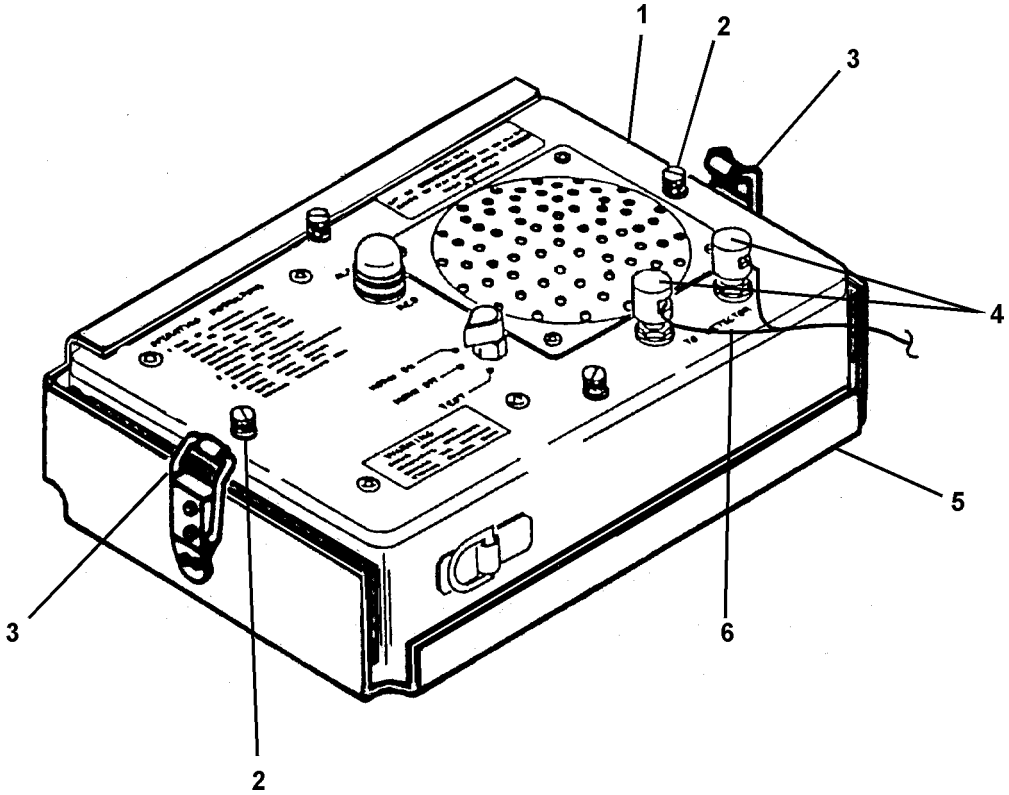
(1) If M42 Remote Alarm is connected to M88 Detector, push on M88 Detector REMOTE ALARM binding posts to release wire. At M42 Remote Alarm (1), push on binding posts (4) to release wire (6).

(2) Unhook two M42 Mount (5) clamping latches (3) from two knurled screws (2) on M42 Remote Alarm (1).

(3) Remove M42 Remote Alarm from mount.

b. **Installation**.

(1) Place M42 Remote Alarm (1) into M42 Mount (5) and secure by placing clamping latches (3) over two knurled screws (2) on M42 Remote Alarm and fastening.



4.14.2 **Captive Screw**.

This task covers: Removal, Installation

INITIAL SETUP

Equipment Condition: M42 Remote Alarm removed (paragraph 4.14.1).

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**.

(1) Loosen knurled captive screw (4) from housing (2).

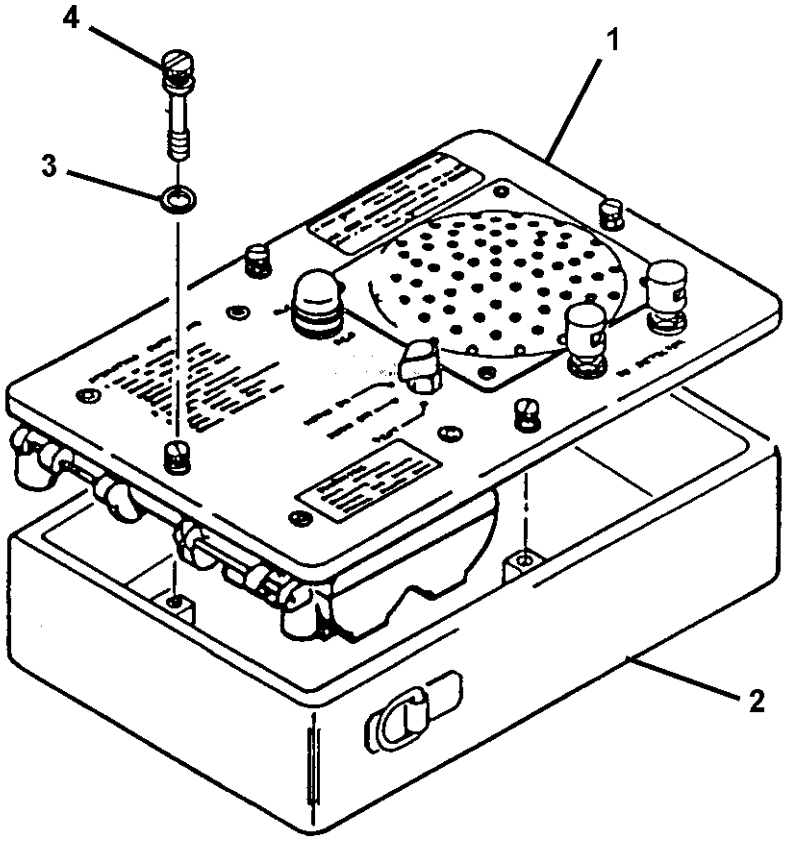
(2) Lift up screw (3) while turning counterclockwise to remove from panel (1).

(3) Remove washer (3).

b. **Installation**.

(1) Place washer (3) on knurled captive screw (4).

(2) Screw knurled captive screw (4) through panel (1) and into housing (2).


4
1
3
2

4.14.3 **Lamp**.

This task covers: Removal, Installation

a. **Removal**.

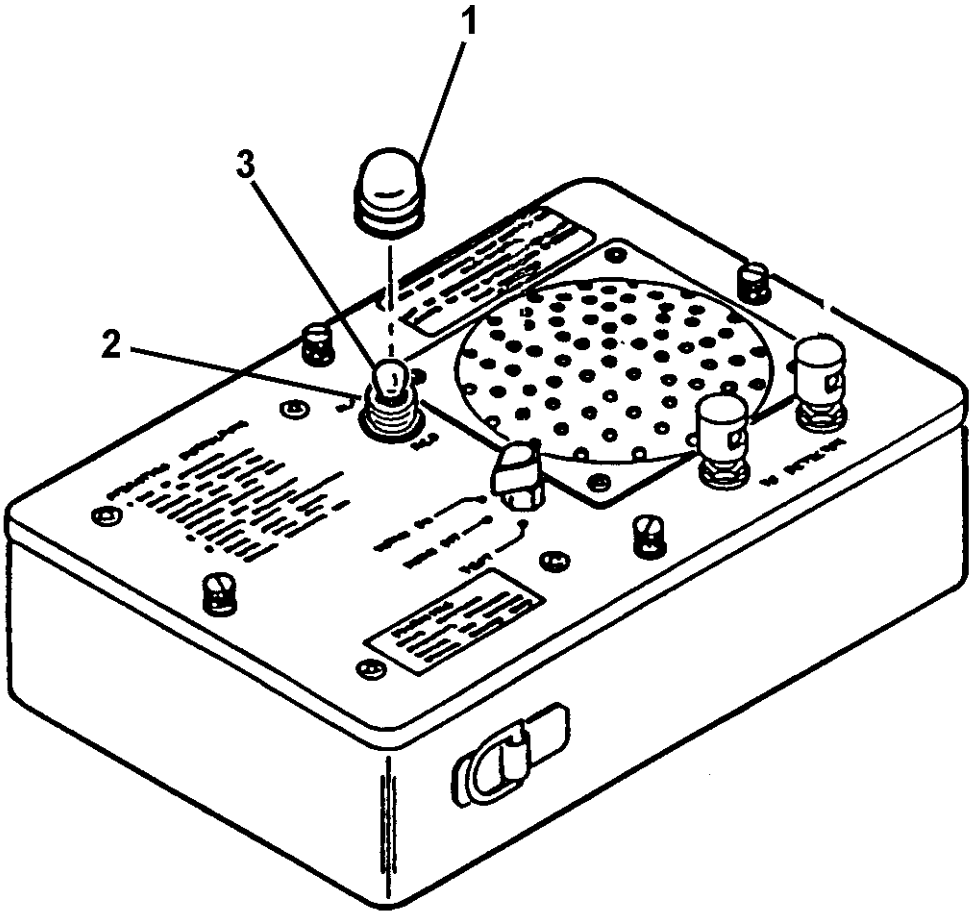
(1) Unscrew lens (1) from lamp holder (2).

(2) Press lamp (3) in while turning counterclockwise and remove.

b. **Installation**.

(1) Insert lamp (3) into lamp holder (2), press in and turn clockwise to install.

(2) Screw lens (1) onto lamp holder (2).



4.14.4 **Lens**.

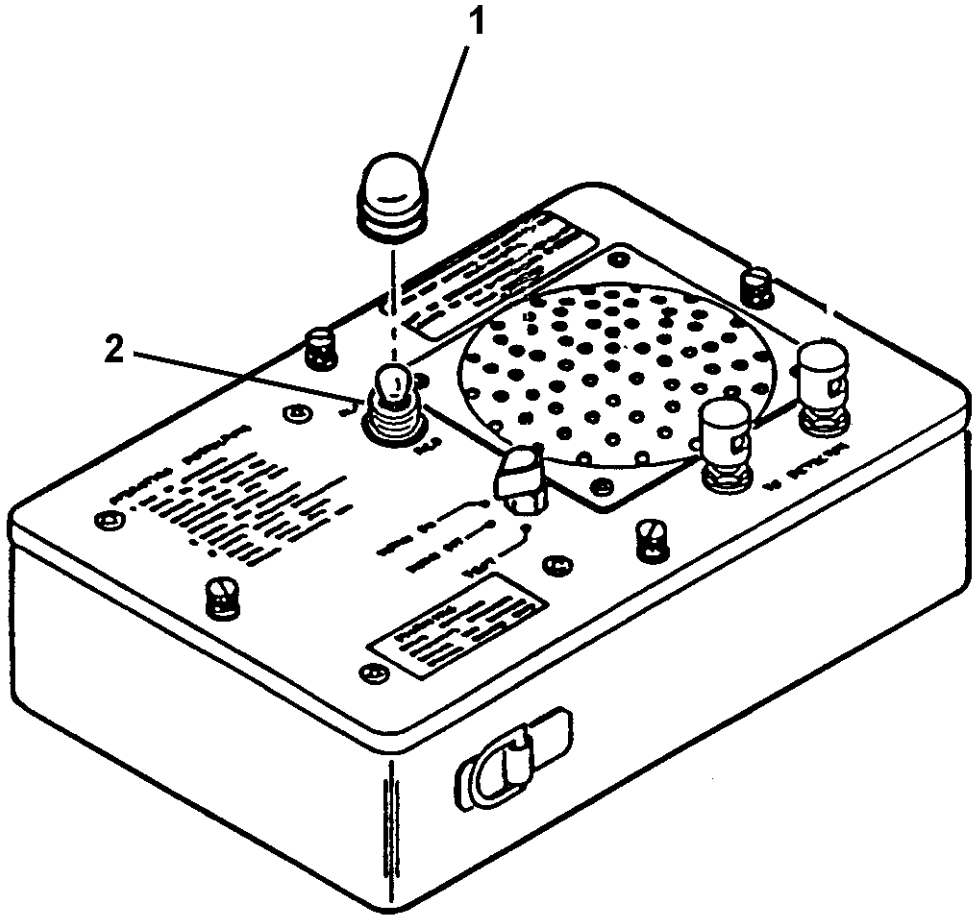
This task covers: Removal, Installation

a. **Removal**.

(1) Unscrew lens (1) from lamp holder (2).

b. **Installation**.

(1) Screw lens (1) onto lamp holder (2).



4.14.5 **Switch Knob**.

This task covers: Removal, Installation

INITIAL SETUP

Tools: Electronic Equipment Tool Kit TK-101/G

a. **Removal**.

NOTE

Horn selector switch should be set to HORN ON position during knob replacement.

(1) Loosen two setscrews (1).

(2) Remove selector switch knob (2) from switch shaft (3).

b. **Installation**.

(1) Place selector switch knob (2) on switch shaft (3).

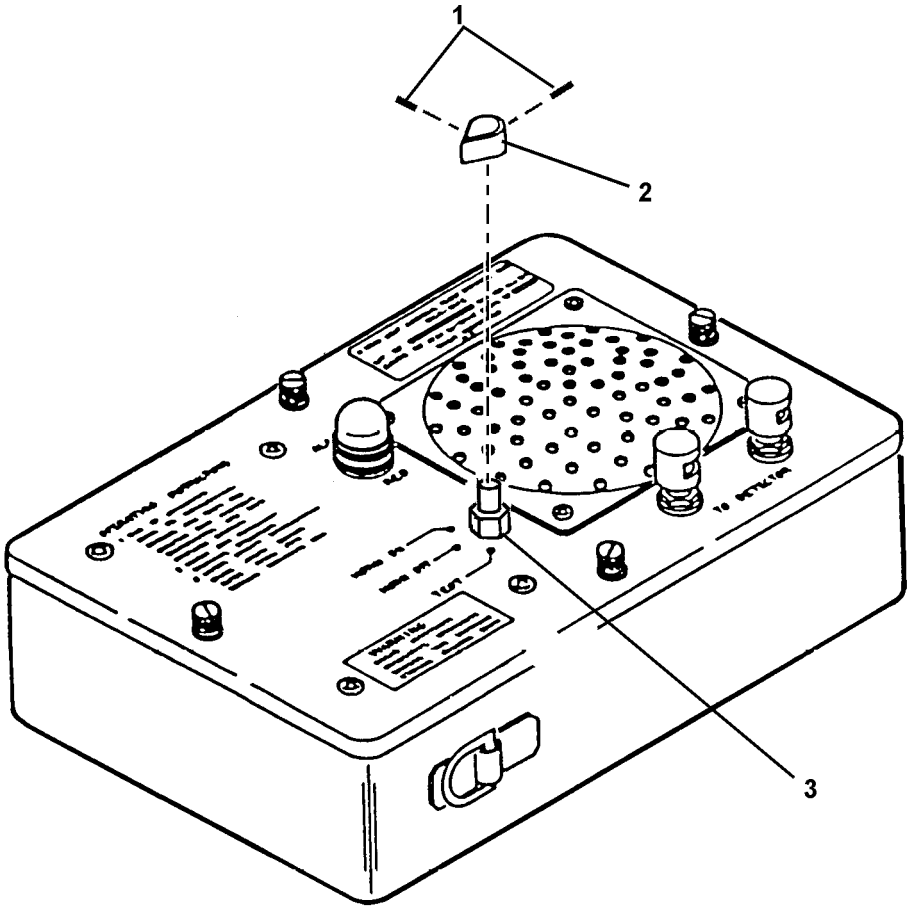
(2) Align knob pointer to HORN ON position.

(3) Tighten two setscrews (1).

NOTE

Selector switch knob must not turn on selector switch shaft after setscrews are tightened.

(4) Turn selector switch knob (2) through its three positions.


1
2
3

4.14.6 **Electrical Cap**.

This task covers: Removal, Installation

a. **Removal**.

NOTE

This procedure applies to both electrical caps.

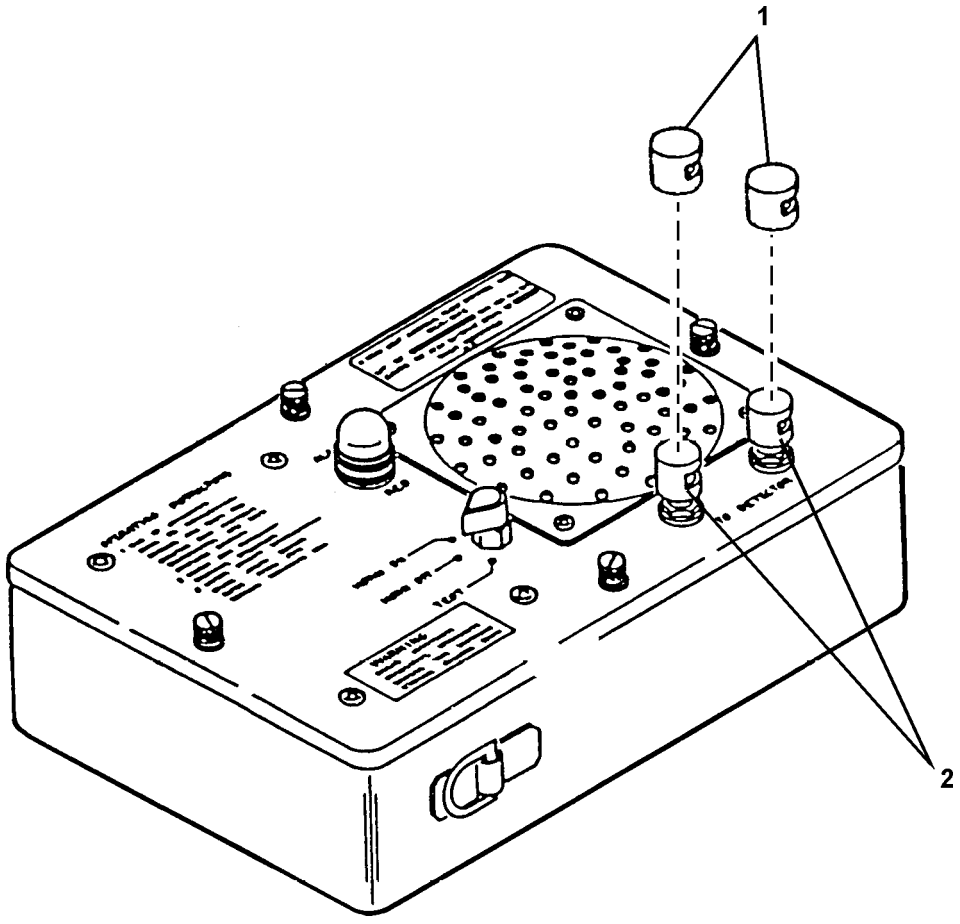
(1) Slide defective electrical cap (1) off top of binding post (2).

(2) Discard defective electrical cap (1).

b. **Installation**.

(1) Align slot in new electrical cap (1) with slot in binding post (2).

(2) Slide electrical cap (1) over binding post (2) until top of electrical cap seats firmly on top of binding post.



4.15 (AIR FORCE ONLY) **AIR FORCE WIPE TEST PROCEDURES**. Air Force wipe testing will be accomplished at unit level at the frequencies contained in the Radioactive Materials Permit, upon initial receipt, and upon transfer to another installation. Proper submission of wipe samples and the accompanying AF Form 495 is critical to receiving an accurate and timely report. Please take a short time to familiarize yourself with proper collection and submission procedures listed below prior to performing the wipe test procedure.

NOTE

Two identical, nominal 10 millicurie (mCi) (370 Mbq), foil Nickel-63 radioactive sources, totaling a nominal 20 mCi (740 Mbq) per detector as indicated by radioactive material label located on the top of the detector (figure 4-2).

4.15.1 **Preparation of the AF Form 495**. Using a ball point pen (Appendix F, Item 3), prepare the AF Form 495 as shown in Figure 4-1.

SWIPE CONTAINER			
NAME AND ADDRESS OF SUBMITTING ACTIVITY 51 CES/CEX Unit 5027 Osan AB Kor APO AP 96278-5027 01212A 01212B			DATE SUBMITTED 18 Dec 96 RADIAC READING
NAME AND TELEPHONE NUMBER OF PERSON PERFORMING TEST MSgt Joe User, DSN315-784-5601			AREA SWIPED
RADIONUCLIDE OR TYPE OF RADIATION Nickel-63 (2 OFF) 0.02 Curies (Total)		SOURCE CODE GID-# + Serial Number	
BASE SAMPLE NUMBER	SERIAL NUMBER OF SOURCE G Ser #/H Ser #		
DATE RECEIVED	BASE CODE	USAF OEHL NUMBER	
SEND TO: USAF OEHL/RZA Brooks Air Force Base, Texas 78235-5501			

AF Form 495, JUL 87 PREVIOUS EDITION WILL BE USED

Figure 4-1. Air Force Form 495

4.15.1.1 **Name and address of the submitting activity**. Clear text address of the submitting unit, including the unit name, street address (or unit number), installation name, and postal zip code (e.g. 51 CES/CEX, Unit 5027, Osan AB Kor, APO AP 96278-5027). Enter Address codes “01212A and 01212B” in the lower right corner of this block.

4.15.1.2 **Name and telephone number of person performing test**. Name and complete DSN number of the person submitting the wipe sample.

4.15.1.3. **Radionuclide or type of radiation**. Obtained from the data tag on the top of the detector.

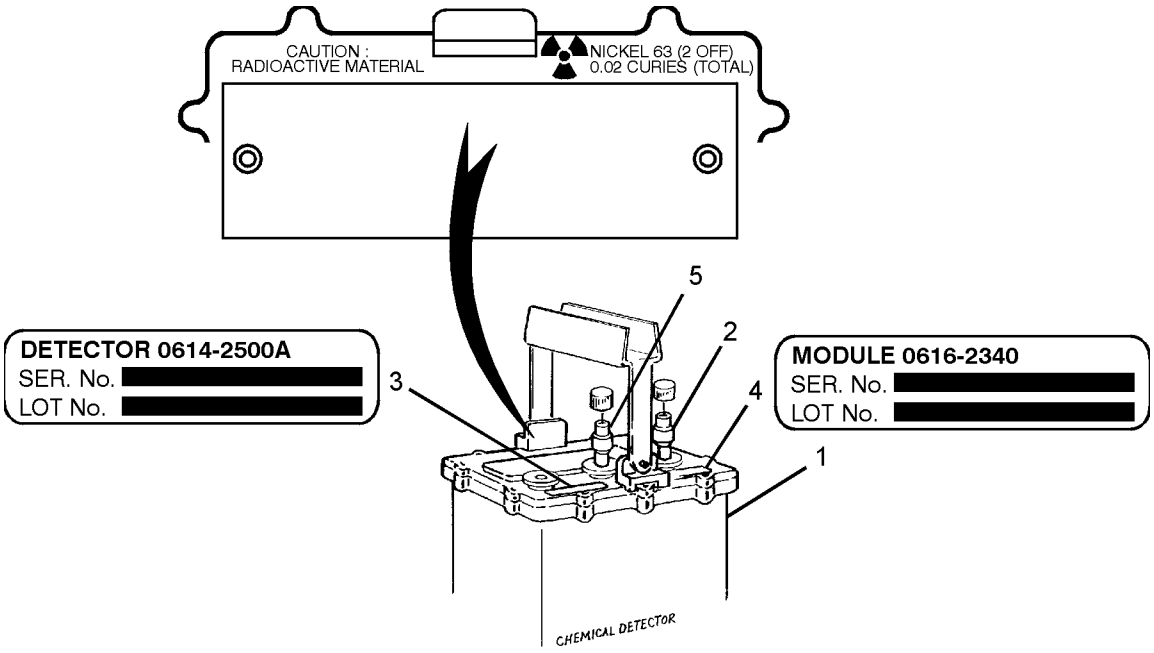


Figure 4-2.

4.15.1.4. **Source code**. Detector serial number and lot number (Figure 4-2, Item 3).

4.15.1.5. **Serial Number of Source**. Module serial number and lot number (Figure 4-2, Item 4).

4.15.2 **Wipe Collection Procedures**:

4.15.2.1 Position M88 (1) on a clean work surface (e.g. table or hard dry ground).

4.15.2.2 Don protective gloves (Appendix F, Item 11).

4.15.2.3 Wipe test will be performed using wipe test cloth (Appendix F, Item 15).

NOTE

Do not use sticky swipes to perform the wipe test.

4.15.2.4 Using a number 2 pencil (Appendix F, Item 13), place a small “x” on the outer edge of the wipe test cloth to mark the side of the test cloth that will touch the detector.

4.15.2.5 Holding the wipe test cloth on the opposite side of the "x," wipe the exterior top surface of M88 (Figure 4-2, Item 1) and around inlet (Figure 4-2, Item 5) and outlet nozzles (Figure 4-2, Item 2).

NOTE

Perform the following procedures in an area that is free from all radiation, except for normal background radiation.

4.15.2.6 Using a ADM-300 RADIAC (Appendix B, Item 5, section III) meter check the wipe test cloth for contamination as follows:

4.15.2.6.1 Open the beta shield of the ADM-300.

4.15.2.6.2 Place wipe paper approximately ¼ inch in front of the probe and note RADIAC indication. DO NOT TOUCH THE PROBE WITH THE WIPE.

WARNING

Any sustained reading on the ADM-300 of 0.1 mR/hr indicates contamination of the M88. Discontinue use of the M88. Bag the M88 until results are returned from Armstrong Laboratory.

Do not lick envelops to seal them or ingestion of Nickel-63 radioactive material may result. Use tape only to seal envelopes.

4.15.2.7 Place the wipe test cloth into the completed AF Form 495 envelope (Appendix F, Item 9).

4.15.2.8 Leave the AF Form 495 envelope containing the wipe test cloth with tape unsealed, only one wipe sample per AF Form 495.

4.15.2.9 Place the unsealed and completed AF Form 495 into a second envelope (Appendix F, Item 10) addressed to:

AL/OEBA
Bldg 140
2402 E Drive
Brooks AFB TX 78235-5114

4.15.2.10 Remove and discard protective gloves and wash hands with soap (Appendix F, Item 14) and water.

4.15.2.11 Results of wipe test evaluation by Armstrong Laboratory will be forwarded to the submitting activity.

4.15.2.12 Assistance can be obtained from the Radioanalytical Branch of Armstrong Laboratory (AL/OEBA) at DSN 240-2061 or COM (210) 536-2061.

4.16 (MARINE CORPS ONLY) **MARINE CORPS WIPE TEST PROCEDURES.** Marine Corps wipe testing will be accomplished at the unit level at the frequencies contained in the Navy Radioactive Materials Permit and upon transfer to another installation. Proper submission of wipe samples and the accompanying label is critical to receiving an accurate and timely report. Please take a short time to familiarize yourself with proper collection and submission procedures listed below prior to performing the wipe test procedure. Refer to FMFM 11-17.

NOTE

The M88 Detector contains two identical, 10 millicurie (mCi) (370 Mbq), foil Nickel-63 radioactive sources, totaling 20 mCi (740 Mbq) per detector as indicated by radioactive material label located on the top of the detector (figure 4-4).

4.16.1 **Preparation of the Wipe Label**. Using a ball point pen (Appendix F, Item 3), prepare the label as shown in Figure 4-3.

WIPE TEST LABEL		
NAME,ADDRESS,TELEPHONE NUMBER AND RUC OF USING ACTIVITY		DATE SUBMITTED 18 Dec 96
		RADIAC READING
NAME,TELEPHONE NUMBER AND RUC OF PERSON PERFORMING TEST GySgt John Marine, DSN 123-4567		AREA WIPED
RADIONUCLIDE OR TYPE OF RADIATION Nickel-63 (2 OFF), 0.02 Curies (Total)		DETECTOR NUMBER Detector Ser # + Detector Lot #
BASE SAMPLE NUMBER	DATE RECEIVED	MODULE NUMBER Module Ser # + Module Lot #
SENT TO: Commander Attn Code 884 RADIAC Calibration Marine Corps Logistics Bases 814 Radford Blvd Albany GA 31704-1128		
MAIL ROOM - DO NOT OPEN		

Figure 4-3. Marine Corps Label

4.16.1.1 **Name and address of submitting activity**. Name, address, phone number and RUC of using activity.

4.16.1.2 **Name and telephone number of person performing test**. Name, phone number and RUC of the person submitting the wipe sample.

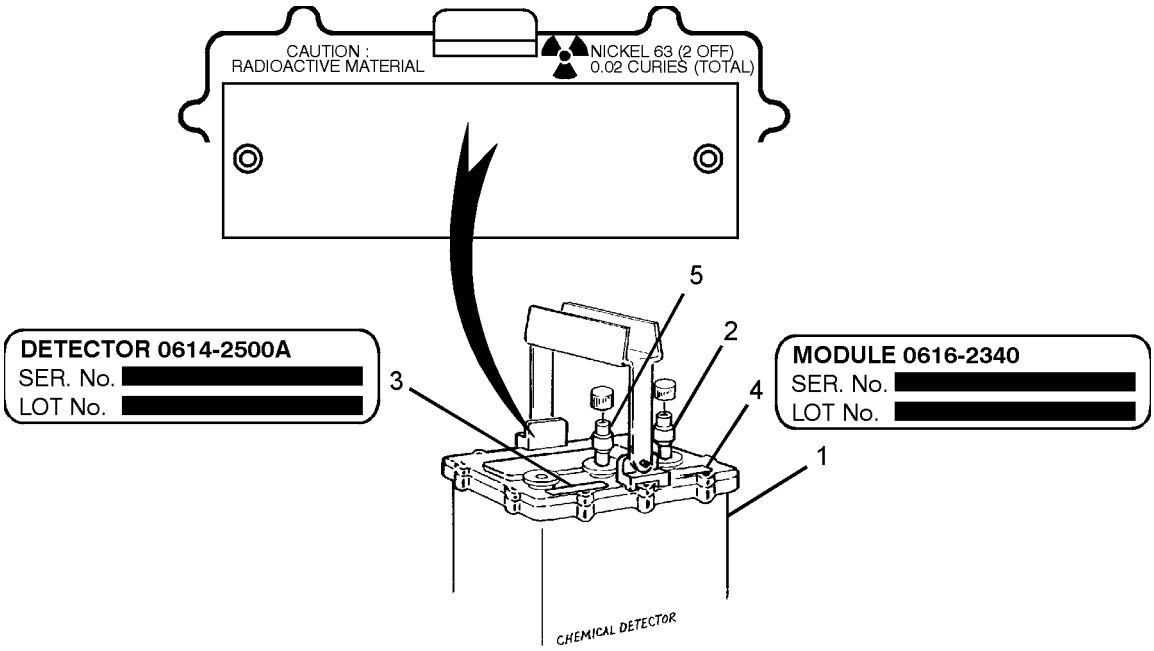


Figure 4-4.

4.16.1.3 **Radionuclide or type of radiation**. Obtained from the data tag on the top of the detector.

4.16.1.4 **Detector number**. Detector serial number and lot number (Figure 4-4, Item 3).

4.16.1.5 **Module number**. Module serial number and lot number (Figure 4-4, Item 4).

4.16.2 **Wipe Collection Procedures**:

4.16.2.1 Position the M88 on a clean work surface (e.g., table or hard dry ground).

4.16.2.2 Put on disposable gloves (Appendix F, Item 11).

4.16.2.3 Leave the wipe disk on the wipe disk folder.

4.16.2.4 Wipe the exterior top surface of the M88 (Figure 4-4, Item 1) and around the inlet (Figure 4-4, Item 5) and outlet nozzles (Figure 4-4, Item 2) with wipe disk.

NOTE

Perform the following procedures in an area that is free from all radiation, except normal background radiation.

4.16.2.5 Using an AN/VDR-2 meter, check the wipe test cloth for contamination as follows:

4.16.2.5.1 Turn on meter and open the beta shield of the AN/VDR-2 to expose beta window.

4.16.2.5.2 Place wipe disk (located on wipe disk folder) approximately ¼ inch in front of the probe and note RADIAC indication. DO NOT TOUCH THE PROBE WITH THE WIPE.

WARNING

Any sustained reading of the AN/VDR-2 (or equivalent meter) that is twice background may indicate Nickel-63 contamination. If the reading is over twice background, discontinue use of the ACADA, and place in two individually sealed plastic bags until the wipe test is analyzed by MARCORLOGBASES Albany. If the laboratory verifies that Nickel-63 contamination is present, disposition instruction for contaminated ACADA will be provided by MARCORLOGBASES. If the sustained reading is less than twice background level, the ACADA may be returned to use.

4.16.2.5.3 Fold the wipe disk folder at dotted line (wipe disk inside), place in interlocking seal plastic bag and seal.

4.16.2.5.4 Place interlocking seal plastic bag in wipe test label envelope and seal with tape.

WARNING

Do not lick envelops to seal as ingestion of Nickel-63 may result. Use tape only to seal envelopes.

4.16.2.5.5 Place sealed, marked envelope in second envelope with mailing label attached, seal with tape and mail to:

Commander
Attn Code 884 RADIAC Calibration
Marine Corps Logistics Bases
814 Radford Blvd
Albany GA 31704-1128

4.16.2.5.6 Place only one wipe sample per Wipe Test Label envelope. Multiple Wipe Test Label envelopes may be placed in the second (mailing) envelope.

4.16.2.5.7 Remove and discard disposable gloves and wash hands with soap (Appendix F, Item 14) and water.

4.16.2.5.8 If maintenance is required, ACADA must be held and tagged until wipe test results are received.

4.16.2.5.9 Results of wipe test evaluation will be reported to COMMARCORLOGBASES (Codes 835-3 and 136) and to the submitting activity.

4.16.2.5.10 Assistance can be obtained from the Marine Corps Logistical Radiation Safety Officer at DSN 567-6231 or COM (912) 439-6231.

4.17 (NAVY ONLY) **NAVY WIPE TEST PROCEDURES**.

4.17.1 **Leak Test Instructions for the M22 ACADA Containing Radioactive Sources**.

Materials for Leak Testing Radiation Sources:

1 Pair polyethylene gloves with plastic bag

1 Prepared/premoistened cotton swab

1 Plastic bag (for swab) with label

1 Preaddressed, self-sealing mailing envelope

1 Radiation test sticker

1 Certificate of radioactivity wipe/leak test sheet

1 Wipe test instruction sheet

Radiation Safety Precautions:

WARNING

Test is done to ensure no loose contamination of Nickel-63, a significant hazard if ingested or inhaled. Do not perform this test if you have any open cuts. After performing wipe, do not allow wipe to make contact with your fingers or any other surface. Wear the gloves provided while taking the wipe. Place swab in plastic bag with label, then remove gloves by sterile technique. (i.e. by grasping the inner surface at the wrist) Wash hands with soap and water when through. Do not lick envelopes to seal or ingestion of Nickel-63 may result. Use tape only.

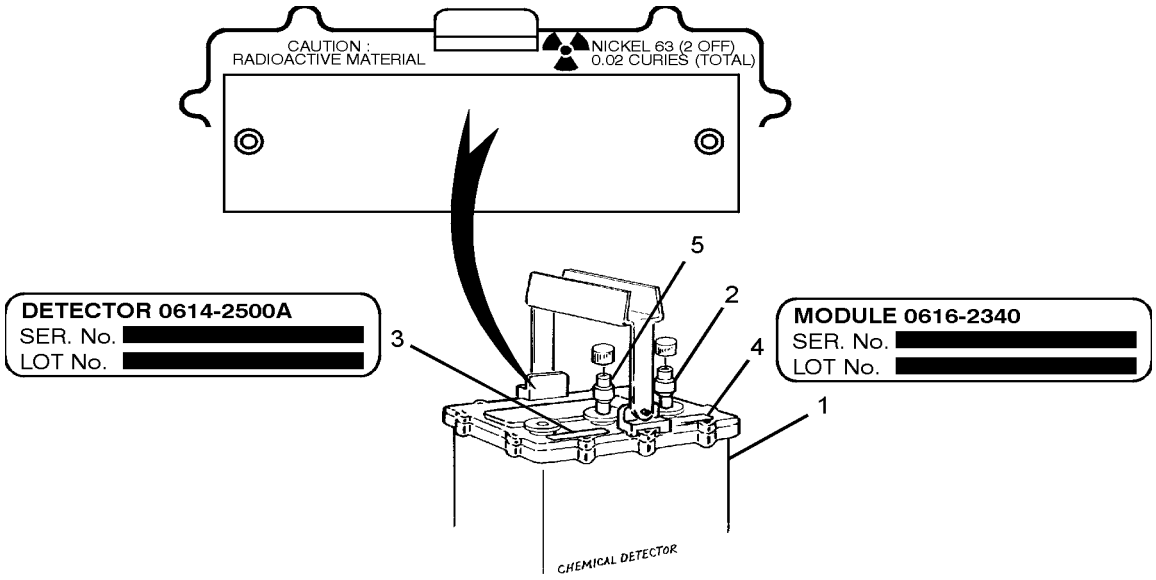


Figure 4-5.

4.17.2 **Leak Test Procedure**:

4.17.2.1 Record the following information in the spaces provided on the Certificate of Radioactivity Wipe/Leak Test sheet, and on the preaddressed mailing envelope:

a. M22 Detector serial number - located right side of unit, near top (Figure 4-5, Item 1)

b. Date that you perform wipe test

c. Name and rank of person performing test

d. Ship name or shore station of the user

4.17.2.2 Using the prepared/enclosed swab, wipe exterior surface around the exhaust port (Figure 4-5, Item 2).

4.17.2.3 Place the swab in the plastic bag and secure closed. Record M22 serial number and date on the attached label.

4.17.2.4 Adjust **AN/PDR-27** to measure 0 to 0.5 mR/hr. Open beta shield on probe and place wipe/swab approximately ¼ inch in front of probe. Note RADIAC reading. **DO NOT TOUCH THE PROBE WITH THE WIPE.**

WARNING

Any sustained reading on the AN/PDR-27 of **0.1 mR/hr** indicates contamination of the detector. Discontinue use and bag the M22. Contact Command Radiation Safety Officer (RSO), NAVSURFWARCENDIV Crane, for assistance at DSN 482-3578 or DSN 482-1625.

NOTE

A reading of less than **0.1 mR/hr** does not necessarily indicate that the detector is free of radioactive contamination. The AN/PDR-27 can only detect very high levels of Nickel-63.

4.17.2.5 Sign and date the radiation sticker. Place on flat surface of M22 Detector near output nozzle.

4.17.2.6 Mail the wipes promptly (if no gross contamination). Use preaddressed envelope to mail sample.

4.18 **INSTALLATION OF M281 MOUNTING KIT**.

4.18.1 **Introduction**.

The Vehicle Mount (a component of the M281 Mounting Kit) is designed to be mounted inside or outside a vehicle and provides an anti-vibration mounting for the M88 Detector. Mounting holes are provided in the back plate and also in the base of the assembly, for appropriate fittings in the vehicle. The M42 Mount (a component of the M281 Mounting Kit) is designed to be mounted inside or outside a vehicle and provides an anti-vibration mounting for the M42 Remote Alarm. Mounting holes are provided in the back plate of the assembly, for appropriate fittings in the vehicle. To allow electrical interconnection between the vehicle and the M88 Detector, a junction box is fitted to the side of the Vehicle Mount.

4.18.2 **Installation of Vehicle Mount**.

Perform Vehicle Mount Installation (paragraph 4.12.1.b).

4.18.3 **Installation of M42 Mount**.

Perform M42 Mount Installation (paragraph 4.13.1.b).

SECTION V. PREPARATION FOR STORAGE AND SHIPMENT

4.19 **STORAGE**.

4.19.1 Prepare M22 Alarm system, including M88 Detector for non-operational storage. Remove battery from battery box (paragraph 2.8.2) and store separately from M88 Detector.

4.19.1 Store M88 Detectors in rooms/areas/sections designated for storage of radioactive materials. This area must be free from danger of flooding, outside the danger radius of flammables or explosives and secured against unauthorized removal.

4.19.2 Post the area with CAUTION - RADIOACTIVE MATERIALS signs as required by AR 385-30 and AFI 40-201. (Yellow signs with magenta letters and radiation symbol). The sign should be at least 8 inches by 10 inches.

4.19.3 Storage of a single M88 Detector must be in a secure area; the area does not need to be marked.

4.20 **PACKING AND SHIPMENT**.

4.20.1 Procedures if packaging will contain a M88 Detector.

CAUTION

Insure that protective caps are installed in both the inlet and exhaust ports as required by paragraph 2.10.5.

NOTE

Since the M88 Detector Unit, which is a component of the M22 Alarm, contains Radioactive Material, the Radiological Protection (Safety) Officer (RPO/RSO) must be notified before shipment to ensure that all special requirements have been met i.e. radiation wipe test, marking, etc. If battery box of M22 Alarm is being shipped, battery must be removed. Air Force users refer to TO 00-110N-3 Requisition, Handling, Storage, and Identification of Radioactive Materials for shipping instructions.

4.20.1.1 Wrap the detector in cushioning material to protect it from shock and vibration.

4.20.1.2 Place the wrapped Detector in a single wall fiberboard container and close with tape.

4.20.1.3 Mark the fiberboard container with the word “RADIOACTIVE.” Marking shall be at least 16-point type or 3/8 inch in height.

4.20.1.4 Place the fiberboard container with the detector in a strong outer shipping container.

4.20.1.5 Apply cushioning or fiberboard dunnage as required to protect in inner fiberboard container and its contents.

4.20.1.6 Close the container in a manner that will allow shipment without loss of the contents.

4.20.1.7 Mark the container in accordance with MIL-STD-129.

4.20.1.8 The Government Bill of Lading (DD Form 1149) and other shipping documents shall be completed

as required IAW Title 49 Code of Federal Regulations and other local or military requirements documents and shall contain the following identification information.

THIS SHIPMENT IS EXCEPTED FROM MARKING AND LABELING REQUIREMENTS UNDER THIS REQUIREMENTS PARAGRAPH 173.424, SPECIFIED IN 49 CFR. THE PROPER SHIPPING NAME IS: PACKAGED-INSTRUMENTS OR ARTICLES, THE UNITED NATIONS IDENTIFICATION NUMBER: UN 2910.

4.20.1 Procedures if packaging will NOT contain a M88 Detector.

NOTE

If battery box of M22 Alarm is being shipped, battery must be removed.

4.20.2.1 Wrap the item, to be shipped, in cushioning material to protect it from shock and vibration.

4.20.2.2 Place the wrapped item in a strong shipping container.

4.20.2.3 Close the container in a manner that will allow ship0ment without loss of the contents.

4.20.2.3.1 Mark the container in accordance with MIL-STD-129.

4.21 **ACCOUNTABILITY**.

Refer to AR 710-3, section 4, for instructions on completing transaction cards. A transaction card(s) is required for each of the following:

a. Inventory Loss
b. Suspected Loss or Theft
c. Receipt
d. Shipment
e. Demilitarization
f. Wipe Test Results

APPENDIX A
REFERENCES

A-1 **SCOPE**.

This Appendix lists all Army, Air Force, Marine Corps, and Navy forms, pamphlets, field manuals, technical manuals, publications, technical bulletins, and regulations referenced to or related to information contained in this manual.

ARMY PUBLICATIONS AND FORMS

A-2 **FIELD MANUALS**.

NBC Protection	FM 3-4
NBC Decontamination	FM 3-5
First Aid for Soldiers	FM 21-11

A-3 **FORMS**.

Recommended Changes to Publications and Blank Forms	DA Form 2028
Recommended Changes to Equipment Technical Publications	DA Form 2028-2
Equipment Inspection and Maintenance Worksheet	DA Form 2404
Government Bill of Lading	DD Form 1149
Report of Discrepancy	SF 364
Product Quality Deficiency Report	SF 368
Notice to Employees	NRC Form 3

A-4 **PAMPHLETS**.

The Army Maintenance Management (TAMMS) (Maintenance Management Update)	DA Pam 738-750

A-5 **ARMY REGULATIONS**.

Supply Policy Below the Wholesale Level	AR-710-2
Asset and Transaction Reporting System	AR 710-3
Safety Procedures for Storage, Shipment, and Disposal of Radioactive Material	AR 385-11
Radioactive Commodities in the DOD Supply System	AR 700-64
Safety Color Code Markings and Signs	AR 385-30

A-6 **SUPPLY BULLETINS**.

FSC 6135 Primary Battery Supply and Management Data	SB 11-6

A-7 **TECHNICAL BULLETINS**.

Direct Support Requirement, Procedures, and Handling of the Radiation Wipe Test for the M88 Chemical Agent Detector Unit	TB 3-6665-321-30
Instructions for the Safe Handling and Identification of U.S. Army Communications – Electronics Command Managed Lithium-Sulfur Dioxide Batteries	TB 43-0130

REFERENCES (cont)

REFERENCES (cont)

A-8 **TECHNICAL MANUALS**.

Procedures for Destruction of Alarm Systems	TM 43-00020-31
Operator's Manual for Decontamination Kit, Individual Equipment: M295	TM 3-4230-235-10

A-9 **COMMON TABLE OF ALLOWANCES**.

Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items)	CTA 50-970
Army Medical Department Expendable/Durable Items	CTA 8-100

A-10 **AIR FORCE PUBLICATIONS AND FORMS**.

Managing Radioactive Material in the USAF	AFI 40-201
Air Force Technical Order System	TO 00-5-1
Air Force Technical Order	AFTO Form 22
Air Force Technical Order	AFTO 00-25-213
Air Force Instruction	AFI 45-2001
Allowance Standard 429	AS 429
Swipe Container	AF Form 495
Calibration Procedures	TO 00-33K-1-100
Radioactive Waste Disposal	TO 00-110N-2
Requisition, Handling, Storage and Identification of Radioactive Material	TO 00-110N-3
Air Force Technical Order	TO 11 W-1-10
Air Force Maintenance Form	Form 105
Air Force Instruction	AFI 32-4001
Air Force Manual	AFM 32-4005
Air Force Manual	AFM 67-1
Air Force Technical Order System	AFR 8-2
Allowance Standard 459	AS 459
CW Decontamination, Detection, and Disposal	TO 11C15-1-3

A-11 **MARINE CORPS PUBLICATIONS AND FORMS**.

Chemical and Biological Contamination Avoidance	FMFM 11-17
Serviceability Standards, NBC	TI 10010-15/1B
Disposal of Lithium Batteries	TI 6135-15/3
Maintenance Management (MIMMS)	MCO 4790.2
Nuclear Biological and Chemical (NBC) Defense Equipment Test and Evaluation Program	MCO 3960.5
NBC Protection	FMFM 11-9
NBC Decontamination	FMFM 11-10
NRC Regulations	MCO 5104.3
Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries	FMFM 11-11
Recommended Changes to Technical Publications	NAVMC 10772
Recommended Changes to Technical Publications	NAVMC 4430.3
Equipment Record Procedures	TM 4700-15/1
Quality Deficiency Report	MCO 4855.10
Transportation and Travel Record of Transportation Discrepancies	MCO P4610.19
Report of Item and Packaging Discrepancies	MCO 4430.3

REFERENCES (cont)

A-12 **NAVY PUBLICATIONS AND FORMS**.

Operator's Navy Instruction	OPNAVINST 4790.4C
Navy Radioactive Materials Permit	NRMP 13-0164-TNP
Operator's Navy Instruction	OPNAVINST 6470.3
Navy Medical	NAVMED P-5041
Technical Manual Deficiency Evaluation Report	NAVSEA TMDER 9086/10

Appendix B
MAINTENANCE ALLOCATION CHART (MAC)

SECTION I. INTRODUCTION

B-1 **THE ARMY MAINTENANCE SYSTEM MAC**.

a. This introduction (section I) provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Unit - includes two subcolumns, C (operator/crew) and O (unit) maintenance

Direct Support - includes a F subcolumn

General Support - includes a H subcolumn

Depot - includes a D subcolumn

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2 **MAINTENANCE FUNCTIONS**. Maintenance functions are limited to and 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 (e.g., by sight, sound, or feel).

b. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, 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; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. **Adjust.** To maintain or regulate, with prescribed limits, by bringing into proper 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 or test, measuring, and diagnostic equipment 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. **Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. **Replace.** To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the 3rd position code of the SMR code.

i. **Repair.** The application of maintenance services[1] including fault location/troubleshooting[2], removal/installation, and disassembly/assembly[3] procedures, and maintenance actions[4] to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. **Overhaul.** That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). 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 material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

---

[1] Services - Inspect, test, service, adjust, align, calibrate, and/or replace.

[2] Fault location/troubleshooting - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[3] Disassembly/assembly - The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

[4] Actions - Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing function authorized in the maintenance allocation chart.

B-3 **EXPLANATION OF COLUMNS IN THE MAC, SECTION II**.

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

b. **Column 2, Component/Assembly.** Column 2 contains the item 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. (For detailed explanation of these functions, see paragraph B-2.)

d. **Column 4, Maintenance Level.** Column 4 specifies each level of maintenance authorized to perform each function listed in Column 3, by indicating work time required (expressed as man-hours in whole hours or decimals) in the appropriate subcolumn. This work-time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work-time figures are to be shown for each level. 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 (including all necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance 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 maintenance
O	Unit maintenance
F	Direct support maintenance
L	Specialized Repair Activity (SRA)
H	General support maintenance
D	Depot maintenance

e. **Column 5, Tools and Test Equipment Reference Code.** Column 5 specifies, by code, those common tool sets (not individual tools), common TMDE, and special tools, special TMDE, and special support equipment required to perform the designated function. Codes are keyed to tools and test equipment in Section III.

f. **Column 6, Remarks.** When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks contained in Section IV.

B-4 **EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III**.

a. **Column 1, Reference Code.** The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. **Column 2, Maintenance Level.** The lowest level of maintenance authorized to use the tool or test equipment.

c. **Column 3, Nomenclature.** Name or identification of the tool or test equipment.

d. **Column 4, National Stock Number.** The National Stock Number of the tool or equipment.

e. **Column 5, Tool Number.** The manufacturer's part number, model number, or type number.

B-5 **EXPLANATION OF COLUMNS IN REMARKS, SECTION IV**.

a. **Column 1, Remarks Code.** The code recorded in column 6, Section II.

b. **Column 2, Remarks.** This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

SECTION II. MAINTENANCE ALLOCATION CHART

ALARM, CHEMICAL AGENT, AUTOMATIC: M22

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
00	ALARM, CHEMICAL AGENT, AUTOMATIC: M22	INSPECT	0.10						
		SERVICE	0.20						
		REMOVE/ INSTALL	0.25						
		REPAIR	0.10						F
01	DETECTOR UNIT, CHEMICAL AGENT AUTOMATIC ALARM: M88	INSPECT	0.10						C
		SERVICE	0.10						B,C,D
		TEST	0.10						A
		TEST		0.10					A,G,H
		TEST			0.5			4,6,19,20	A,G,I
		REMOVE/ INSTALL		0.02					
		REPLACE		0.11				1,18	
		REPAIR		0.10				1,18,5	
		REPAIR			0.5			2,7,8,15 ,18	J
0101	MODULE ASSEMBLY	REPLACE			0.5			2,7,8	
		TEST			0.75			4,20,21	A,G
		REPAIR			0.25			3,7,8,10,14,16	J
		TEST					1.0		K
		REPAIR					4.0		K
010101	PROCESSOR PCB ASSEMBLY	REPLACE					0.25	8,10	
		TEST					1.0		K
		REPAIR					4.0		K
0102	CASE ASSEMBLY	REMOVE/ INSTALL			0.5			2,7,8	G
		TEST			0.25			4,20	J
		REPAIR			0.25			2,3,7,8,9,10,11,12, 13, 14,15,16, 17	

ALARM, CHEMICAL AGENT, AUTOMATIC: M22 (Continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
02	BATTERY BOX ASSEMBLY	INSPECT	0.05						C
		SERVICE	0.05						B,C
		REMOVE/ INSTALL	0.05						
		REPLACE		0.05					
		REPAIR		0.15				1	F
03	TRANSIT CASE ASSEMBLY	INSPECT	0.02						C
		SERVICE	0.10						B,C
		REPLACE		0.05					
		REPAIR		0.02					F

POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM: M28

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
00	POWER SUPPLY ASSEMBLY	INSPECT	0.05	0.05					C
		SERVICE							B,C
		REMOVE/ INSTALL		0.10					
		TEST		0.10				4	G
		REPLACE		0.05					
		REPAIR		0.05					F

MOUNTING KIT, CHEMICAL AGENT ALARM: M281

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
00	MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM: M281	REMOVE/ INSTALL		0.25				1	
		REPAIR		0.15				1	F
01	M88 VEHICLE MOUNT ASSEMBLY	INSPECT	0.03						C
		SERVICE	0.03						B,C
		REPLACE		0.15				1	
		REPAIR		0.30				1	F
0101	JUNCTION BOX ASSEMBLY	REPLACE		0.30				1	
		TEST		0.15				4	G
		REPAIR		0.10				1	F
02	BASE, CHASSIS M42 MOUNT	INSPECT	0.02						C
		SERVICE	0.02						B,C
		REPLACE		0.10				1	
		REPAIR		0.15				1	F

ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment Ref Code	(6) Remarks Code
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
00	ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42	INSPECT	0.10						C
		SERVICE	0.10						B,C,E
		TEST	0.10						A
		TEST		0.10				1,4	A,G
		TEST			0.20			2,3,4	A,G
		REPLACE		0.10					
		REPAIR	0.10						F
		REPAIR		0.10				1	F
		REPAIR			0.10			2	J
01	PANEL ASSEMBLY	REMOVE/ INSTALL		0.05				1	
		REPAIR		0.10				1	F
		REPAIR			0.15			2	J

SECTION III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

ALARM, CHEMICAL AGENT, AUTOMATIC: M22
POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM: M28
MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM: M281
ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	O	TOOL KIT, ELECTRONIC, TK-101/G	5180-00-064-5178	PPL964 (80063)
2	F	TOOL KIT, ELECTRONIC, TK-105/G	5180-00-610-8177	PPL927 (80063)
4	O,F	DIGITAL MULTIMETER	6625-01-139-2512	AN/PSM-45A (8005) OR EQUIVALENT
5	O,F	RADIAC METER	5860-01-396-6223	ADM-300 (U6807)
6	O,F	RADIAC SET	6665-00-211-6895	AN/PDR-27 OR EQUIVALENT
7	F	SCREWDRIVER SET, TORQUE-LIMITING	5120-00-832-6224	
8	F	SCREWDRIVER SET, STD AND METRIC		TMT-7331
9	F	SCREWDRIVER HEAD, ADJ OFFSET		TMT-AG891
10	F	SCREWDRIVER BIT, POZIDRIVE #1		4F467
11	F	SOCKET, DEEP, 7/8“ (MOD)		36-1636
12	F	SOCKET, DEEP, 1/4“ (MOD)		36-1639
13	F	SPANNER, BOX-TYPE, 1-1/2“ (MOD)		36-1635
14	F	SOCKET ADAPTER, 1/4“ TO 3/8 “ DRIVE	5120-00-224-9219	
15	F	SOCKET, DEEP, 12MM, 3/8” DR.	5120-01-112-8314	
16	F	SOCKET, DEEP, 17MM, 3/8” DR.	5120-01-117-7151	
17	F	SOCKET, 5.5MM, 1/4” DR.	5120-01-112-0577	
18	O	KEY SET, METRIC SOCKET HEAD SCREW	5120-01-046-5079	B18.3.2M (80204)
19	F	CONFIDENCE SAMPLE	6665-01-382-7081	
20	F	POWER SUPPLY ASSEMBLY	5340-01-M26-4586	0614-2315
21	F	BUBBLE FLOWMETER		TBD

SECTION IV. REMARKS

ALARM, CHEMICAL AGENT, AUTOMATIC: M22
POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM: M28
MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM: M281
ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42

REMARKS CODE	REMARKS
A	USE BUILT-IN TEST
B	CLEAN EXTERNAL SURFACES
C	PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)
D	REPLACE LITHIUM BATTERY (BA-5590/U)
E	REPLACE ALKALINE “D” BATTERIES (BA-3030/U)
F	REPAIR BY REMOVING AND REPLACING REPAIR PARTS IN APPENDIX “F” RPSTL
G	PERFORM VOLTAGE/ CONTINUITY CHECKS
H	AIR FORCE, MARINE CORPS AND NAVY WIPE TEST AT UNIT
I	ARMY WIPE TEST IS PERFORMED AT DIRECT SUPPORT USING TB 3-6665-321-30&P UNTIL IT IS SUPERSEDED BY TM 3-6665-321-30&P
J	REPAIR BY REMOVING AND REPLACING REPAIR PARTS IN TM 3-6665-321-30&P RPSTL
K	RETURN TO MANUFACTURER FOR TEST AND REPAIR
L	AIR FORCE, MARINE CORPS, AND NAVY WIPE TEST AT UNIT
M	ARMY WIPE TEST AT DIRECT SUPPORT

Appendix C
OPERATOR AND UNIT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST

SECTION I. INTRODUCTION

C-1 **SCOPE**.

This RPSTL 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 operator and unit maintenance of the ALARM, CHEMICAL AGENT, AUTOMATIC: M22. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

C-2 **GENERAL**.

In addition to Section I, Introduction, 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. This 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. Sending units, brackets, filters, and bolts shall be listed with the component they mount on. Bulk materials are listed by item name in the Group 99 Bulk Materials Table at the end of this appendix. Repair parts kits are listed separately in their own functional group within Section II. Items listed are shown on the associated illustration.

b. Section III - Special Tools List. Not Applicable.

c. Section IV - Cross-Reference Indexes. There are two cross-reference indexes in this RPSTL: the National Stock Number Index and the Part Number Index. The National Stock Number Index refers you to the figure and item number. The Part Number Index refers you to the figure and item number. The figure and item number index lists figure and item numbers in alpha/numeric sequence and cross-references NSN, CAGEC, and part number.

C-3 **EXPLANATION OF COLUMNS (SECTIONS II AND III)**.

a. ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration.

b. SMR CODE (Column (2)). The source, maintenance, and recoverability (SMR) code containing supply/requisitioning information, maintenance level authorization criteria, and disposition instruction, as shown in the following breakout:

C-3 **EXPLANATION OF COLUMNS (SECTIONS II AND III)**. (Continued)

Source Code	Maintenance Code		Recoverability Code
XX	¾ ¾¾¾¾¾ XX ¾¾¾¾¾ ¾		X
1st two positions	3rd position	4th position	5th position
How you get an item	Who can install, replace or use the item	Who can do complete repair* on the item	Who determined disposition action on an item

* 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. Explanations of source codes follow:

Source Code	Application/Explanation
PA PB PC PD PE PF PG	Stock items; use the applicable NSN to requisition/request items with these source codes. they are authorized to the level indicated by the code entered in the 3rd position of the SMR code. * * NOTE: Items coded PC are subject to deterioration.
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 level indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.
MO-Made at unit/ AVUM level MF-Made at DS AVIM level MH-Made at GS level ML-Made at SRA MD-Made at Depot	Items with these codes are not to be requisitioned/requested individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the bulk material group of the repair parts list of the RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at higher level, order the item from the higher level of maintenance.
AO-Assembled by unit/AVUM level AC-Assembled by DS/AVIM level AH-Assembled by FS level AL-Assembled by SRA 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 level of maintenance indicated by the source code. If the 3rd position of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.

C-3 **EXPLANATION OF COLUMNS (SECTIONS II AND III)**. (Continued)

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

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

XC - Installation drawing, diagrams, instruction sheet, field service drawing; identified by manufacturer's part number.

XD - Item is not stocked. Order an XD-coded item through normal supply channels using the CAGEC 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 750-1.

(2) Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third position of the SMR code as follows:

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

Maintenance Code	Application/Explanation
C -	Crew or operator maintenance done within unit/AVUM maintenance.
O -	Unit level/AVUM maintenance can remove, replace, and use the item.
F -	Direct support/AVIM maintenance can remove, replace, and use the item.
H -	General support maintenance can remove, replace, and use the item.
L -	Specialized repair activity can remove, replace, and use the item.
D -	Depot 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 repaired and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions).

NOTE

Some limited repair may be done on the item at a lower level of maintenance, if authorized by the MAC and SMR codes.

C-3 **EXPLANATION OF COLUMNS (SECTIONS II AND III)**. (Continued)

Maintenance Code	Application/Explanation
O -	Unit/AVUM is the lowest level that can do complete repair of the item.
F -	Direct support/AVIM is the lowest level that can do complete repair of the item.
H -	General support is the lowest level that can do complete repair of the item.
L -	Specialized repair activity is the lowest level that can do complete repair of the item.
D -	Depot is the lowest level 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 maintenance of "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 shown in the fifth position of the SMR code as follows:

Recoverability Code	Application/Explanation
Z -	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the 3rd position of the SMR code.
O -	Reparable item. When uneconomically reparable, condemn and dispose of the item at the unit or aviation unit level.
F -	Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support or aviation intermediate level.
H -	Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support level.
D -	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item are not authorized below depot level.
L -	Reparable item. Condemnation and disposal not authorized below specialized repair activity (SRA).
A -	Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

C-3 **EXPLANATION OF COLUMNS (SECTIONS II AND III)**. (Continued)

c. NSN (Column (3)). The National stock number for the item is listed in this column.

d. CAGEC (COLUMN (4)). The commercial and Government entity code (CAGEC) is a 5-digit code which is used to identify the manufacturer, distributor, or Government agency/activity 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 number listed.

f. DESCRIPTION AND USABLE ON CODE (UOC) (column (6)). This column includes the following information:

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

(2) Part numbers of bulk materials are referenced in this column in the line entry to be manufactured/fabricated.

(3) The statement "END OF FIGURE" appears just below the last item description in column (6) for a given figure in both Sections II and III.

g. QTY (Column (7)). The QTY (quantity per figure) column 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 instead of a quantity indicates that the quantity is variable and the quantity may vary from application to application.

C-4 **EXPLANATION OF INDEX FORMAT AND COLUMNS (SECTION IV)**.

a. National Stock Number (NSN) Index.

(1) STOCK NUMBER Column. This column lists the NSN in national item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN.

NSN (e.g., 5385-01-574-1476) NIIN	When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

(2) FIG. Column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in Section II and Section III.

(3) ITEM Column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

C-4 **EXPLANATION OF INDEX FORMAT AND COLUMNS (SECTION IV)**. (Continued)

b. PART NUMBER INDEX. Part numbers in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

(1) CAGEC NUMBER Column. The Commercial and Government Entity Code (CAGEC) is a 5 digit numeric code used to identify the manufacturer, distributor, or Government agency, etc. that supplies the item.

(2) PART NUMBER Column. Indicates the part number assigned to the item.

(3) FIG. Column. This column lists the number of the figure where the item is identified/located in Sections II and III.

(4) ITEM Column. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

(5) STOCK NUMBER Column. This column lists the NSN for the associated part number and manufacturer identified in the PART NUMBER and CAGEC columns to the left.

REFERENCE DESIGNATOR INDEX. (Include as applicable.) Reference designators in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combination which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

(1) STOCK NUMBER Column. This column lists the NSN for the associated part number and manufacturer identified in the PART NUMBER and CAGEC Columns to the left.

(2) FIG. Column. This column lists the number of the figure where the item is identified/located in Section II or III.

(3) ITEM Column. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

C-5 **SPECIAL INFORMATION**.

a. Fabrication Instructions. Bulk materials required to manufacture items are listed in the bulk material functional group of this RPSTL. Part numbers for bulk material are also referenced in the Description Column of the line item entry for the item to be manufactured/fabricated. Detailed fabrication instructions for items source coded to be manufactured or fabricated are found in Appendix G.

b. Index Numbers. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the national stock number/part number index and the bulk material list in Section II.

C-6 **HOW TO LOCATE REPAIR PARTS**.

a. When National Stock Numbers or Part Numbers Are Not Known.

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

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

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

(4) Fourth. Look in the repair parts list for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

b. When National Stock Number or Part Number Is Known.

(1) First. If you have the national stock number, look in the STOCK NUMBER column of the National Stock Number Index. The NSN is arranged in national item identification number (NIIN) sequence. (See paragraph 4a.) Note the figure and item number next to the NSN.

(2) Second. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

(3) Third. Identify the item on the figure and use the figure and Item number to find the NSN.

NOTE

If you have the part number, look in the PART NUMBER column of the part number index. Identify the figure and item number, look up the item on the figure in Section II.

c. When Reference Designator Is Known.

(1) First. If you know the reference designator, look in the REFERENCE DESIGNATOR column of the reference designator index. Note the figure and item number.

(2) Second. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

SECTION II. REPAIR PARTS LIST

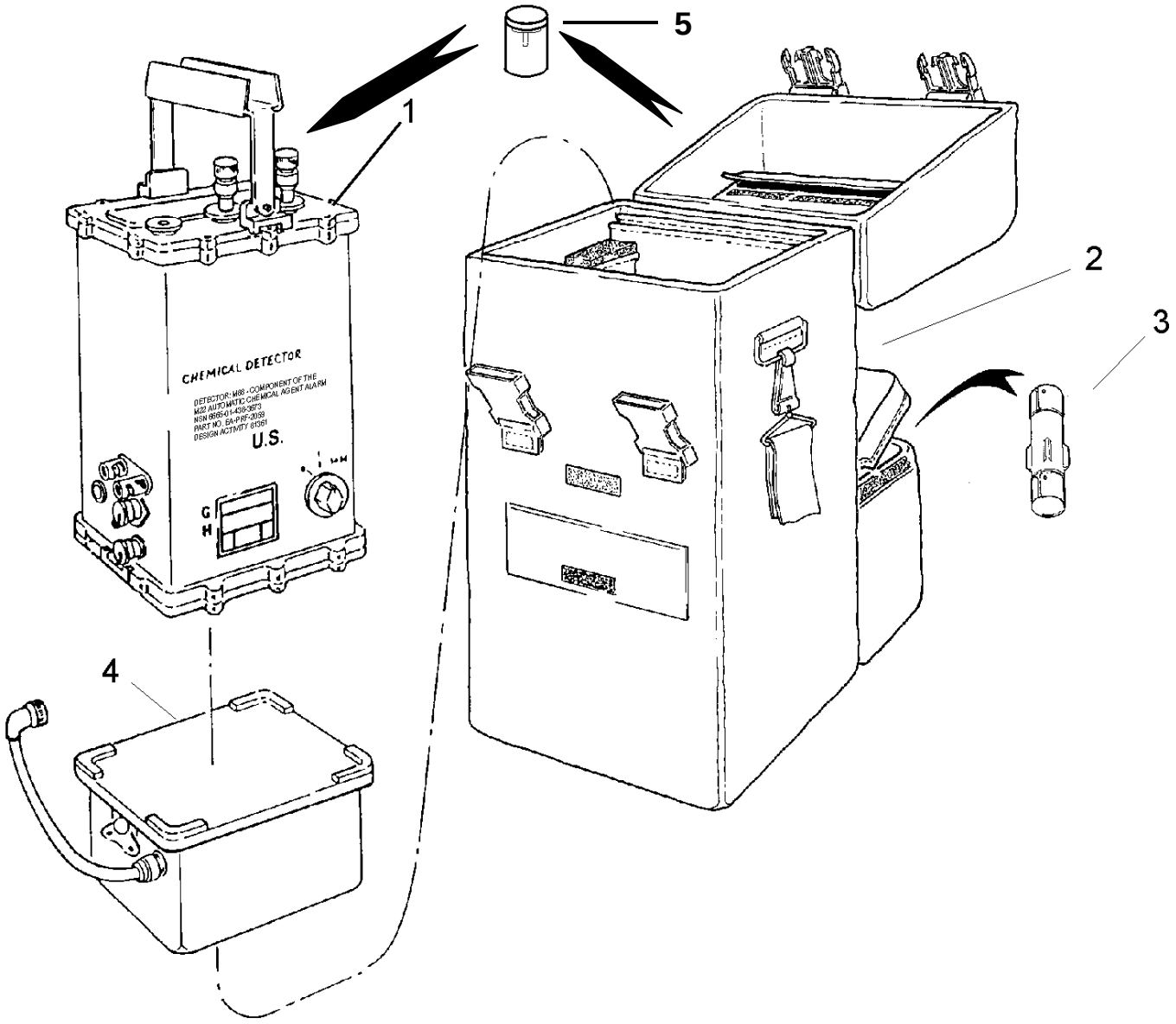


Figure C-1. Alarm, Chemical Agent, Automatic: M22

GROUP 00
ALARM, CHEMICAL AGENT, AUTOMATIC: M22

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	PAODA	6665-01-438-3673	81361	EA-PRF-2059	DETECTOR UNIT, CHEMICAL AGENT AUTOMATIC:M88	1
2	PAOOO	6665-01-448-6483	81361	EA-PRF-2067	TRANSIT CASE	1
3	PAOZZ	6665-01-456-7138	81361	EA-PRF-2064	CONFIDENCE SAMPLE	1
4	PAOOO	6160-01-456-2544	81361	EA-PRF-2063	BATTERY BOX	1
5	PAOZZ	5340-01-454-6323	81361	5-15-18985	CAP, PROTECTIVE, DUST AND MOISTURE SEAL	2

END OF FIGURE

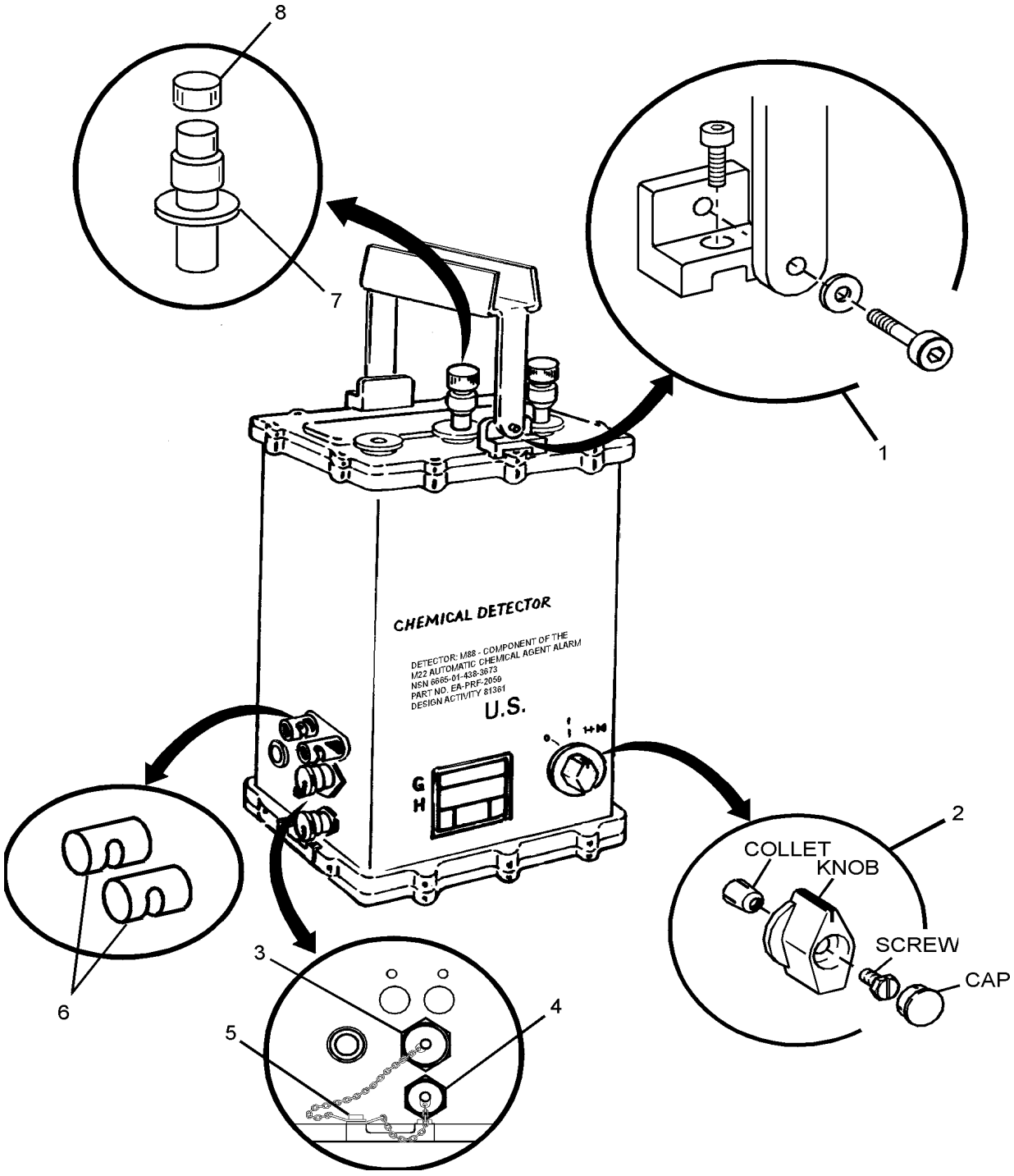


Figure C-2. Detector Unit, Chemical Agent, Automatic: M88

GROUP 01
DETECTOR UNIT, CHEMICAL AGENT, AUTOMATIC: M88

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	PAOZZ	6665-01-456-8215	81361	EA-PRF-2148	HANDLE, CARRYING	1
2	PAOZZ	5355-01-456-1658	81361	5-15-18986	KNOB	1
3	PAOZZ	5935-00-813-4081	77820	10-101960-123	COVER, ELECTRICAL	1
4	PAOZZ	5935-00-786-8506	77820	10-102960-83	COVER, ELECTRICAL	1
5	XDOZZ		4S332	5000-6224N	SCREW, SOCKET	1
6	PAOZZ	5999-00-869-6263	80063	SCC76202-1	CAP, ELECTRICAL	2
7	PACZZ	6665-01-448-6484	81361	EA-PRF-2065	INLET NOZZLE ASSEMBLY	1
8	PACZZ	5340-01-454-6322	81361	5-15-18984	CAP, PROTECTIVE, DUST AND MOISTURE SEAL	2

END OF FIGURE

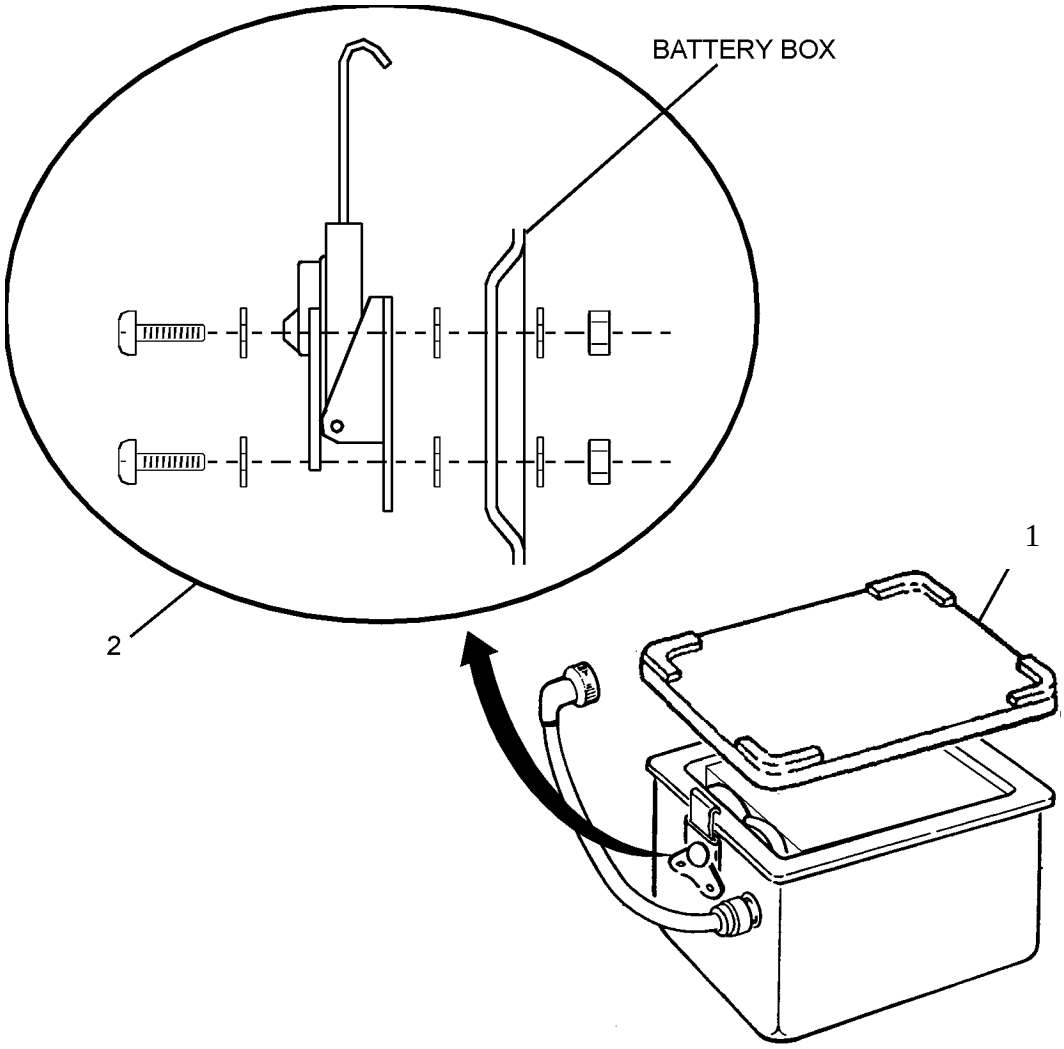


Figure C-3. Battery Box

GROUP 02
BATTERY BOX

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	PAOZZ	6160-01-456-2547	81361	EA-PRF-2068	COVER, BATTERY BOX	1
2	PAOZZ	5340-01-456-9109	81361	EA-PRF-3130	LATCH, RIM	1

END OF FIGURE

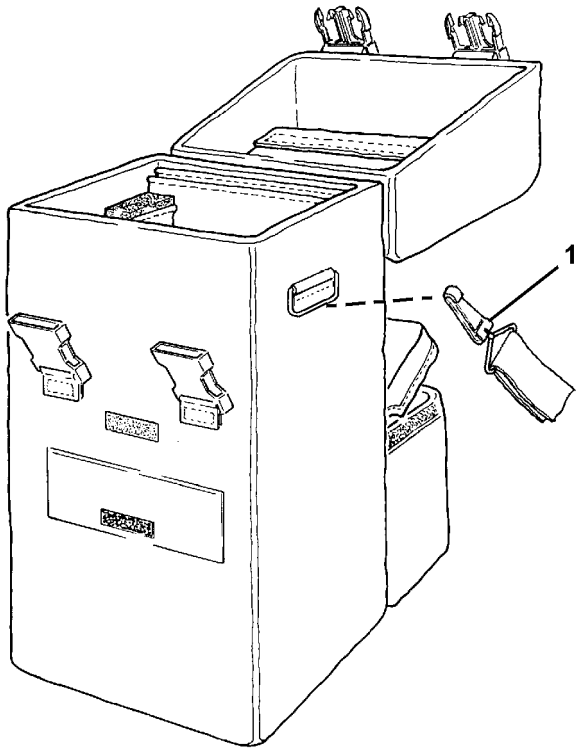


Figure C-4. Transit Case Assembly

GROUP 03
TRANSIT CASE ASSEMBLY

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	PAOZZ	6665-01-457-3923	81361	5-15-18987	SLING BAG AND CASE.....	1
					END OF FIGURE	

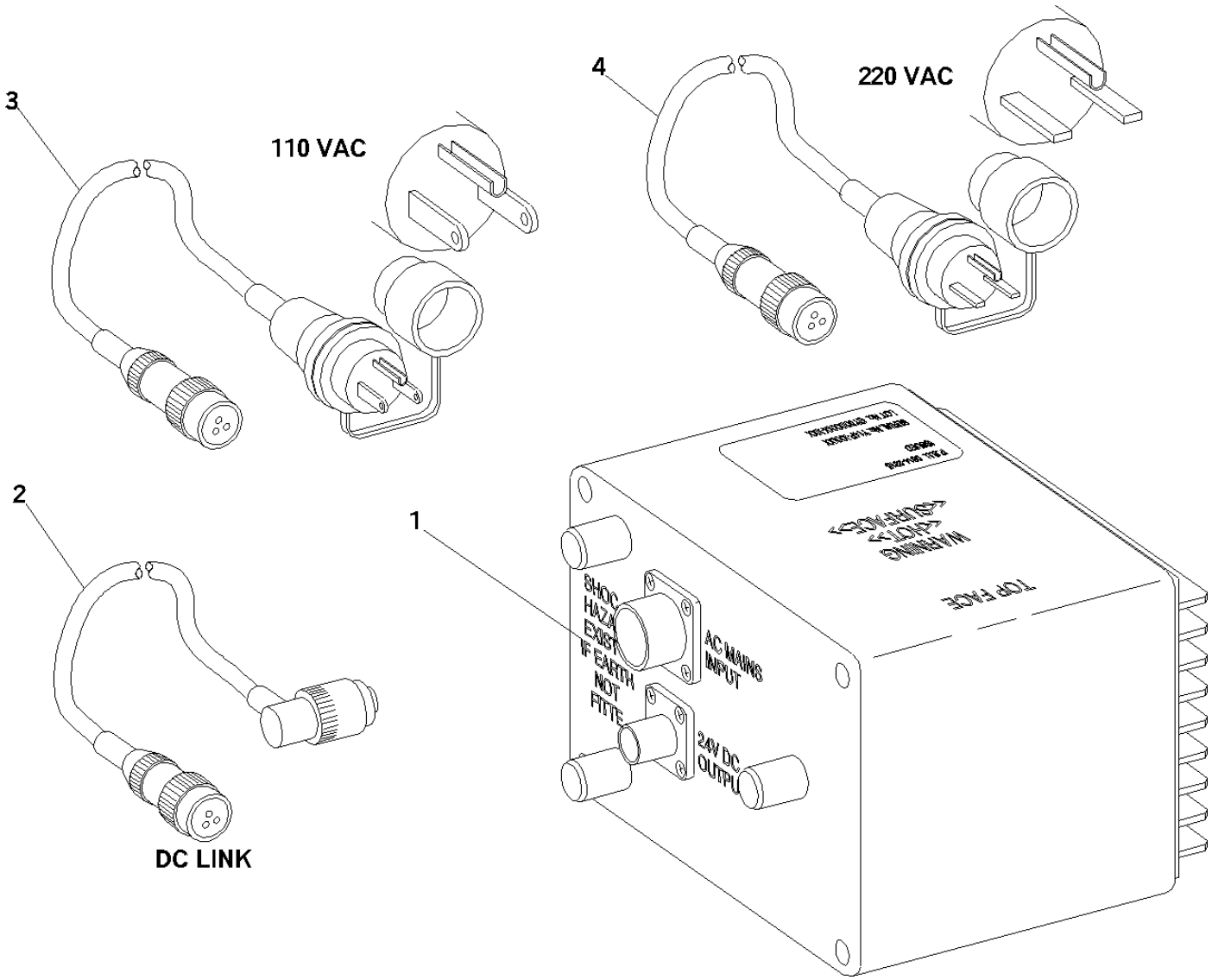


Figure C-5. Power Supply, Chemical Agent Automatic Alarm: M28

GROUP 00
POWER SUPPLY, CHEMICAL AGENT AUTOMATIC ALARM: M28

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	XA0ZA				POWER SUPPLY ASSEMBLY	1
2	PAOZZ	6150-01-456-2545	81361	5-15-18991	CABLE ASSY, POWER D.C.....	1
3	PAOZZ	6150-01-456-2548	81361	5-15-18998	CABLE ASSY, POWER, A.C. (110V).....	1
4	PAOZZ	6150-01-456-2546	81361	5-15-19000	CABLE ASSY, POWER, A.C. (220V)	1

END OF FIGURE

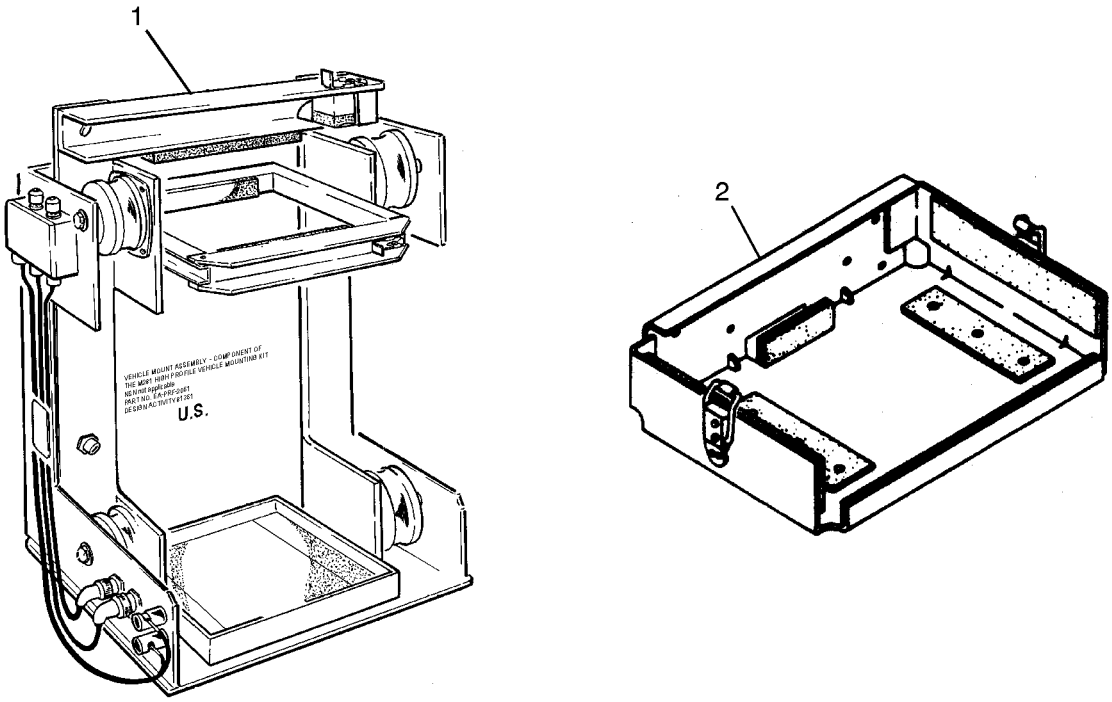


Figure C-6. Mounting kit, Chemical Agent Automatic Alarm: M281

GROUP 00
MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM: M281

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	XAOOO				VEHICLE MOUNT	1
2	PAOOO	5895-00-136-7182	81361	D5-15-5490	BASE, CHASSIS	1
					END OF FIGURE	

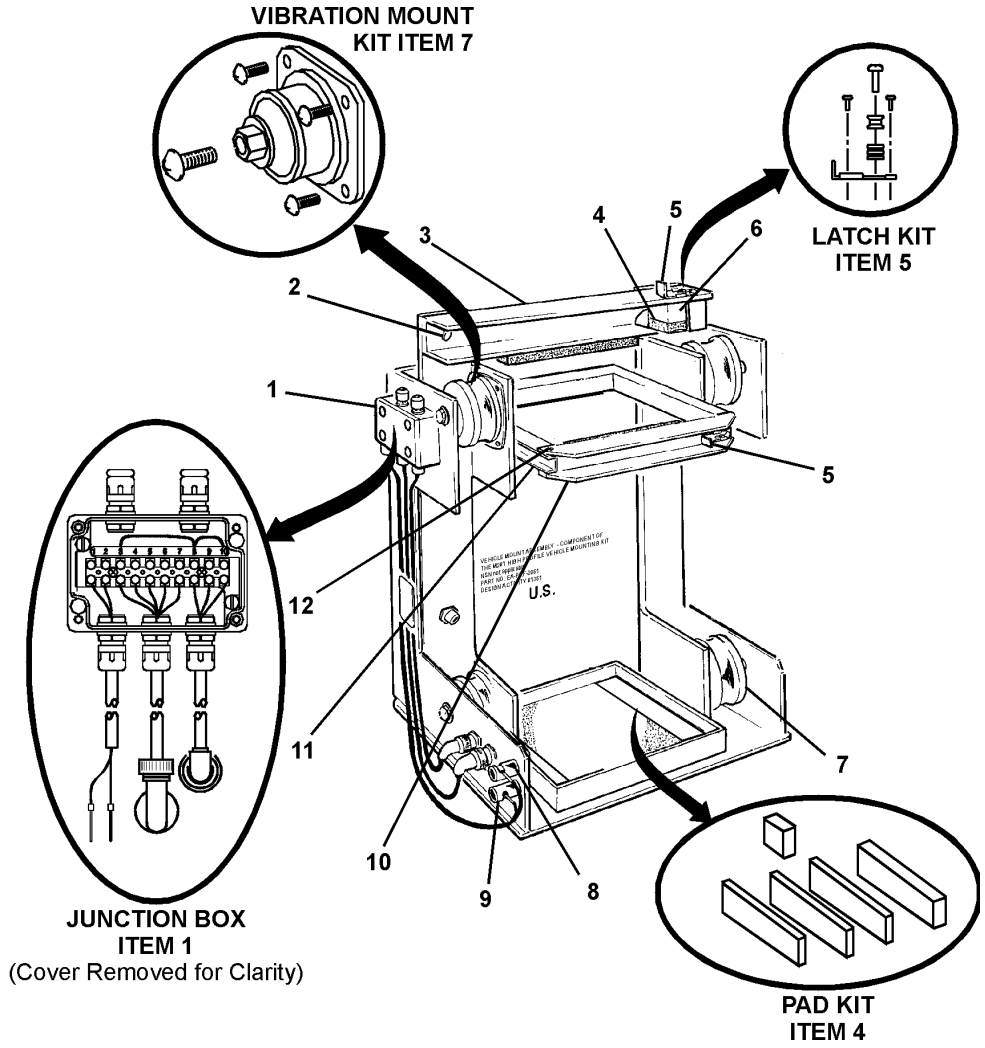


Figure C-7. Vehicle Mount Assembly

GROUP 01
VEHICLE MOUNT ASSEMBLY

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	PAOOO	5975-01-448-8894	81361	5-15-18999	JUNCTION BOX	1
2	PAOZZ	5315-01-455-3172	81361	5-15-18994-2	PIN, SHOULDER HEAD (TOP).....	1
3	PAOZZ	5340-01-456-4518	81361	5-15-18993	COVER, ACCESS (TOP)	1
4	PAOZZ	5340-01-456-2543	81361	5-15-18983	PAD, CUSHIONING	1
5	PAOZZ	5325-01-456-4525	81361	5-15-18982	LATCH GUIDE, SNAPSLIDE.....	2
7	PAOZZ	5342-01-457-0171	81361	EA-PRF-2066	MOUNT, RESILENT	1
8	PAOZZ	5940-00-937-5237	81349	PB08NA01	BINDING POST, ELECTRICAL	2
9	PAOZZ	5999-00-869-6263	80063	SC-C76202-1	CAP, ELECTRICAL	2
10	PAOZZ	5340-01-456-4519	81361	5-15-18992	COVER, ACCESS (FRONT)	1
11	PAOZZ	5325-01-456-5347	81361	5-15-18997	FASTENER, SNAPSLIDE.....	2
12	PAOZZ	5315-01-455-3171	81361	5-15-18994-1	PIN, SHOULDER, HEAD (FRONT)	1

END OF FIGURE

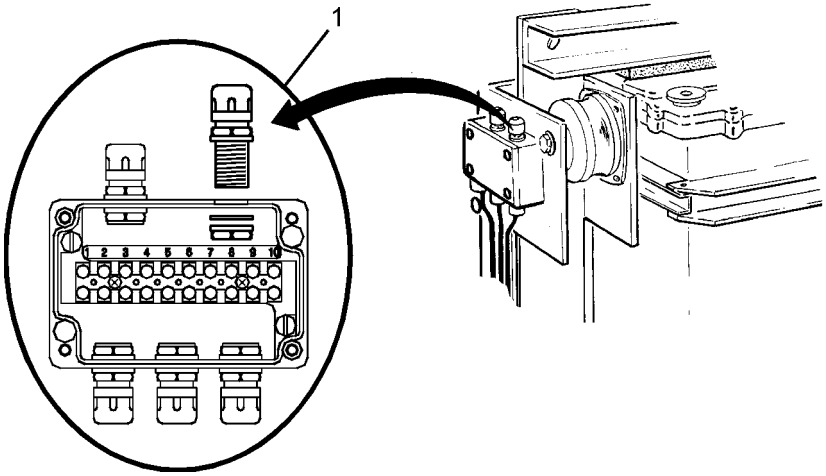


Figure C-8. Junction Box

GROUP 0101
JUNCTION BOX

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	PAOZZ	5975-01-456-4520	81361	5-15-19002	STUFFING TUBE.....	5
					END OF FIGURE	

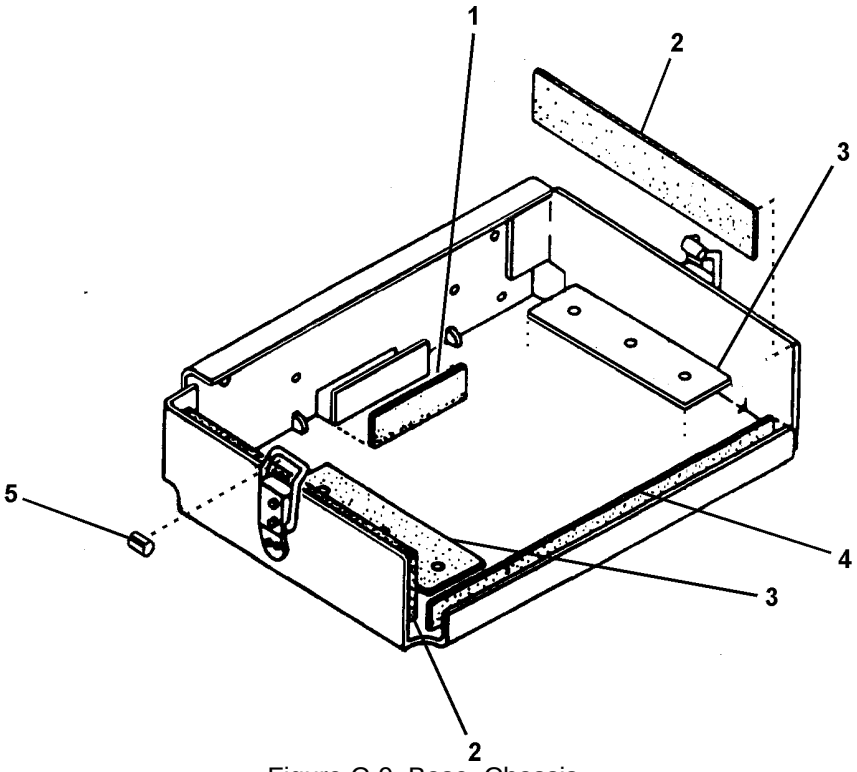
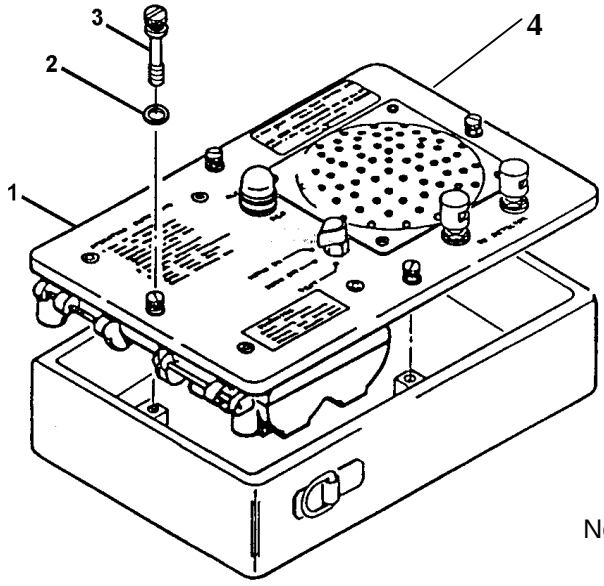


Figure C-9. Base, Chassis

GROUP 02
BASE, CHASSIS

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	MOOZZ		81361	C5-15-5511-3	LINER, MAKE FROM RUBBER SHEET MIL-R-3065, TYPE S C1 SC7158	1
2	MOOZZ		81361	C5-15-5511-2	LINER, MAKE FROM RUBBER SHEET MIL-R-3065, TYPE S C1 SC7158	2
3	MOOZZ		81361	C5-15-5506	PAD, RUBBER, MAKE FROM RUBBER SHEET MIL-R-3065, TYPE S C1 SC7158	2
4	MOOZZ		81361	C5-15-5511-1	LINER, MAKE FROM RUBBER SHEET MIL-R-3065, TYPE S C1 SC7158	1
5	MOOZZ		81361	C5-15-5512	INSULATOR, MAKE FROM RUBBER TUBING,MIL-R-3065, TYPE S C1 SC7158	2
					END OF FIGURE	



NOTE

No further disassembly authorized.

Figure C-10. Alarm Unit, Chemical Agent Automatic Alarm: ABCA-M42

GROUP 00
ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABCA-M42

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	XAOFF		81361	E5-15-4819	PANEL, ASSEMBLY	1
2	PAOZZ	5330-01-173-1387	80205	NAS1523AA08Y	PACKING WITH RETAIN	4
3	PAOZZ	5305-00-462-0206	81361	C5-15-4794	SCREW, EXTERNALLY RETAININGV	4
4	PAFZZ	6665-00-133-0688	81361	D5-15-4824	HOUSING, CHEMICAL AG	1
					END OF FIGURE	

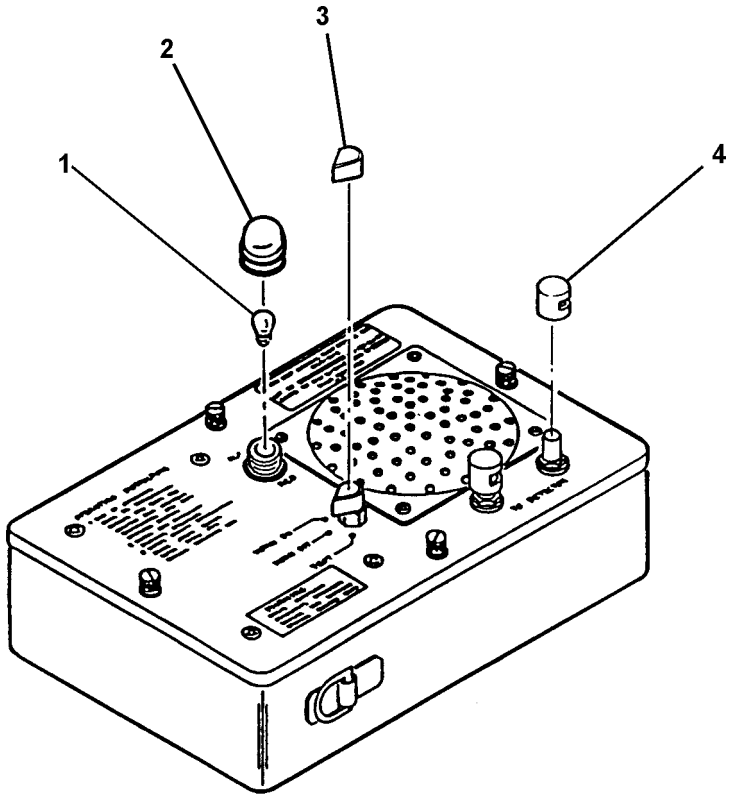


Figure C-11. Panel Assembly

GROUP 01
PANEL ASSEMBLY

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	PAOZZ	6240-00-155-8706	42498	NPL47	LAMP, INCANDESCENT	1
2	PAOZZ	6210-01-098-3886	83330	125-1191-403	LENS, LIGHT	1
3	PAOZZ	5355-01-980-5647	96906	MS91528-OP2B	KNOB	1
4	PAOZZ	5999-00-869-6263	80063	SC-C76202-1	CAP, ELECTRICAL	2

END OF FIGURE

GROUP 99
BULK MATERIALS

(1) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION	(7) QTY
1	PAOZZ	9320-00-231-0704	81349	MIL-R-3065	RUBBER SHEET, SOLID, 1/16 IN.	V
2	PAOZZ	9320-00-435-4207	81361	C5-15-4676	RUBBER STRIP, 1/4 IN.	V
3	PAOZZ	4720-00-431-8318	81349	MIL-R-3065	RUBBER TUBING, 3/32 ID-3/16 OD	V

END OF FIGURE

SECTION III. SPECIAL TOOLS LIST

(Not Applicable)

SECTION IV. CROSS REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

(1) STOCK NUMBER	(2) FIG	(3) ITEM
4720-00-431-8318	Bulk	3
5305-00-462-0206	C-10	3
5315-01-445-3172	C-7	2
5315-01-455-3171	C-7	12
5330-01-173-1387	C-10	2
5340-01-454-6323	C-1	5
5340-01-545-6322	C-2	8
5340-01-456-2543	C-7	4
5355-01-980-5647	C-11	3
5355-01-M26-4585	C-2	2
5895-00-136-7182	C-6	2
5940-00-937-5237	C-7	8
5999-00-869-6263	C-2	6
5999-00-869-6263	C-7	9
5999-00-869-6263	C-11	4
6150-01-M26-4589	C-5	4
6150-01-M26-4590	C-5	3
6150-01-M26-4591	C-5	2
6160-01-M26-4587	C-1	4
6160-01-M26-4588	C-3	1
6210-01-098-3886	C-11	2
6240-00-155-8706	C-11	1
6665-00-133-0688	C-10	4
6665-01-438-3673	C-1	1
6665-01-448-6473	C-1	2
6665-01-448-6484	C-2	7
6665-01-M26-4582	C-1	3
6665-01-M26-4586	C-2	1
6665-01-M26-4592	C-4	1
5340-01-456-4519	C-7	10
5325-01-456-4525	C-7	5
5340-01-456-4518	C-7	3
5325-01-456-5347	C-7	11
6665-01-M26-4604	C-8	1
5342-01-457-0171	C-7	7
9320-00-231-0704	Bulk	1
9320-00-435-4207	Bulk	2

PART NUMBER INDEX

CAGEC	PART NO.	FIG	ITEM	STOCK NUMBER
U3092	0614-2549	C-7	6	NSN APPLIED FOR
83330	125-1191-403	C11	2	6210-01-098-3886
81361	5000-6224N	C-2	5	NSN APPLIED FOR
81361	5-15-18982	C-7	5	5340-01-456-4525
81361	5-15-18983	C-7	4	5340-01-456-2543
81361	5-15-18984	C-2	8	5340-01-545-6322
81361	5-15-18985	C-1	5	5340-01-454-6323
81361	5-15-18986	C-2	2	5355-01-M26-4585
81361	5-15-18987	C-4	1	6665-01-M26-4592
81361	5-15-18991	C-5	2	6150-01-M26-4591
81361	5-15-18992	C-7	10	6665-01-M26-4596
81361	5-15-18993	C-7	3	5340-01-456-4518
81361	5-15-18994-1	C-7	12	5315-01-455-3171
81361	5-15-18994-2	C-7	2	5315-01-455-3172
81361	5-15-18997	C-7	11	5325-01-456-5347
81361	5-15-18998	C-5	3	6150-01-M26-4590
81361	5-15-18999	C-7	1	5975-01-448-8894
81361	5-15-19000	C-5	4	6150-01-M26-4589
81361	5-15-19002	C-8	1	6665-01-M26-4604
81361	5-15-4676	Bulk	2	9320-00-435-4207
81361	5-15-4794	C-10	3	5305-00-462-0206
81361	5-15-4819	C-10	1	
81361	5-15-4824	C-10	4	6665-00-133-0688
81361	5-15-5490	C-6	2	5895-00-136-7182
81361	5-15-5506	C-9	3	
81361	5-15-5511-1	C-9	4	
81361	5-15-5511-2	C-9	2	
81361	5-15-5511-3	C-9	1	
81361	5-15-5512	C-9	5	
96906	62GB-738-10	C-2	3	NSN APPLIED FOR
96906	62GB-738-8	C-2	4	NSN APPLIED FOR
81361	EA-PRF-2059	C-1	1	6665-01-438-3673
81361	EA-PRF-2063	C-1	4	6160-01-M26-4587
81361	EA-PRF-2064	C-1	3	6665-01-M26-4582
81361	EA-PRF-2065	C-2	7	6665-01-448-6484
81361	EA-PRF-2067	C-1	2	6665-01-448-6473
81361	EA-PRF-2068	C-3	1	6160-01-M26-4588
81361	EA-PRF-2148	C-2	1	6665-01-M26-4586
81361	EA-PRF-3130	C-3	2	NSN APPLIED FOR
81361	EA-PRF-2066	C-7	7	5342-01-456-0171
81349	MIL-R-3065	Bulk	1	9320-00-231-0704
81349	MIL-R-3065	Bulk	3	9320-00-431-8318
96906	MS91528-OP2B	C-11	3	5355-01-980-5647
80205	NAS1523AA08Y	C-10	2	5330-01-173-1387
42498	NPL47	C-11	1	6240-00-155-8706
81349	PB08NA01	C-7	8	5940-00-937-5237
80063	SCC76202-1	C-2	6	5999-00-869-6263
80063	SCC76202-1	C-7	9	5999-00-869-6263
80063	SCC76202-1	C-11	4	5999-00-869-6263

FIGURE AND ITEM NUMBER INDEX

Figure	Item	Stock Number	CAGEC	Part Number
C-1	1	6665-01-438-3673	81361	EA-PRF-2059
C-1	2	6665-01-448-6473	81361	EA-PRF-2067
C-1	3	5340-01-M26-4582	81361	EA-PRF-2064
C-1	4	6665-01-M26-4587	81361	EA-PRF-2063
C-1	5	6665-01-M26-6323	81361	5-15-18985
C-2	1	6665-01-M26-4586	81361	EA-PRF-2148
C-2	2	5355-01-M26-4585	81361	5-15-18986
C-2	3	NSN APPLIED FOR	96906	62GB-738-10
C-2	4	NSN APPLIED FOR	96906	62GB-738-8
C-2	5	NSN APPLIED FOR	81361	5000-6224N
C-2	6	5999-00-869-6263	80063	SCC76202-1
C-2	7	6665-01-448-6484	81361	EA-PRF-2065
C-2	8	5340-01-545-6322	81361	5-15-18984
C-3	2	NSN APPLIED FOR	81361	EA-PRF-3130
C-3	1	6160-01-M26-4588	81361	EA-PRF-2068
C-4	1	6665-01-M26-4592	81361	5-15-18987
C-5	2	6150-01-M26-4591	81361	5-15-18991
C-5	3	6150-01-M26-4590	81361	5-15-18998
C-5	4	6150-01-M26-4589	81361	5-15-19000
C-6	2	5895-00-136-7182	81361	D5-15-5490
C-7	1	5974-01-448-8894	81361	5-15-18999
C-7	2	5315-01-445-3172	81361	5-15-18994-2
C-7	3	5340-01-456-4518-01-M26-4598	81361	5-15-18993
C-7	4	5340-01-456-2543	81361	5-15-18983
C-7	5	5325-01-456-4525	81361	5-15-18982
C-7	6	NSN APPLIED FOR	81361	0614-2549
C-7	7	5342-01-457-0171	81361	EA-PRF-2066
C-7	8	5940-00-937-5237	81349	PB08NA01
C-7	9	5999-00-869-6263	80063	SCC76202-1
C-7	10	5340-01-456-4519	81361	5-15-18992
C-7	11	5325-01-456-5347	81361	5-15-18997
C-7	12	5315-01-455-3171	81361	5-15-18994-1
C-8	1	6665-01-M26-4604	81361	5-15-19002
C-9	1	NA	81361	C5-15-5511-3
C-9	2	NA	81361	C5-15-5511-2
C-9	3	NA	81361	C5-15-5506
C-9	4	NA	81361	C5-15-5511-1
C-9	5	NA	81361	C5-15-5512
C-10	1	NA	81361	E5-15-4819
C-10	2	5330-01-173-1387	80205	NAS1523AA08Y
C-10	3	5305-00-462-0206	81361	C5-15-4794
C-10	4	6665-00-133-0688	81361	5-15-4794
C-11	1	6240-00-155-8706	42498	NPL47
C-11	2	6210-01-098-3886	83330	125-1191-403
C-11	3	5355-01-980-5647	96906	MS91528-OP2B
C-11	4	5999-00-869-6263	80063	SCC76202-1
Bulk	1	9320-00-231-0704	81349	MIL-R-3065
Bulk	2	9320-00-435-4207	81361	5-15-4676
Bulk	3	4720-00-431-8318	81349	MIL-R-3065

Appendix D
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

SECTION I. INTRODUCTION

D-1 **SCOPE**.

This appendix lists Components of the End Item (COEI) and Basic Issue Items (BII) for the ALARM, CHEMICAL AGENT, AUTOMATIC: M22 to help you inventory the items for safe and efficient operation of the equipment.

D-2 **GENERAL**.

The Components of End Item and Basic Issue Items are divided into the following sections.

Section II, Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the ALARM, CHEMICAL AGENT, AUTOMATIC: M22 and the auxiliary equipment used with it. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

Section III, Basic issue Items. These essential items are required to place the ALARM, CHEMICAL AGENT, AUTOMATIC: M22 in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the ALARM, CHEMICAL AGENT, AUTOMATIC: M22 during operation and when it is transferred between property accounts. This list is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

D-3 **EXPLANATION OF COLUMNS**.

Column (1), Illus Number. Gives you the number of the item illustrated.

Column (2), National Stock Number. Identifies the stock number of the item to be used for requisitioning purposes.

Column (3), Description, Cage, Part Number, and Usable On Code. Identifies the Federal name (in all capital letters) followed by a minimum description when needed. The last line below the description is the Commercial and Government Entity Code (CAGEC) (in parentheses) and the part number. Usable on Code not applicable.

Column (4), U/I (Unit of issue). Indicates how the item is issued for the National Stock Number shown on column two.

Column (5), Qty Rqd. Indicates the quantity required.

SECTION II. COMPONENTS OF END ITEM (COEI)

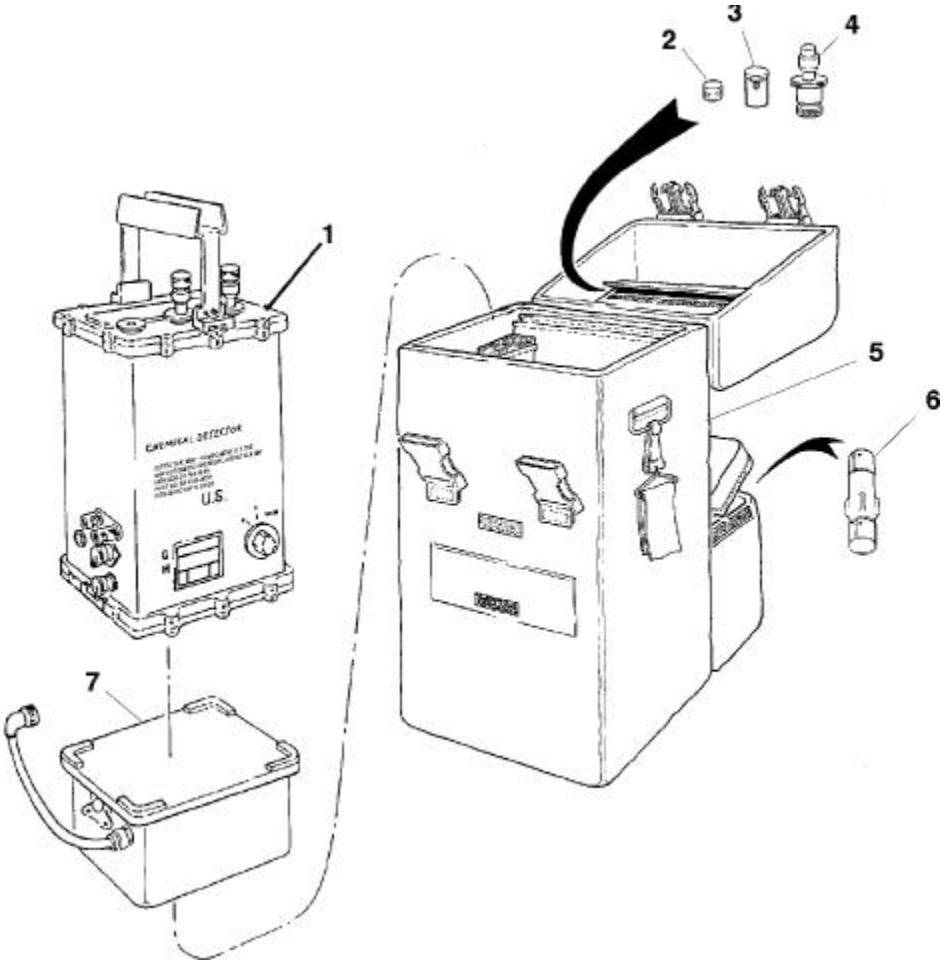


Figure D-1. M22 Alarm Components of End Item (COEI)

Table D-1. M22 Automatic Alarm Components of End Item (COEI) List

(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number Usable On Code	(4) U/I	(5) Qty Rqd
1	6665-01-438-3673	DETECTOR UNIT, CHEMICAL AGENT AUTOMATIC ALARM: M88 (81361) EA-PRF-2059	EA	1
3	5340-01-454-6323	CAP, PROTECTIVE , DUST AND MOISTURE SEAL (RAIN CAP) (81361) 5-15-18985	EA	2
5	6665-01-448-6483	TRANSIT CASE ASSEMBLY (81361) EA-PRF-2067	EA	1
6	6665-01-456-7138	CONFIDENCE SAMPLE (81361) EA-PRF-2064	EA	1
7	6160-01-456-2544	BATTERY BOX (81361) EA-PRF-2063	EA	1
		ONBOARD SPARES		
4	6665-01-448-6484	INLET NOZZLE ASSEMBLY (81361) EA-PRF-2065	EA	1
2	5340-01-454-6322	CAP, PROTECTIVE, DUST AND MOISTURE SEAL (PROTECTIVE CAPS) (81361) 5-15-18984	PK	6

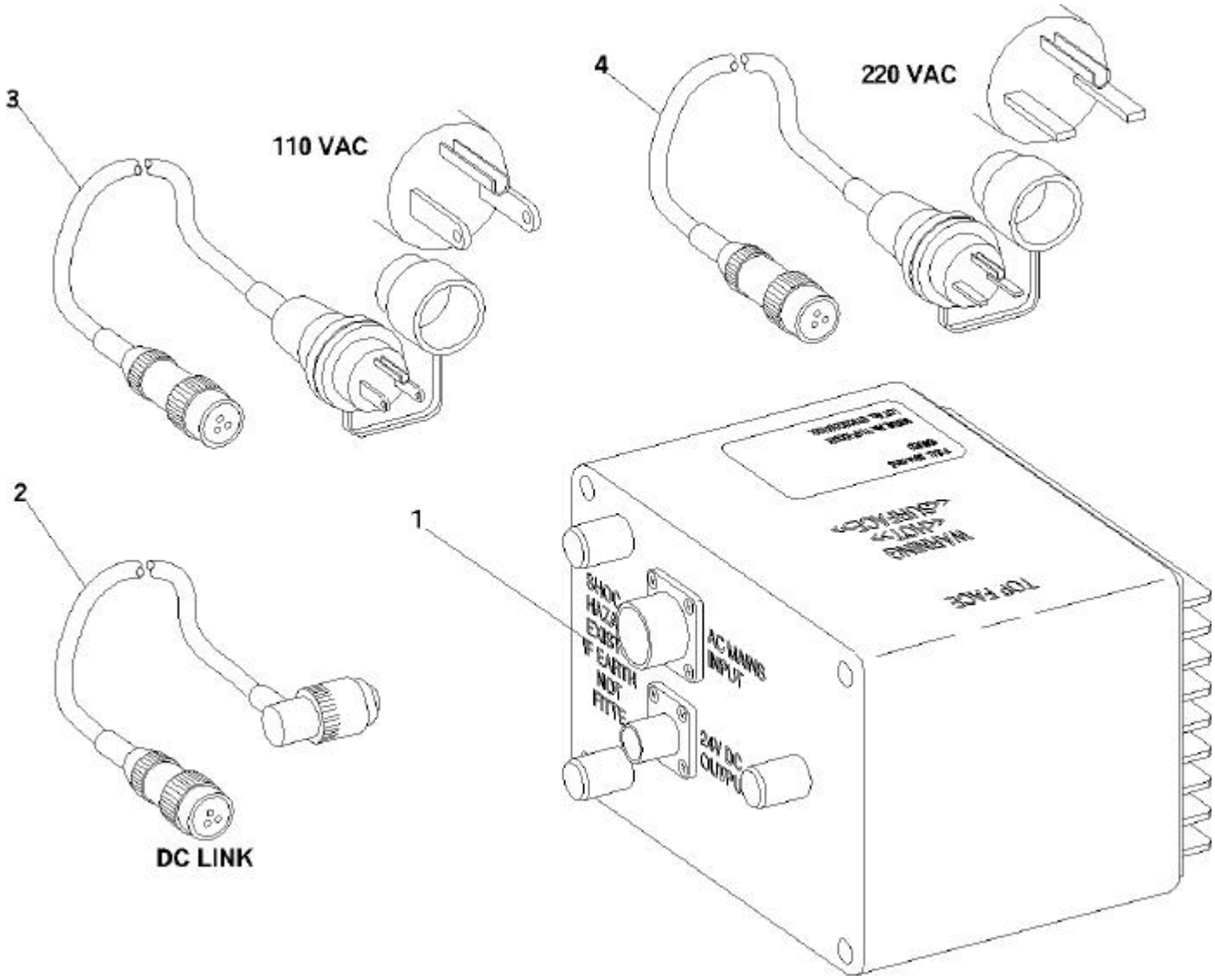


Figure D-2. M28 Power Supply Components of End Item (COEI)

Table D-2. M28 Power Supply Components of End Item (COEI) List

(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable On Code	(4) U/I	(5) Qty Rqd
1		POWER SUPPLY ASSEMBLY		EA	1
2	6150-01-456-2545	CABLE ASSEMBLY, POWER, D.C. (81361) 5-15-18991		EA	1
3	6150-01-456-2548	CABLE ASSEMBLY, POWER, A.C., 110V (81361) 5-15-18998		EA	1
4	6150-01-456-2546	CABLE ASSEMBLY, POWER, A.C., 220V (81361) 5-15-19000		EA	1

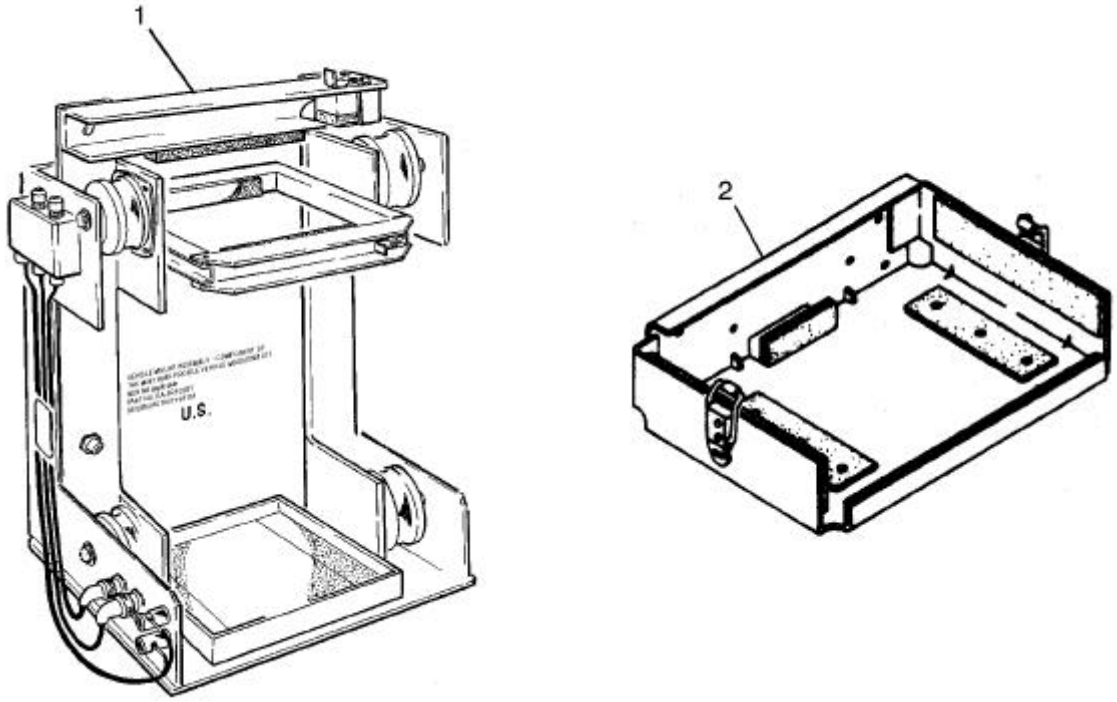


Figure D-3. M281 Mounting Kit Components of End Item (COEI)

Table D-3. M281Mounting Kit Components of End Item (COEI) List

(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable On Code	(4) U/I	(5) Qty Rqd
1		VEHICLE MOUNT		EA	1
2	5895-00-136-7182	BASE, CHASSIS (81361) D5-15-5490		EA	1

SECTION III. BASIC ISSUE ITEMS (BII)

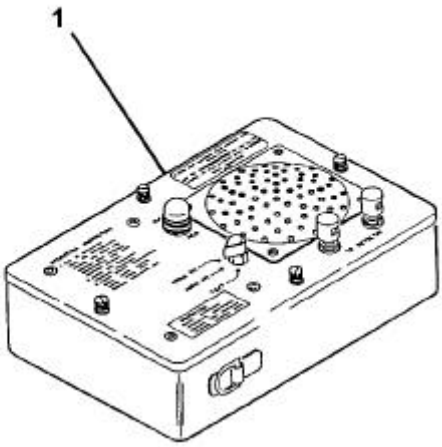


Figure D-4. Basic Issue Items (BII)

Table D-4. Basic Issue Items (BII) List

(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable On Code	(4) U/I	(5) Qty Rqd
1	6665-00-859-2215	ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABC M42 (81361) D5-15-4826		EA	1
2		OPERATOR'S AND UNIT MAINTENANCE MANUAL (81361) TM 3-6665-321-12&P, TO 11H2-23-1, TM 10434A-12&P, and EE168-DB-OMP-010		EA	1

Appendix E
ADDITIONAL AUTHORIZATION LIST

SECTION I. INTRODUCTION

E-1 **SCOPE**.

This appendix lists additional items you are authorized for the Alarm, Chemical Agent, Automatic: M22.

E-2 **GENERAL**.

This list identifies items that do not have to accompany the ALARM, CHEMICAL AGENT, AUTOMATIC: M22 and that do not have to be turned in with it. These items are authorized to you by the Common Table of Allowances (CTA), Modification Table of Organization and Equipment (MTOE), Tables of Distribution and Allowances (TDA), or Joint Table of Allowance (JTA), or Air Force Allowance Standard Code.

E-3 **EXPLANATION OF LISTING**.

National Stock Numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support his equipment. The items are listed in alphabetical sequence by item name. If the item required differs for different configuration of this equipment, see the "Usable On Code" heading in the description column for the correct configuration. Usable On Codes are not applicable.

SECTION II. ADDITIONAL AUTHORIZED ITEMS LIST

Table E-1. Additional Authorization List (AAL)

National Stock Number	Description CAGEC and Part Number	Usable On Code	U/I	Qty Req'd
6120-01-438-6960	POWER SUPPLY: CHEMICAL AGENT AUTOMATIC ALARM, M28 (81361) EA-PRF-2060		EA	1
6665-01-438-6959	MOUNTING KIT, CHEMICAL AGENT AUTOMATIC ALARM: M281 (81361) EA-PRF-2061		EA	1
6665-00-859-2215	ALARM UNIT, CHEMICAL AGENT AUTOMATIC ALARM: ABC M42 (81361) D5-15-4826		EA	*1 TO 4
5940-01-427-9110	ADAPTER, BATTERY TERMINAL (80058) J-6358/P		EA	1
6130-01-443-0970	CHARGER, BATTERY (80058) PP-8444A/U		EA	1

*NOTE: Up to five M42 Alarms may be connected to one M88 Detector Unit. One M42 Alarm is provided as BII. The additional (1 to 4) M42 Alarms are AAL.

Appendix F
EXPENDABLE AND DURABLE ITEMS

SECTION I. INTRODUCTION

4.8 **SCOPE**.

This appendix lists expendable and durable items that you will need to operate and maintain the ALARM, CHEMICAL AGENT, AUTOMATIC: M22. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA, 50-970, Allowance Standard 429 and/or Allowance Standard 459, Expendable/Durable Items (except medical, Class V repair parts, and heraldic items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

F-2 **EXPLANATION OF COLUMNS**.

Column (1), Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the item (e.g., "ball point pen, Appendix F, Item 3").

Column (2), Level. This column identifies the lowest level of maintenance that requires the item.

Column (3), National Stock Number. This is the National Stock Number assigned to the item that you can use to requisition it.

Column (4), Item Name, Description, Commercial and Government Entity Code (CAGEC), and Part Number. This column provides the other information you need to identify the item.

Column (5), Unit of Measure (U/M). This code shows the physical measurement or count of an item, such as dozen (DZ), ounce (OZ), each (EA), foot (FT), etc. If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II. EXPENDABLE AND DURABLE ITEMS LIST

Table F-1. Expendable and Durable Items List

(1) Item Number	(2) Level	(3) National Stock Number	(4) Item Name, Description CAGEC, and Part Number	(5) U/M
1	O	6810-00-223-2739	ACETONE, TECHNICAL (81348)	OZ
2	O	8040-00-464-4185	ADHESIVE, RUBBER 5 OZ. (76381) EC880	OZ
3	C	7520-01-060-5820	BALL POINT PEN(83421) FMFO-004	EA
4	C	6135-01-036-3495	BATTERY, NON-RECHARGEABLE, LITHIUM, (80058) BA-5590/U	EA
5	C	6135-00-930-0030	BATTERY, NON-RECHARGEABLE (80058) BA3030/U	EA
6	O	TBD	BEARING GEL (U3092) 0614-2672	TB
7	C	6145-01-155-4256 or 6145-01-155-4258	CABLE, TELEPHONE, (81349) WD-14TT (81349) WD-1/TT	A/R
8	C	8395-00-267-3150	CLEANING CLOTH, LINT FREE, 10 YDS.	YDS
9	O	7530-00-198-5873	ENVELOPE, MAILING 3 3/8" X 8 7/8" (81348) UU-E-552	EA
10	O	7530-00-286-6970	ENVELOPE, MAILING 4 1/8" X 9 1/2" (81348) UU-E-522	EA
11	O	8415-00-682-6786	GLOVES, DISPOSABLE (96717) Pinkies	PR
12	O	8135-00-160-7770	PAPER, CRAFT, UNTREATED (58536) A-A-203	RO
13	O	7510-00-281-5234	PENCIL, WRITING, BLACK No.2	DZ
14	O	8520-00-228-0598	SOAP, TOILET (84768) HARCO-LIQUID	OZ
15	O	6640-00-836-6870	WIPE, TEST CLOTH	EA
16	O	7510-00-266-6712	TAPE, PRESSURE SENSITIVE, ADHESIVE (19203) 8783476	RO
17	O	8030-01-126-9460	SEALING COMPOUND (05972) 222	BT
18	O	7920-00-282-9246	BRUSH, WIRE (81348) H-B-178/3-1	EA
19	O	6665-01-198-7573	SWIPES, CLOTH TEST (52320) U3204	BX
20	O	8105-00-837-7753	BAG, PLASTIC, INTERLOCKING SEAL (81349) MIL-B-117	EA
21	O	TBD	LABEL, WIPE TEST	PK
22	O	6140-01-419-8187	BATTERY, STORAGE (80063) BB-390/A	EA

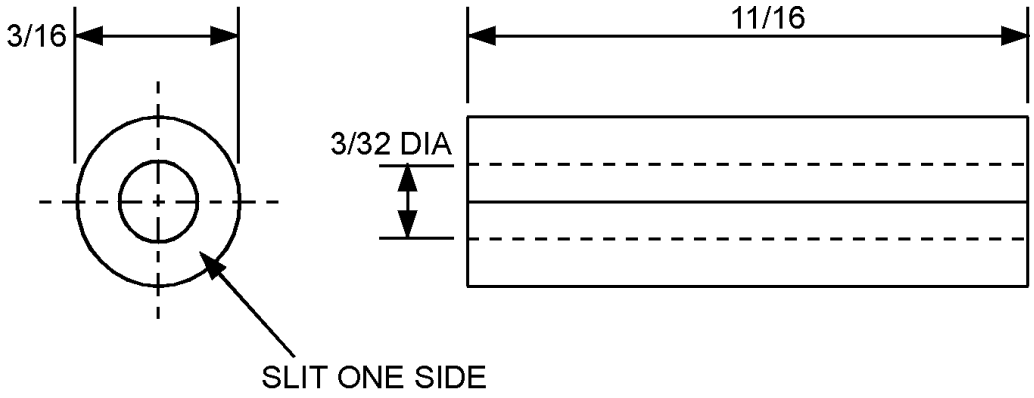
Appendix G
ILLUSTRATED LIST OF MANUFACTURED ITEMS

SECTION I. INTRODUCTION

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at unit maintenance. All bulk materials needed for manufacture of an item are listed by National Stock Number. The manufactured items are referred to by part number.

SECTION II. MANUFACTURED ITEMS

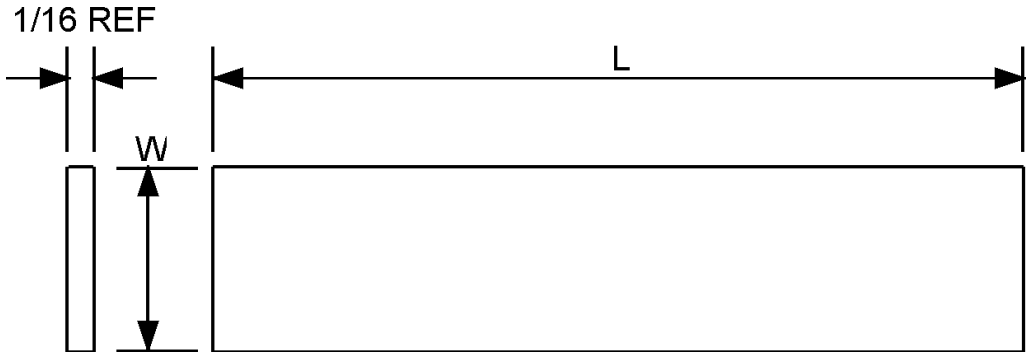
G-1 **ALARM MOUNTING BRACKET INSULATOR**.



NOTES:

1. Fabricate mounting bracket insulator (P/N C5-15-5512) from rubber tubing NSN 4720-00-431-8318 stock.
2. Ensure ends are cut square.
3. Dimensions are in inches.
4. Dimensional tolerances ± 1/16 unless otherwise indicated.

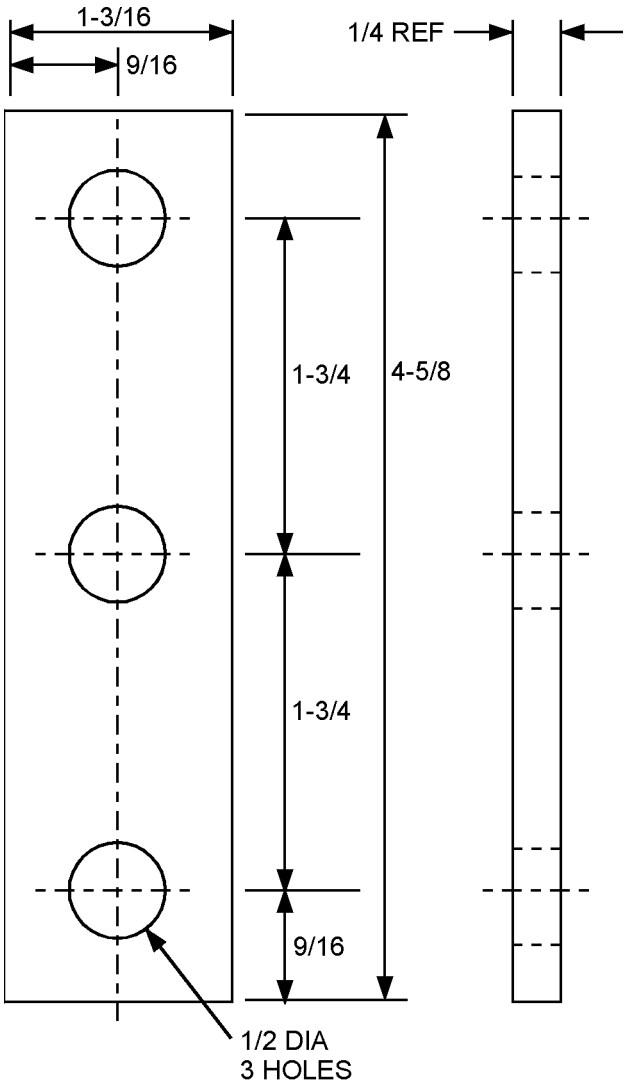
G-2 **ALARM MOUNTING BRACKET LINERS**.



NOTES:

1. Fabricate mounting bracket liner (P/N C5-15-5511-1) 7-3/4 x 1/2 from 1/16 rubber sheet NSN 9320-00-231-0704 stock.
2. Fabricate mounting bracket liner (P/N C5-15-5511-2) 5-1/4 x 1 from 1/16 rubber sheet NSN 9320-00-231-0704 stock.
3. Fabricate mounting bracket liner (P/N C5-15-5511-3) 1-1/2 x 1/2 from 1/16 rubber sheet NSN 9320-00-231-0704 stock.
4. Dimensions are in inches.
5. Dimensional tolerances ± 1/16 unless otherwise indicated.

G-3 **M42 ALARM MOUNTING BRACKET PADS**.



NOTES:

1. Fabricate mounting bracket rubber pads (P/N C5-15-4676) 1-3/16 x 4-5/8 from 1/4 sheet rubber strip NSN 9320-00-435-4207 stock.
2. Dimensions are in inches.
3. Dimensional tolerances ± 1/16 unless otherwise indicated.

Appendix H
NUCLEAR REGULATORY COMMISSION REQUIREMENTS

H-1 **GENERAL GUIDELINES**.

H-2 **INFORMATION ABOUT TITLE 10 AND THE LICENSE**.

H-2.1 **Rules and Regulations/NRC License**. The US Nuclear Regulatory Commission (NRC) sets standards and issues licenses for the safe use, storage, and possession of items containing radioactive material. The M88 contains the radioisotope Nickel-63. M88s should be used and stored In Accordance With (IAW) the conditions of the NRC license issued to each owning service in the Department of Defense. The US Army NRC license is issued to HQ, TACOM-ACALA, Rock Island, IL 61299-7630. Marine Corps M88s should be used and stored IAW the conditions of NRMP 10-67004-T2NP issued to the Commander, Marine Corps Logistics Bases, Albany, GA 31704-1128. Current copies of the NRC regulations (Title 10 code of Federal Regulation) and the license are available upon request from each service licensee.

H-2.2 **Notice to Employees**. Form NRC-3, Notice to Employees, contained on the following page, is provided for reference whenever the radioactive material described by this technical manual is used.

H-2.3 **Disposal**. Unserviceable M88 detectors will be turned into depot.

H-2.4 **Identification of Radioactive Material**. The Detector Unit, Chemical agent Automatic Alarm: M88 contains two identical millicurie (370 Mbq), foil Nickel-63 radioactive sources (a total nominal of 20 mCi (740 Mbq) per instrument). The M88 detector is labeled on the top face to indicate radioactive material is present.

H-2.5 **Part 21.** Title 10 CFR part 21 requires a responsible officer of the licensed organization to promptly evaluate and report defects and noncompliances that relate to substantial safety hazards. Failure to comply may result in personal fines to these officers.

H-2.5.1 Substantial safety hazard examples:

Exposure to, or release of, licensed radioactive material
Major degradation of essential safety related equipment
Major deficiencies involving design or use of licensed material

H-2.5.2 Responsible Officer or Radiological Protection Officer. Any suspected defect or noncompliance should be reported in writing or telephonically promptly to the following:

Director
US Army Armament and Chemical Acquisition and Logistics Activity
ATTN: AMSTA-AC-SF
Rock Island, IL 61299-7630

AUTOVON: 793-2965/2964/2966/2969
COMMERCIAL: (309) 782-2965/2964/2966/2969
AFTER DUTY HOURS: AV793-1110

H-2.5.3 Radiological Protection Officer. Air Force units that require a radioactive materials permit, IAW AFI 40-201, will report any suspected defect or noncompliance in writing or telephonically to:

USAF Radioisotope Committee,
HQ AFMOA/SGBR
Brooks, AFB, TX 78235
AUTOVON: 240-3331
COMMERCIAL: (210) 536-3331

H-2.5.4 Navy responsible Radiation Safety Officer. Any suspected defect or noncompliance will be reported in writing or telephonically promptly to the following:

Commander
CODE 067EM
NAVSURFWARCENDIV
300 Highway 361
Crane, IN 47522-5001

AUTOVON: 482-3578
COMMERCIAL: 812-854-3578
AFTER DUTY HOURS: 482-1225

H-2.5.5 Marine Corps responsible officer, Radiological Protection Officer or Radiation Safety officer. Any suspected defect or noncompliance should be reported in writing or telephonically promptly to the following:

Commander
Attn Codes 136
Marine Corps Logistics Bases
814 Radford Boulevard
Albany, GA 31704-1128

DSN: 567-5249/6213/6215/6231
COMMERCIAL: (912) 439-5249/6213/6215/6231
AFTER HOURS: 567-5206/5207

NRC Form 3
(9/1998)
Part 1

UNITED STATES NUCLEAR REGULATORY COMMISSION
Washington, DC 20555-0001

NOTICE TO EMPLOYEES

STANDARDS FOR PROTECTION AGAINST RADIATION (PART 20); NOTICES; INSTRUCTIONS AND REPORTS TO WORKERS; INSPECTIONS (PART 19); EMPLOYEE PROTECTION

WHAT IS THE NUCLEAR REGULATORY COMMISSION?

The Nuclear Regulatory Commission is an independent Federal regulatory agency responsible for licensing and inspecting nuclear power plants and other commercial uses to radioactive materials.

WHAT DOES THE NRC DO?

The NRC's primary responsibility is to ensure that workers and the public are protected from unnecessary or excessive exposure to radiation and that nuclear facilities, including power plants, are constructed to high quality standards and operated in a safe manner. The NRC does this by establishing requirements in Title 10 of the Code of Federal Regulations (10 CFR) and in licenses issued to nuclear users.

WHAT RESPONSIBILITY DOES MY EMPLOYER HAVE?

Any company that conducts activities licensed by the NRC must comply with the NRC's requirements. It a company violates NRC requirements, it can be fined or have its license modified, suspended or revoked. Your employer must tell you which NRC radiation requirements apply to your work and must post NRC Notices of Violation involving radiological working conditions.

WHAT IS MY RESPONSIBILITY?

For your own protection and the protection of your co-workers, you should know how NRC requirements relate to your work and should obey them. If you observe violations of the requirements or have a safety concern, you should report them.

WHAT IF I CAUSE A VIOLATION?

If you engaged in deliberate misconduct that may cause a violation of the NRC requirements, or would have caused a violation if it had not been detected, or deliberately provided inaccurate or incomplete information to either the NRC or to your employer, you may be subject to enforcement action. It you report such a violation, the NRC will consider the circumstances surrounding your reporting in determining the appropriate enforcement action, if any.

HOW DO I REPORT VIOLATIONS AND SAFETY CONCERNS?

If you believe that violations of NRC rules or the terms of the license have occurred, or it you have a safety concern, you should report them immediately to your supervisor. You may report violations or safety concerns directly to the NRC. However, the NRC encourages you to raise your concerns with the licensee since it is the licensee who has the primary responsibility for, and is most able to ensure, safe operation of nuclear facilities. If you choose to report your concern directly to the NRC, you may report this to an NRC inspector or call or write to the NRC Regional Office serving your area. If you send your concern in writing, it will assist the NRC in protecting your identity if you clearly state in the beginning of your letter that you have a safety concern or that you are submitting an allegation. The N RC's toll-free SAFETY HOTLINE for reporting safety concerns is listed below. The addresses for the NRC Regional Offices and the toll-free telephone numbers are also listed below.

WHAT IF I WORK WITH RADIOACTIVE MATERIAL OR IN THE VICINITY OF A RADIOACTIVE SOURCE?

If you work with radioactive materials or near a radiation source, the amount of radiation exposure that you are permitted to receive may be limited by NRC regulations. The limits on your exposure are contained in sections 20.1201, 20.1207, and 20.1208 of Title l0 of the Code of Federal Regulations (10 CFR 20) depending on the part of the regulations to which your employer is subject. While these are the maximum allowable limits, your employer should also keep your radiation exposure as far below those limits as "reasonably achievable."

MAY I GET A RECORD OF MY RADIATION EXPOSURE?

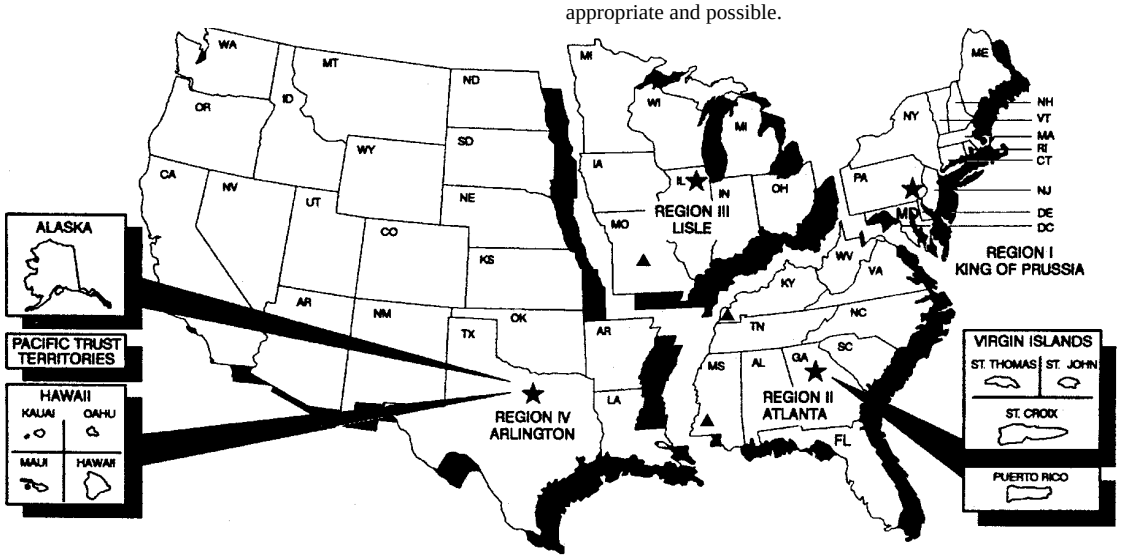
Yes. Your employer is required to advise you of your dose annually if you are exposed to radiation for which monitoring was required by NRC. In addition, you may request a written report of your exposure when you leave your job.

HOW ARE VIOLATIONS OF NRC REQUIREMENTS IDENTIFIED?

NRC conducts regular inspections at licensed facilities to assure compliance with NRC requirements. In addition, your employer and site contractors conduct their own inspections to assure compliance. All inspectors are protected by Federal law. Interference with them may result in criminal prosecution for a Federal offense.

MAY I TALK WITH AN NRC INSPECTOR?

Yes. NRC inspectors want to talk to you if you are worried about radiation safety or have other safety concerns about licensed activities, such as the quality of construction or operations at your facility. Your employer may not prevent you from talking with an inspector. The NRC will make all reasonable efforts to protect your identity where appropriate and possible.



▲ - Callaway Plant Site in Missouri and Grand Gulf Plant Site in Mississippi are under the purview of Region IV. The Paducah Gaseous Diffusion Plant in Kentucky is under the purview of Region III.

NRC Form 3
(9/1998)
Part 2

MAY I REQUEST AN INSPECTION?

Yes. If you believe that your employer has not corrected violations involving radiological working conditions, you may request an inspection. Your request should be addressed to the nearest NRC Regional Office and must describe the alleged violation in detail. It must be signed by you or your representative.

HOW DO I CONTACT THE NRC?

Talk to an NRC inspector on-site or call or write to the nearest NRC Regional Office in your geographical area (see map below). If you call the NRC's toll-free SAFETY HOTLINE during normal business hours, your call will automatically be directed to the NRC Regional Office for your geographical area. If you call after normal business hours, your call will be directed to the NRC's Headquarters Operations Center, which is manned 24 hours a day.

CAN I BE FIRED FOR RAISING A SAFETY CONCERN?

Federal Law prohibits an employer from firing or otherwise discriminating against you for bringing safety concerns to the attention of your employer or the NRC. You may not be fired or discriminated against because you:

- ask the NRC to enforce its rules against your employer;
- refuse to engage in activities which violate NRC requirements;
- provide information or are about to provide information to the NRC or your employer about violations of requirements or safety concerns;
- are about to ask for, or testify, help, or take part in an NRC, Congressional, or any Federal or State proceeding.

WHAT FORMS OF DISCRIMINATION ARE PROHIBITED?

It is unlawful for an employer to fire you or discriminate against you with respect to pay, benefits, or working conditions because you help the NRC or raise a safety issue or otherwise discourage you from engaging in protected activities. Violations of Section 211 of the Energy Reorganization Act (ERA) of 1974(42 U.S.C. 5851) include the harassment and intimidation by employers of (I) employees who bring safety concerns directly to their employers or to the NRC; (ii) employees who have refused to engage in an unlawful practice, provided that the employee has identified the illegality to the employer; (iii) employees who have testified or are about to testify before Congress or in any Federal or State proceeding regarding any provision (or proposed provision) of the ERA or the Atomic Energy Act (AEA) of 1954; (iv) employees who have commenced or caused to be commenced a proceeding for the administration or enforcement of any requirement imposed under the ERA or AEA or who have, or are about to, testify, assist, or participate in such a proceeding.

HOW DO I FILE A DISCRIMINATION COMPLAINT?

If you believe that you have been discriminated against for bringing violations or safety concerns to the NRC or your employer, you may file a complaint with the U.S. Department of Labor (DOL) pursuant to Section 211 of the ERA. Yo complaint must describe the firing or discrimination and must be filed within 180 days of the occurrence. Filing an allegation, complaint, or request for action with the NRC does not extend the requirement to file a complaint with the DOL within 180 days. You must file the complaint with the DOL. To do so you may contact the Allegation Coordinator in the appropriate NRC Region, listed below, who will provide you with the address and telephone number of the correct OSHA Regional office to receive your complaint. You may also check your local telephone directory under the U.S. Government listings f the address and telephone number of the appropriate OSHA Regional office.

WHAT CAN THE DEPARTMENT OF LABOR DO?

If your complaint involves a violation of Section 211 of the ERA by your employer, it is the DOL, NOT THE NRC, that provides the process for obtaining personal remedy. The DOL will notify your employer that a complaint has been filed and will investigate your complaint. If the DOL finds that your employer has unlawfully discriminated against you it may order that you be reinstated, receive back pay, or be compensated for any injury suffered as a result of the discrimination.

WHAT WILL THE NRC DO?

The NRC will evaluate each allegation of harassment, intimidation, or discrimination. Following this evaluation, an investigator from the NRC's Office of Investigations may interview you and review available documentation. Based on the evaluation, and, if applicable, the interview, the NRC will assign a priority and a decision will be made whether to pursue the matter further through investigation. The assigned priority is based on the specifics of the case and its significance relative to other ongoing investigations. The NRC may not pursue an investigation to the point that a conclusion can be made whether the harassment, intimidation, or discrimination actually occurred. Even if NRC decides not to pursue an investigation, if you have filed a complaint with DOL the NRC will monitor the results of the DOL investigation. If the NRC or DOL finds that unlawful discrimination has occurred, the NRC may issue a Notice of Violation to your employer, impose a fine, or suspend modify, or revoke your employer's NRC license.

UNITED STATES NUCLEAR REGULATORY COMMISSION REGIONAL OFFICE LOCATIONS

A representative of the Nuclear Regulatory Commission can be contacted by employees who wish to register complaints or concerns about radiological working conditions or other matters regarding compliance with Commission rules and regulations at the following addresses and telephone numbers.

REGIONAL OFFICES

REGION	ADDRESS	TELEPHONE
I	U.S. Nuclear Regulatory Commission, Region I 475 Allendale Road King of Prussia, PA 19406-1415	(800) 432-1156
II	U.S. Nuclear Regulatory Commission, Region II Atlanta Federal Center 61Forsyth Street, S.W., Suite 23T85 Atlanta, GA 30303-3415	(800) 577-8510
III	U.S. Nuclear Regulatory Commission, Region III 801 Warrenville Road Lisle, IL 60532-4351	(800)522-3025
IV	U.S. Nuclear Regulatory Commission, Region IV 611 Ryan Plaza Drive, Suite 400 Arlington, TX 76011-8064	(800) 952-9677

To report safety concerns or violations of NRC requirements by your employer, telephone: **NRC SAFETY HOTLINE** **1-800-695-7403**	To report incidents involving fraud, waste, or abuse by an NRC employee or NRC contractor, telephone: **OFFICE OF THE INSPECTOR GENERAL** **HOTLINE** **1-800-233-3497**

INDEX

INDEX - (Continued)

INDEX - (Continued)

INDEX - (Continued)

INDEX - (Continued)

INDEX - (Continued)

INDEX - (Continued)

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
04748

MICHAEL E. RYAN
General, U.S. Air Force
Chief of Staff

GEORGE T. BABBITT
General, U.S. Air Force
Commander, AMFC

M. K. HAYDEN
Colonel, USMC
Director, Program Support
Marine Corps Systems Command

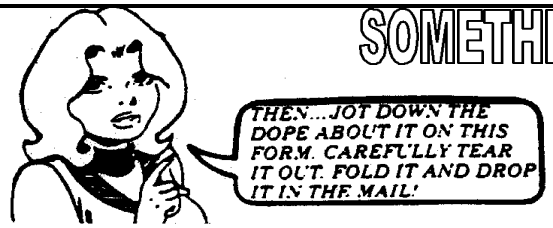
DAVID P. ACTON
Life Cycle Manager USN
Code 805Z

DISTRIBUTION:

To be distributed in accordance with initial distribution (IDN) 280834, requirements for special distribution for TM 3-6665-321-12&P

*U.S. GOVERNMENT PRINTING OFFICE: 1998-646-036/60504

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
ARMY TM 3-6665-321-12&P AIR FORCE TO 11H2-23-1 MARINE CORPS 10434A-12&P NAVY (NAVSEA) EE168-DB-OMP-010	**May 1998**	**Alarm, Chemical Agent, Automatic: M22**

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
D-1	D-2		
C-8			

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In 1st line of paragraph change M88 to M22

Change NSN for Snapslide from:
"6665-01-123-5432"
to
"6632-00-321-6789"

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER

Charles Smith (SSG) 793-xxxx

SIGN HERE

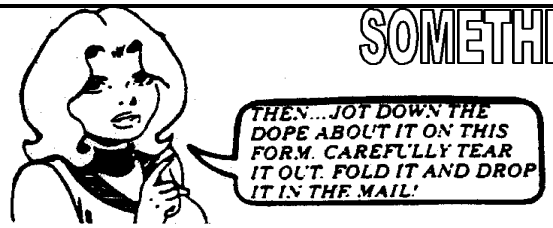
Charles Smith

DA FORM 1 JUL 79 **2028-2**

PREVIOUS EDITIONS ARE OBSOLETE

PS. IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUATERS

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
ARMY TM 3-6665-321-12&P AIR FORCE TO 11H2-23-1 MARINE CORPS 10434A-12&P NAVY (NAVSEA) EE168-DB-OMP-010	**May 1999**	**Alarm, Chemical Agent, Automatic: M22**

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 **2028-2**

PREVIOUS EDITIONS ARE OBSOLETE

PS. IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUATERS

REVERSE OF DA FORM 2028-2

TEAR ALONG PERFORATED LINE

FILL IN YOUR
UNITS ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

Technical Director
Edgewood Research, Development and Engineering Center
ATTN: SCBRD-ENL-V
Aberdeen Proving Ground, MD 21010-5423

PIN: 076565-000