**SOLDIER'S MANUAL and**
**TRAINER'S GUIDE**

## MOS 11C

# INDIRECT FIRE INFANTRYMAN

## SKILL LEVELS 1/2/3/4

**AUGUST 2004**

**HEADQUARTERS**
**DEPARTMENT OF THE ARMY**

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# SOLDIER'S MANUAL and TRAINER'S GUIDE

# MOS 11C, Indirect Fire Infantryman, Skill Levels 1, 2, 3 and 4

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## PREFACE

This publication is for Skill Levels 1 through 4 soldiers holding the military occupational specialties 11C. It contains standardized training objectives, in the form of task summaries, to train on critical tasks that support unit missions during wartime. Soldiers holding MOS 11C should have access to this publication.

This manual applies to both Active and Reserve Component soldiers.

The proponent of this publication is the United States Army Infantry School. Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to--

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*Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.*

# CHAPTER 1

## Introduction

*This soldier's manual (SM) identifies the individual military occupational specialty training requirements for soldiers in MOS 11C. Commanders, trainers, and soldiers should use it to plan, conduct, and evaluate individual training in units. This manual is the primary MOS reference to support the self-development and training of every soldier. It is used with the following manuals to establish effective training plans and programs that integrate soldier, leader, and collective tasks:*

- *The soldier's manuals of common tasks (STP-21-1-SMCT and STP 21-24-SMCT).*
- *Army Training and Evaluation Programs (ARTEPs).*
- *FM 25-101.*

### 1-1. TASK SUMMARIES

Task summaries outline the wartime performance requirements of each critical task in the SM. They provide the soldier and the trainer with the information needed to prepare, conduct, and evaluate critical task training. As a minimum, task summaries include information the soldier must know and the skills that he must perform to standards for each task. The format for the task summaries included in this SM is as follows:

a. **Task Number**. A 10-digit number identifies each task or skill. This task number, along with the task title, must be included in any correspondence pertaining to the task.

b. **Task Title**. The task title identifies the action to be performed.

c. **Conditions**. The task condition identifies all the equipment, tools, references, job aids, and supporting personnel that the soldier needs to use to perform the task in wartime. This section identifies any environmental conditions that can alter task performance, such as visibility, temperature, or wind. This section also identifies any specific cues or events that trigger task performance such as a chemical attack or identification of a threat vehicle.

d. **Standards**. The task standards describe how well and to what level the task must be performed under wartime conditions. Standards are typically described in terms of accuracy, completeness, and speed.

e. **Training and Evaluation**. The training evaluation section identifies specific actions (known as performance measures) that the soldier must do to successfully complete the task. These actions are in the evaluation guide section of the task summary and are listed in a pass/fail format for easy evaluation. For some tasks, the training and evaluation section may also include detailed training information in a training information outline and an evaluation preparation section. The evaluation preparation section indicates necessary modifications to task performance in order to train and evaluate a task that cannot be trained to the wartime conditions. It may also include special training and evaluation preparation instructions to accommodate these modifications, and any instructions that should be given to the soldier before evaluation.

f. **References**. This section identifies references that provide more detailed and thorough explanations of task performance requirements than those given in the task summary description.

g. **Warnings**. Warnings alert users to the possibility of immediate personal injury or damage to equipment.

h. **Notes.** Notes provide a supportive explanation or hint that relates to the performance standards.

### 1-2. SOLDIER'S RESPONSIBILITIES

Each soldier is responsible for performing individual tasks that the first-line supervisor identifies based on the unit's mission-essential task list (METL). The soldier must perform each task to the standards listed in

the SM. If a soldier has a question about how to do a task or which tasks he must perform, he must ask the first-line supervisor for clarification. The first-line supervisor either knows how to perform each task or can direct the soldier to the appropriate training materials.

**1-3. TRAINING SUPPORT**
This manual includes the following appendixes and information:

a. **Glossary**. The glossary, which follows the last appendix, is a single comprehensive list of acronyms, abbreviations, definitions, and letter symbols.

b. **References**. This section contains two lists of references that support training of all tasks in this SM. "Needed" references are listed in the conditions statement and are required for the soldier to do the task. "Recommended" references are materials that help a trainer prepare for the task but are not required to perform the task.

## CHAPTER 2

## MOS Skill Level Tasks

2-1. General. The MOS Training Plan (MTP) identifies the essential components of a unit training plan for individual training. Units have different training needs and requirements based on differences in environment, location, equipment, dispersion, and similar factors. Therefore, the MTP should be used as a guide for conducting unit training and not a rigid standard. The MTP is designed to assist the commander in preparing a unit training plan which satisfies integration, cross training, training up, and sustainment training requirements for soldiers in this MOS.

This MTP shows the relationship of an MOS skill level between duty position and critical tasks. These critical tasks are grouped by task commonality into subject areas. These subject areas are used to define the training requirements for each duty position within an MOS.

**Duty Position Column**. This column lists the duty positions of the MOS, by skill level, which have different training requirements.

**Subject Area Column**. This column lists, by numerical key, the subject areas a soldier must be proficient in to perform in that duty position.

**Task Number Column**. This column lists the task numbers for all tasks included in the subject area.

**Title Column**. This column lists the task title for each task in the subject area.

**Training Location Column**. This column identifies the training location where the task is first trained to soldier training publications standards. If the task is first trained to standard in the unit, the word "Unit" will be in this column. If the task is first trained to standard in the training base, it will identify, by brevity code (ANCOC, BNCOC, etc.), the resident course where the task was taught. Figure 2-1 contains a list of training locations and their corresponding brevity codes.

| | |
|---|---|
| **UNIT** | Trained in the Unit |
| **INSTITUT** | Institution |

Figure 2-1. Training Locations

2-2. Subject Area Codes.

**Skill Level 1**

5 COMMUNICATIONS: GENERAL
7 COMMUNICATIONS: RADIO
9 MOVE: BASIC TACTICS
16 NAVIGATE: GENERAL/COMPASS/MAP
19 RECON-SECURITY: NIGHT VISION DEVICES
20 RECON-SECURITY: OPSEC AND COMSEC
22 SUSTAIN: GENERAL
24 SUSTAIN: NBC
26 VEHICLES
29 VEHICLES: M113-SERIES
30 WEAPONS: 120-MM MORTAR
32 WEAPONS: 60-MM MORTAR
33 WEAPONS: 81-MM MORTAR
34 WEAPONS: M9 PISTOL
37 WEAPONS: GENERAL
38 WEAPONS: HG/MINES/DEMOLITIONS
39 WEAPONS: M136 LAUNCHER (AT4)
40 WEAPONS: M16 SERIES RIFLE
52 WEAPONS: MORTARS

**Skill Level 2**

5 COMMUNICATIONS: GENERAL
7 COMMUNICATIONS: RADIO
9 MOVE: BASIC TACTICS
16 NAVIGATE: GENERAL/COMPASS/MAP
19 RECON-SECURITY: NIGHT VISION DEVICES
20 RECON-SECURITY: OPSEC AND COMSEC
22 SUSTAIN: GENERAL
35 WEAPONS: FDC MBC
38 WEAPONS: HG/MINES/DEMOLITIONS
49 WEAPONS: MK19 MACHINE GUN
50 WEAPONS: MORTAR FDC GENERAL
51 WEAPONS: MORTAR FDC PLOTTING BOARD
52 WEAPONS: MORTARS

**Skill Level 3**

9 MOVE: BASIC TACTICS
10 MOVE: DEFENSE/OFFENSE
13 MOVE: SPECIALIZED MISSIONS
14 MOVE: URBAN OPERATIONS
16 NAVIGATE: GENERAL/COMPASS/MAP
20 RECON-SECURITY: OPSEC AND COMSEC
22 SUSTAIN: GENERAL

24 SUSTAIN: NBC
52 WEAPONS: MORTARS

**Skill Level 4**

1 COMMAND AND STAFF
9 MOVE: BASIC TACTICS
10 MOVE: DEFENSE/OFFENSE
51 WEAPONS: MORTAR FDC PLOTTING BOARD
52 WEAPONS: MORTARS

2-3. Critical Tasks List.

**MOS TRAINING PLAN**
**11C14**

| Task Number | Title | Training Location | Sust Tng SL |
|---|---|---|---|
| 071-820-0001 | Operate Telephone Set, TA-1/PT | UNIT | 1 |
| 071-820-0003 | Install Communication Wire Lines | UNIT | 1 |
| 071-820-0004 | Recover Communication Wire Lines | UNIT | 1 |
| 113-587-0070 | Troubleshoot Secure Single-Channel Ground and Airborne Radio Systems (SINCGARSs) ICOM With or Without the AN/VIC-1 or AN/VIC-3 | UNIT | 1 |
| 113-588-4025 | Repair Telephone Cable WD-1/TT or WF16/U | UNIT | 1 |
| 113-594-2005 | Install and Operate an Switchboard, Telephone, Manual SB-993/GT | UNIT | 1 |
| 113-594-2014 | Operate Switchboard, Telephone, Manual SB-22/PT | UNIT | 1 |
| 113-600-1023 | Install Tactical Telephone | UNIT | 1 |
| 113-600-2007 | Operate Telephone Set TA-312/PT | UNIT | 1 |
| 113-600-3015 | Perform Operators PMCS on Tactical Telephone Sets | UNIT | 1 |
| 113-609-2053 | Operate Automated Net Control Device (ANCD) AN/CYZ-10 | UNIT | 1 |
| 113-587-2075 | Operate SINCGARS Data Devices | UNIT | 1 |
| 113-587-2076 | Operate Secure SINCGARS Using Control Monitor (CM) | UNIT | 1 |
| 113-587-2077 | Operate SINCGARS Remote Control Unit (SRCU) | UNIT | 1 |
| 071-810-0003 | Construct a Field-Expedient Antenna | UNIT | 1 |
| 071-810-0004 | Maintain Intercommunications Set, AN/VIC-1, on a Tracked Vehicle (Includes FM Radio) | UNIT | 1 |
| 113-571-1004 | Operate in Radio Nets | UNIT | 1 |
| 113-573-4003 | Encode and Decode Messages Using KTC 600(*) Tactical Operations Code | UNIT | 1 |
| 113-573-4006 | Use the KTC 1400(*) Numerical Cipher/Authentication System | UNIT | 1 |
| 113-573-6001 | Recognize Electronic Attack (EA) and Implement Electronic Protection (EP) | UNIT | 1 |
| 113-573-7017 | Prepare/Submit Interference Message Report | UNIT | 1 |
| 113-587-1064 | Prepare SINCGARS (Manpack) for Operation | UNIT | 1 |
| 113-587-1067 | Install Single-Channel Ground and Airborne Radio Systems (SINCGARSs) ICOM With or Without the AN/VIC-1 or AN/VIC-3 | UNIT | 1 |
| 113-587-2059 | Operate Radio Set AN/PRC-77 With an TSEC/KY-57 | UNIT | 1 |
| 113-587-2061 | Operate Radio Set AN/VRC-64 or AN/GRC-160 with TSEC/KY-57 | UNIT | 1 |
| 113-587-2064 | Operate Radio Set AN/VRC-12 or AN/VRC-47 with TSEC/KY-57 | UNIT | 1 |
| 113-587-2070 | Operate SINCGARS Single-Channel (SC) | UNIT | 1 |
| 113-587-2071 | Operate SINCGARS Frequency Hopping (FH) (Net Members) | UNIT | 1 |
| 113-587-2072 | Operate SINCGARS Frequency Hopping (FH) Net Control Station (NCS) | UNIT | 1 |
| 113-587-2082 | Operate Secure AN/VRC-92 RETRANS | UNIT | 1 |
| 061-283-1001 | Determine Direction Within the Target Area | UNIT | 1 |
| 071-326-0512 | Estimate Range | INSTITUT | 1 |
| 071-410-0018 | Move as a Member of a Mortar Unit While Dismounted | UNIT | 1 |
| 071-074-0002 | Determine a Grid Azimuth Using an M2 Compass | UNIT | 1 |

| Task Number | Title | Training Location | Sust Tng SL |
|---|---|---|---|
| 071-329-7017 | Navigate Using an AN/PSN-11 Precision Lightweight Global Positioning System Receiver | UNIT | 1 |
| 071-329-7018 | Prepare the AN/PSN-11 Precision Lightweight Global Positioning System Receiver for Operation | UNIT | 1 |
| 071-329-7019 | Enter Waypoints into an AN/PSN-11 Precision Lightweight Global Positioning System Receiver | UNIT | 1 |
| 071-315-0003 | Operate a Night Vision Sight, AN/PVS-4 | UNIT | 1 |
| 071-315-0030 | Operate Night Vision Goggles, AN/PVS-5 | UNIT | 1 |
| 071-315-0090 | Maintain a Thermal Viewer, AN/PAS-7 | UNIT | 1 |
| 071-315-0091 | Operate a Thermal Viewer, AN/PAS-7 | UNIT | 1 |
| 071-704-0001 | Operate a Mini Eyesafe Laser Infrared Observation Set, AN/PVS-6 | UNIT | 1 |
| 071-704-0002 | Maintain a Mini Eyesafe Laser Infrared Observation Set, AN/PVS-6 | UNIT | 1 |
| 071-710-0008 | Operate Night Vision Goggles, AN/PVS-7B | UNIT | 1 |
| 071-710-0009 | Maintain Night Vision Goggles, AN/PVS-7B | UNIT | 1 |
| 071-331-0801 | Challenge Persons Entering Your Area | INSTITUT | 1 |
| 052-191-1501 | Perform Individual Camouflage | INSTITUT | 1 |
| 071-600-0001 | Destroy Supplies and Equipment | UNIT | 1 |
| 181-906-1505 | Conduct Combat Operations According to the Law of War | INSTITUT | 1 |
| 031-503-1021 | MARK NBC CONTAMINATED AREA | UNIT | 1 |
| 031-503-1030 | Prepare the Chemical Agent Monitor for Operation | UNIT | 1 |
| 031-503-1031 | Use the Chemical Agent Monitor | UNIT | 1 |
| 031-503-1032 | Prepare the Chemical Agent Monitor for Movement | UNIT | 1 |
| 031-506-1052 | Protect Yourself and Others From Chemical and Biological Injury/Contamination by Using a Collective Protection Shelter | UNIT | 1 |
| 071-200-0002 | Tow a Tracked Vehicle | UNIT | 1 |
| 071-212-0020 | Start an M113-Series Vehicle Using Auxiliary Power | UNIT | 1 |
| 071-212-0021 | Drive an M113-Series Vehicle | UNIT | 1 |
| 071-212-0022 | Maintain the Mortar System on an M113-Series Vehicle | UNIT | 1 |
| 071-090-0001 | Perform Safety Checks on a 120-mm Mortar | INSTITUT | 1 |
| 071-090-0002 | Lay a 120-mm Mortar for Deflection and Elevation | INSTITUT | 1 |
| 071-090-0003 | Boresight a 120-mm Mortar | INSTITUT | 1 |
| 071-090-0004 | Prepare 120-mm Mortar Ammunition for Firing | INSTITUT | 1 |
| 071-090-0005 | Maintain a 120-mm Mortar | INSTITUT | 1 |
| 071-084-0002 | Maintain a 60-mm Mortar | INSTITUT | 1 |
| 071-084-0003 | Perform Misfire Procedures on a 60-mm Mortar While in the Handheld Mode | INSTITUT | 1 |
| 071-084-0004 | Engage Targets with a 60-mm Mortar While Firing in the Handheld Mode | INSTITUT | 1 |
| 071-323-4101 | Place a 60-mm Mortar into Action While in the Handheld Mode | INSTITUT | 1 |
| 071-323-4102 | Lay a 60-mm Mortar for Deflection and Elevation | INSTITUT | 1 |
| 071-323-4103 | Boresight a 60-mm Mortar | INSTITUT | 1 |
| 071-323-4104 | Perform Safety Checks on a 60-mm Mortar | INSTITUT | 1 |
| 071-323-4106 | Prepare 60-mm Mortar Ammunition for Firing | INSTITUT | 1 |
| 071-086-0002 | Maintain an 81-mm Mortar | INSTITUT | 1 |

| Task Number | Title | Training Location | Sust Tng SL |
|---|---|---|---|
| 071-086-0003 | Lay an 81-mm Mortar for Deflection and Elevation | INSTITUT | 1 |
| 071-086-0004 | Perform Safety Checks on an M252 81-mm Mortar | INSTITUT | 1 |
| 071-086-0005 | Boresight an M252 81-mm Mortar | INSTITUT | 1 |
| 071-321-3905 | Prepare 81-mm Mortar Ammunition for Firing | INSTITUT | 1 |
| 071-004-0002 | Perform a Function Check on an M9 Pistol | INSTITUT | 1 |
| 071-004-0005 | Correct Malfunctions of an M9 Pistol | INSTITUT | 1 |
| 071-705-0003 | Zero an M68 Sight | INSTITUT | 1 |
| 071-705-0004 | Boresight an M68 Sight | INSTITUT | 1 |
| 071-000-0004 | Maintain a Bayonet | INSTITUT | 1 |
| 071-326-0100 | Engage an Enemy with a Bayonet | INSTITUT | 1 |
| 071-703-0001 | Operate M145 Telescope, Straight | UNIT | 1 |
| 071-703-0002 | Maintain M145 Telescope, Straight | UNIT | 1 |
| 052-192-1021 | Locate Mines by Visual Means | INSTITUT | 1 |
| 052-192-1117 | Install an M21 Antitank (AT) Mine | INSTITUT | 1 |
| 052-192-1118 | Remove an M21 Antitank (AT) Mine | INSTITUT | 1 |
| 071-054-0003 | Perform Misfire Procedures on an M136 Launcher | INSTITUT | 1 |
| 071-008-0001 | Mount a Night Vision Sight, AN/PVS-4, on an M16-Series Rifle | UNIT | 1 |
| 071-008-0002 | Dismount a Night Vision Sight, AN/PVS-4, from an M16-Series Rifle | UNIT | 1 |
| 071-008-0004 | Mount an AN/PAS-13 Thermal Weapon Sight on an M16-Series Rifle | UNIT | 1 |
| 071-008-0005 | Dismount an AN/PAS-13 Thermal Weapon Sight from an M16-Series Rifle | UNIT | 1 |
| 071-008-0006 | Zero an AN/PAS-13 Thermal Weapon Sight to an M16-Series Rifle | UNIT | 1 |
| 071-008-0008 | Mount an AN/PAQ-4-Series Aiming Light on an M16-Series Rifle | INSTITUT | 1 |
| 071-008-0009 | Dismount an AN/PAQ-4-Series Aiming Light from an M16-Series Rifle | INSTITUT | 1 |
| 071-008-0010 | Zero an AN/PAQ-4-Series Aiming Light to an M16-Series Rifle | INSTITUT | 1 |
| 071-008-0011 | Engage Targets with an M16-Series Rifle Using an AN/PAQ-4-Series Aiming Light | INSTITUT | 1 |
| 071-310-0001 | Zero an M16A4 Rifle | INSTITUT | 1 |
| 071-311-2006 | Construct Field-Expedient Firing Aids for an M16A1/A2 Rifle | INSTITUT | 1 |
| 071-315-2307 | Zero a Night Vision Sight, AN/PVS-4, to an M16-Series Rifle | INSTITUT | 1 |
| 071-074-0004 | Engage Targets with a 60-mm, 81-mm, or 120-mm Mortar Using Direct Lay | INSTITUT | 1 |
| 071-074-0005 | Refer and Realign Aiming Post | INSTITUT | 1 |
| 071-074-0006 | Manipulate a 60-mm, 81-mm, or 120-mm Mortar for Traversing and/or Searching Fire | UNIT | 1 |
| 071-074-0008 | Emplace Aiming Posts | UNIT | 1 |
| 071-074-0037 | Fire a Mortar | UNIT | 1 |
| 071-074-0038 | Reciprocally Lay a Mortar Using a Laid Mortar | INSTITUT | 1 |
| 071-076-0001 | Maintain Fire Control Equipment | UNIT | 1 |
| 071-321-4012 | Store Mortar Ammunition | UNIT | 1 |
| 071-326-0518 | Camouflage a Mortar Firing Position | UNIT | 1 |
| 071-334-4001 | Guide a Helicopter to a Landing Point | UNIT | 2 |
| 071-810-0001 | Maintain an AN/PRC-126 Radio | UNIT | 2 |
| 071-810-0002 | Operate an AN/PRC-126 Radio | UNIT | 2 |

| Task Number | Title | Training Location | Sust Tng SL |
|---|---|---|---|
| 061-283-1003 | Locate a Target by Polar Plot | UNIT | 2 |
| 071-326-5605 | Control Movement of a Fire Team | UNIT | 2 |
| 071-326-5606 | Select an Overwatch Position | UNIT | 2 |
| 071-520-0001 | Orient a Map Using an M2 Compass | UNIT | 2 |
| 071-710-0004 | Control Use of Night Vision Devices | UNIT | 2 |
| 071-730-0006 | Enforce Operations Security | UNIT | 2 |
| 071-316-2538 | Charge a Battery Using a PP-7382/TAS Battery Charger | UNIT | 2 |
| 071-600-0005 | Enforce Preventive Medicine | UNIT | 2 |
| 071-082-0001 | Place a Mortar Ballistic Computer into Operation | INSTITUT | 2 |
| 071-082-0002 | Conduct a System Self-Test on a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0003 | Prepare a Mortar Ballistic Computer with Initialization Data | INSTITUT | 2 |
| 071-082-0004 | Program Safety Data in a Mortar Ballistic Computer | UNIT | 2 |
| 071-082-0005 | Program No-Fire Data in a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0006 | Compute Data for a Grid Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0007 | Compute Data for a Shift Mission Using a Mortar Ballistic Computer | UNIT | 2 |
| 071-082-0008 | Compute Data for a Polar Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0009 | Compute Data for a Mark-Center-of-Sector Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0010 | Compute Data for a Grid-Registration Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0014 | Compute Data for Sheaf Adjustment Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0015 | Compute Data for a Traversing Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0016 | Compute Data for a Searching Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0018 | Compute Data for an Illumination Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0019 | Compute Data for a Coordinated Illumination Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0020 | Compute Data for Simultaneous Missions Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0021 | Compute Data for a Split-Section Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0022 | Compute Data for a Final Protective Fire Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0023 | Compute Data for a Quick-Smoke Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0024 | Compute Data for an Immediate-Suppression or Smoke Mission Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0025 | Enter a Meteorological Message Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0026 | Determine a Location by Resection, Intersection, or Traverse Using a Mortar Ballistic Computer | INSTITUT | 2 |
| 071-082-0027 | Operate a Mortar Ballistic Computer Using a Digital Message Device | INSTITUT | 2 |
| 071-082-0028 | Maintain a Mortar Ballistic Computer | INSTITUT | 2 |
| 052-193-2030 | Clear Misfires | INSTITUT | 2 |
| 071-030-0008 | Correct Malfunctions of an MK 19 Machine Gun | UNIT | 2 |

| Task Number | Title | Training Location | Sust Tng SL |
|---|---|---|---|
| 071-321-4011 | Use Mortar Firing Tables | INSTITUT | 2 |
| 071-076-0002 | Record Information on Firing Records | INSTITUT | 2 |
| 071-076-0003 | Record Data Using Meteorological Data Sheet | INSTITUT | 2 |
| 071-076-0004 | Compute Meterological Firing Corrections | INSTITUT | 2 |
| 071-076-0008 | Apply No-Fire Data to a Plotting Board | INSTITUT | 2 |
| 071-076-0010 | Compute Angle T | INSTITUT | 2 |
| 071-078-0002 | Prepare a Plotting Board for Operation Using the Below Pivot-Point Method | INSTITUT | 2 |
| 071-078-0003 | Compute Re-Registration Corrections Using a Plotting Board | UNIT | 2 |
| 071-078-0004 | Compute Data for a Polar Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0005 | Compute Data for a Final Protective Fire Using a Plotting Board | UNIT | 2 |
| 071-078-0006 | Compute Data for Sheaf Adjustment Using a Plotting Board | UNIT | 2 |
| 071-078-0007 | Compute Data for a Traversing and/or Searching Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0008 | Compute Data for an Illumination Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0009 | Compute Data for a Coordinated Illumination Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0011 | Compute Data for a Quick-Smoke Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0012 | Compute Data for a Grid Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0013 | Compute Data for a Mark-Center-of-Sector Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0016 | Compute Data for a Shift Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0017 | Compute Data for a Split-Section Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0018 | Compute Data for an Immediate-Suppression or Smoke Mission Using a Plotting Board | UNIT | 2 |
| 071-078-0019 | Compute Registration Corrections Using a Plotting Board | UNIT | 2 |
| 071-078-0001 | Prepare a Plotting Board for Operation Using the Pivot-Point Method | INSTITUT | 2 |
| 071-074-0012 | Conduct Occupation of a Mortar Firing Position by a Squad | UNIT | 2 |
| 071-074-0013 | Fire a Ladder Mission | UNIT | 2 |
| 071-074-0017 | Select Mortar Firing Positions | UNIT | 2 |
| 071-074-0022 | Conduct a Displacement by a Mortar Squad | UNIT | 2 |
| 071-074-0033 | Conduct the Defense of a Mortar Firing Position by a Squad | UNIT | 2 |
| 071-074-0036 | Adjust Mortar Fire Using Direct Alignment | INSTITUT | 2 |
| 071-074-0042 | Lay a Mortar Using Direct Alignment | INSTITUT | 2 |
| 071-321-4001 | Boresight a Mortar for Deflection Using an M2 Aiming Circle | UNIT | 2 |
| 071-321-4002 | Boresight a Mortar for Elevation Using an M2 Compass | UNIT | 2 |
| 071-321-4007 | Lay a Carrier-Mounted Mortar Using an M2 Compass | UNIT | 2 |
| 071-321-4009 | Lay a Ground-Mounted Mortar Using an M2 Compass | UNIT | 2 |
| 071-326-3001 | Direct a Driver Over a Terrain Route | UNIT | 3 |
| 071-334-4002 | Establish a Helicopter Landing Point | INSTITUT | 3 |
| 071-410-0010 | Conduct a Leader's Reconnaissance | INSTITUT | 3 |
| 071-430-0029 | Reorganize a Unit | UNIT | 3 |
| 071-450-0027 | Conduct a Relief | INSTITUT | 3 |
| 071-450-0030 | Conduct a Passage of Lines | INSTITUT | 3 |

| Task Number | Title | Training Location | Sust Tng SL |
|---|---|---|---|
| 071-440-0026 | Select a Mortar Position During an Urban Operation | UNIT | 3 |
| 071-500-0001 | Determine Location Using Hasty Survey Techniques | INSTITUT | 3 |
| 301-348-6001 | Protect Classified Information and Material | UNIT | 3 |
| 071-600-0009 | Coordinate with Supported Units | INSTITUT | 3 |
| 031-503-4003 | Control Unit Radiation Exposure | UNIT | 3 |
| 031-507-3003 | Supervise Operational Decontamination | UNIT | 3 |
| 071-074-0007 | Reciprocally Lay a Mortar Using an M2 Aiming Circle | INSTITUT | 3 |
| 071-074-0010 | Conduct Occupation of a Mortar Firing Position by a Section | UNIT | 3 |
| 071-074-0015 | Recommend Employment of Mortars | UNIT | 3 |
| 071-074-0016 | Prepare Mortar Fire Plans | INSTITUT | 3 |
| 071-074-0024 | Conduct a Displacement by a Mortar Section | INSTITUT | 3 |
| 071-074-0029 | Conduct a Defense of a Mortar Firing Position by a Section | UNIT | 3 |
| 071-074-0040 | Control the Expenditure of Mortar Ammunition | UNIT | 3 |
| 071-321-4000 | Declinate an M2 Aiming Circle | INSTITUT | 3 |
| 071-326-5626 | Prepare an Oral Operation Order | INSTITUT | 4 |
| 071-940-0002 | Conduct Resupply of a Platoon | UNIT | 4 |
| 071-326-5630 | Conduct Movement Techniques by a Platoon | INSTITUT | 4 |
| 071-326-5832 | Conduct a Disengagement by a Platoon While Under Enemy Pressure | INSTITUT | 4 |
| 071-078-0020 | Compute Terrain Mortar Positions Using a M16 Plotting Board | UNIT | 4 |
| 071-074-0011 | Conduct Occupation of a Mortar Firing Position by a Platoon | UNIT | 4 |
| 071-074-0026 | Conduct a Displacement by a Mortar Platoon | UNIT | 4 |

# CHAPTER 3

## Critical Tasks

Skill Level 1

Subject Area 5: COMMUNICATIONS: GENERAL

### Operate Telephone Set, TA-1/PT
### 071-820-0001

**Conditions:** In a combat environment, given a field telephone set TA-1/PT and an already installed field wire line with a telephone or switchboard operator at the terminal end.

**Standards:** Sent and received an understandable outgoing and incoming call using proper radio telephone procedures.

**Performance Steps**

1. Reset the visual indicator.
2. Adjust buzzer volume.
3. Make an outgoing call.
4. Receive an incoming call.

NOTE: When the TA-l/PT is connected to a switchboard line, depress the generator lever rapidly several times to signal the end of a call.

**Evaluation Preparation:** SETUP: At the test site provide all material according to the task condition statement.

BRIEF SOLDIER: Tell the soldier to conduct an outgoing and incoming call using proper radio telephone procedures.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Reset the visual indicator. | ____ | ____ |
| 2. Adjusted buzzer volume. | ____ | ____ |
| 3. Made an outgoing call. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5805-243-13 |

**Install Communication Wire Lines**

**071-820-0003**

**Conditions:** In a combat environment, given communications wire (WD-1 on DR-8s or combat wire WD-36), as required; field telephones, as required; a reel unit (RL-39); an assistant, if required; and a requirement to install the communications wire lines.

**Standards:** Installed communication lines as required to meet the tactical situation; connected the wire to a fixed object at the originating and terminating ends of the wire; installed the wire so that it was protected from damage by vehicle traffic and from enemy fire, observation, or destruction.

**Performance Steps**

1. Check the field wire for serviceability by connecting it to the binding post terminals on two separate telephones and transmit and receive.

NOTE 1: Ensure that a "drip loop" is provided at both ends of the wire.

2. Anchor the wire at the start point. Leave enough slack in the wire at the beginning and terminating ends to allow the lead-in wire to reach the telephone or switchboard.

NOTE 2: Field wire must be laid loosely on the ground with plenty of well-distributed slack (approximately 20 percent). Slack allows the wire to lay flat on the ground and simplifies maintenance and rerouting of the wire.

NOTE 3: If laying the wire to an observation post, ensure that the wire parallels the front of at least one defensive position so that the defensive element may detect enemy soldiers who may be attempting to follow the wire into friendly positions.

NOTE 4: When laying surface lines, they should be tied to trees or other fixed objects to prevent passing troops and vehicles from pulling the wire into traffic lanes. All ties should be made at ground level.

3. Move slowly toward the terminating end of the wire. Allow the wire to revolve off the DR-8. DO NOT lay the wire in a straight line.

NOTE 5: Test the wire before and after a new reel is spliced into the line and before connecting the line to a switchboard or telephone.

NOTE 6: Ensure that all splices are taped with electrical tape to prevent moisture from shorting out communications.

4. Anchor the wire at the terminal end and connect it to the telephone or switchboard. Try to talk to someone on the other end of the wire.

NOTE 7: Ensure that the wire is buried at least three feet deep if the wire is to be buried in loose or sandy soil.

NOTE 8: If the situation allows, all lines should be tagged with the using unit's identity code (UIC), which is found in the CEOI.

NOTE 9: Tagging of communication lines is necessary to distinguish one line from another. At a minimum, communication lines must be tagged at the originating point and on each side of the point where the communication line crosses manmade linear terrain features.

NOTE 10: Tags are normally cut, notched, marked, and obtained through the chain of command from the unit communication section. In the event that tags are not available, the unit should improvise substitute tags. Every unit is responsible for ensuring that its lines are adequately marked.

5. When time and the situation permit, bury and camouflage the wire.

**Evaluation Preparation:** SETUP: At the test site, provide all material according to the task condition statement.

BRIEF SOLDIER: Tell the soldier to install the wire so that it is protected from damage by vehicle traffic and from enemy fire, observation, and destruction.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Installed hot loop. | ____ | ____ |
| 2. Repaired communication wire. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 11-43 |
| | FM 11-50 |
| | FM 24-33 |
| | FM 7-7 |

**Recover Communication Wire Lines**

**071-820-0004**

**Conditions:** In a combat environment, given empty DR-8s, as required; reel unit, RL-39; a telephone, TA 1/PT; helpers, as needed; and a requirement to recover communications wire lines (WD-1/TT).

**Standards:** Recovered communications wire WD-1/TT. Inspected, repaired (where required), and recoiled the wire onto a DR-8 for future use.

**Performance Steps**

1. Determine and obtain the materials required to recover the communications wire line.
2. Inspect the recovery equipment for serviceability.
3. Run the standing end of the wire around the DR-8 spool, through the small hole in the side of the spool and connect it to the screw type connectors located there (if the DR-8 is empty; if not, splice the standing end of the wire to the wire on the DR-8).
4. Direct a helper, if provided, to follow the wire's route, release the wire from its fixed anchor points, and remove the identification tags.
5. Hang the reel unit, RL-39, around the neck and snap the carrying handles on the DR-8 to the carrying straps. Move slowly in the direction that the wire is running and rotate the reel using the crank and axle, winding the wire onto the DR-8 spool.
6. As the wire coils on the DR-8 spool, visually inspect the wire for breaks and abrasions. If time permits, repair the wire before winding it onto the spool.
7. Continue the process described in step 5 until all wire has been inspected, repaired, and re-coiled on the DR-8 spool.

**Evaluation Preparation:** SETUP: At the test site provide all materials according to the task condition statement.

BRIEF SOLDIER: Tell the soldier to recover the wire and coil the wire onto a DR-8 for future use.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Determined and obtained the materials required to recover the communications wire line. | ____ | ____ |
| 2. Inspected the recovery equipment for serviceability. | ____ | ____ |
| 3. Ran the standing end of the wire around the DR-8 spool, through the small hole in the side of the spool, and connected it to the screw type connectors located there (if the DR-8 was empty; if not, spliced the standing end of the wire to the wire on the DR-8). | ____ | ____ |
| 4. Followed the wire's route, released the wire from its fixed anchor points, and removed the identification tags. | ____ | ____ |
| 5. Hung the reel unit, RL-39, around the neck and snapped the carrying handles on the DR-8 to the carrying straps. Moved slowly in the direction the wire was running and rotated the reel using the crank and axle, winding the wire onto the spool DR-8. | ____ | ____ |
| 6. As the wire coiled onto the DR-8 spool, visually checked the wire for breaks and abrasions. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 7. Continued the process described in step 5 until all wire was inspected, repaired, and coiled on the DR-8 spool. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 11-43 |

**Troubleshoot Secure Single-Channel Ground and Airborne Radio Systems (SINCGARSs) ICOM With or Without the AN/VIC-1 or AN/VIC-3**

**113-587-0070**

**Conditions:** Given an inoperable secure SINCGARS with or without intercommunications set AN/VIC-1, with or without frequency-hopping multiplexer (FHMUX) TD-1456/VRC, operating in a net; digital multimeter AN/PSM-45(*); radio test set AN/PRM-34; tool kit TK-101/G; ANCD AN/CYZ-10 with fill, fill cable; TM 11-5820-890-20-1, TM 11-5820-890-20-2, or TM 11-5820-890-20-3; DA Form 5986-E, and DA Form 5988-E.

**Standards:** Restored the radio set to operation or evacuated the defective LRU to a higher maintenance level.

**Performance Steps**

1. Verify reported malfunctions.
   a. Review operator's actions.
   b. Perform visual inspections.
2. Perform systematic troubleshooting procedures.
   a. Perform self-test.
   b. Perform off-line measurements.
3. Take corrective actions.
   a. Fix or replace the defective LRU. (Refer to the MAC.)
   b. Perform an operational check.
   c. Evacuate the defective LRU to a higher maintenance level.
      (1) Process for a higher maintenance level.
      (2) Prepare maintenance forms.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Refer to TM 11-5820-890-20-1, TM 11-5820-890-20-2, or TM 11-5820-890-20-3 for all performance measures. | | |
| 1. Verified reported malfunctions.<br>a. Reviewed operator's actions.<br>b. Performed visual inspection. | ____ | ____ |
| 2. Performed systematic troubleshooting procedures.<br>a. Performed self-test.<br>b. Performed off-line measurements. | ____ | ____ |
| 3. Took corrective actions.<br>a. Fixed or replaced the defective LRU. (Refer to the MAC.)<br>b. Performed an operational check.<br>c. Evacuated the defective LRU to a higher maintenance level.<br>(1) Processed for a higher maintenance level.<br>(2) Prepared maintenance forms. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| | DA PAM 738-750 |

**Repair Telephone Cable WD-1/TT or WF16/U**

**113-588-4025**

**Conditions:** Given an telephone cable containing an open and a ground or short, an tool equipment TE-33, an telephone set TA-312/PT (operational) two each, an crimper E9B, an splice connectors UIR, an friction tape and electrical tape, and an TC 24-20.

**Standards:** Standards have been met when the telephone cable has been repaired and tested.

**Performance Steps**

1. Repair an open.
2. Repair short or ground.
3. Test telephone cable.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Repaired an open. | ____ | ____ |
| 2. Repaired short or ground. | ____ | ____ |
| 3. Tested telephone cable. | ____ | ____ |

Note: Refer to TC 24-20 for all performance measures.

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| TC 24-20 | |
| TM 11-5805-201-12 | |

**Install and Operate an Switchboard, Telephone, Manual SB-993/GT**

**113-594-2005**

**Conditions:** Given an switchboard SB-993/GT complete, an tool equipment TE-33, an field wire lines to telephones, three each, an ACP 134, an TM 11-5805-294-12, with paper and pencil.

**Standards:** Standard is met when SB-993/GT has been installed and operational IAW TM 11-5805-294-12, chapter 2, and ACP 134, chapter 3, within 15 minutes.

**Performance Steps**

1. Perform pre installation procedures. (Refer to TM 11-5805-294-12, para 7)
2. Install the switchboard. (Refer to TM 11-5805-294-12, para 2-6)
3. Process a line-to-line call. (Refer to TM 11-5805-294-12, para 10; ACP 134, table 1, pp 3-3, 3-4, and 3-6)
4. Processes a conference call. (Refer to TM 11-5805-294-12, para 2-7; ACP 134, table1, pp 3-3, 3-4, 3-5, and 3-6)

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed pre installation procedures. | ____ | ____ |
| 2. Installed the switchboard. | ____ | ____ |
| 3. Processed a line-to-line call. | ____ | ____ |
| 4. Processed a conference call. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**Operate Switchboard, Telephone, Manual SB-22/PT**

**113-594-2014**

**Conditions:** This task is performed in a tactical or non tactical situation, in all weather conditions, and may be performed in an NBC environment. Given a switchboard SB-22/PT, prepared traffic diagram, incoming calls to answer, TM 11-5805-201-12, battery BA-30 (four each), sledgehammer and shovel, ground rod MX-148/G with ground strap, field wire lines (from terminal equipment), tool kit TE-33, cleaning brush, pencil, DA Form 2404 (equipment inspection and maintenance work sheet).

**Standards:** Standard is met when switchboard is installed, local, trunk, and conference calls are processed, and PMCS is performed IAW TM 11-5805-262-12, ACP 134, chapters 2 and 3, and DA Pam 738-750.

**Performance Steps**

1. Install switchboard. (Refer to TM 11-5805-262-12, para 2-3 thru 2-9)
2. Perform PMCS. (Refer to TM 11-5805-262-12, para 3-3)

Note: Refer to TM 11-5805-262-12, para 3-5 thru 3-11 for steps 3-9.

3. Perform preliminary operating procedures.
4. Connect local calls.
5. Connect outgoing trunk calls.
6. Connect incoming trunk calls.
7. Perform recall procedures on local calls.
8. Perform recall procedures on trunk calls.
9. Connect conference calls.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Installed switchboard. | ____ | ____ |
| 2. Performed PMCS. | ____ | ____ |
| 3. Performed preliminary operating procedures. | ____ | ____ |
| 4. Connected local calls. | ____ | ____ |
| 5. Connected outgoing trunk calls. | ____ | ____ |
| 6. Connected incoming trunk calls. | ____ | ____ |
| 7. Performed recall procedures on local calls. | ____ | ____ |
| 8. Performed recall procedures on trunk calls. | ____ | ____ |
| 9. Connected conference calls. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| DA PAM 738-750 | |

**Install Tactical Telephone**

**113-600-1023**

**Conditions:** Given an telephone set TA-312/PT, battery BA-30 (two each), tool kit TE-33, TM 11-5805-201-12, installed wire line. This task is performed in a tactical or non tactical situation, in all weather conditions, and may be performed in an NBC environment.

**Standards:** Standard is met when telephone is installed, an operation check is made, and PMCS is performed IAW TM 11-5805-201-12, chapter 2, TC 24-20, chapter 12, and DA Pam 738-750 within 10 minutes.

**Performance Steps**

1. Perform PMCS. (Refer to TM 11-5805-201-12, para 4-2)
2. Prepare telephone for operation. (Refer to TM 11-5805-201-12, para 2-3a, and TC 24-20, chapter 12)
3. Install batteries. (Refer to TM 11-5805-201-12, para 2-3f)
4. Install telephone on a pole or tree. (Refer to TM 11-5805-201-12, para 2-3b)
5. Install/remove deicing screen. (Refer to TM 11-5805-201-12, para 2-3g)
6. Perform operational check. (Refer to TM 11-5805-201-12, para 3-2 and 3-3a)

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed PMCS. | ____ | ____ |
| 2. Prepared telephone for operation. | ____ | ____ |
| 3. Installed batteries. | ____ | ____ |
| 4. Installed telephone on a pole or tree. | ____ | ____ |
| 5. Installed/removed deicing screen. | ____ | ____ |
| 6. Performed operational check. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| TC 24-20 | |
| TM 11-5805-201-12 | |

**Operate Telephone Set TA-312/PT**

**113-600-2007**

**Conditions:** This task is performed in a tactical or nontactical situation, under all weather conditions, and it may be performed in an NBC environment. You will be provided with the following: 1. Telephone set TA-312/PT (installed), two each. 2. Headset H-144/U. 3. Screwdriver. 4. TM 11-5805-201-12.

**Standards:** Task standard has been met when a call has been initiated and completed IAW the performance measures.

**Evaluation Preparation:**

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Refer to TM 11-5805-201-12 for performance measures. | | |
| 1. Initiate a call in the prescribed mode of operation (paragraph 3-2). | ____ | ____ |
| 2. Answer calls in the prescribed mode of operation (paragraph 3-3a). | ____ | ____ |
| NOTE: Performance measure 3 may be used if the telephone operator must have his hands free during operation. | | |
| 3. Answer calls using external headset (paragraph 3-3b). | ____ | ____ |
| NOTE: Operation under conditions less than ideal may require the operator to make special operating considerations. | | |
| 4. Operate telephone set under unusual conditions (paragraph 3-4). | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If any step is failed, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| TM 11-5805-201-12 | 622-113-1886-B |
| | DVC 11-03 |
| | SS0410 |

**Perform Operators PMCS on Tactical Telephone Sets**

**113-600-3015**

**Conditions:** Given an telephone set TA-312/PT, batteries BA-30 or BA 3030 (two each), telephone set TA-838/TT, batteries BA-42 or 3042 (four each), telephone set TA-1/PT, lint-free cloth and brush, DA Form 2404, denatured alcohol, TM 11-5805-201-12, TM 11-5805-650-12, TM 11-5805-243-13, DA Pam 738-750.

**Standards:** Standard has been met when the maintenance has been performed and DA Form 2404 is completed.

**Performance Steps**

1. Perform maintenance on TA-312/PT. (Refer to TM 11-5805-201-12)
2. Complete DA Form 2404. (Refer to DA Pam 738-750)
3. Perform maintenance on TA-838/TT. (Refer to TM 11-5805-650-12)
4. Compete DA Form 2404. (Refer to DA Pam 738-750)
5. Perform maintenance on TA-1/PT. (Refer to TM 11-5805-243-13)
6. Complete DA Form 2404. (Refer to DA Pam 738-750)

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed maintenance on TA-312/PT. | ____ | ____ |
| 2. Completed DA Form 2404. (TA-312/PT) | ____ | ____ |
| 3. Performed maintenance on TA-838/TT. | ____ | ____ |
| 4. Completed DA Form 2404. (TA-838/TT) | ____ | ____ |
| 5. Performed maintenance on TA-1/PT. | ____ | ____ |
| 6. Completed DA Form 2404. (TA-1/PT) | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| DA PAM 738-750 | |
| TM 11-5805-201-12 | |
| TM 11-5805-243-13 | |
| TM 11-5805-650-12 | |

**Operate Automated Net Control Device (ANCD) AN/CYZ-10**

**113-609-2053**

**Conditions:** Given two Automated Net Control Device (ANCD) AN/CYZ-10, SINCGARS Radio Set with secure device, W4 Fill Cable, TB 11-5820-890-12, and TM 11-5820-890-10-8.

**Standards:** Perform in sequence the transfer of COMSEC Keys and SOI information from ANCD to ANCD; Load radio with COMSEC using ANCD; Obtain SOI information from ANCD, correcting all errors within 15 minutes.

**Performance Steps**

1. Transfer COMSEC Keys and SOI information from ANCD to ANCD.
   a. Turn on both ANCDs.
   b. Make main menu selection. (ANCD)
   c. Make source ANCD menu selections.
   d. Make target ANCD menu selections.
   e. Transfer data from ANCD to ANCD.
   f. Turn off/disconnect ANCDs.
2. Load radio from ANCD using mode 2 fill.
   a. Turn on radio and ANCD.
   b. Make main menu selection. (ANCD)
   c. Make application menu selection. (ANCD)
   d. Set controls of radio and connect to ANCD with fill cable.
   e. Transfer mode 2 fill from ANCD to radio.
   f. Disconnect ANCD from radio and turn off ANCD.
3. Obtain SOI information from ANCD.
   a. Turn on ANCD.
   b. Make main menu selection.
   c. Make SOI menu selection.
   d. Turn off ANCD.
4. Perform PMCS on ANCD.
   a. Visual inspection.
   b. Check battery.
   c. Check fill port/CIK port.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Transferred COMSEC keys and SOI information from ANCD to ANCD.<br>a. Turned on both ANCDs.<br>b. Made main menu selection. (ANCD)<br>c. Made source ANCD menu selections.<br>d. Made target ANCD menu selections.<br>e. Transferred data from ANCD to ANCD.<br>f. Turned off/disconnected ANCDs. | ____ | ____ |
| 2. Loaded radio from ANCD using Mode 2 fill.<br>a. Turned on radio and ANCD.<br>b. Made main menu selection. (ANCD)<br>c. Made application menu selection. (ANCD)<br>d. Set controls of radio and connect to ANCD with fill cable.<br>e. Transferred mode 2 fill from ANCD to radio.<br>f. Disconnected ANCD from radio and turned off ANCD. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 3. Obtained SOI information from ANCD.<br>a. Turned on ANCD.<br>b. Made main menu selection.<br>c. Made SOI menu selection.<br>d. Turned off ANCD. | ____ | ____ |
| 4. Performed PMCS on ANCD.<br>a. Conducted visual inspection.<br>b. Checked battery.<br>c. Checked fill port/CIK port. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| DA PAM 738-750 | |
| TB 11-5820-890-12 | |
| TM 11-5820-890-10-8 | |

Subject Area 7: COMMUNICATIONS: RADIO

**Operate SINCGARS Data Devices**

**113-587-2075-P**

**Conditions:** Given an SINCGARS operating in a digital net, designated operational data device, TM 5820-890-10-1 for ICOM or TM 11-5820-890-10-3 for Non-ICOM, and appropriate data devices technical bulletin (TB).

**Standards:** Standards are met when data is sent and received over the net.

**Performance Steps**

1. Connect data device cable to RT audio/data connector.
2. Set FCTN to SQ ON.
3. Set data rate switch.
4. Send and receive data.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Connected data device cable to RT audio/data connector. | ____ | ____ |
| 2. Set FCTN to SQ ON. | ____ | ____ |
| 3. Set data rate switch. | ____ | ____ |
| 4. Send and receive data. | ____ | ____ |

Note: Refer to TM 11-5820-890-10-1 or TM 5820-8980-10-3 for performance measures 1 and 2. Refer to appropriate data device TB for performance measures 3 and 4.

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| TM 11-5820-890-10-1 | FM 24-18 |
| TM 11-5820-890-10-3 | |

**Operate Secure SINCGARS Using Control Monitor (CM)**

**113-587-2076P**

**Conditions:** Given a SINCGARS radio operating in a net, C-11291 CM, TM 11-5820-890-10-1, TM 11-5820-890-10-3, and unit SOI.

**Standards:** The standards are met when radio functions are changed using the CM.

**Performance Steps**

1. Prepare control monitor for operation.
2. Change radio functions using the control monitor.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Prepared control monitor for operation. | ____ | ____ |
| 2. Changed radio functions using the control monitor. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| TM 11-5820-890-10-1 | |
| TM 11-5820-890-10-3 | |

**Operate SINCGARS Remote Control Unit (SRCU)**

**113-587-2077-P**

**Conditions:** Given a SINCGARS ICOM operating a net, SRCU C-11561, battery BA-1372, battery BA-5590, battery case CY-8346, flat-tip screwdriver, installed field wire line WF-16, pack frame, cable CX-13298, distant station, TM 11-5820-890-10-1, and TM 11-5820-890-20-1.

**Standards:** The standards are met when an operational message is sent and received from the SRCU.

**Performance Steps**

1. Prepare SRCU for operation.
2. Operate SRCU single channel (SC).
3. Operate SRCU frequency hopping (FH).

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Prepared SRCU for operation. | ____ | ____ |
| 2. Operated SRCU single channel (SC). | ____ | ____ |
| 3. Operated SRCU frequency hopping (FH). | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| TM 11-5820-890-10-1 | |

**Construct a Field-Expedient Antenna**

**071-810-0003**

**Conditions:** In a combat environment, given field wire, material suitable to use as insulators, a knife, parachute suspension cord or other suitable string material, electrical tape, an operational FM radio, a designated radio frequency and call sign, and a requirement to construct an FM antenna using the materials available.

**Standards:** Established communications with a designated distant radio station.

**Performance Steps**

1. Select type of antenna the mission requires.
    a. Vertical antennas are omni-directional; that is, they transmit and receive equally well in all directions. Most tactical antennas are vertical; for example, the manpack portable radio uses a vertical whip as do the vehicular radios in tactical vehicles.

NOTES:
-- A vertical antenna may be improvised by using a metal pipe or rod of the correct length, held erect by guy lines. The lower end of the antenna should be insulated from the ground by placing it on a large block of wood or other insulating material.

-- A vertical antenna may also be a wire supported by a tree or a wooden pole. For short vertical antennas, the pole may be used without guys (if properly supported at the base). If the length of the vertical mast is not long enough to support the wire upright, it may be necessary to modify the connection at the top of the antenna.

    b. Doublet antennas are directional broadside to their length, which makes the vertical doublet antenna essentially omnidirectional. This is because the radiation pattern is doughnut shaped. The horizontal doublet antenna is bi-directional.
    c. The vertical half-rombic, long-wire, and "V" antenna are three types of field-expedient directional antennas. These antennas consist of a single wire two or more wave lengths long, supported on poles or tree branches at a height of 3 to 7 meters (10 to 20 feet) above the ground. These antennas will, however, operate satisfactorily as low as 1 meter (approximately 3 feet) above the ground.

2. Construct a field-expedient omnidirectional antenna.
    a. Analyze the materials available in the area to fabricate the desired antenna.
    b. Determine the required length of the improvised antenna.
    c. Determine the method by which the antenna will be supported (if required).
    d. Attach any required insulators to the antenna wire (if wire is used).
    e. Stretch and attach the antenna (if wire is used) to a vertical support (tree or pole), and secure it in a taut position.
    f. Attach the antenna to the radio's antenna well.
    g. Scrape the paint from a small (1 inch) point on the radio's case at the point where the ground wire will be attached (normally where the battery case connects to the RT).
    h. Position the antenna until the radio performs to its maximum capability and clear communications have been established with the distant station.
    i. Attach one end of the ground wire to the sharpened end of the ground stake (if made of wood) and drive it deeply into the ground. If the ground stake is made of metal, attach the ground wire to the top of the stake and drive it into the ground.
    j. Attach the other end of the ground wire to the radio's case at the point where the paint was removed.
    k. Attempt to contact a distant radio station.

3. Construct a half-wave doublet antenna.
    a. Determine the expedient materials required and available to construct a half-wave doublet antenna.

**Performance Steps**

b. Determine the best location to construct the antenna.
c. Cut two lengths of wire 1/4 wave length long.
d. Connect the two wires together with an expedient insulator.
e. Attach insulators to each end of the antenna wire to insulate the antenna from its supports.
f. Attach sufficient wire, cord, or rope to the outer two insulators to permit the antenna to be secured to the identified anchor points.
g. Untwist and spread the two wires apart and remove approximately 3 inches of insulation from the ends of the wire that will be attached to the center of the wire antenna.
h. Remove a portion (approximately 1 inch) of insulation from the end of each length of antenna wire at a point approximately 3 inches from the center insulator.
i. Connect the ends of the wire, with the insulation removed and running to the radio, to the anchor points.
j. Tape the connections.
k. Remove approximately 1 inch of insulation from the ends of the antenna running to the radio.
l. Untwist the wire and connect one strand of the wire to the base of the small antenna and screw it into the antenna well.
m. Release the clamp on one side of the battery box, scrape a small portion of the paint away so that bare metal is exposed, attach the remaining twisted strand of wire to the point from which the paint was removed, close the battery box, and fasten the clamp.
n. Stretch the wire between two anchor points (ensure that an insulator is between the anchor point and the antenna portion of the wire) and secure the insulator to the anchor points.
o. Attempt to establish communications with a distant radio station set to the same frequency.
p. Adjust the antenna, as required, to obtain maximum performance of the antenna.

4. Construct a field-expedient directional antenna.
   a. Determine the type of directional antenna required for mission accomplishment.
   b. Identify and locate the expedient materials required to construct the desired type of antenna.
   c. Determine the location where the antenna will be erected.
   d. Construct the required antenna.
      (1) Construct vertical half-rombic antenna.
         ( a) Determine the direction in which the desired receiving station is located by using a compass.
         ( b) Lay the antenna on the ground so that the long axis of the antenna is aligned on the desired azimuth.
         ( c) Connect the far end (opposite of the radio) to a ground stake.
         ( d) Cut the wire at a point approximately 18 inches from the anchor point in the desired direction of transmission and attach an expedient resistor to the end of it. Secure the other end of the resistor to the wire running to the anchor point and tighten the wire.
         ( e) Cut the wire at a point approximately 3 feet from the anchor point nearest the radio and attach an expedient insulator between the anchor point and the long wire of the antenna. Stretch the antenna wire across the vertical support pole(s) or tree limb(s) so that an angle of approximately 54 degrees is obtained and attach it to a ground stake (near the radio).
         ( f) At a distance of approximately 3 to 4 feet from the ground stake nearest the radio, cut the antenna wire and connect one end of the antenna to an expedient insulator.
         ( g) Connect the portion of wire connected to the ground stake to the opposite end of the insulator.
         ( h) Cut an additional piece of wire approximately 5 feet long, attach it to a point below the insulator at a point where the insulation has been removed, and connect it to the radio.
         ( i) Tape all connections with waterproof tape.
         ( j) Attempt to contact a distant radio station.
      (2) Construct long-wire antenna.

CAUTION: DO NOT use this antenna with the radio transmitter 524 in the high power mode. Damage to the radio could result.

**Performance Steps**

( a) Stretch the antenna wire (approximately 100 feet long) between two vertical supports at an approximate height of 3 1/2 to 4 1/2 meters above the ground of 3.5 to 4.5 meters. Run the wire (opposite end from the radio) at an angle of approximately 45 degrees and anchor it to the ground using either metal or wooden ground stakes.
( b) Attach the end of the antenna wire located where the radio will be operated from to a stake and anchor it to the ground.
( c) Cut the wire at a point approximately 2 feet from the anchor point in the desired direction of transmission and attach an expedient resistor between the anchor point and the antenna.
( d) Cut the wire at a point approximately 3 feet from the anchor point nearest the radio and attach an expedient insulator between the anchor point and the long wire of the antenna.
( e) Run a short (approximately 4 feet) piece of wire (single strand WD 1) from the antenna terminal on the radio to a point above the insulator from which the insulation has been removed and secure it.
( f) Secure a second single strand of wire to the radio at a point on the radio from which the paint has been removed to the other end of the insulator,
( g) Place the radio into operation and attempt to contact a distant radio station.
( h) Adjust the antenna's length as required to obtain optimum performance of the radio.

(3) Construct the "V" antenna so the open end of the V is oriented in the desired direction of transmission.
( a) Determine the desired configuration of the antenna.
( b) Determine the length of the antenna legs and their angles.
( c) Identify the vertical support(s) required.
( d) Construct the antenna.
( e) Attempt to contact a distant radio station.
( f) Adjust the antenna as required to obtain optimum performance (if required).

**Evaluation Preparation:** SETUP: At the test site provide the soldier with all the materials according to the task condition statement.

BRIEF SOLDIER: Tell the soldier to construct a field expedient antenna using the materials provided that allows the provided radio to communicate with a distant station.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Selected the type of antenna the mission required. | ____ | ____ |
| 2. Constructed a field-expedient omnidirectional antenna. | ____ | ____ |

a. Analyzed the materials available in the area to fabricate the desired antenna.
b. Determined the required length of the improvised antenna.
c. Determined the method by which the antenna would be supported (if required).
d. Attached any required insulators to the antenna wire (if wire was used).
e. Stretched and attached the antenna (if wire was used) to a vertical support (tree or pole) and secured it in a taut position.
f. Attached the antenna to the radio's antenna well.
g. Scraped the paint from a small (1 inch) point on the radio's case at the point where the ground wire was be attached (normally where the battery case connects to the RT).
h. Adjusted the length and position of the antenna until the radio performed to its optimum capability, and clear communications were established with the distant station.
i. Attached one end of the ground wire to the sharpened end of the ground stake (if made of wood) and drove it deeply into the ground. If the ground

| Performance Measures | GO | NO GO |
|---|---|---|
| stake was made of metal, attached the ground wire to the top of the stake and drove it into the ground.<br>j. Attached the other end of the ground wire to the radio's case at the point where the paint was removed.<br>k. Contacted a distant radio station. | | |
| 3. Constructed a half-wave doublet antenna.<br>a. Determined the expedient materials required and available to construct a half-wave doublet antenna.<br>b. Determined the best location to construct the antenna.<br>c. Cut two lengths of wire 1/4 wave length long.<br>d. Connected the two wires together with an expedient insulator.<br>e. Attached insulators to each end of the antenna wire to insulate the antenna from its supports.<br>f. Attached sufficient wire, cord, or rope to the outer two insulators to permit the antenna to be secured to the identified anchor points.<br>g. Untwisted the two wires and removed approximately 3 inches of insulation from the ends of the wire that would be attached to the center of the wire antenna.<br>h. Removed a portion (approximately 1 inch) of insulation from the end of each length of antenna wire at a point approximately 3 inches from the center insulator.<br>i. Connected the ends of the wire from which the insulation was removed, and ran it to the radio.<br>j. Taped the connections to ensure it was water tight.<br>k. Removed approximately 1 inch of insulation from the ends of the antenna and ran it to the radio.<br>l. Untwisted the wire and connected one strand of the wire to the base of small antenna and screwed it into the antenna well.<br>m. Released the clamp on one side of the battery box, scraped a small portion of the paint away so that bare metal was exposed, attached the remaining twisted strand of wire to the point from which the paint was removed, closed the battery box, and fastened the clamp in the closed position.<br>n. Stretched the wire between two anchor points, ensured that an insulator was between the anchor point and the antenna portion of the wire, and secured it in a taut manner to the anchor points.<br>o. Attempted to establish communications with a distant radio station set to the same frequency.<br>p. Adjusted the antenna, as required, to obtain maximum performance of the antenna. | ____ | ____ |
| 4. Constructed a field-expedient directional antenna.<br>a. Determined the type of directional antenna required for mission accomplishment.<br>b. Identified and located the expedient materials required to construct the desired type of antenna.<br>c. Determined the location where the antenna would be erected.<br>d. Constructed the required antenna.<br>(1) Constructed the vertical half-rombic antenna.<br>( a) Determined the direction in which the desired receiving station was located by using a compass.<br>( b) Laid the antenna on the ground so that the long axis of the antenna was aligned on the desired azimuth.<br>( c) Connected the far end (opposite of the radio) to a ground stake.<br>( d) Cut the wire at a point approximately 18 inches from the anchor | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|

point in the desired direction of transmission and attached an expedient resistor to the end of it. Secured the other end of the resistor to the wire, ran it to the anchor point, and tightened the wire.

( e) At a distance of approximately 3 to 4 feet from the ground stake nearest the radio, cut the antenna wire and connected one end of the antenna to an expedient insulator.

( f) Connected the portion of wire connected to the ground stake to the opposite end of the insulator.

( g) Cut a portion of wire approximately 5 feet in length and attached it to a point above the insulator where the insulation was removed and the insulator attached.

( h) Attached the other end of the wire to the radio's antenna well.

( i) Cut an additional piece of wire approximately 5 feet long, attached it to a point below the insulator at a point where the insulation was removed, and connected it to the radio.

( j) Taped all connections with waterproof tape.

( k) Attempted to establish communications with a distant station.

(2) Constructed long-wire antenna.

( a) Stretched the antenna wire (approximately 100 feet long) between two vertical supports at an approximate height 3 1/2 to 4 1/2 meters above the ground. Ran the wire (opposite end from the radio) at an angle of approximately 45 degrees and anchored it to the ground using either metal or wooden ground stakes.

( b) Attached the end of the antenna wire located where the radio will be operated from to a stake and anchored it to the ground.

( c) Cut the wire at a point approximately two feet from the anchor point in the desired direction of transmission and attached an expedient resistor between the anchor point and the antenna.

( d) Cut the wire at a point approximately 3 feet from the anchor point nearest the radio and attached an expedient insulator between the anchor point and the long wire of the antenna.

( e) Placed the radio into operation and attempted to contact a distant radio station.

( f) Adjusted the antenna's length, as required, and obtained optimum performance of the radio.

(3) Constructed the "V" antenna so the open end of the "V" was oriented in the desired direction of transmission.

( a) Determined the desired configuration of the antenna.

( b) Identified and located the expedient materials required to construct the desired type of antenna.

( c) Determined the location where the antenna would be erected.

( d) Constructed the antenna.

( e) Attempted to contact a distant radio station.

( f) Adjusted the antenna's length as required to obtain optimum performance of the radio.

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 24-18 |

**Maintain Intercommunications Set, AN/VIC-1, on a Tracked Vehicle (Includes FM Radio)**
**071-810-0004**

**Conditions:** Given a tracked vehicle with an installed intercommunications set; basic issue items (BII); cleaning equipment and rags, as required; appropriate technical manuals (TM), as applicable; and a requirement to perform operator and or other required maintenance on the vehicle's intercommunications set.

**Standards:** Scheduled and or other required operator's maintenance was performed on the vehicle's intercommunications set. The system was inspected and corrections made where required within the scope of the operator's responsibility. Uncorrected faults were recorded following procedures in DA Pam 738-750 and were reported to the chain of command.

**Performance Steps**
NOTE: As part of the maintenance, check to ensure that all accessories to the system are properly installed.

1. Inspect the vehicle's intercom and all accessories to determine their serviceability, following procedures prescribed in the appropriate TM.
2. Correct identified faults within the scope of the operator's responsibility.
3. Record uncorrected faults following procedure as prescribed in DA Pam 738-750.
4. Report uncorrected faults to the chain of command.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to perform maintenance on the AN/VIC-1 on a tracked vehicle.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inspected the vehicle's intercom, checked to ensure that all accessories to the system were properly installed. | ____ | ____ |
| 2. Corrected identified faults within the scope of the operator's responsibility. | ____ | ____ |
| 3. Recorded uncorrected faults following procedures as prescribed in DA Pam 738-750. | ____ | ____ |
| 4. Reported uncorrected faults to the chain of command. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| TM 11-5820-401-10-2 | DA PAM 738-750 |
| TM 11-5820-498-12 | |
| TM 11-5830-340-12 | |

**Operate in Radio Nets**

**113-571-1004**

**Conditions:** Given a requirement and the following: Radio set; Unit SOI; ANCD; Applicable TM for radio set used; Applicable Army regulations; Applicable allied communications publications (ACPs). Supervision and assistance will be available.

**Standards:** Task standard has been met when you have properly entered the selected radio net and authenticated upon request of the NCS. You have transmitted and received traffic as directed by the NCS, performed duties as NCS, and have left and/or closed the net in accordance with applicable operating procedures and ACP for the radio net in which you are operating according to performance measure 1 through 5.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Determines operational net to be entered. (Refer to SOI or ANCD.) | ____ | ____ |
| 2. Requests permission to enter net. (Refer to ACP 125(E), ACP 124(D), ACP 126(C), FM 24-19, Operating Procedures.) | ____ | ____ |
| 3. Passes traffic as directed by the NCS. (Refer to ACP 125(E), ACP 124(D).ACP-126(C) | ____ | ____ |
| 4. Requests permission from the NCS to leave the net. (Refer to ACP 125(E), ACP 124(D), ACP 126(C), ACP-131(E), FM 24-19, station leaving net and closing a net.) | ____ | ____ |
| 5. Performs functions of an NCS. (Refer to ACP 125(E), ACP 124(D), FM 24-19, precedence prosigns.) | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show what the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| ACP 125(D) | TC 24-19 |
| FM 24-19 | |

**Encode and Decode Messages Using KTC 600(*) Tactical Operations Code**
**113-573-4003**

**Conditions:** Given a unit SOI with KTC 600(*) (OPCODE), plain text message to be encoded, and encoded message to be decoded. Supervision and assistance will be available.

**Standards:** Encode and decode a message using KTC 600(*) within 30 seconds per code group or word/phrase.

**Performance Steps**
SECURITY PRECAUTIONS: Use of code set. Each set of the KTC 600(*) tactical operations code is effective for 48 hours unless otherwise directed by the signal office. Never mix plain language with encoded messages. Spelling and punctuation must be kept to an absolute minimum. Variant code groups are provided for more commonly used phrases. These should be used impartially and at random.
SECURITY PRECAUTIONS: Spare groups are provided to assign additional variants to plain text phrases in the code, or to assign new plain text values as required.

1. Encode a message that has been provided by the supervisor.

    a. Write the plain text message on a piece of paper, leaving sufficient space above each line to write the code values.
    b. Turn to the code set to be used for the time period.
    c. Find the word, phrase, or number to be encoded and write the three-letter code group on the message.

NOTE: The encode section of the operations code is made up of words and phrases commonly used in tactical operations which are arranged in alphabetical order, like a dictionary.

NOTE: The numeral section of the operations code provides two types of code groups for each number.

    (1) The numbers which are not followed by the symbol (+) will be used when the numerals are used singularly or as the first final number of a group of numbers.
    (2) The numbers with the (+) ending will be used with all but the final number of a group of numbers.

2. Decode a message that has been provided.
    a. After receiving and writing down the encoded message, turn to the code set to be used for the time period.

NOTE:The decode section of the code is made up of the three-letter code groups in alphabetical order, with a word, phrase, or number to the right of each group.

    b. b Find the code group and write the word, phrase, or number under that group in the encoded message.

NOTE: Some vocabulary entries include word endings (e.g., -ing, -ed, -ly). These endings should be spelled out if the message content does not clearly indicate which ending is applicable.

**Evaluation Preparation:**

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| SECURITY PRECAUTIONS: Use of code set. Each set of the KTC 600(*) tactical operations code is effective for 48 hours unless otherwise directed by the signal office. Never mix plain language with encoded messages. Spelling and punctuation must be kept to an absolute minimum. Variant code groups are provided for more commonly used phrases. These should be used impartially and at random. Spare groups are provided to assign additional variants to plain text phrases in the code, or to assign | | |

**Performance Measures** **GO** **NO GO**

new plain text values as required.

1. Encode a message that has been provided by the supervisor. ____ ____
    a. Write the plain text message on a piece of paper, leaving sufficient space above each line to write the code values.
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    a. After receiving and writing down the encoded message, turn to the code set to be used for the time period.

Note: The decode section of the code is made up of the three-letter code groups in alphabetical order, with a word, phrase, or number to the right of each group.

b. Find the code group and write the word, phrase, or number under that group in the encoded message.

Note: Some vocabulary entries include word endings (e.g., -ing, -ed, -ly). These endings should be spelled out if the message content does not clearly indicate which ending is applicable.

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier scores NO-GO, show him what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| KTC 600(*) | FA6064 |
| | FA6066 |
| | KTC 600 |
| | KTC 600 CEO |

**Use the KTC 1400(*) Numerical Cipher/Authentication System**

**113-573-4006**

**Conditions:** Given map coordinates to be encoded, encoded numerical information to be decoded, authentication challenge for reply, pencil, paper, and unit SOI extract with KTC 1400(*) numeral cipher/authentication system and supplemental instructions.

**Standards:** Use the KTC 1400(*) numeral cipher/authentication system to encode and decode, and provide a correct reply for a challenge to authenticate.

**Performance Steps**

SECURITY PRECAUTIONS: Use of code sets. Each set of the KTC 1400(*) is effective for 12 hours unless otherwise directed by the signal office. Encrypt no more than 15 characters with a single SET INDICATOR. If an entire message must be encrypted, use the operation code KTC 600(*). Use only random letter combinations as SET INDICATORS. Variant letters are provided for each numeral. These should be used impartially and at random. SECURITY PRECAUTIONS: Each table has plain text numbers and letters after the 6th, 12th, and 18th lines. These are to ease operation. Do not use these as cipher values. In challenge and reply authentication, only the station responding is verified. Do not accept a challenge as an authentication. To verify both stations, both stations should be challenged and should reply. Another challenge should be made if an incorrect reply is received, if a "standby" is requested, or if an unusual delay occurs between challenge and reply. Never give the challenge and reply in the same transmission (self authentication).

1. Find the line for encryption.

    a. Randomly select any two letters for SET INDICATOR (SI), (except Z).
    b. Find the first letter of the SI in the LINE INDICATOR column.
    c. Find the second SI letter.
    d. Find the SET LETTER in the LINE INDICATOR column. This line will be used to encrpyt up to 15 characters.

2. Encrypt grid zone letters provided by the supervisor.

NOTE: Grid zone letters will be included in messages when they are necessary to the understanding of such messages. No other letters will be encrypted. If necessary to preclude misunderstanding, a statement may be made that grid zone letters are included in the message.

3. Encrypt numbers provided by the supervisor.
4. Prepare for transmission.
5. Decrypt grid zone letters and numbers.
6. Perform challenge and reply authentication.
    a. Challenge a station using authentication.
    b. Reply to a station using authentication.
7. Perform transmission authentication.

**Evaluation Preparation:**

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| SECURITY PRECAUTIONS: Use of code sets. Each set of the KTC 1400(*) is effective for 12 hours unless otherwise directed by the signal office. Encrypt no more | | |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|

than 15 characters with a single SET INDICATOR. If an entire message must be encrypted, use the operation code KTC 600(*). Use only random letter combinations as SET INDICATORS. Variant letters are provided for each numeral. These should be used impartially and at random. Each table has plain text numbers and letters after the 6th, 12th, and 18th lines. These are to ease operation. Do not use these as cipher values. In challenge and reply authentication, only the station responding is verified. Do not accept a challenge as an authentication. To verify both stations, both stations should be challenged and should reply. Another challenge should be made if an incorrect reply is received, if a "standby" is requested, or if an unusual delay occurs between challenge and reply. Never give the challenge and reply in the same transmission (self authentication).

1. Find the line for encryption. ____ ____
   a. Randomly select any two letters for SET INDICATOR (SI), (except Z).
   b. Find the first letter of the SI in the LINE INDICATOR column.
   c. Find the second SI letter.
   d. Find the SET LETTER in the LINE INDICATOR column. This line will be used to encrypt up to 15 characters.
2. Encrypt grid zone letters provided by the supervisor. ____ ____

Note: Grid zone letters will be included in messages when they are necessary to the understanding of such messages. No other letters will be encrypted. If necessary to preclude misunderstanding, a statement may be made that grid zone letters are included in the message.

3. Encrypt numbers provided by the supervisor. ____ ____
4. Prepare for transmission. ____ ____
5. Decrypt grid zone letters and numbers. ____ ____
6. Perform challenge and reply authentication. ____ ____
   a. Challenge a station using authentication.
   b. Reply to a station using authentication.
7. Perform transmission authentication. ____ ____

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier scores NO-GO, show him what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| KTC 1400 (*) | CEOI SUPPLEMENTAL INSTRUC<br>KTC 1400 |

**Recognize Electronic Attack (EA) and Implement Electronic Protection (EP)**
**113-573-6001**

**Conditions:** Given a radio set, applicable operator's technical manual, FM 24-1, FM 24-33, and unit SOI extract or Data Transfer Device AN/CYZ-10 loaded with appropiate data.

**Standards:** Standards are met when you have determined that electronic warfare is directed at your station and electronic counter-countermeasures (ECCM) are employed for continued operation.

**Performance Steps**

1. Introduction. A close relationship exists between ECCM and COMSEC. Both defensive arts are based on the same principle. An enemy who does not have access to our essential elements of friendly information (EEFI) is a much less effective foe. The major goal of COMSEC is to ensure that friendly use of the electromagnetic spectrum for communications is by the enemy. The major goal of practicing sound ECCM techniques is to ensure the continued use of the electromagnetic spectrum. ECCM techniques are designed to ensure commanders some degree of confidence in the continued use of these techniques. Our objective must be to ensure that all communications equipment can be employed effectively by tactical commanders in spite of the enemy's concerted efforts to degrade such communications to the enemy's tactical advantage. The modification and the development of equipment to make our communications less susceptible to enemy exploitation are expensive processes. Equipment is being developed and fielded which will provide an answer to some of ECCM problems. Commanders, staff, planners, and operators remain responsible for security and continued operation of all communications equipment.
    a. Operators of communications equipment must be taught what jamming and deception can do to communications. They must be made aware that incorrect operating procedures can jeopardize the unit's mission and ultimately increase unit casualties. Preventive and remedial ECCM techniques must be employed instinctively. Maintenance personnel must be made aware that unauthorized or improperly applied modifications may cause equipment to develop peculiar characteristics which can be readily identified by the enemy.
    b. ECCM should be preventive in nature. ECCM should be planned and applied to force the enemy to commit more jamming, interception and deception resources to a target than it is worth, or is available. ECCM techniques must also be applied to force the enemy to doubt the effectiveness of the enemy's jamming and deception efforts.
    c. Before we can begin to prevent electronic countermeasures (ECM), we must first be certain of what we are trying to prevent.
        (1) Jamming is the deliberate radiation, reradiation, or reflection of electromagnetic energy with the object of impairing the use of electronic devices, equipment, or systems. The enemy conducts jamming operations against us to prevent us from effectively employing our radios, radars, navigational aids (NAVAIDS), satellites, and electro-optics. Obvious jamming is normally very simple to detect. The more commonly used jamming signals of this type are described below. Do not try to memorize them; just be aware that these and others exist. When experiencing a jamming incident, it is much more important to recognize it and take action to overcome it than to identify it formally.
            ( a) Random noise. It is random in amplitude and frequency. It is similar to normal background noise and can be used to degrade all types of signals.
            ( b) Stepped tones. These are tones transmitted in increasing and decreasing pitch. They resemble the sound of bagpipes.
            ( c) Spark. The spark is easily produced and is one of the most effective forms of jamming. Bursts are of short duration and high intensity. Sparks are repeated at a rapid rate and are effective in disrupting all types of communications.
            ( d) Gulls. The gull signal is generated by a quick rise and a slow fall of a variable radio frequency and is similar to the cry of a sea gull.
            ( e) Random pulse. In this type of interference, pulses of varying amplitude, duration, and rate are generated and transmitted. Random pulses are used to disrupt

**Performance Steps**

teletypewriter, radar, and all types of data transmission systems.

( f) Wobbler. The wobbler is a single frequency which is modulated by a low and slowly varying tone. The result is a howling sound which causes a nuisance on voice radio communications.

( g) Recorded sounds. Any audible sound, especially of a variable nature, can be used to distract radio operators and disrupt communications. Examples of sounds include: music, screams, applause whistles, machinery noise, and laughter.

( h) Preamble jamming. This type of jamming occurs when the synchronization tone of speech security equipment is broadcast over the operating frequency of secure radio sets. Preamble jamming results in radios being locked in the receive mode. It is especially effective when employed against radio nets using speech security devices.

( i) Subtle jamming. This type of jamming is not obvious at all. With subtle jamming, no sound is heard from our receivers. They cannot receive incoming friendly signals, but everybody appears normal to the radio operator.

(2) Meaconing. This is a system of receiving radio beacon signals from NAVAIDS and rebroadcasting them on the same frequency to confuse navigation. The enemy conducts meaconing operations against us to prevent our ships and aircraft from arriving at their intended targets or destinations.

(3) Intrusion. Intentional insertion of electromagnetic energy into transmission paths with the objective of deceiving equipment operators or causing confusion. The enemy conducts intrusion operations against us by inserting false information into our receiver paths. This false information may consist of voice instructions, ghost targets, coordinates for fire missions, or even rebroadcasting of prerecorded data transmissions.

(4) Interference. Interference is any electrical disturbance which causes undesirable responses in electronic equipment. As a MIJI term, interference refers to the unintentional disruption of the use of radios, radars, NAVAIDS, satellites, and electro-optics. This interference may be of friendly, enemy, or atmospheric origin. For example, a civilian radio broadcast interrupting military communications is interference.

2. Communications Protective Measures.

a. Considerations. Properly applied ECCM techniques will deny valuable intelligence sources to the enemy and eliminate much of the threat that he poses to our combat operations. The following discussion describes practical ways to protect communications systems.

b. The siting of the transmitting antenna is critical in the ECCM process. Before making a decision about a proposed site for either a single-channel or multichannel antenna, there are two basic questions to answer:

(1) Are communications possible from the proposed site?

(2) Are there enough natural obstacles between the site and the enemy to mask transmission?

c. The final decision on site selection will often be a tradeoff between the answers to these two questions. The communications mission must have first priority in determining the actual antenna sites. There are additional actions that must be taken to limit the enemy's chances of interception and location successes. Transmitters and antennas should be located away from the headquarters. The two locations should be separated by more than 1 kilometer (0.62 mile). Erroneous radio frequency direction (RFD) data used in conjunction with observation data may favor the targeting of a decoy site instead of the actual transmitter site. This ploy depends upon good camouflage at the actual site. Transmitters grouped in one area indicate the relative value of the headquarters. Directional antennas reduce radiation exposure to enemy receivers and enhance the intended signal. (For instruction on directional antennas, refer to TC 24-21.)

d. Use the lowest possible transmitter power output. power means less radiated power reaches the enemy and thus increases his difficulty in applying ECM.

e. Use only approved code systems. Never use unauthorized (homemade) codes. Use of non-NSA generated codes can provide a false COMSEC sense of security that can be exploited by enemy radio intercept operators. Only when absolutely necessary should traffic be passed in the clear.

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f. Rather than assuming equipment is defective, assume that it is operational. Operators must not contact other stations for equipment checks simply because no message has been transmitted in a set time frame.

**Evaluation Preparation:** Setup: A radio set operating in a radio net with interference applied to the system. Brief soldier. Tell the soldier to ensure that he is applying proper tactics to the jamming system.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Determine if ECM is being employed.<br>a. Check for accidental or unintentional interference. (Refer to FM 24-33.)<br>b. Check for intentional interference. (Refer to FM 24-33.) | ____ | ____ |
| 2. Initiate operator's procedures. (Refer to FM 24-1 and FM 24-33.)<br>a. Check the equipment ground to ensure that the interference is not caused by a buildup of static electricity.<br>b. Disconnect the antenna.<br>c. Identify the type of sound.<br>d. Move the receiver or reorient the antenna, if possible, and listen or look for variations in the strength of the disturbance.<br>e. Tune the receiver above or below the normal frequency. If such detuning causes the intensity of the interfering signal to drop sharply, it can be assumed that the interference is the result of spot jamming. | ____ | ____ |
| 3. Identify jamming signals. (Refer to FM 24-33.) | ____ | ____ |
| 4. Employ antijamming measures. (Refer to FM 24-1.)<br>NOTE: Antijamming measures are designed to allow radio operators to work effectively through intentional interference. Regardless of the nature of the interfering signal, radio operators WILL NOT reveal in the clear the possibility or success of enemy jamming. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until the task can be correctly performed.

**References**

| **Required** | **Related** |
|---|---|
| FM 24-1 | FM 24-18 |
| FM 24-33 | TC 24-21 |

**Prepare/Submit Interference Message Report**

**113-573-7017**

**Conditions:** This task is performed in any condition or situation. Given FM 24-33, DA Pam 25-7, and unit SOI extract with the KTC 1400(*). NOTE: Supervision and assistance are available.

Situation I. While performing the duties of an operator in a radio net/system, you encounter an interfering signal of unknown origin, possibly a MIJI incident.

Situation II. One of your duties as a radio operator is to prepare and submit MIJI incident reports.

**Standards:** The standards are met when the MIJIFEEDER voice template message report is prepared and submitted through the NCS by the best available means and the supplemental information assembled for the follow-up MIJI report.

**Performance Steps**

1. Introduction. Meaconing, intrusion, and jamming are deliberate actions intended to deny any enemy the effective use of the electromagnetic spectrum. Interference is unintentional disruption of the effective use of the electromagnetic spectrum by friendly, enemy, or atmospheric sources. Collectively, meaconing, intrusion, jamming, and interference incidents are referred to as MIJI incidents.

2. MIJI reports document all disruptions of the following:
   a. Radios.
   b. Radars.
   c. Navigational aids (NAVAIDS).
   d. Satellites.
   e. Electro-optics.

3. Disruptions caused by equipment malfunctions or destruction are exceptions. The MIJI report serves two purposes. First, it provides information to the tactical commander allowing timely decisions to be made to overcome the MIJI problem. Second, it provides a historical record of MIJI incidents from which appropriate ECCM techniques and measures can be developed. This helps us to counter future attempts by the enemy to deny us the effective use of the electromagnetic spectrum.

4. This task gives instructions for completing MIJI reports for communications and noncommunications emitters. To fulfill the two purposes stated above, there are two kinds of MIJI reports. The MIJIFEEDER voice template message is a brief report of a MIJI incident. It serves as a decision making tool for the command. The MIJIFEEDER record message is a complete report of a MIJI incident. This provides a historical record from which appropriate ECCM techniques and measures can be developed. To find the definition of meaconing, intrusion, jamming, and interference, see Training Information Outline of Task 113-573-6001, Recognize Electronic Attack (EA) and Implement Electronic Protection (EP).

5. Purpose and Use of the MIJIFEEDER Voice Template. It is only the information needed to adequately inform the tactical commander of the incident in a timely manner. It is used to make evaluation of enemy actions or intentions easier and to provide data to implement appropriate countercountermeasures. It is forwarded through the chain of command to the unit operations center by the equipment operator experiencing the MIJI incident. The report should be forwarded using the most expeditious service communications means available.

6. Report Format and Use of the MIJIFEEDER Voice Template. The voice template was developed for

**Performance Steps**

use under the JINTACCS program. It is designed to ensure interoperability on the battlefield during combined, joint, and inter-Army operations. The standardized, simple format permits the expeditious notification of appropriate action elements in time-critical situations. Only the completed and underlined areas (as appropriate) of the format are transmitted. The MIJIFEEDER voice templates are self-explanatory and contain 10 items of information. When the message is transmitted over nonsecure means, each line number is stated and the completed information is encrypted. When a secure means is used, the title of each line is transmitted along with the completed information.

7. Purpose and use of the MIJIFEEDER Voice Template. The MIJIFEEDER record is a complete report of a MIJI incident. It provides a basis for developing appropriate counteraction measures to be implemented at proper command levels. The Joint Electronic Warfare Center (JEWC) is the action agency for this report. All MIJIFEEDER record message reports initially evaluated as nonexercise should be forwarded as soon as possible to the JEWC. The JEWC uses these reports to develop trends and to evaluate foreign ECM operations. They are also used by the JEWC to recommend operational methods and equipment changes that will reduce MIJI vulnerability of radios, radars, NAVAIDS, satellites, and electro-optics.

8. Reporting Procedures of the MIJIFEEDER Record Message. The message is forwarded by the Signal officer of the affected unit to the JEWC, OPM, San Antonio, TX, through operations channels to the corps operation center. All MIJIFEEDER reports are forwarded via secure means within 24 hours of the MIJI incident. Security classification of MIJI incidents or evaluation reports is determined principally by intent and location of the implied or stated source of the problem. Stations in combat areas or having a sensitive military mission ordinarily classify all MIJI reports.

9. Report Format and Contents. In order to complete this report, you must use FM 24-33 and DA Pam 25-7.

**Evaluation Preparation:** Setup: You are provided with FM 24-33 and DA Pam 25-7. Brief Soldier: You must process a MIJIFEEDER Voice Template/MIJIFEEDER Record Message Report in proper format.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Entered the unit designation. | ____ | ____ |
| 2. Entered the type of interference encountered. | ____ | ____ |
| 3. Entered the unit location in either of two ways: longitude in minutes and seconds, or in complete grid coordinates down to 10- or 100-meter increments. | ____ | ____ |
| 4. Entered two digits each for day, hour, minutes and one letter for the time zone for the start of the MIJI incident. | ____ | ____ |
| 5. Entered two digits each for day, hour, minutes, and one letter for the time zone for the end of the MIJI incident. | ____ | ____ |
| 6. Entered the nomenclature for the equipment affected. | ____ | ____ |
| 7. Entered the channel, frequency or frequency range affected, and the unit of measure. | ____ | ____ |
| 8. Entered, in his or her own words, a brief description or other information regarding the MIJI incident. | ____ | ____ |
| 9. When required, entered the hours, minutes, and time zone. | ____ | ____ |
| 10. Entered the message authentication IAW the joint task form (JTF) requirements. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until the task is performed correctly.

**References**

| **Required** | **Related** |
|---|---|
| FM 24-33 | FM 24-35-1 |

**Prepare SINCGARS (Manpack) for Operation**

**113-587-1064**

**Conditions:** Given an operational SINCGARS manpack radio with battery box CY-8346, battery BA-5590, antenna AS-3683, handset H-250, pack frame with straps, TM 11-5820-890-10-1, and TM 11-5820-890-10-3.

**Standards:** Standard is met when battery, fill battery, antenna and handset are installed and attached to pack frame in accordance with TM 11-5820-890-10-1.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Install batteries. | ____ | ____ |
| 2. Install antenna. | ____ | ____ |
| 3. Connect handset H-250. | ____ | ____ |
| 4. Assemble radio and pack frame. | ____ | ____ |
| 5. Preset function controls. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier scores NO-GO, show him what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| TM 11-5820-890-10-1 | |
| TM 11-5820-890-10-3 | |

**Install Single-Channel Ground and Airborne Radio Systems (SINCGARSs) ICOM With or Without the AN/VIC-1 or AN/VIC-3**

**113-587-1067**

**Conditions:** Given a designated vehicle, designated SINCGARS integrated communications (ICOM) with or without intercommunications set AN/VIC-1; installation kit(s) MK-2310 and MK-2314 (if radio set AN/VRC-92 is installed); ANCD AN/CYZ-10 with fill, fill cable; digital multimeter AN/PSM-45(*); tool kit TK-101/G; drill and drill bits from auto common No. 1; TM 11-5820-890-10-1, TM 11-5820-890-20-1, TM 11-5820-890-20-2, and TM 11-5830-340-12; SB 11-131-2; DA Form 5986-E, and DA Form 5988-E.

**Standards:** Mounted the radio set on its platform and processed test traffic without error.

**Performance Steps**

1. Inventory complete radio system kit. (Refer to SB 11-131-2, TM 11-5820-890-10-1, TM 11-5820-890-20-1, and TM 11-5820-890-20-2.)
2. Install installation kit. (Refer to TM 11-5820-890-20-1, TM 11-5820-890-20-2, and TM 11-5830-340-12.)
3. Mount system components. (Refer to TM 11-5820-890-20-1 and TM 11-5820-890-20-2.)
4. Perform an operational check. (Pass test traffic.) (Refer to TM 11-5820-890-10-1.)
5. Establish maintenance records.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inventoried complete radio system kit. (Refer to SB 11-131-2, TM 11-5820-890-10-1, TM 11-5820-890-20-1, and TM 11-5820-890-20-2.) | ____ | ____ |
| 2. Installed installation kit. (Refer to TM 11-5820-890-20-1, TM 11-5820-890-20-2, and TM 11-5830-340-12.) | ____ | ____ |
| 3. Mounted system components. (Refer to TM 11-5820-890-20-1 and TM 11-5820-890-20-2.) | ____ | ____ |
| 4. Performed an operational check. (Passed test traffic.) (Refer to TM 11-5820-890-10-1.) | ____ | ____ |
| 5. Established maintenance records. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| TM 11-5820-890-10-1 | DA PAM 738-750 |
| TM 11-5830-340-12 | |

**Operate Radio Set AN/PRC-77 With an TSEC/KY-57**

**113-587-2059**

**Conditions:** Given a operational AN/PRC-77, COMSEC TSEC/KY-57, battery BA-4386 or BA 5590, fill device TSEC/KYK-13 or TSEC/KOI-18 TM 11-5820-667-12, Equipment Inspection Maintenance Worksheet DA Form 2404 and Unit SOI.

**Standards:** Standard is met when communication is established tactical message can be transmitted and received between a minimum of two radios.

**Performance Steps**

1. Check equipment for completeness.
2. Assemble components of radio set.
   a. Install battery.
   b. Assemble for man-pack operation.
   c. Install the antenna.
3. Install TSEC/KY-57 in pack frame.
4. Load keys into TSEC/KY-57. (KOI-18 or KYK-13)
5. Initiate secure voice procedures.
6. Communicate with distant radio station.
7. Perform stopping procedures.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Checked equipment for completeness. | ____ | ____ |
| 2. Assembled components of radio set.<br>a. Installed battery.<br>b. Assembled for man-pack operation.<br>c. Installed the antenna. | ____ | ____ |
| 3. Installed TSEC/KY-57 on pack frame. | ____ | ____ |
| 4. Loaded keys into TSEC/KY-57. (KOI-18 or KYK-13) | ____ | ____ |
| 5. Initiated secure voice procedures. | ____ | ____ |
| 6. Communicated with distant radio station. | ____ | ____ |
| 7. Performed stopping procedures. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 24-18 |
| | FM 24-33 |
| | TC 24-19 |
| | TM 11-5820-667-12 |

**Operate Radio Set AN/VRC-64 or AN/GRC-160 with TSEC/KY-57**

**113-587-2061**

**Conditions:** Given an operational AN/VRC-64 or AN/GRC-160 with TSEC/KY-57, unit SOI, clean lint free cloth and brush, (O) TM 11-5810-312-12, (O) TM 11-5810-256-OP-2, TM 5820-498-12, distant station, TSEC/KYK-13 or KOI-18 w/keys, DA Form 2404.

**Standards:** Standards are met when the radio is aligned and operating properly and secure radio check successfully completed and stopping procedures correctly initiated.

**Performance Steps**

1. Perform starting procedures.
2. Enter net using correct call signs.
3. Conduct secure commo check.
4. Exit net.
5. Perform stopping procedures.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed starting procedures. | ____ | ____ |
| 2. Entered net using correct call signs. | ____ | ____ |
| 3. Conducted secure commo check. | ____ | ____ |
| 4. Exited net. | ____ | ____ |
| 5. Performed stopping procedures. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| FM 24-18 | |
| TC 24-19 | |

**Operate Radio Set AN/VRC-12 or AN/VRC-47 with TSEC/KY-57**

**113-587-2064**

**Conditions:** Given an operational AN/VRC-12 or AN/VRC-47, distant station, unit SOI, DA Form 2404 (Equipment Inspection and Maintenance Worksheet), TM 11-5820-401-10-1 or TM 11-5820-401-10-2, two TSEC/KY-57s with HYP-57s, KYK-13 or KOI-18, with keys.

**Standards:** Standard is met when equipment is operating and secure message is sent and received.

**Performance Steps**

1. Check equipment for completeness.
2. Prepare equipment for operation.
3. Perform starting procedures.
4. Enter secure radio net.
   a. Use correct call signs.
   b. Conduct secure radio check.
5. Leave secure radio net.
   a. Use correct procedures.
   b. Use correct call signs.
6. Perform stopping procedures.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Checked equipment for completeness. | ____ | ____ |
| 2. Prepared equipment for operation. | ____ | ____ |
| 3. Performed starting procedures. | ____ | ____ |
| 4. Entered secure radio net.<br>a. Used correct call signs.<br>b. Conducted secure radio check. | ____ | ____ |
| 5. Left secure radio net.<br>a. Used correct procedures.<br>b. Used correct call signs. | ____ | ____ |
| 6. Performed stopping procedures. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| FM 24-18 | |
| TC 24-19 | |
| TM 11-5820-401-10-1 | |
| TM 11-5820-401-10-2 | |

**Operate SINCGARS Single-Channel (SC)**

**113-587-2070**

**Conditions:** Given an operational SINCGARS, KYK-13/TSEC with keys or AN/CYZ-10, distant station, TM 11-5820-890-10-8, TM 11-5820-890-10-3, ACP 125 US Suppl-1, DA Pam 738-750, FM 24-19, FM 24-18, and unit SOI or ANCD w/SOI data loaded.

**Standards:** The standards are met when a secure communications check is conducted in SC mode with a distant station.

**Performance Steps**

1.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Perform starting procedures. | ____ | ____ |
| 2. Load traffic encryption key (TEK). | ____ | ____ |
| 3. Enter net. | ____ | ____ |
| a. Use correct procedures. | | |
| b. Conduct secure communications check. | | |
| 4. Exit net. | ____ | ____ |
| 5. Perform stopping procedures. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until the task can be performed correctly.

**References**

| **Required** | **Related** |
|---|---|
| DA PAM 738-750 | ACP 125 US SUPP-1 |
| FM 24-18 | FM 24-19 |
| TM 11-5820-890-10-1 | |
| TM 11-5820-890-10-3 | |

**Operate SINCGARS Frequency Hopping (FH) (Net Members)**

**113-587-2071**

**Conditions:** Given an operational SINCGARS radio, ECCM fill device with FH data, KYK-13/TSEC with keys, distant net control station (NCS), unit SOI, DA Form 2404, TM 11-5820-890-10-1, TM 11-5820-890-10-3, ACP 125 US Suppl-1, DA Pam 738-750, FM 24-19, and FM 24-18.

**Standards:** The standards are met when FH communications is established using the cold start and CUE late net entry methods and the radio check is successfully completed.

**Performance Steps**

1.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Perform starting procedures. | ____ | ____ |
| 2. Perform net member cold start procedures. | ____ | ____ |
| a. Use correct call signs. | | |
| b. Use correct procedures. | | |
| 3. Perform net member CUE late net entry. | ____ | ____ |
| a. Use correct call signs. | | |
| b. Use correct procedures. | | |
| 4. Perform stopping procedures. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| ACP 125 US SUPP-1 | |
| DA FORM 2404 | |
| DA PAM 738-750 | |
| FM 24-18 | |
| FM 24-19 | |
| TM 11-5820-890-10-1 | |
| TM 11-5820-890-10-3 | |

**Operate SINCGARS Frequency Hopping (FH) Net Control Station (NCS)**
**113-587-2072**

**Conditions:** Given an operational SINCGARS, ECCM fill device with FH data, KYK-13/TSEC with keys, distant stations, TM 11-5820-890-10-1, TM 11-5820-890-10-3, ACP 125 US Suppl-1, DA Pam 738-750, FM 24-19, FM 24-18, and unit SOI.

**Standards:** The standards are met when an operational message is sent and received in the FH mode using the cold start and CUE late net entry procedures.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Perform starting procedures. | ____ | ____ |
| 2. Perform NCS permission checks. | ____ | ____ |
| 3. Perform NCS cold start net opening. | ____ | ____ |
| a. Use correct call signs. | | |
| b. Conduct FH communications. | | |
| 4. Perform NCS CUE late net entry. | ____ | ____ |
| a. Use correct call signs. | | |
| b. Conduct FH communications. | | |
| 5. Perform stopping procedures. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| FM 24-18 | |
| TM 11-5820-890-10-1 | |
| TM 11-5820-890-10-3 | |

**Operate Secure AN/VRC-92 RETRANS**

**113-587-2082**

**Conditions:** Given a test message, an operational AN/VRC-92 secure RETRANS system with ground plane antenna systems, fill device MX-18290 with FH data or ANCD AN/CYZ-10 with fill, fill cable, operating net, primary and alternate RETRANS site locations, TM 11-5820-890-10-1, and TM 11-5985-357-13.

**Standards:** Radio station A sent and received test messages to and from radio station B and processed CUE calls as required.

**Performance Steps**

1. Perform operator's PMCS. (Refer to TM 11-5820-890-10-1, operator's PMCS tables.)
2. Complete maintenance form.
3. Prepare radio for operation.
    a. Perform premission checks.
    b. Acquire frequencies and call signs/call words from the AN/CYZ-10.
    c. Load single-channel frequencies.
    d. Load offset frequencies.
    e. Load communications security (COMSEC).
    f. Load frequency-hopping (FH) data.
    g. Enter the net using cold start, hot start, or cold start late net entry.
    h. Perform net control station (NCS) operations.
4. Set up secure RETRANS site. (Refer to TM 11-5820-890-10-1 and TM 11-5985-357-13, operator's PMCS tables.)
    a. Move to RETRANS site.
    b. Make initial contact with the net.
    c. Perform operator's PMCS on the ground plane antennas.
    d. Set up the ground plane antennas.
    e. Set up RTs C and D for FH operation.
        (1) Set FCTN switches to SQ ON.
        (2) Set RT C MODE to FH and COMSEC to CT. Contact RT A with RT C.
        (3) Set RT D MODE to FH and COMSEC to CT. Contact RT B with RT D.
        (4) If RT A is the NCS, set RT D MODE to FH-M. If RT B is the NCS, set the RT C MODE to FH-M.

NOTE: If the outstation does not have the new FH data, the RETRANS RT will have to electronically-remote-fill (ERF) the new FH data to the outstation.

        (5) Connect the retransmit cable.
5. Monitor secure RETRANS. (Refer to TM 11-5820-890-10-1 and TM 11-5985-357-13.)
    a. Request station A send a given test message to station B. Upon successful completion, request station B send a given test message to station A.
    b. Set RTs C and D FCTN switches to RXMT.
    c. Inform that RETRANS is operational.
    d. Monitor RETRANS for correct operation.

NOTE: No voice or data traffic will be audible. The only indication that traffic is being passed is by observation of the meters.

    e. Respond to CUE calls as required.
        (1) Late net entries.
        (2) Relay FH updates.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|

1. Performed operator's PMCS. (Refer to TM 11-5820-890-10-1, operator's PMCS tables.) ____ ____
   a. Completed maintenance form.
   b. Prepared radios for operation.
      (1) Performed premission checks.
      (2) Acquired frequencies and call signs/call words from the AN/CYZ-10.
      (3) Loaded single-channel frequencies.
      (4) Loaded offset frequencies.
      (5) Loaded COMSEC.
      (6) Loaded FH data.
      (7) Entered net using cold start, hot start, or cold start late net entry.
      (8) Performed NCS operations.

2. Set up secure RETRANS site. (Refer to TM 11-5820-890-10-1 and TM 11-5985-357-13, operator's PMCS tables.) ____ ____
   a. Moved to RETRANS site.
   b. Made initial contact with the net.
   c. Performed operator's PMCS on the ground plane antenna systems.
   d. Set up the ground plane antennas.
   e. Set up RTs C and D for FH operation.
      (1) Set FCTN switches to SQ ON.
      (2) Set RT C MODE to FH and COMSEC to CT. Contacted RT A with RT C.
      (3) Set RT D MODE to FH and COMSEC to CT. Contacted RT B with RT D.
      (4) IF RT A was the NCS, set RT D MODE to FH-M. If RT B was the NCS, set RT C MODE to FH-M.

NOTE: If the outstation does not have the new FH data, the RETRANS RT will have to ERF the new FH data to the outstation.

      (5) Connected the retransmit cable.

3. Monitored secure RETRANS. (Refer to TM 11-5820-890-10-1 and TM 11-5985-357-13.) ____ ____
   a. Requested station A send a given test message to station B. Upon successful completion, requested station B send a given test message to station A.
   b. Set RTs C and D FCTN switches to RXMT.
   c. Informed net that RETRANS was operational.
   d. Monitored RETRANS for correct operation.

NOTE: No voice or data traffic will be audible. The only indication that traffic is being passed is by observation of the meters.

   e. Responded to CUE calls as required.
      (1) Late net entries.
      (2) Relay FH updates.

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO GO if any step is failed. If the soldier fails any step, show what was done wrong and how to do it correctly. Have the soldier practice until he can correctly perform the task.

**References**

| **Required** | **Related** |
|---|---|
| TM 11-5820-890-10-1 | DA PAM 738-750 |
| TM 11-5985-357-13 | FM 21-26 |

Subject Area 9: MOVE: BASIC TACTICS

**Determine Direction Within the Target Area**

**061-283-1001**

**Conditions:** Given a object in the target area with a known direction, field artillery binoculars, a compass, and a target in the target area.

**Standards:** Determine the direction to selected points expressed to the nearest 10 mils (+/-60 mils) of the actual direction.

**Performance Steps**

1. Identify five methods of determining direction within the target area.

NOTE: Determining direction is an essential skill for the observer. Direction is an integral part of terrain-map association, adjustment of fire, and target location. There are five methods by which to determine direction.

a. ESTIMATING. As a minimum, the observer should be able to visualize the eight cardinal directions (N, NE, E, SE, S, SW, W, NW). Because of the accuracy of this method, it is the least preferred method of determine direction.
b. SCALING FROM A MAP. Using a protractor, the observer can scale direction from a map to an accuracy of 10 mils.
c. USING A COMPASS. Using a M2 or a lensatic compass, the observer can measure direction to an accuracy of 10 mils.
   (1) Care must be taken when a compass is used around radios or large concentrations of metal such as vehicles.
   (2) Observers should move about 50 meters away from vehicles to avoid incorrect readings.
d. MEASURING FROM A REFERENCE POINT. Using a reference point with a known direction, the observer can measure horizontal angular deviations and apply them to the reference directions.
   (1) Angular deviations may be measured with the binoculars or with the hand. In measuring with binoculars, angular deviation is determined to the nearest 1 mil.
      ( a) The horizontal scale of the binocular reticle pattern is divided into increments of 10 mils.
      ( b) The vertical scale in the center of the lens in divided into increments of 10 mils and is used in Height Of Burst adjustments.
e. USING OTHER MEASURING DEVICES. When properly oriented, the G/VLLD provides direction to the nearest mil.

2. Apply the RALS Rule and announce the new direction to the target.

NOTE: Ensure that the students understand how to apply RALS when determining target direction from a point of known direction.

a. Direction increases to the right and decreases to the left (RIGHT Add/LEFT Subtract).
b. To determine the direction to the target, apply the number of mils measured left or right of the known direction by applying RALS.

**Evaluation Preparation:** Setup: Ensure that all the equipment is available, serviceable and ready for use. Use the reference and the evaluation guide to score the soldier's performance.

Brief Soldier: Tell the soldier what he is required to do in accordance with (IAW) the task conditions and standard.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Did the solider use the M2 compass and determines direction to two reference points within 60 mils of the actual direction? | ____ | ____ |
| 2. Did the solider express direction to the nearest 10 mils? | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any steps are failed (F). If the soldier fails any steps, show what was done wrong and how to do it correctly.

**Estimate Range**

**071-326-0512**

**Conditions:** Given personnel, equipment, and vehicles, all stationary and either partially or fully exposed, at ranges from 50 to 3,000 meters, during daylight or night, with good visibility.

**Standards:** Announced the range to each target with no more than a 20-percent error (plus or minus).

**Performance Steps**

NOTE: Estimating range is one of the most difficult skills to learn, but is an indispensable one to have when it is needed.

1. Football field method. Even though the length of a football field is 100 yards instead of 100 meters, it is a familiar unit of measure that soldiers can use in estimating ranges.
   a. Learn what a 100-meter interval (football field) looks like on the ground (Figure 1).

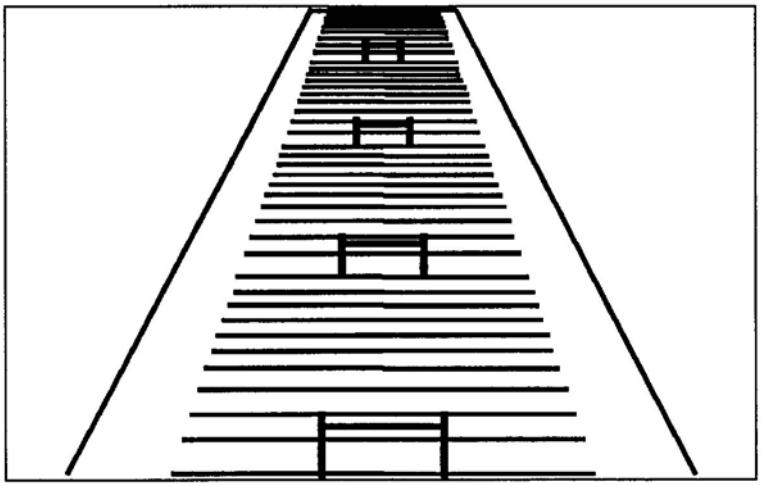


Figure 1. Football field method.

   b. For ranges up to 500 meters, estimate the number of football fields between you and the target.
   c. For ranges between 500 and 1,000 meters, pick a point halfway between you and the target. Determine the distance to the halfway point as previously described. Double the estimate to find the range to the target (Figure 2).

**Performance Steps**

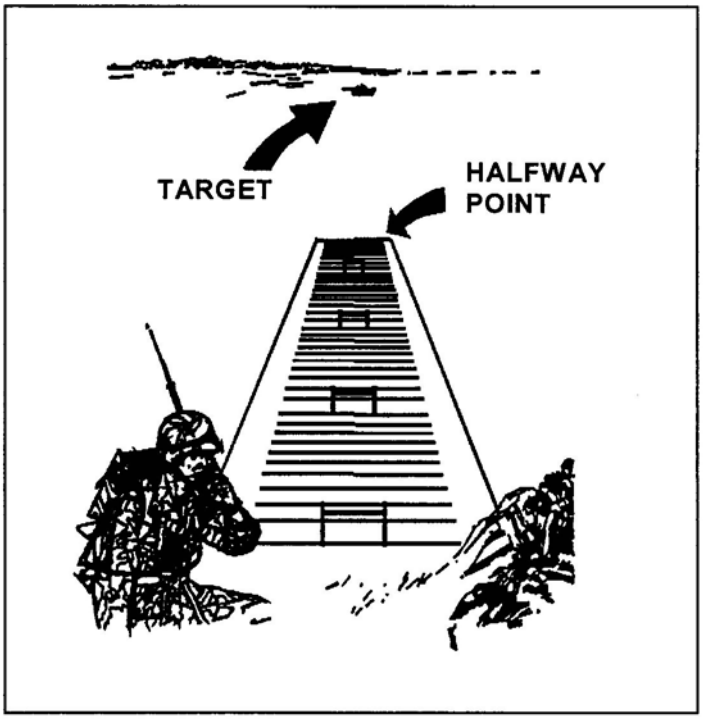



Figure 2. Halfway-point method.

d. Learn the effects of terrain and weather conditions on target appearance (Figure 3).

| CONDITIONS IN WHICH TARGETS SEEM CLOSER | CONDITIONS IN WHICH TARGETS SEEM FARTHER AWAY |
|---|---|
| Bright, clear, daylight conditions | Foggy, rainy, hazy, or twilight conditions |
| Targets with sun in front of them | Targets with sun behind them |
| Targets at higher elevations | Targets at lower elevations |
| Large targets | Small targets |
| Brightly colored targets (white, red, yellow) | Darkly colored targets |
| Targets that have contrast | Camouflaged targets |
| Targets viewed across a ravine, hollow, river, or depression | |
| Targets at sea | |

Figure 3. Effects of terrain and weather on target appearance.

2. Recognition/appearance-of-objects method.
   a. Although the target conditions in Figure 4 will have some effect on range estimation, the data in Figure 4 generally hold true.

**Performance Steps**

| TARGET | DISTANCE TARGET CAN BE RECOGNIZED WITH THE NAKED EYE (in meters) | DISTANCE TARGET CAN BE RECOGNIZED WITH BINOCULARS (in meters) |
|---|---|---|
| A tank crew member, soldier, machine gun, mortar, antitank gun, antitank missile launcher | 500 | 2,000 |
| Tank, armored personnel carrier, truck (by model) | 1,000 | 4,000 |
| Tank, howitzer, armored personnel carrier, truck | 1,500 | 5,000 |
| Armored or wheeled vehicle | 2,000 | 6,000 |

Figure 4. Target recognition method.

b. If possible, study the appearance of people and objects at various distances until you know how far away they are by how big or clear that seem to be.

EXAMPLE: You should be able to identify armored and wheeled vehicles from 1,500 to 2,000 meters with the naked eye. If you can identify the vehicle as a tank, but you cannot determine the model, the range is between 1,000 and 1,500 meters. Binoculars can greatly increase the range at which you can identify your target.

3. Flash-to-bang method.
   a. Using this method, determine range by measuring the time between the flash and the gun report (Figure 5). Sound travels at the speed of 330 meters per second. Light travels much faster.

**Performance Steps**

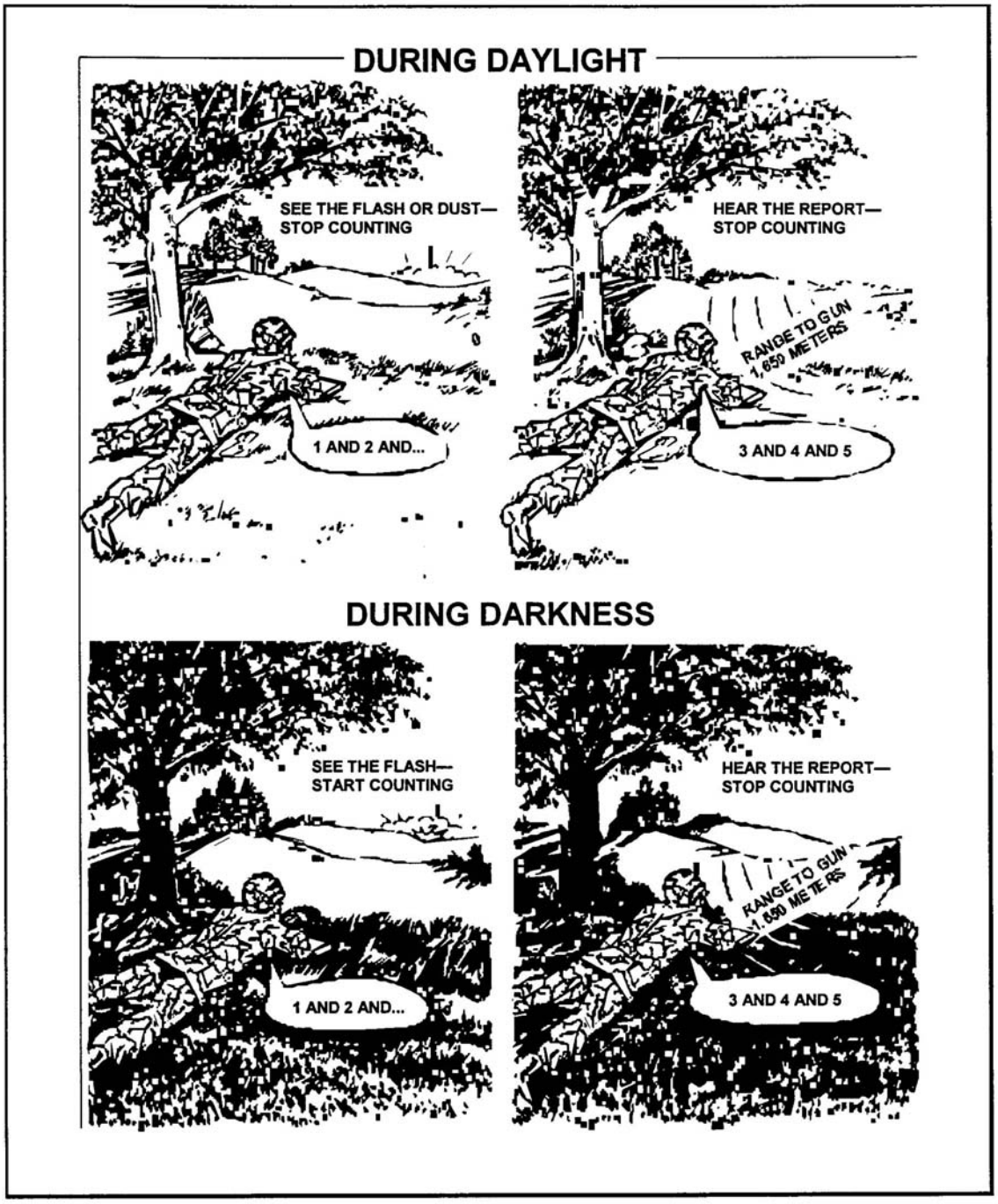



Figure 5. Flash-to-bang method.

b. Observe the flash of the target or weapon firing.
c. Count the number of seconds until you hear the weapon fire. You may measure this time interval on a stopwatch, or you may estimate it by counting steadily. For example, a 3-second count would be "one-thousand-one, one-thousand-two, one-thousand-three" or 1 and 2 and 3." If you must count higher than 10, start over at 1.
d. Multiply the number of seconds by 330 meters (the speed of sound) to estimate the range from your position to the target.

**Performance Steps**

4. Binocular-reticle/mil-relation methods.
   a. Binocular-reticle method. Fire control equipment requires precise calculations and adjustments, so it is marked in mils. You can use the reticle in a pair of binoculars to determine the width, length, or height of a target in mils (Figure 6).

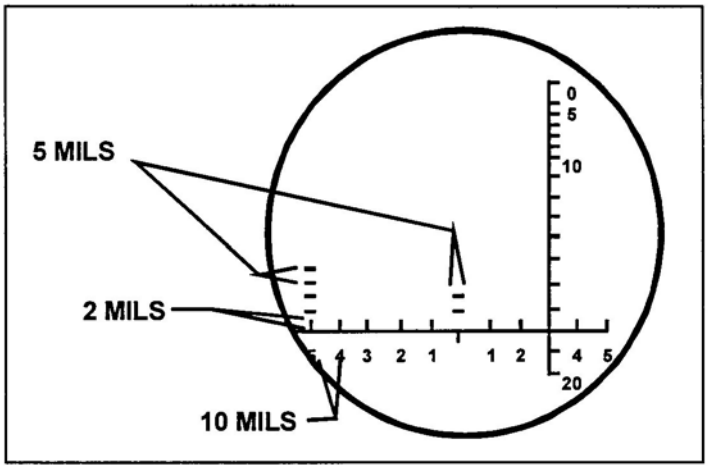



Figure 6. Binocular reticle.

   b. Mil-relation method. Use the width, length, or height of the target in mils, represented by the R in the mil-relation formula, R=W-m, to determine the range to the target (Figure 7). The mil relation holds true whether the W is measured horizontally or vertically (Figure 8).

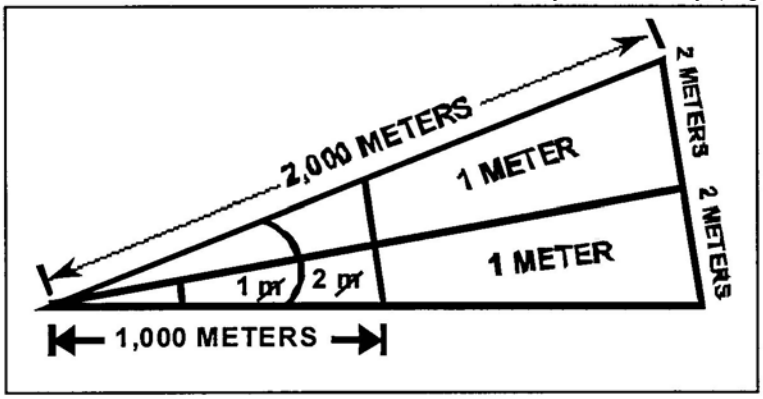



Figure 7. Mil-relation method.

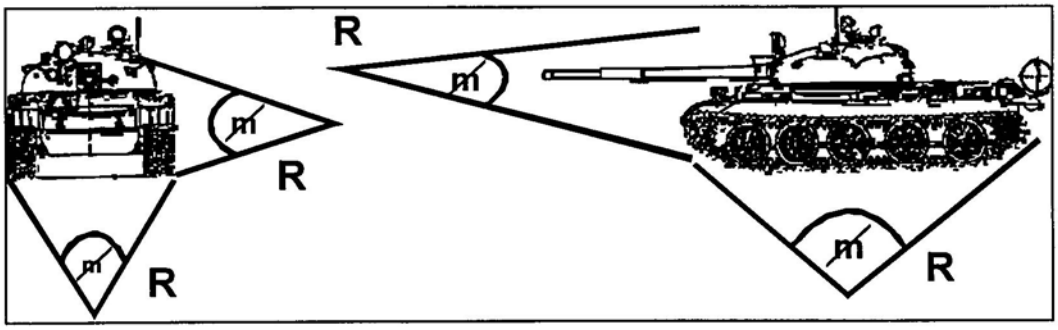



Figure 8. Use of the mil-relation formula.

   (1) If you know any two of these three measurements, you can use this formula to compute the remaining measurement.

**Performance Steps**

(2) The mil is a unit of angular measurement equal to 1/6400 of a circle. One degree consists of about 18 mils. The symbol for a mil is the letter "m" with a slash through it. Because the relationship represented by this formula is constant, other units of measure, such as yards, feet or inches, can be substituted for meters in expressing width or range.

(3) Both W (width, length, or height) and R (range) must be expressed in the same unit measure. For example, if you extend the lines that define a 1-mil angle out 1,000 yards, the distance between the end of one line and the other will be 1 yard. At 1,000 meters, a 1-mil angle is 1 meter across (Figure 9).

| TARGET | | | ANGLE MEASUREMENT IN MILS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| TYPE | LENGTH | WIDTH | RANGE (IN METERS) | | | | | | | | | |
| MEDIUM TANK | 6.5 METERS | 3.5 METERS | 6,500 | 3,300 | 2,200 | 1,600 | 1,300 | 1,100 | 900 | 800 | 700 | 700 |
| | | | 3,500 | 1,800 | 1,200 | 900 | 700 | 600 | 500 | 400 | 400 | 400 |
| HEAVY TANK | 7.5 METERS | 3.5 METERS | 7,500 | 3,800 | 2,500 | 1,900 | 1,500 | 1,300 | 1,100 | 900 | 800 | 800 |
| | | | 3,500 | 1,800 | 1,200 | 900 | 700 | 600 | 500 | 400 | 400 | 400 |

Figure 9. Mil angle measurement and range.

(4) You can use the word "WORM" as a memory aid (Figure 10).

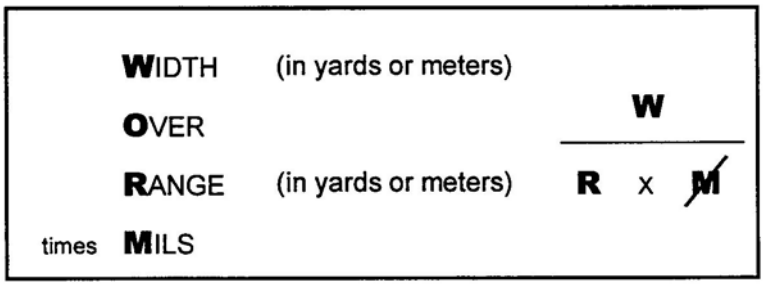



Figure 10. WORM memory aid.

**Evaluation Preparation:** SETUP: Position personnel, equipment, and vehicles (or silhouettes) to serve as five targets at ranges from 50 to 3,000 meters. Ensure the target is fully exposed. Allow binoculars to be available for the soldier to use in estimating the range, using the binocular reticle and the mil-relation methods.

BRIEF SOLDIER: Tell the soldier to announce the distance to at least three of the five targets, with no more than 20-percent error in the distance.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Used the football field method. | ____ | ____ |
| 2. Used the recognition/appearance-of-objects method. | ____ | ____ |
| 3. Used the flash-to-bang method. | ____ | ____ |
| 4. Used the binocular-reticle/mil-relation method. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 17-12-1-1
FM 21-75

**Move as a Member of a Mortar Unit While Dismounted**

**071-410-0018**

**Conditions:** In a combat environment, as a member of a mortar unit (squad, section, or platoon) given equipment to be carried, and assigned a position in a movement formation.

**Standards:** Maintained required interval and distance from other formation members; arrived with assigned equipment without unavoidable damage; observed assigned sector; reported or passed on any pertinent information; practiced light, noise, and litter discipline during movement; assumed and manned security positions during halts; and followed directions of leader(s).

**Performance Steps**

1. Maintain distance and interval.
2. Carry assigned equipment.
3. Maintain observation and security.
4. Relay information.
5. Practice light, noise, and litter discipline.
6. Follow directions.

**Evaluation Preparation:** SETUP: At the test site, provide an area in which a mortar unit can move dismounted. This task is tested only during a platoon or larger tactical exercise.

BRIEF SOLDIER: Tell the soldier he is a member of a mortar unit, and to use proper movement techniques within the formation as dictated by terrain and visibility, and to follow the leader's instructions or signals.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Maintained distance and interval. | ____ | ____ |
| 2. Carried assigned equipment. | ____ | ____ |
| 3. Maintained observation and security. | ____ | ____ |
| 4. Relayed information. | ____ | ____ |
| 5. Practiced light, noise, and litter discipline. | ____ | ____ |
| 6. Followed directions. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

Subject Area 16: NAVIGATE: GENERAL/COMPASS/MAP

**Determine a Grid Azimuth Using an M2 Compass**
**071-074-0002**

**Conditions:** Given an M2 compass, a 1/4-inch flat-tip screwdriver, 1:50,000-scale map, the exact location from which to measure the azimuth, and targets to which azimuths must be determined.

**Standards:** Determined the declination constant and declinated the compass with no more than a 10-mil error; determined the grid azimuth to the targets to within 60 mils.

**Performance Steps**

1. Determine the declination constant.
   a. To determine a grid azimuth with an M2 compass, the soldier must declinate the compass. To do this, he must know the declination constant for his area of operation. To determine the declination constant, he must know the grid-magnetic (G-M) angle for the area. To find the G-M angle for the area, he looks at the bottom right-hand corner of the 1:50:000-scale military map of the area for the declination diagram. The G-M angle is listed below the date (Figure 1).

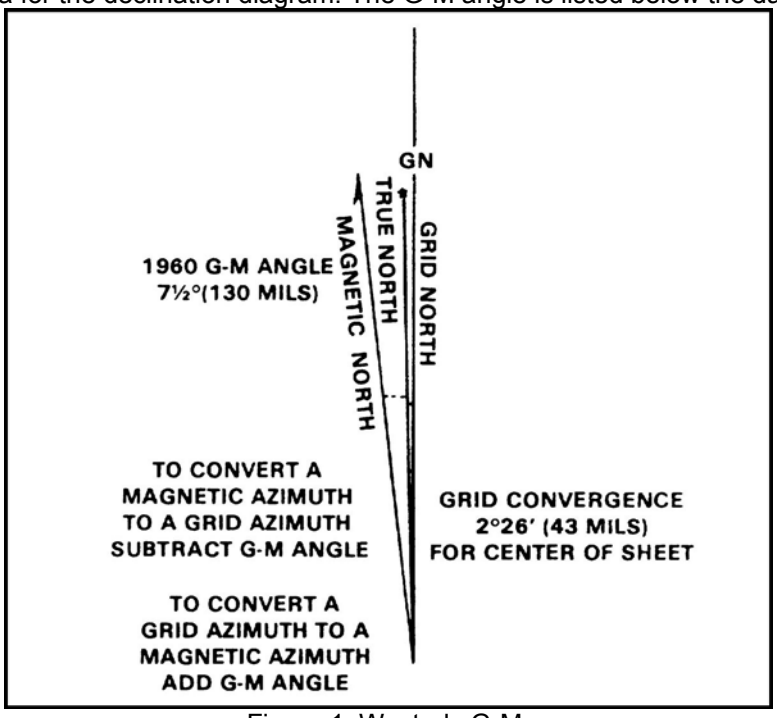



Figure 1. Westerly G-M.

   b. If magnetic north is west of grid north (westerly G-M angle), the declination constant is 6400, minus the G-M angle.
   EXAMPLE: (Refer to Figure 1.) The G-M angle is 130 mils, and magnetic north is west of grid north. The value of the G-M angle is subtracted from 6400. The declination constant is 6270 mils and is indexed on the azimuth scale of the M2 compass.
   [6400 - 130 (G-M angle) = 6270 (declination constant)]
   c. If magnetic north is east of grid north (easterly G-M angle), the declination constant is 6400 mils, plus the G-M angle.
   EXAMPLE: (Refer to Figure 2.) The G-M angle is 370 mils, and magnetic north is east of grid north. The value of the G-M angle is added to 6400 mils to equal 6770 mils. Since the declination constant is greater than 6400 mils, 6400 mils is subtracted from the declination

**Performance Steps**

constant (6770) to determine the remainder. The declination constant is 370 mils and is indexed on the azimuth scale of the M2 compass.
[6400 + 370 (G-M angle) = 6770 - 6400 = 370 (Declination constant)]

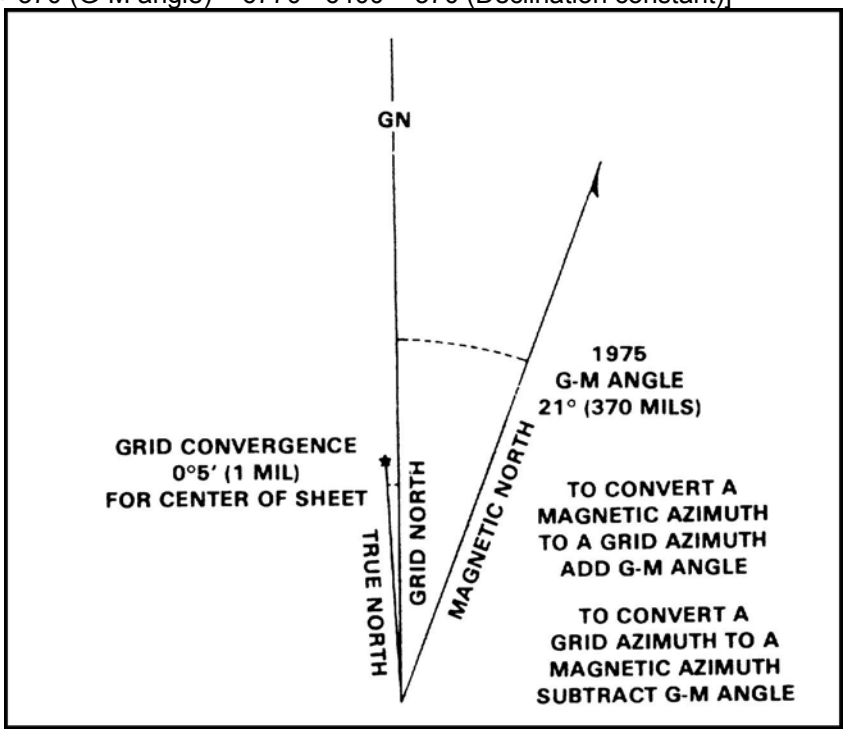



Figure 2. Easterly G-M.

NOTE: (Refer to Figure 2.) There is a simpler method to determine the declination constant. If magnetic north is east of grid north (easterly G-M angle), the declination is 370 mils, and magnetic north is east of grid north. The declination constant equals the G-M angle--370 mils.

2. Declinate the compass.
   a. Open the compass cover and fold out the rear sight holder parallel with the face of the compass (Figure 3).

**Performance Steps**

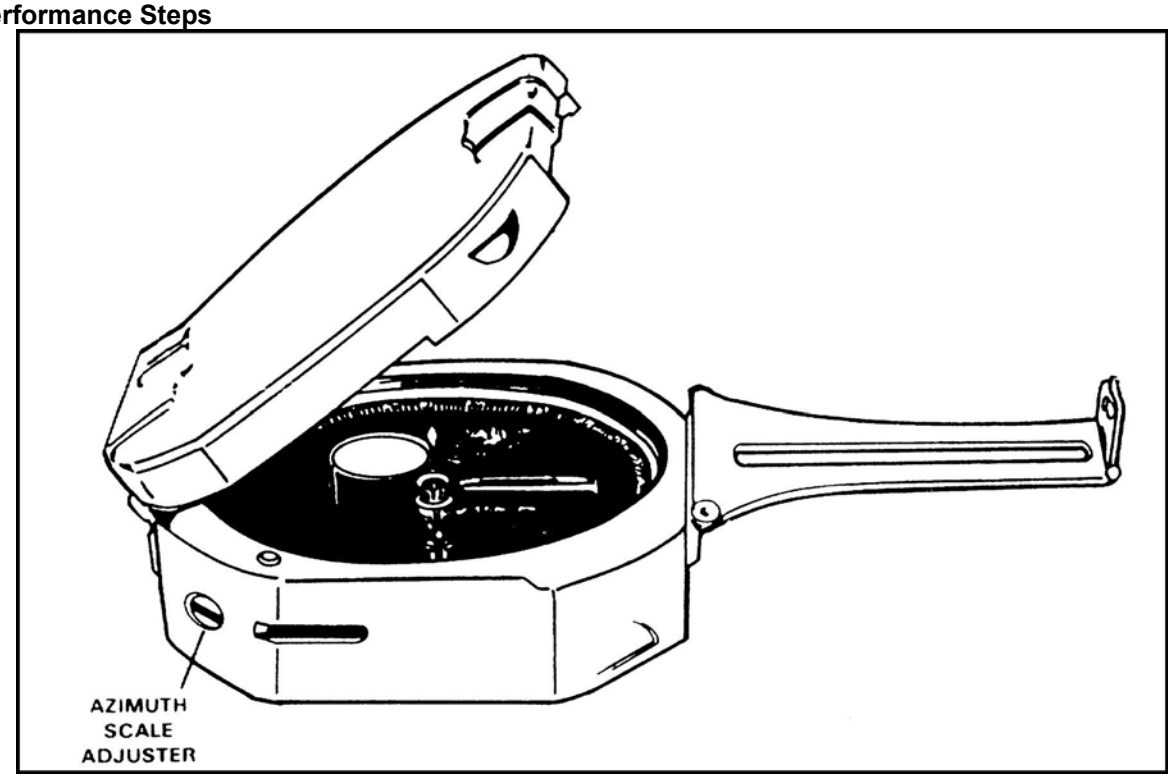



Figure 3. M2 compass azimuth scale adjuster.

NOTE: The smallest graduation on the azimuth scale of an M2 compass equals 20 mils. The declination can be set to 10 mils by interpolation.

b. Round the declination constant to the nearest 10 mils.
c. Use a screwdriver or other suitable instrument to turn the azimuth scale adjuster (Figure 3) clockwise or counterclockwise until the declination constant appears under the azimuth scale index (Figure 4).

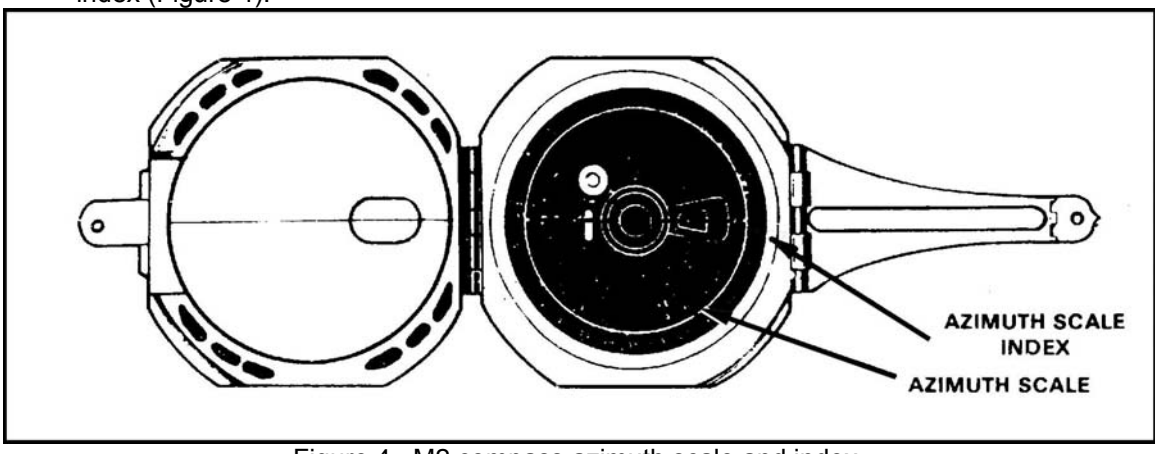



Figure 4. M2 compass azimuth scale and index.

NOTE: The azimuth scale can be rotated about 900 mils in either direction from zero.

d. The M2 compass is now declinated. Any azimuth measured with it will be a grid azimuth.

3. Measure a grid azimuth using an M2 compass.
   a. Index the known declination constant on the azimuth scale adjuster.
   b. Place the compass cover to an angle of about 45 degrees to the face of the compass so that the scale reflection can be viewed in the mirror (Figure 5).

**Performance Steps**

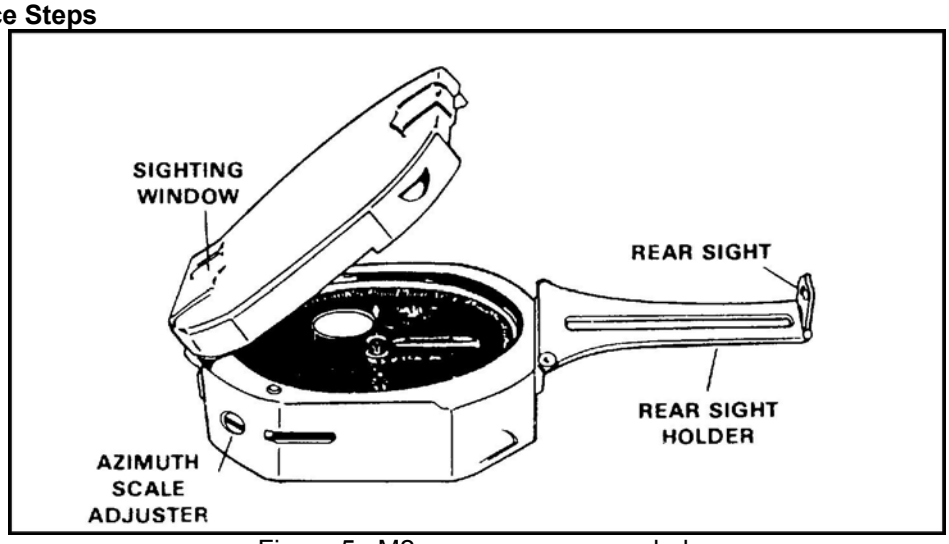



Figure 5. M2 compass cover angled.

c. Adjust sights to the desired position using the following method:
   (1) Raise the rear sight holder about level with the face of the compass and raise the rear sight. Sight on the object through the rear sight holder and window in the cover. The compass is correctly sighted when it is level (the bubble in the circular level is about centered and the needle floats freely), and the black centerline of the window bisects the object and opening in the rear sight.
   (2) Use this procedure when shooting an azimuth in the handheld mode or when placing the compass on a solid nonmetallic object.

NOTE: If the object sighted is at a lower elevation than the compass, raise the rear sight holder as needed. DO NOT TILT THE COMPASS.

4. Hold the compass in both hands at eye level with arms braced against the body and the rear sight near the eyes.

NOTE: For precise measurements, place the compass on a nonmetallic stake or object.

5. Level the compass by viewing the circular level in the mirror. Sight on the object, look into the mirror, and read the azimuth indicated by the black end of the needle.

NOTE: The newer compasses have the north and south ends of the needle marked "N" and "S" in raised, white lettering.

**Evaluation Preparation:** SETUP: Provide all equipment and material given in the task condition statement. Select points to which azimuths will be determined. Determine the azimuth to each point using the compass that the soldier will use.

BRIEF SOLDIER: Tell the soldier to determine the G-M angle and declination constant and declinate the M2 compass. Indicate the points to the soldier. Tell the soldier that to determine the azimuth to each point.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Determined the G-M angle. | ____ | ____ |
| 2. Determined the declination constant to nearest 10 mils. | ____ | ____ |
| 3. Declinated the M2 compass to within 10 mils of the declination constant. | ____ | ____ |
| 4. Held the compass level. | ____ | ____ |
| 5. Determined the correct azimuth to each of the points (each azimuth to be within | ____ | ____ |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 60 mils). | | |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 21-26 |
| | TM 9-1290-333-15 |

**Navigate Using an AN/PSN-11 Precision Lightweight Global Positioning System Receiver**
**071-329-7017**

**Conditions:** Given an AN/PVS-11 precision lightweight global positioning system receiver (PLGR) that has been set up for operation and a requirement to move to a new location.

**Standards:** Navigated from one point on the ground to within 100 meters of another point while dismounted using the PLGR.

**Performance Steps**

1. Enter or verify SETUP display.
   a. Select setup mode.
   b. Select setup units.
   c. Select setup magnetic variation type.
   d. Select elevation hold mode, time reference, and error display format.
   e. Select setup datum and automatic off timer.
   f. Select setup data port.
   g. Select setup automark.
2. Enter crypto keys.
3. Enter and verify initialization displays.
   a. Initialize position.
   b. Initialize time and date.
   c. Initialize track and ground speed.
   d. Initialize user-defined datum, if necessary.
   e. Initialize crypto key, if necessary.
4. Enter, edit, or review waypoint information.
   a. Copy waypoints.
   b. Determine distance between waypoints.
   c. Calculate a waypoint.
   d. Clear waypoints.
   e. Define a mission route.
5. Check status displays to ensure acquisition of four satellites.
6. Navigate to next point.

**Evaluation Preparation:** SETUP: Provide sufficient setup, initialization, and waypoint information to soldier so that PLGR can be used to navigate. Prepare a navigation course.

BRIEF SOLDIER: Tell the soldier to navigate from one point on the ground to another using the PLGR.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Navigated to another point.<br>a. Entered destination.<br>b. Checked status displays. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
| --- | --- |
| | TM 11-5825-291-13 |

**Prepare the AN/PSN-11 Precision Lightweight Global Positioning System Receiver for Operation**
**071-329-7018**

**Conditions:** Given an AN/PSN-11 precision lightweight global positioning system receiver (PLGR) (turned off) with battery (BA-5800/U) not installed.

**Standards:** Prepared the PLGR for operation without damaging equipment.

**Performance Steps**

1. Install battery.
   a. Remove power battery cover (top of the unit) by twisting counterclockwise.
   b. Gently insert the battery (contact ends first) into the compartment.
   c. Screw the power battery cover on snugly.

2. Set up the PLGR for operation.

NOTE: An item or field flashing shows the location of the cursor. If no item or field is flashing, use the left or right arrow key to move the cursor. Use the up or down arrow keys to increase or decrease the value of a character, to scroll through a field or selection, or to activate a function.

   a. Turn the PLGR on by pressing the ON/BRT key. (Wait for the PLGR to go through its BIT (built-in test).
   b. Press the MENU key. Move the cursor to SETUP. Activate the SETUP field by pressing the down arrow key.
   c. Move the cursor to the operating mode. Select the CONT (continuous POS) mode by pressing the up or down arrow key.
   d. Move the cursor to the SV-TYPE (satellite vehicle type) and select MIXED.
   e. Press the right arrow key and move the cursor to the right one time to see the up or down arrow symbol preceding the P.
   f. Press the down arrow key one time to display the next screen.
   g. Move the cursor to the coordinate system and select MGRS-NEW.
   h. Move the cursor to the units of measurement and select METRIC.
   i. Move the cursor to ELEV (elevation) and select METER and MSL (mean sea level).
   j. Move the cursor to ANG (angle) and select DEG (degrees) and MAG (magnetic).
   k. Go to the next page by repeating step c and press the down arrow key twice. (Move the cursor to ELEVATION HOLD and select AUTOMATIC.)
   l. Move the cursor to TIME and adjust time to your location.
   m. Move the cursor to ERR (error) and select +_m (meter).
   n. Go to the next page and move the cursor to DTM (datum) and select the datum for your location.
   o. Move the cursor to AUTOMATIC OFF TIMER and select OFF.
   p. Move two pages down to the AUTOMARK MODE and select OFF.

**Evaluation Preparation:** SETUP: At the test site, provide soldier with an AN/PSN-11 PLGR with battery.

BRIEF SOLDIER: Tell the soldier to set up the AN/PSN-11 PLGR for navigating while dismounted.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Installed battery. Inserted the battery (contact ends first) into the compartment. | ____ | ____ |
| 2. Set up the PLGR for operation. | ____ | ____ |
| a. Turned PLGR on. | | |
| b. Entered or verified SETUP display. | | |
| c. Selected operating mode and satellite vehicle (CONT and MIXED). | | |
| d. Selected units (MGRS-NEW, METRIC, METER, MSL, DEG, and MAG). | | |
| e. Selected EL Hold, TIME, and EER (automatic time = Z hour time zone). | | |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| f. Selected DATUM and AUTOMATIC OFF TIMER (geographic location and off). | | |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If a soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5825-291-13 |

**Enter Waypoints into an AN/PSN-11 Precision Lightweight Global Positioning System Receiver**
**071-329-7019**

**Conditions:** Given an AN/PSN-11 PLGR that has been set up for dismounted operation.

**Standards:** Entered waypoints into the AN/PSN-11 PLGR so that it could be used to navigate.

**Performance Steps**

1. Enter a waypoint into the PLGR:
   a. Press the WP key to display the waypoint menu page. The cursor is on the ENTER field. Activate the ENTER field. (The PLGR will automatically display the next unused waypoint.)
   b. Press the right arrow key three times. The waypoint label field will be flashing. (This is where you give your waypoint a name, such as Point 1, OBJ Blue, or ORP.) Press the up or down arrow key one time. The cursor will be on the first character of the waypoint label. Use the up or down arrow keys to scroll through and select the first character of the waypoint label. Then press the right arrow key to move the cursor to the next space until you have entered all characters of the waypoint label.
   c. Move the cursor to the grid zone designator (second line). Select the grid zone designator (located on your map in the grid reference).
   d. Move the cursor to the grid square identifier and 10-digit grid coordinate. On the third line, select the 100,000 grid square identifier located in the grid reference box on your map and select the 10-digit grid coordinate for your destination.
   e. Enter the elevation of the waypoint in the same manner (optional). Move to next page.

NOTE: The PLGR will confirm the new waypoint by displaying WAYPOINT STORED.

**Evaluation Preparation:** SETUP: At the test site, provide soldiers with an AN/PSN-11 PLGR that has been set up for dismounted operation. Provide a requirement sheet.

BRIEF SOLDIER: Tell the soldier to enter a waypoint into the AN/PSN-11 PLGR.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Entered the waypoint label. | ____ | ____ |
| 2. Entered the waypoint grid zone designator. | ____ | ____ |
| 3. Entered the waypoint grid square identifiers and coordinates. | ____ | ____ |
| 4. Stored the waypoint. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores a NO-GO, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5825-291-13 |

Subject Area 19: RECON-SECURITY: NIGHT VISION DEVICES

**Operate a Night Vision Sight, AN/PVS-4**
**071-315-0003**

**Conditions:** At night, given an AN/PVS-4 sight in its carrying case and BA-1567/U batteries.

**Standards:** Prepared and correctly placed the AN/PVS-4 sight into operation, then shut it down and stored it.

**Performance Steps**

1. Unpack the sight.

CAUTION: Relieve air pressure inside the carrying case by pressing the core of the relief valve, located near the handle, before releasing the latches.

a. Release the latches securing the top of the carrying case, and remove the top.
b. Remove the carrying bag from the carrying case. Open the bag and remove the sight.
c. Inspect the sight for damage (cracks, chips, and abrasions) and ensure that the decals are readable. Report deficiencies.

CAUTION: The AN/PVS-4 is a precision electro-optical instrument. They must always be handled carefully. Be sure to turn the ON-OFF/TUBE BRIGHTNESS and ON/OFF/RETICLE BRIGHTNESS switches OFF before installing batteries.

2. Install the batteries (Figure 1).

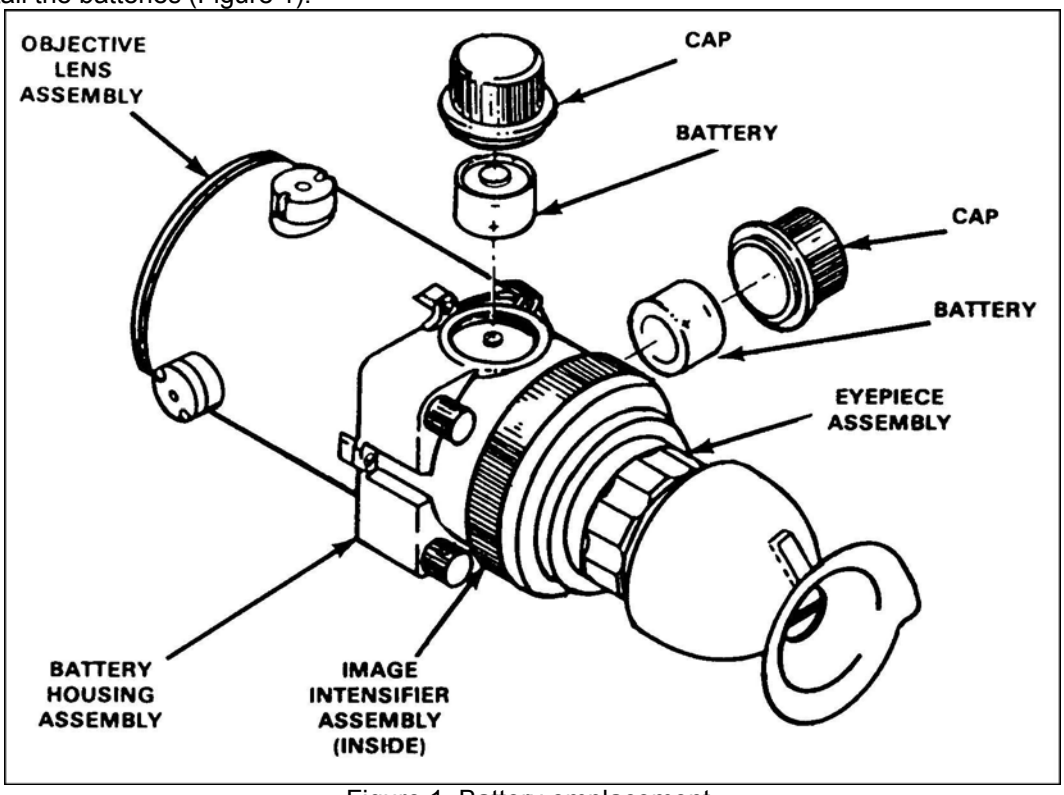



Figure 1. Battery emplacement.

a. Remove the battery caps by turning them counterclockwise.
b. Insert a battery in each cap with the negative (-) terminal (raised end) facing into the cap.
c. Replace the battery caps and tighten them snugly.

**Performance Steps**

3. Operate the device under normal conditions (Figure 2).

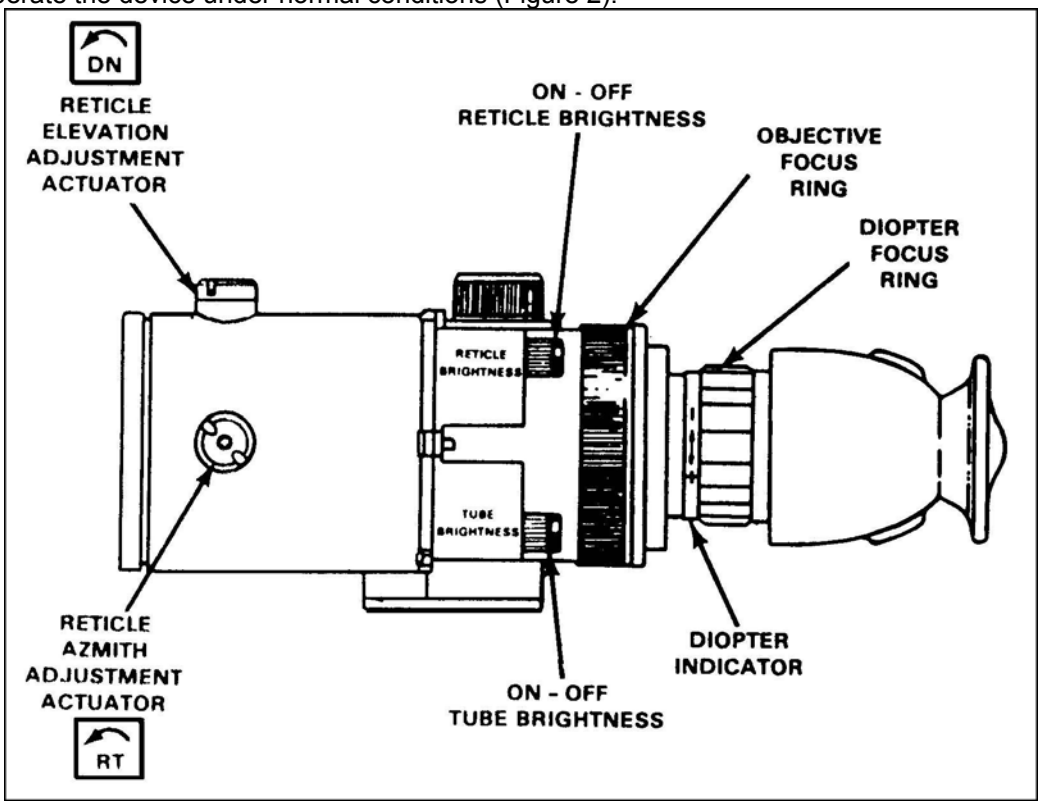



Figure 2. Controls and indicators.

WARNING
Using the sight without the eye guard installed may cause detection by the enemy and, when operated on a weapon, can result in physical injury to the operator because of weapon recoil.

NOTES:
1. The daylight cover must be installed during the daylight and removed at night.
2. Batteries must be removed when the sight is not in use to prevent accidentally turning on the sight.
   a. Press the eye against the eye guard to open the rubber leaves that prevent the emission of stray light.
   b. Turn the ON-OFF/TUBE BRIGHTNESS control clockwise to turn on the sight.

NOTE: If the equipment fails to operate, refer to the troubleshooting procedures in TM.

   c. Adjust the ON-OFF/TUBE BRIGHTNESS control to the lowest setting that provides good target-to-background contrast.
   d. Turn the ON-OFF/ RETICLE BRIGHTNESS control clockwise to turn on the light-emitting diode. Adjust the light intensity so that the reticle is just visible against the background.

CAUTION
Excessive reticle brightness may damage the image intensifier tube.

   e. Turn the diopter focus ring (Figure 2) to obtain the clearest image of the reticle pattern.
   f. Turn the objective focus ring (Figure 2) until the target in the field of view is sharply defined.

NOTE: During surveillance or target engagement, the operator must adjust the objective focus to ensure a sharp image at different ranges.

4. Perform after-operation procedures.
   a. Turn the reticle and tube brightness controls fully clockwise.
   b. Remove both batteries.
   c. Replace the sight in the carrying case.

**Evaluation Preparation:** SETUP: At the test site, provide all the materials and equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to remove the AN/PVS-4 from its storage case and place it into operation. Tell him to take the AN/PVS-4 out of operation and replace it in its storage case.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Steps 1and 2 are to be executed in sequence. | | |
| 1. Removed sight from the carrying case.<br>a. Released the air pressure.<br>b. Released the latches.<br>c. Inspected the sight for damages. | ____ | ____ |
| 2. Installed the batteries.<br>a. Placed the ON-OFF/TUBE BRIGHTNESS switch to OFF.<br>b. Placed the ON-OFF/RETICLE BRIGHTNESS switch to OFF.<br>c. Removed the battery caps (two each).<br>d. Inserted the batteries (two each) correctly (negative [-] terminal facing into the cap).<br>e. Replaced caps (two each). | ____ | ____ |
| 3. Turned the ON-OFF/TUBE BRIGHTNESS control to ON. | ____ | ____ |
| 4. Turned the ON-OFF/RETICLE BRIGHTNESS control to OFF. | ____ | ____ |
| 5. Performed after-operation procedures.<br>a. Turned the ON-OFF/TUBE BRIGHTNESS control to OFF.<br>b. Turned the ON-OFF/RETICLE BRIGHTNESS control to OFF.<br>c. Removed both batteries.<br>d. Replaced the sight in the carrying case. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5855-213-10 |

**Operate Night Vision Goggles, AN/PVS-5**

**071-315-0030**

**Conditions:** At night, given serviceable AN/PVS-5 night vision goggles with components, accessories, and batteries.

**Standards:** Used the AN/PVS-5 night vision goggles during performance of assigned mission, complied with all appropriate warnings and cautions. Inspected and operated the goggles to obtain the best possible image. Properly shut down the goggles and stowed with accessories in the carrying case.

**Performance Steps**

1. Perform preoperational checks.

CAUTION: The AN/PVS-5 is a precision electro-optical instrument and must be handled carefully. Keep caps on objective and eyepiece lenses when not in use. Do not expose the unprotected objective lens to bright light with power applied to the goggles. Damage to the image intensifier can result.

a. Remove the goggles from the carrying case (Figure 1).

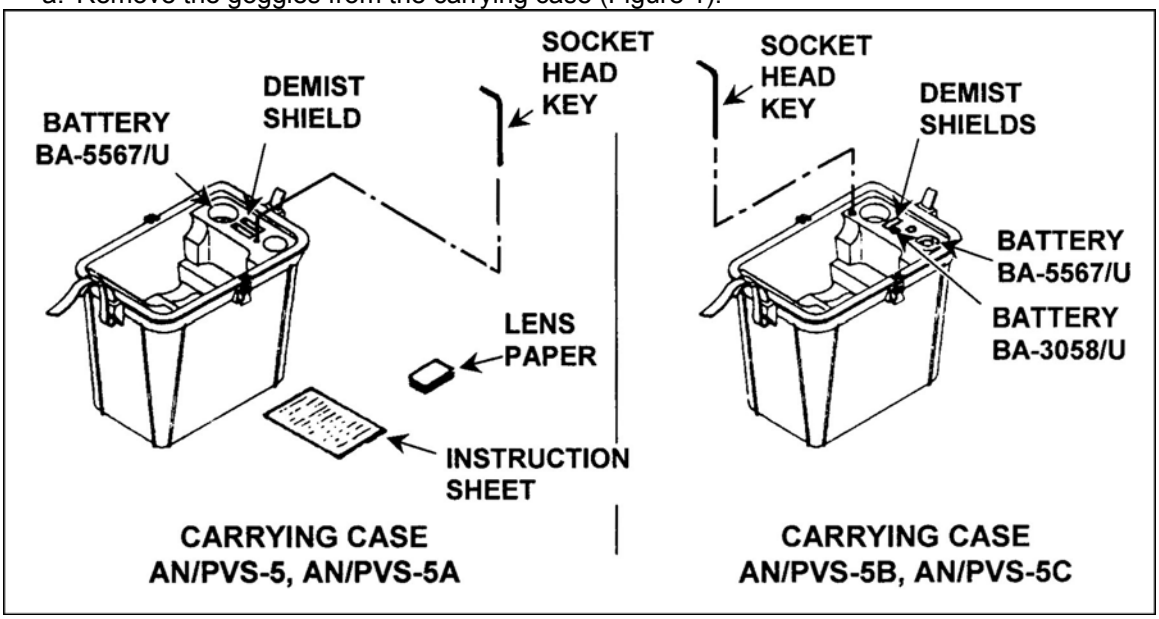



Figure 1. Carrying case items.

CAUTION: The neck cord must be placed around the user's neck when the goggles are removed from the carrying case.

b. Place the neck cord around your neck.

c. Make sure the rotary switch is in the OFF position.

CAUTION: The rotary switch must be in the OFF position when the batteries are installed.

WARNING: Do not use mercury or rechargeable NiCad batteries. Using these batteries could result in system failure, which could cause personnel injury.

WARNING

Danger of explosion. Do not transport batteries in pockets or other containers containing metal objects such as coins, keys, and so on. Metal objects can short circuit batteries and cause them to become very hot. The BA-5567/U (lithium) batteries could explode.

WARNING

The BA-5567/U (lithium) battery contains sulfur dioxide gas under pressure and should be handled in the following manner: (1) The BA-5567/U (lithium) batteries have safety vents to prevent explosion. When they are venting sulfur dioxide gas, you may smell it or hear the sound of gas escaping. When the safety

**Performance Steps**

vents have operated, the batteries are fairly safe from bursting but will be hot and must be handled with care. (2) Do not heat, puncture, disassemble, short circuit, attempt to recharge, or otherwise tamper with the batteries. (3) Turn off the equipment if the battery compartment becomes unduly hot. Do not open the battery compartment, but turn in the goggles to maintenance and report the problem.

d. Install the BA-5567/U (lithium) battery or BA-3058/U (alkaline) battery (Figures 2, 3, and 4).
   (1) Remove the BA-5567/U (lithium) battery cap or BA-3058/U (alkaline) battery cap(s).
   (2) Insert the BA-5567/U (lithium) battery with the recessed (+) side in first. Insert the BA-3058/U (alkaline) batteries with the flat (-) side in first.

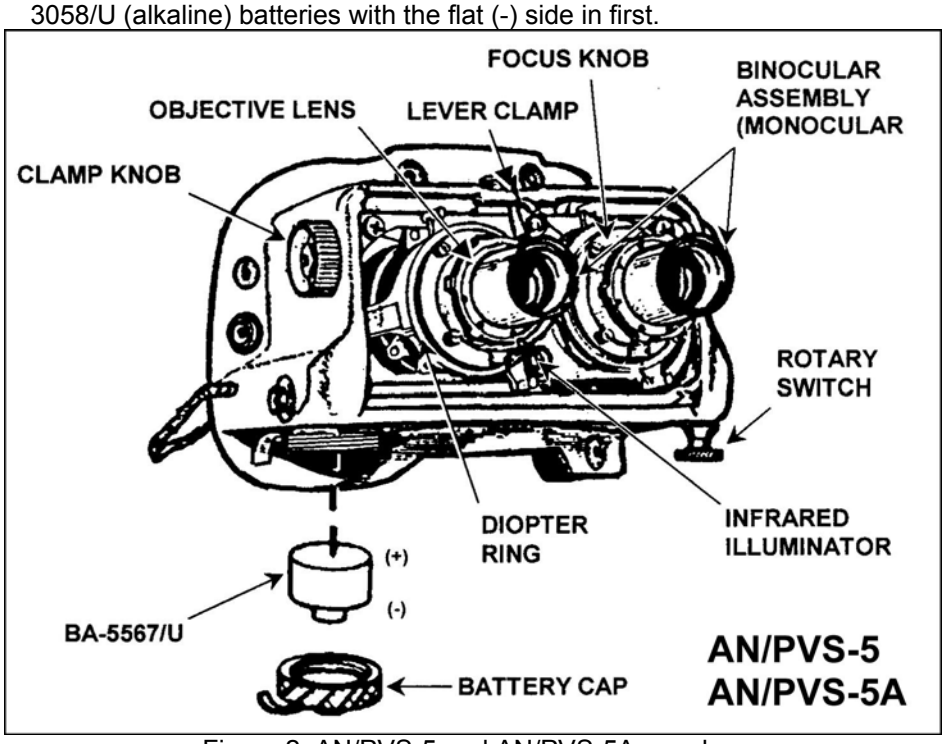



Figure 2. AN/PVS-5 and AN/PVS-5A goggles.

**Performance Steps**

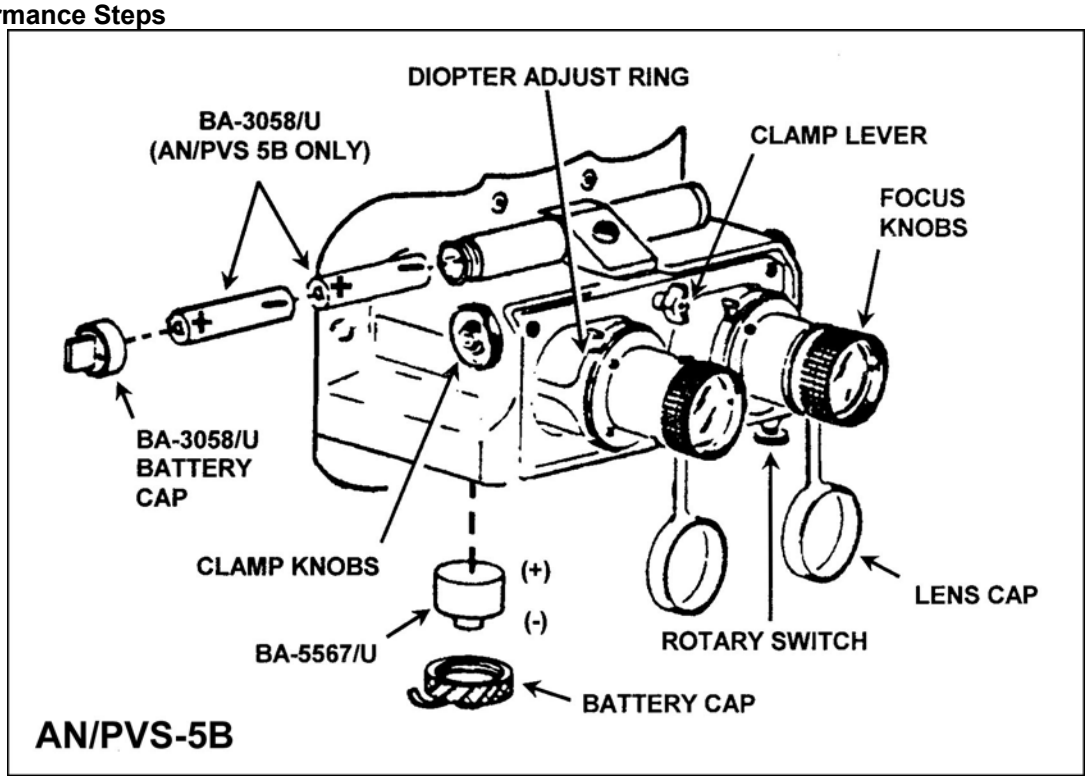



Figure 3. AN/PVS-5B goggles.

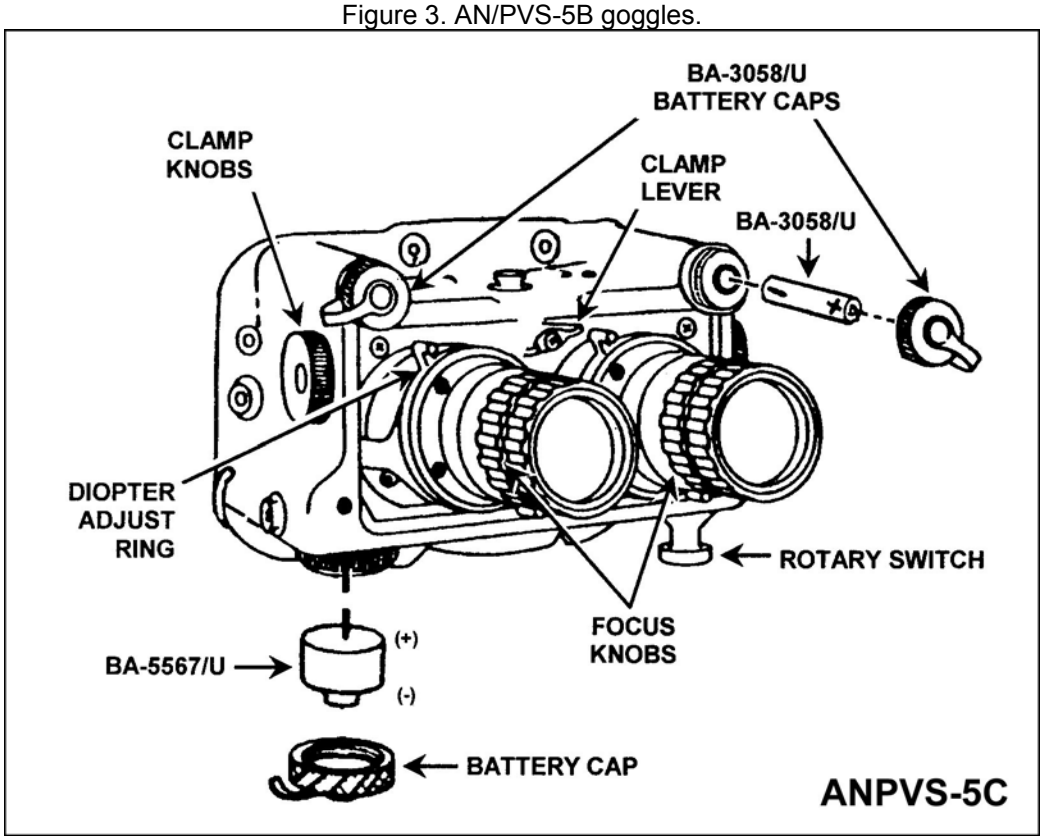



Figure 4. AN/PVS-5C goggles.

WARNING

**Performance Steps**
For AN/PVS-5B and AN/PVS-5C: Do not use the goggles with more than one type of battery at a time. Putting both battery types in your goggles at the same time draws off power and will severely reduce battery life of both types.

NOTE: The BA-5567/U (lithium) battery compartment is the same for the AN/PVS-5, AN/PVS-5A, AN/PVS-5B, and AN/PVS-5C. The upper battery compartment for the BA-3058/U (alkaline) batteries is on the top of the face mask for the AN/PVS-5B as shown in Figure 3 and for the AN/PVS-5C as shown in Figure 4.

(3) Replace the battery cap and tighten it firmly to ensure a watertight seal.

2. Prepare the goggles for operation.
   a. Snap the headstrap to the face mask, making sure all straps are extended to their maximum lengths.
   b. Move the objective focus knob and diopter adjustment ring throughout their range to make sure they rotate freely.
   c. Remove the eyepiece lens caps.
   d. Place the goggles on your head and adjust the headstraps.
      (1) Bend your head so that you are facing the ground.
      (2) With straps loosened, place the goggle headstrap on your head.
      (3) Grasp the headstrap side (horizontal) band adjustment with both hands and slowly pull band adjustment until face mask cushion just touches your face.
      (4) Continue pulling straight back on the straps until the goggles feel snug (Figure 5).

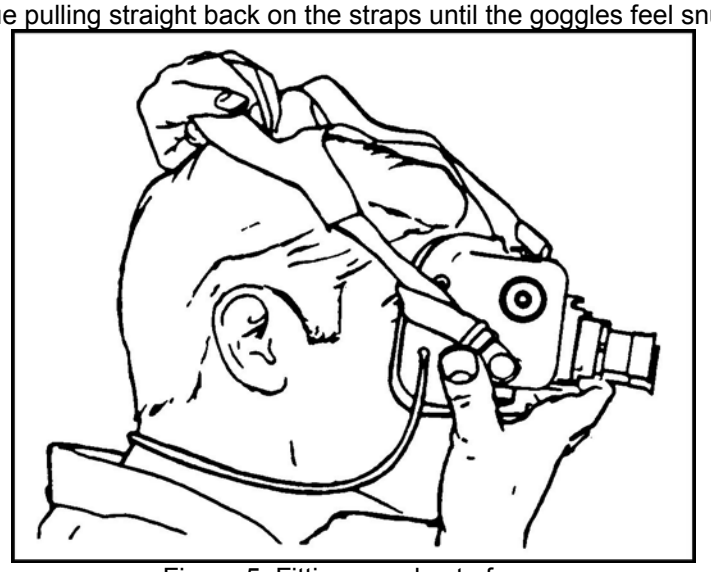


Figure 5. Fitting goggles to face.

(5) With your head still bent, grasp center (vertical) band adjustment and pull until snug (Figure 6).

**Performance Steps**

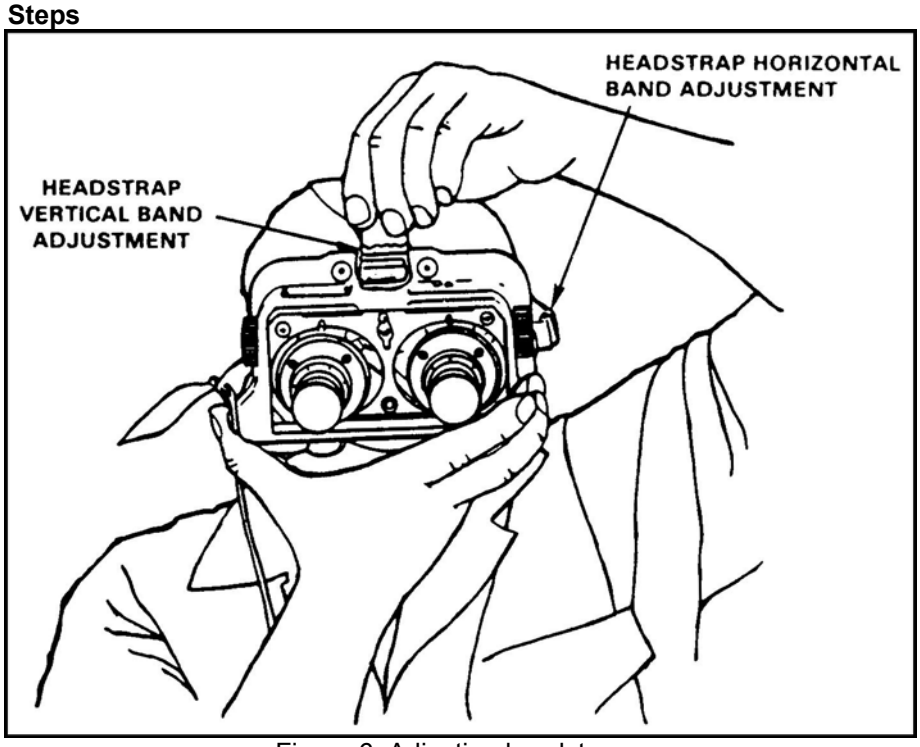



Figure 6. Adjusting headstraps.

(6) Lift your head to a normal viewing position and make final adjustments on all bands until you have a comfortable, stable fit.

e. Remove objective lens cap.

3. Operate the goggles.

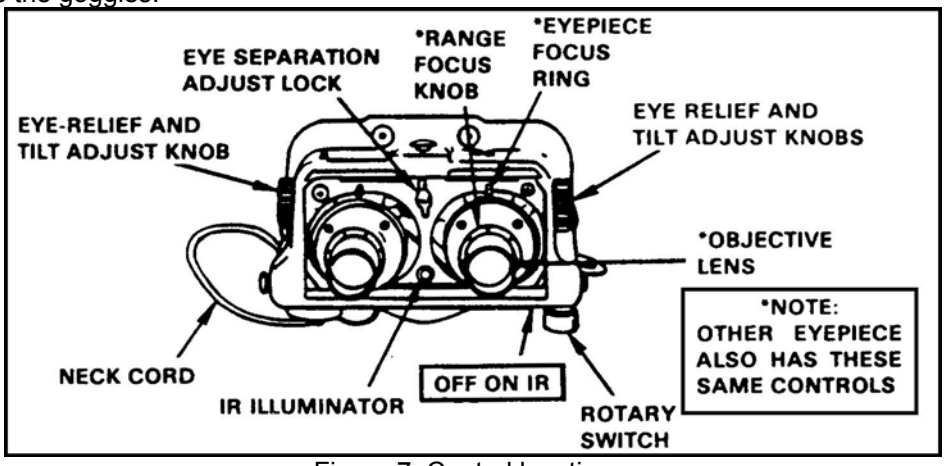



Figure 7. Control locations.

CAUTION: Perform the following procedures in the dark.
NOTE: Refer to Figure 7 for the location of controls on the AN/PVS-5, AN/PVS-5A, AN/PVS-5B, and AN/PVS-5C.

a. Set the rotary switch on the ON position. A green glow will appear in each eyepiece after a slight delay.
b. Adjust the diopter adjustment rings. After the eye relief is set, the diopter adjustment ring adjusts between the eye and the eyepiece. Adjust both eyepieces by turning the diopter adjustment rings counterclockwise.

**Performance Steps**

c. Adjust the objective focus knobs. Adjust both objective focus knobs to infinity, all the way counterclockwise and back approximately 1/16 turn to infinity. If you are focusing on an object less than 100 to 200 feet away, adjust the focus knobs slightly to the right. Adjustment of the objective focus knobs regulates the target distance that is in focus. The objective focus knobs are located right on the objective lenses.

d. Loosen the lever clamp (wing nut) counterclockwise and gently pull the monocular apart to their fullest extent. Then, gently push the monocular together to attain a proper sight picture.
   (1) The proper sight picture has one circular image with a slight overlap.
   (2) An improper sight picture may be due to the monocular being improperly positioned in front of the eyes.
   (3) Tighten the lever clamp (wing nut) clockwise finger tight. Do not over tighten the lever clamp (wing nut).

e. Adjust the clamp knobs.
   (1) Loosen the clamp knobs counterclockwise and adjust the monocular to attain the desired monocular tilt. The monocular has a tilt range of 25 degrees.
   (2) The monocular may be adjusted fore and aft in the slot of the face mask assembly within a 0.39 inch (10 millimeter) range. This adjustment changes your field of view. Start by placing the monocular as close to your eyes as possible and then move them outward. The position is a matter of individual preference. Placing the monocular close to the eye allows an excellent view of the monocular image. If the monocular lenses are more than 0.71 inch (18 millimeters) from the eye, your field of view will be less than 40 degrees.

NOTE: If the eyepiece lenses are not properly aligned with the eyes, optimal resolution will not be achieved. Proper alignment of the eyepiece lenses is achieved when the distance between the monocular matches the distance between your pupils and the line of sight is the same as the vertical angle of the binoculars. When all the eyepiece adjustments (eyespan, vertical, and tilt) are properly set, the edges of the images in both monocular will be clear.

   (3) Tighten the clamp knobs clockwise finger tight. Do not over tighten the knobs.

4. Adjust the focus.

NOTE: When setting the diopter adjustment, you can achieve a clear image in each eye (monocular) and yet have a blurred image or develop eyestrain when viewing with both eyes.

NOTE: The following procedure is performed outdoors at night while wearing the goggles.

a. Preset the objective focus knob and diopter adjustment ring of both monocular fully counterclockwise.
b. Turn on the goggles.
c. Look at the edge or some detail of a building or other manmade structure at least 100 feet (33 meters) away.
d. Cover your left eye, or cup your hand over the left objective lens. Do not close your left eye. Be careful not to touch the lenses.
e. Turn the right diopter adjustment ring clockwise until you first obtain a clear image, and stop.

NOTE: If you continue to turn the diopter adjustment ring clockwise, the image may seem clear initially, but you could experience eyestrain or headaches after prolonged use.

f. Refine the focus of the right objective lens by very slowly turning the right objective focus knob until the sharpest image is obtained.
g. Repeat steps 4c through 4f for the left monocular.
h. After adjusting both monocular for best focus, cover the objective lens of the left monocular and view the image through the right monocular, checking to see if the image is still clear. Then cover the right monocular with the right hand and view the image through the left monocular. If either monocular is not clear, repeat steps 4c through 4g.
i. With both eyes open, make final objective focus adjustments, if necessary.
j. Turn off the goggles.

5. Operate the goggles for reading.

NOTE: Keep both eyes open when focusing.

**Performance Steps**

a. Turn on the goggles to the IR position by pulling the switch down and turning it clockwise. (On the AN/PVS-5, you do not have to pull the switch down to turn it to IR.)
b. Check that the IR illuminator has been turned on by passing your hand directly in front of the goggles. If the contrast appears extra bright, turn the rotary switch to the ON position from the IR position.
c. Turn the objective focus knobs fully clockwise to view up close.
d. Cover your left eye. Keep both eyes open. Adjust the right diopter adjustment ring until the viewing area becomes as clear as possible.
e. Adjust the right objective focus knob for the clearest image of your reading material.
f. Cover your right eye. Keep both eyes open. Adjust the left diopter adjustment ring until the viewing area becomes as clear as possible.
g. Adjust the left objective focus knob for the clearest image of your reading material.
h. Have an observer wearing night vision goggles check carefully for stray light that may be visible at the edges of your face mask cushion.

WARNING
The infrared (IR) illuminator is for conditions of extreme darkness. The light from the illuminator can be detected by the enemy using night vision devices, so only use the IR illuminator for emergencies. The purpose of the IR illuminator is for viewing within approximately 6 feet (2 meters).

6. Operate the IR illuminator.
   a. Pull down and turn the rotary switch to the IR position and observe that the area to your immediate front is lighted. (On the AN/PVS-5, you do not have to pull the switch down to turn it to IR.) As the IR illuminator is turned on, the momentary flash that you see is normal.

WARNING
Two major disadvantages occur when the IR illuminator is used. First, it makes the night vision goggles an active IR system, and when illuminated, the operator is subject to detection by enemy systems. Second, when the illuminator is used, the battery power is consumed six times faster.

   b. Check that the IR illuminator has been turned on by passing your hand directly in front of the goggles. If the contrast appears extra bright on your hand, the IR illuminator is lighted.

7. Install and remove the demist shields.

NOTE: Use the demist shields if the eyepieces become fogged during operation.
CAUTION: Demist shields will be damaged if wiped while wet or with wet lens paper.

   a. Remove the demist shields from the goggles carrying case. Snap the shields over the eyepiece lenses being careful not to smudge the eyepiece lenses or demist shields.
   b. Remove the demist shields by grasping them and pulling them off the eyepiece lenses. Place them back in the carrying case.

8. Operate the goggles in the standby mode.
   a. During extended periods of nonuse, turn the rotary switch to OFF. Observe that the green glow disappears immediately from the goggles.
   b. Remove the goggles from your head.
   c. Let them hang by the neck cord around your neck.

9. Perform shutdown and storage procedures.
   a. Remove goggles.
      (1) Shut down goggles by turning rotary switch to OFF.
      (2) Unsnap side straps.
      (3) Unsnap center strap.

**Performance Steps**

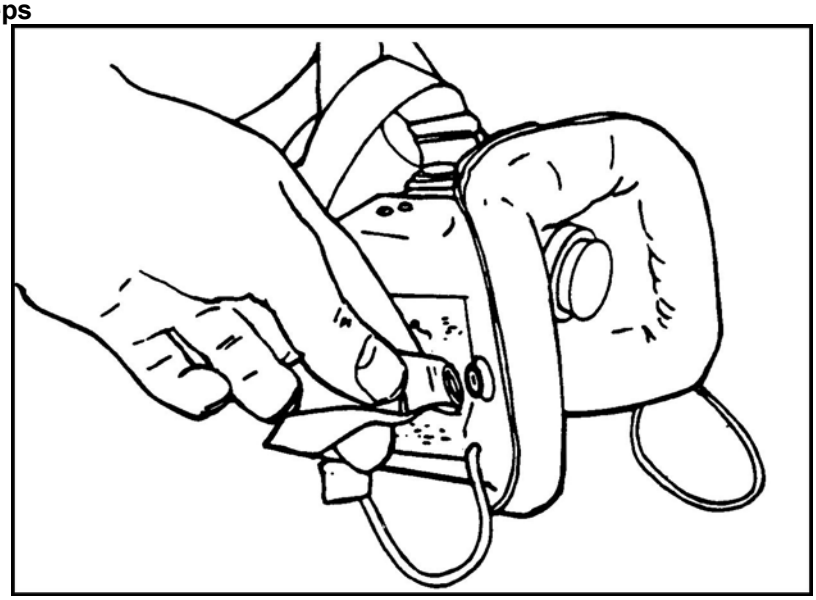


Figure 8. Removing headstrap assembly.

CAUTION: When removing the headstrap at the fastener, lift snap only at LIFT DOT (Figure 8) to avoid tearing the strap or breaking through the face mask. The white dot on the strap's button is the only place the button releases on its own. The LIFT DOT is not on the AN/PVS-5B headstrap.

b. Replace the objective lens caps and eyepiece caps.
c. Remove batteries.
   (1) Unscrew the battery caps.
   (2) Remove the BA-5567/U (lithium) battery or BA-3058/U (alkaline) batteries from the battery compartments.
   (3) Replace the battery caps.
d. Loosen the clamp knobs and lever clamp (wing nut).

CAUTION: Failure to loosen the clamp knobs and lever clamp (wing nut) before stowing could result in damage to the face mask.

e. Place the goggles and batteries in the carrying case, and secure the latch.

**Evaluation Preparation:** SETUP: Evaluate this task at night or in a classroom where you an control the light to simulate nighttime conditions. Provide the soldier with a set of AN/PVS-5 night vision goggles, complete with components and fresh batteries.

BRIEF SOLDIER: Tell the soldier to prepare the goggles for operation, attach the components, operate the goggles, and shut down and stow the goggles under the following conditions: normal operation, extreme darkness, and rain or high humidity. Tell the soldier that he must notify you before turning the goggles ON and after turning them OFF, so you can darken or lighten the room accordingly. Tell him not to energize the goggles when the room lights are on.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed preoperational checks.<br>a. Removed the goggles from the carrying case.<br>b. Placed the neck cord around your neck.<br>c. Ensured the rotary switch was in the OFF position.<br>d. Installed the battery(ies). | ____ | ____ |
| 2. Prepared the goggles for operation.<br>a. Installed the headstraps.<br>b. Removed the eyepiece lens caps. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| c. Put on the goggles and adjusted the headstraps. | | |
| d. Removed objective lens caps. | | |
| 3. Operated the goggles. | ____ | ____ |
| a. Turned the rotary switch to ON. | | |
| b. Adjusted all controls to obtain proper sight picture. | | |
| c. Made sure the infrared illuminator was not turned on. | | |
| 4. Performed shutdown and storage. | ____ | ____ |
| a. Removed goggles. | | |
| b. Turned the rotary switch to OFF. | | |
| c. Replaced the lens caps. | | |
| d. Removed the battery(ies). | | |
| e. Loosened the clamp knobs and lever clamp (wing nut). | | |
| f. Placed the goggles and battery (ies) in the carrying case. | | |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 11-5855-238-10 |

**Maintain a Thermal Viewer, AN/PAS-7**

**071-315-0090**

**Conditions:** Given an AN/PAS-7 with all components; two clean camel's-hair brushes; lens tissue; lens cleaner; three to five clean, lint-free cloths; mild detergent; water; and TM 11-5855-246-10.

**Standards:** Performed preventive maintenance checks and services on the AN/PAS-7 thermal viewer IAW TM.

**Performance Steps**

1. Check viewer.
    a. Check exterior surfaces for cleanliness and dents.
    b. Check infrared window and eyepiece lens surface for cleanliness, fractures, scratches, or other damage.
    c. Check rubber eyeshield for cleanliness and for proper operation of security shutter.
    d. Check connector for cleanliness and for bent or damaged pins or other damage.
    e. Check neck and hand sling fabric for cleanliness and for rips, tears, or other damage.

WARNING
Lithium organic batteries may be used in the AN/PAS-7A. They are potentially hazardous if misused or tampered with before, during, or after discharge. The following precautions must be strictly observed to prevent possible injury to personnel or equipment damage: Do not heat, incinerate, crush, puncture, disassemble, or otherwise mutilate the batteries. Do not short circuit, recharge, or bypass the internal fuse. Do not store in equipment during long periods of nonuse (in excess of 30 days). Turn off the equipment immediately if you detect the battery compartment becoming unduly hot, hear battery cells venting (hissing sound), or smell irritating sulfur dioxide gas. Remove and dispose of the battery only after it is cool (30 to 60 minutes).

2. Check rechargeable battery with charger or check disposable battery.
    a. Check exterior surfaces for cleanliness and for dents, scratches, or other damage.
    b. Check connector for cleanliness and for bent or damaged pins, or other damage.

3. Check interconnecting cables.
    a. Check connectors and cables for cleanliness.
    b. Check connectors for bent or damaged pins or other damage.
    c. Check cables for cracks, breaks, or other damage.

4. Check carrying bag.
    a. Open bag and shake out any grit or dirt. Wipe interior and exterior with clean, dry, lint-free cloth. If needed, dampen cloth with clean water to remove grease or dirt.
    b. Check fabric for rips, tears, or other damage.
    c. Check zipper for proper operation.

5. Check transit case.
    a. Remove cover and take all units and accessories from case. Turn the case over and shake out any loose dirt or grit. Check interior cushions for rips, tears, or other damage.
    b. Check exterior surfaces for cleanliness and for dents, scratches, or other damage.
    c. Check hold-down latches for proper operation and for bent clasps or other damage.

6. Clean lens and window surfaces.

CAUTION: Use lens tissue when cleaning lens or window surfaces. Do not use a cloth that will scratch the lens and window surfaces.

NOTE: When lens and window surfaces need cleaning, clean exterior surfaces and rubber eyepiece before cleaning lens surfaces.

    a. Remove rubber eyeshield from eyepiece by gently pulling it off.
    b. Remove all dirt, dust, and foreign matter from the lens surface with a clean camel's-hair brush.

**Performance Steps**

c. For stubborn dirt, use lens tissue folded to form a swab and dampened with lens cleaner.
d. Use a gentle circular motion on the lens; start at the center and work out towards the edge.
e. Dry the lens with dry lens tissue, using the same circular motion.

7. Clear exterior surfaces.
   a. Brush the exterior surfaces with a camel's-hair brush. (Do not use same brush you used for cleaning lens and window surfaces.)
   b. Wipe the surfaces with a clean, lint-free cloth.
   c. For stubborn dirt, use the cloth dampened with clean, fresh water or with a mild detergent and water.
   d. Dry thoroughly with a clean, lint-free cloth.
8. Clean rubber eyeshield.
   a. Wipe it with a clean, lint-free cloth.
   b. For stubborn dirt, use the cloth dampened with clean, fresh water.
   c. Air dry, or dry with a clean, lint-free cloth.
9. Clean connectors and cables.
   a. Remove all dirt, dust, and foreign matter with a camel's-hair brush.
   b. For stubborn dirt, use a lint-free cloth dampened with clean, fresh water.
   c. Air dry, or dry with a clean, lint-free cloth.

**Evaluation Preparation:** SETUP: At the test site, provide all materials and equipment indicated in the task condition statement.

BRIEF SOLDIER: Tell the soldier to perform operator maintenance on an AN/PAS-7.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Checked viewer.<br>a. Checked exterior surface for cleanliness and dents.<br>b. Checked infrared window and eyepiece lens surface for cleanliness and for fractures, scratches or other damage.<br>c. Checked rubber eyeshield for cleanliness and for proper operation of security shutter.<br>d. Checked connector for cleanliness and for bent or damaged pins or other damage.<br>e. Checked neck and hand sling fabric for cleanliness and for rips, tears or other damage. | ____ | ____ |
| 2. Checked rechargeable battery with charger or checked disposable battery.<br>a. Checked exterior surfaces for cleanliness, dents, scratches or other damage.<br>b. Checked connector for cleanliness and for bent or damaged pins or other damage. | ____ | ____ |
| 3. Checked interconnecting cable.<br>a. Checked connectors and cable for cleanliness.<br>b. Checked connectors for bent or damaged pins or other damage. | ____ | ____ |
| 4. Checked carrying bag.<br>a. Opened bag and shook out any grit or dirt. Wiped interior and exterior with clean, dry, lint-free cloth. If needed, dampened cloth with clean water to remove grease or dirt.<br>b. Checked fabric for rips, tears, or other damage.<br>c. Checked zipper for proper operation. | ____ | ____ |
| 5. Checked transit case. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| a. Removed cover and all units and accessories from case. Turned over the case and shook out any loose dirt or grit. Checked interior cushions for rips, tears, or other damage. | | |
| b. Checked exterior surfaces for cleanliness and for dents, scratches, or other damage. | | |
| c. Checked hold-down latches for proper operation and for bent clasps or other damage. | | |
| 6. Cleaned lens and window surfaces. | ____ | ____ |
| a. Removed rubber eyeshield from eyepiece by gently pulling it off. | | |
| b. Removed all dirt, dust, and foreign matter from the lens surface with a clean camel's-hair brush. | | |
| c. For stubborn dirt, folded the lens tissue to form a swab and dampened it with lens cleaner. | | |
| d. Used a gentle circular motion on the lens; started at the center and worked out towards the edge. | | |
| e. Dried the lens with dry lens tissue, used the same circular motion. | | |
| 7. Exterior surfaces. | ____ | ____ |
| a. Brushed exterior surfaces with a camel's-hair brush. Used a clean brush. Did not reuse the same brush used to clean lens and window surfaces. | | |
| b. Wiped the surfaces with a clean, lint-free cloth. | | |
| c. For stubborn dirt, folded the lens tissue to form a swab. Dampened the tissue with clean, fresh water and, if desired, added a mild detergent. | | |
| d. Dried thoroughly with a clean, lint-free cloth. | | |
| 8. Cleaned rubber eyeshield. | ____ | ____ |
| a. Wiped with a clean, lint-free cloth. | | |
| b. For stubborn dirt, used a lint-free cloth dampened with clean fresh water. | | |
| c. Air dried, or dried with a clean, lint-free cloth. | | |
| 9. Cleaned connectors and cables. | ____ | ____ |
| a. Removed all dirt, dust, and foreign matter with a camel's-hair brush. | | |
| b. For stubborn dirt, used a lint-free cloth dampened with clean fresh water. | | |
| c. Air dried, or dried with a clean, lint-free cloth. | | |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| TM 11-5855-246-10 | |

**Operate a Thermal Viewer, AN/PAS-7**

**071-315-0091**

**Conditions:** During limited visibility, given an AN/PAS-7 and a sector to scan.

**Standards:** Installed the batteries and focused the goggles. After using the goggles, removed the batteries, covered the lens caps, and properly stowed the goggles in their carrying case.

**Performance Steps**

WARNINGS

1. Breakage of the cathode-ray (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, avoid rough handling or jarring of the instrument. Handling of the CRT will be done only by qualified maintenance personnel using approved safety mask and gloves.

2. The infrared window is coated with thorium fluoride, which contains a radioactive isotope, Thorium-232. The only potential hazard involves ingestion (swallowing or inhaling) of this coated material. This coating is electro-deposited in the silicone base so cleaning with alcohol will not damage it, but it cannot be machined or worked on with abrasives of any sort.

1. Adjust the neck sling.
    a. Put the neck sling around your neck.
    b. Adjust it to a comfortable position on your chest.

WARNING

Lithium organic batteries may be used in the AN/PAS-7A. They are potentially hazardous if misused or tampered with before, during, or after discharge. The following precautions must be strictly observed to prevent possible injury to personnel or equipment damage:

-- Do not heat, incinerate, crush, puncture, disassemble, or otherwise mutilate the batteries.
-- Do not short circuit, recharge, or bypass the internal fuse.
-- Do not store in equipment during long periods of nonuse (in excess of 30 days).
-- Turn off the equipment immediately if you detect the battery compartment becoming unduly hot, hear battery cells venting (hissing sound), or smell irritating sulfur dioxide gas. Remove and dispose of the battery only after it is cool (30 to 60 minutes).

2. Install the rechargeable battery (AN/PAS-7 or AN/PAS-7A) or the disposable battery (AN/PAS-7A only).
    a. Rechargeable battery.
        (1) Connect the female end of the interconnecting cable to the viewer.
        (2) Connect the male end of the interconnecting cable to the rechargeable battery (Figure 1).

**Performance Steps**

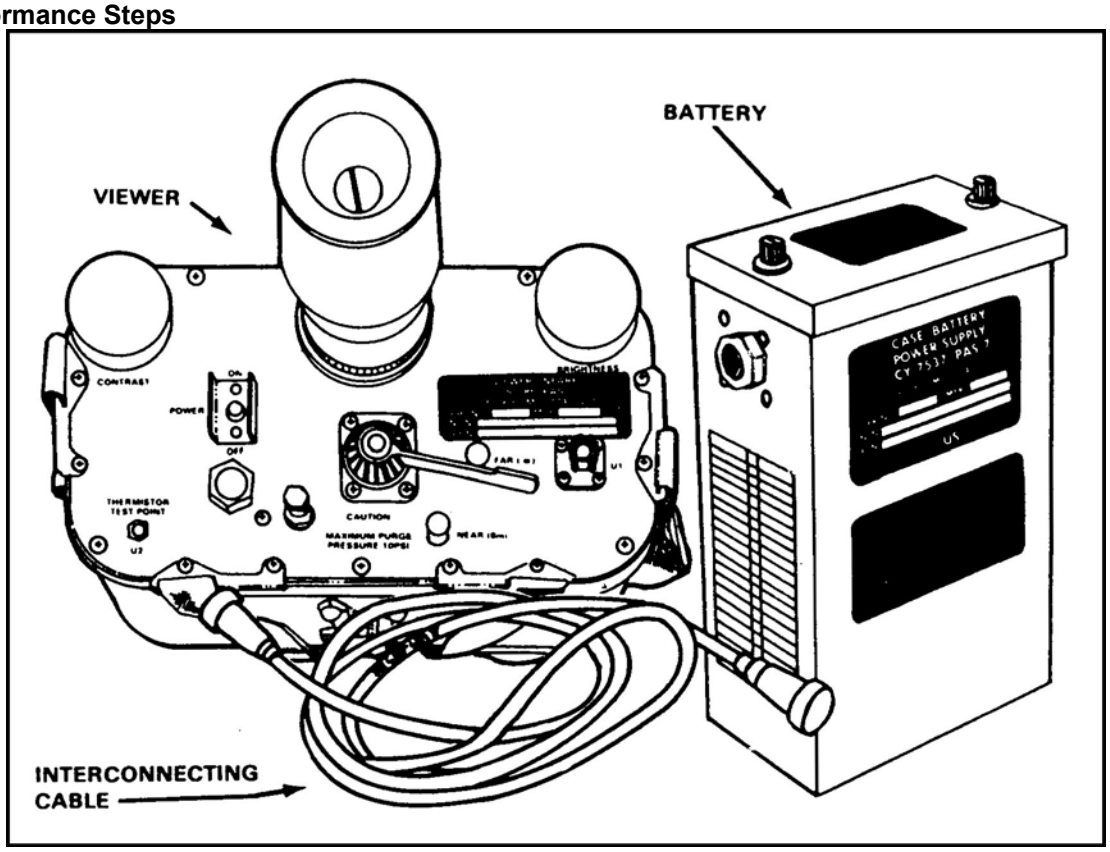



Figure 1. AN/PAS-7 and battery.

(3) Attach the battery to your belt or place it on a nearby support if the viewer is being operated on a tripod.

b. Disposable battery.

(1) Let the viewer hang on your chest by the neck strap with the disposable battery case up.
(2) Unlatch the two hold-down latches on the disposable battery case (one on each end). Note that the battery cable is stowed under the nylon hinges of the battery case cover.
(3) Hold the viewer neck strap to one side. Remove the battery cover from the battery case and fold it back until it rests on top of the case. Remove the battery cable from under the nylon cover hinges.
(4) After making sure the battery removal strip is out, insert the disposable lithium battery (BA-5599/U) into the case with the battery connector to the right (side toward the viewer FOCUS lever).
(5) Press the battery firmly into the case as far as it will go.
(6) Fold the battery removal strap over the battery and close the battery case cover. Latch the two hold-down latches.
(7) Make sure the viewer power switch is in the OFF position. Then connect and lock the battery cable connector to the connector on the viewer front panel.

CAUTION: Before turning the power switch to the ON position, be sure that the brightness control is fully counterclockwise.

3. Place the power switch in the ON position. A faint ticking of the oscillating mirror can be heard. Wait about 30 seconds after turn-on for the CRT heater to warm up (Figure 2).

**Performance Steps**

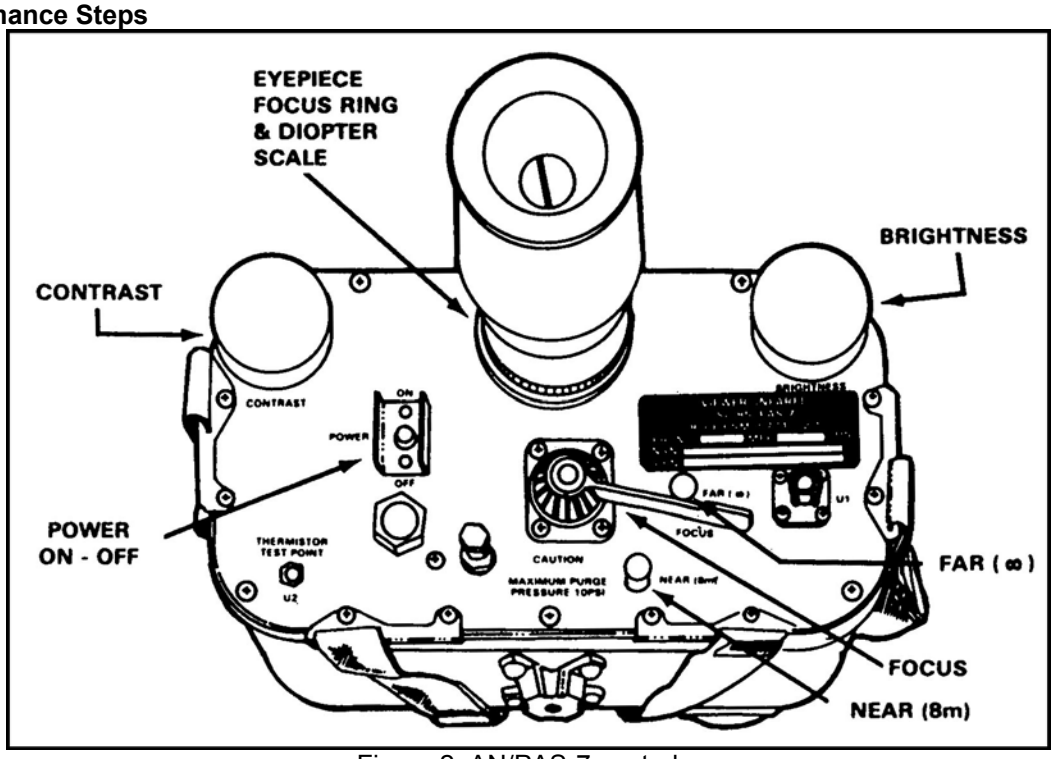



Figure 2. AN/PAS-7 controls.

4. Remove the lens cap from the infrared (IR) window (Figure 3).

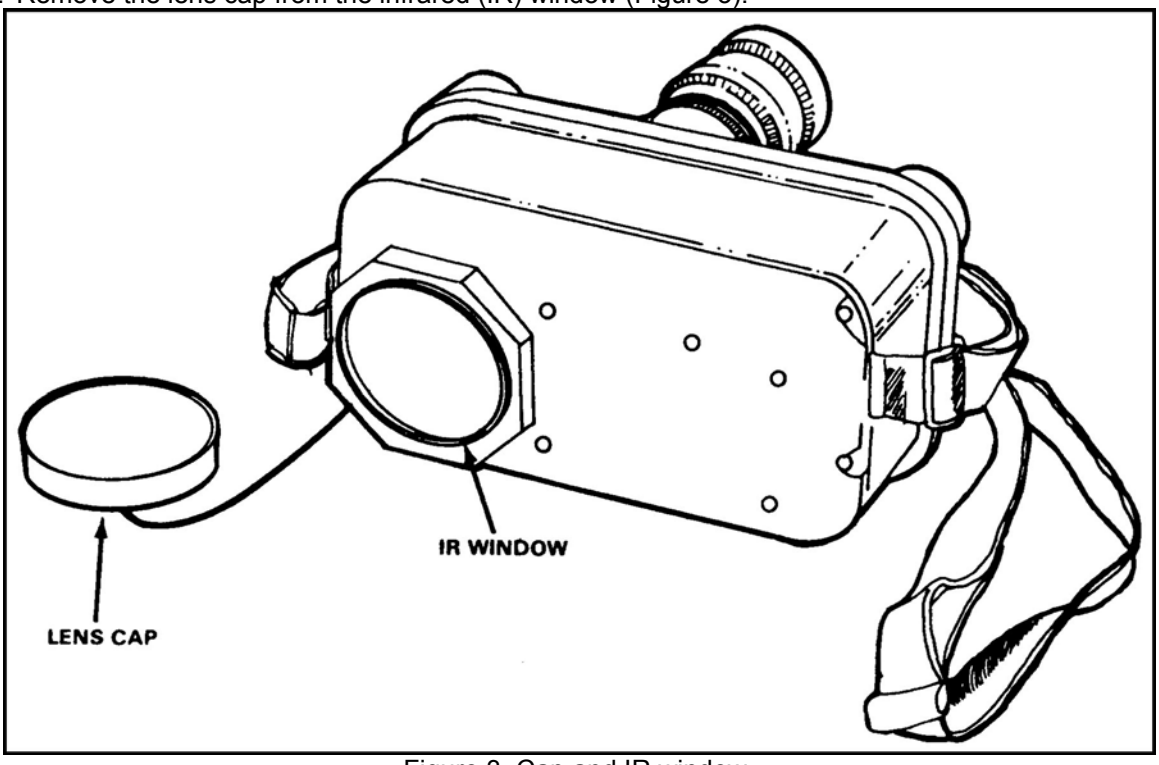



Figure 3. Cap and IR window.

5. Perform system checkout.

**Performance Steps**

a. Select a known, warm target--a person at 10 to 20 feet is best.
b. Slide each hand under the hand slings on each end of the viewer.
c. Adjust the hand slings for a comfortable fit.
d. Hold the viewer in the palms of the hands so that the right thumb can move the tip of the FOCUS lever and the right forefinger can rotate the brightness control. The left forefinger can rotate the contrast control.
e. Raise the viewer to eye level and press your eye firmly against the rubber eyeshield to open the shutter.
f. Aim the viewer at the target and adjust the brightness control with the right forefinger until the background scene is just visible.
g. Adjust the eyepiece focus.
   (1) Rotate the eyepiece focus ring (Figure 2) until the crosshairs are in the best focus.
   (2) Once adjusted, no further adjustment should be necessary during the operation.
h. Rotate the contrast control with the left forefinger until the desired contrast between target image and background in obtained (Figure 2).
i. Adjust the focus lever with the right thumb (Figure 2) for the best target image (Figure 4).

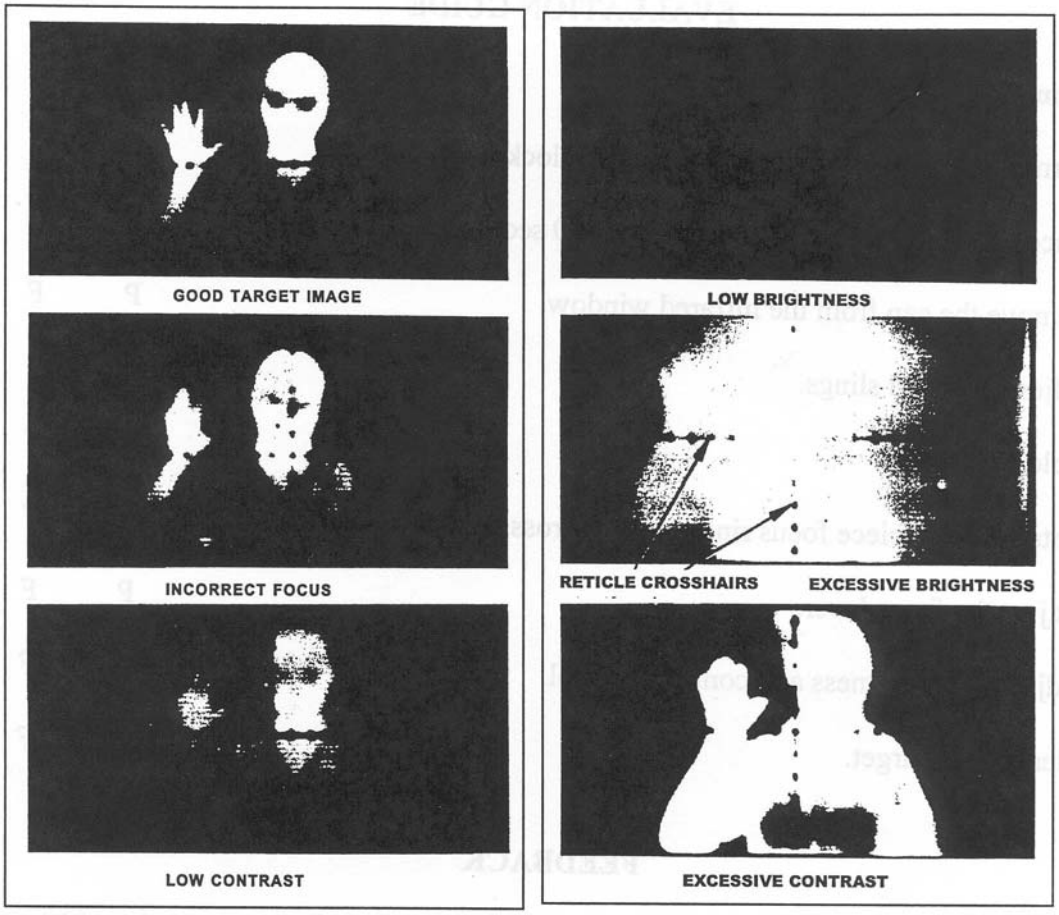



Figure 4. Selection of the best target image.

NOTE: Improper focusing can lead to one or more of the examples shown in Figure 4. If the viewer is focused properly, the target presents a good display.

6. Operate the viewer to search or scan the area of interest.
   a. Hold the viewer to the eye and search or scan the area of interest while adjusting the focus control between NEAR (8M) and FAR ( o [infinity]), depending upon the distance to the area

**Performance Steps**

being scanned.

b. Once a target of interest is observed, readjust brightness, contrast, and focus controls as required for a good target image on the display.
c. Between search and scan periods, turn down the brightness control and let the viewer hang by the neck sling and rest on your chest. Adjust the neck sling length as required for a comfortable fit. For long periods between search and scan operations, turn the brightness control down and power switch to OFF to conserve the battery.

7. Shut down the viewer.
   a. Set the power switch to OFF.
   b. Place the protective cap over the IR window.
   c. Disconnect the interconnecting cable from the viewer (and rechargeable battery, if applicable).
   d. If you are using a disposable battery, unlatch the two hold-down latches on the disposable battery case and open the cover. Pull the battery removal strap to loosen the battery and remove the battery from the case. Stow the battery interconnecting cable under the nylon cover hinges, close the cover, and latch the hold-down latches.
   e. Stow the viewer and disposable battery (or interconnecting cable, if applicable) in the carrying bag or stow the system in the transit case as applicable. Install any protective caps removed for operation on the connectors before stowing the equipment in the transit case.

**Evaluation Preparation:** SETUP: At the test site, provide all the equipment given in the task condition statement. If testing more than one soldier, use two sectors with different targets. For safety, ensure the brightness control is fully counterclockwise before testing.

BRIEF SOLDIER: Tell the soldier his left and right limits and that testing ends when the target has been correctly identified.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Adjusted the neck sling. | ____ | ____ |
| 2. Installed the rechargeable battery (AN/PAS-7 or AN/PAS-7A) or the disposable battery (AN/PAS-7A only). | ____ | ____ |
| 3. Placed the power switch to ON and waited 30 seconds. | ____ | ____ |
| 4. Removed the lens cap from the infrared window. | ____ | ____ |
| 5. Performed system checkout. | ____ | ____ |
| 6. Operated the viewer. | ____ | ____ |
| 7. Adjusted the focus lever. | ____ | ____ |
| 8. Adjusted the brightness and contrast control. | ____ | ____ |
| 9. Identified the target. | ____ | ____ |
| 10. Turned viewer off. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5855-246-10 |

**Operate a Mini Eyesafe Laser Infrared Observation Set, AN/PVS-6**
**071-704-0001**

**Conditions:** Given a mini eyesafe laser infrared observation set (MELIOS), AN/PVS-6; two batteries (BA-6516/U or BB-516/U); and TM 11-5860-202-10.

**Standards:** Placed the MELIOS AN/PVS-6 into operation without damaging equipment.

**Performance Steps**
WARNING: A lithium battery BA-6516/U contains gas under pressure. Do not heat, puncture, disassemble, short circuit, try to recharge, or otherwise tamper with the battery. If the battery compartment gets hot, turn off the equipment. Wait until the battery cools off before you remove it. Lithium batteries have safety vents to prevent explosion. Handle the batteries with care. Return the batteries to Defense Reutilization and Marketing Office for disposal IAW DOD Handbook 4160.21-M.

1. Prepare the MELIOS for operation.
   a. Open the carrying case.
   b. Remove the MELIOS from the carrying case.
   c. Ensure the mode switch is in the OFF position (Figure1).

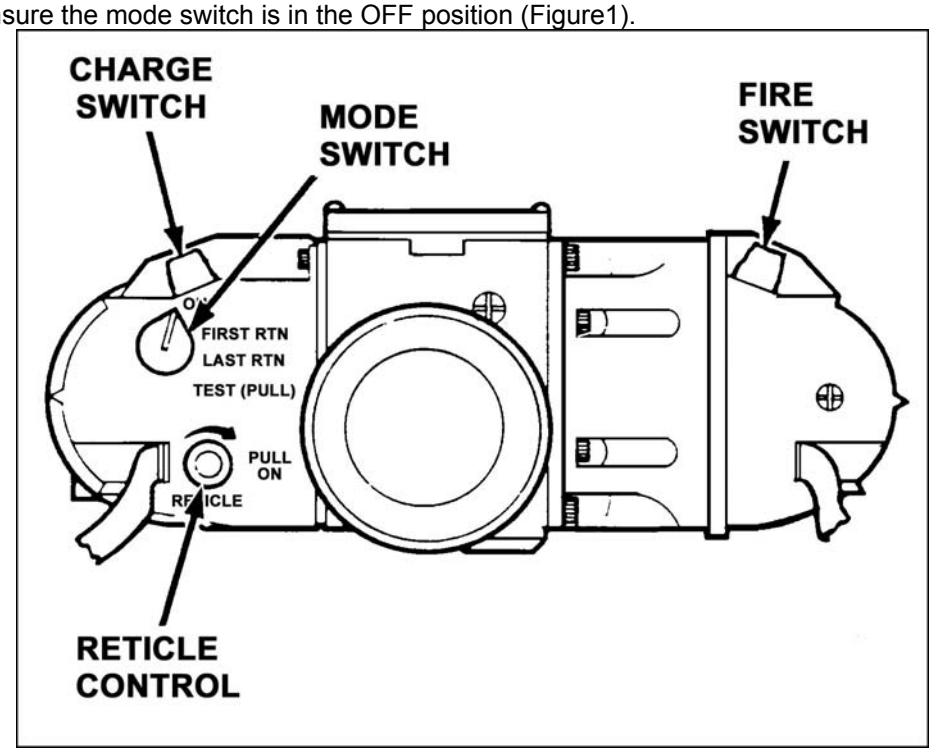



Figure 1. MELIOS controls and indicators.

   d. Install battery (Figure 2).

**Performance Steps**

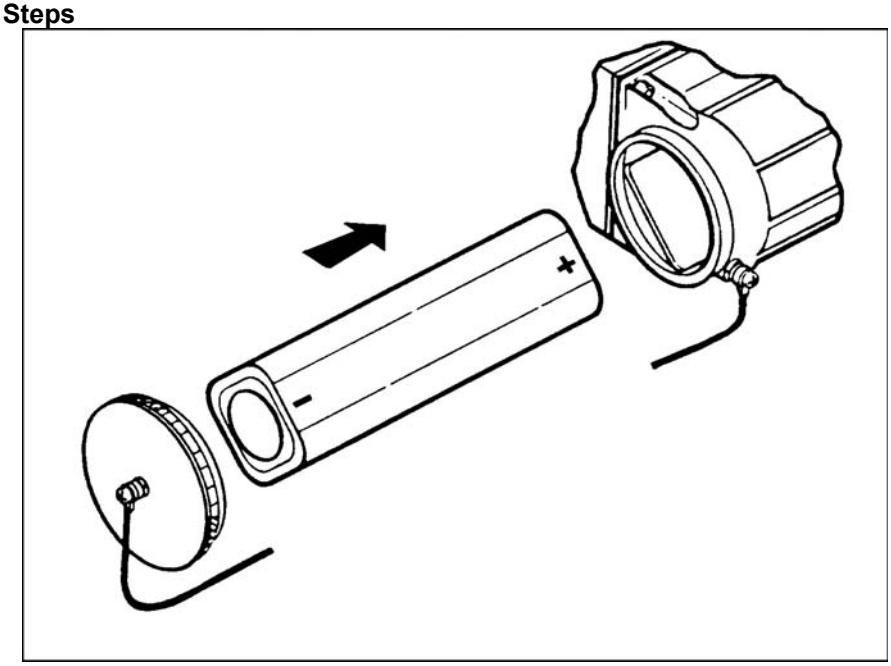


Figure 2. Battery replacement.

(1) Open battery compartment door by turning screw bail counterclockwise.
(2) Insert battery with the small raised contact first.
(3) Close and secure battery compartment door.

e. Rotate the front lens cap away from the objective lens and laser window (Figure 3).

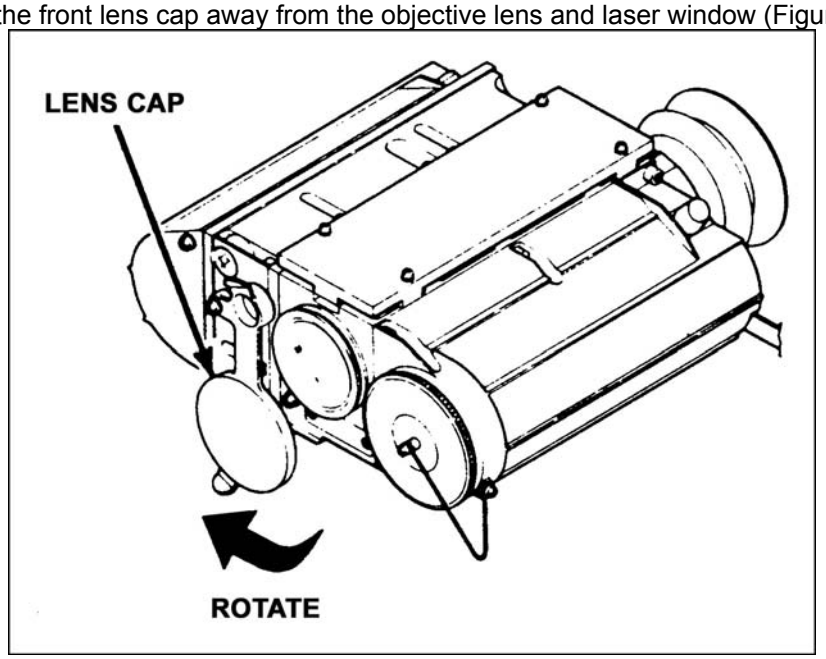



Figure 3. Lens cap.

f. Pull the eyeshield plug out of eyeshield (Figure 4).

**Performance Steps**

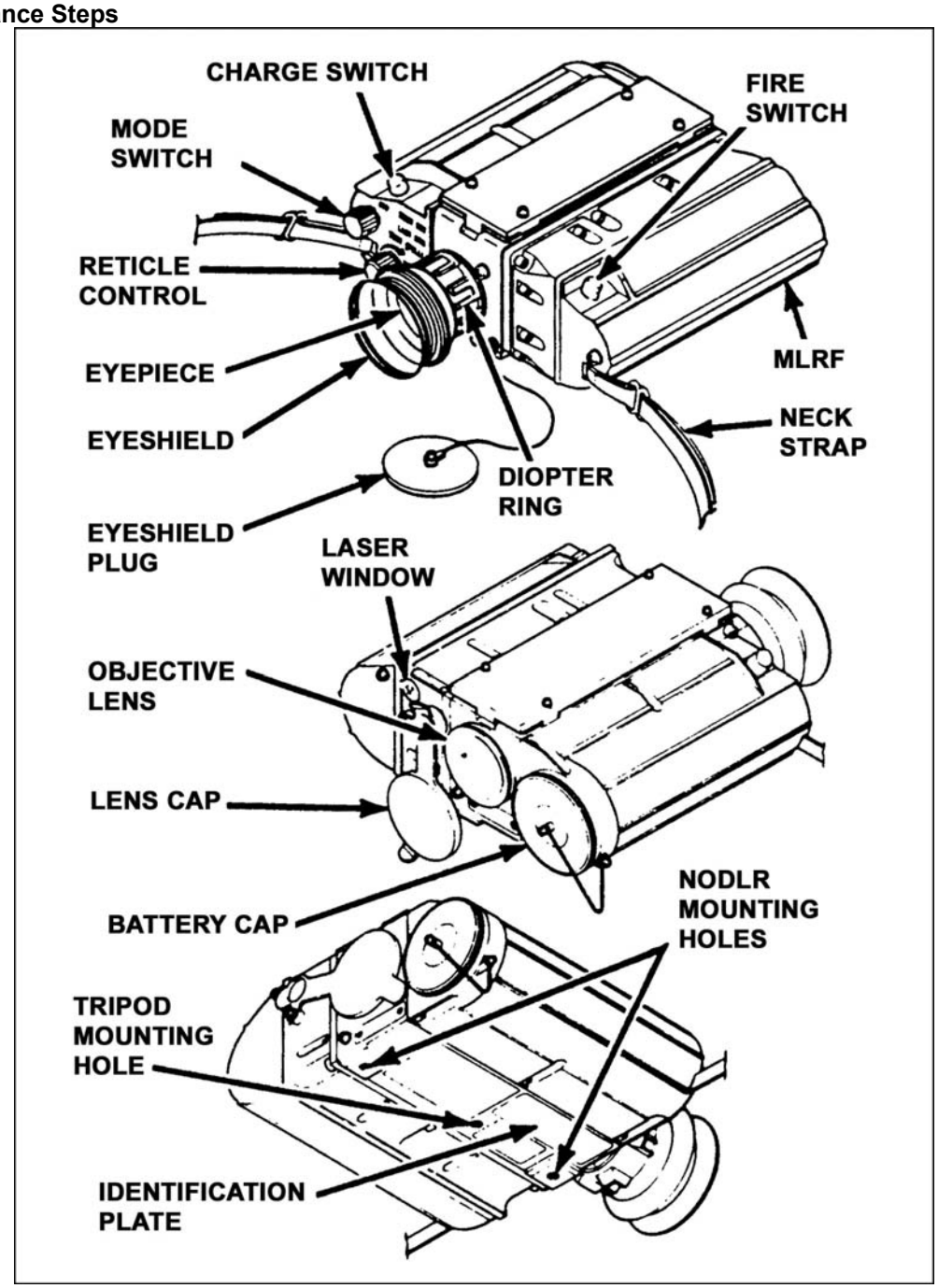



Figure 4. MELIOS laser rangefinder components.

g. Adjust the diopter setting for clear focus.
h. Test the mini laser range finder (MLRF).
   (1) Place the neck strap around your neck.
   (2) Pull and turn the mode switch to the test position.
   (3) Press and release the charge switch.
   (4) Observe the display through the eyepiece lens to ensure all the elements and indicators are lit. Perform troubleshooting procedures for any indicators that are not lit (Figure 5).

**Performance Steps**

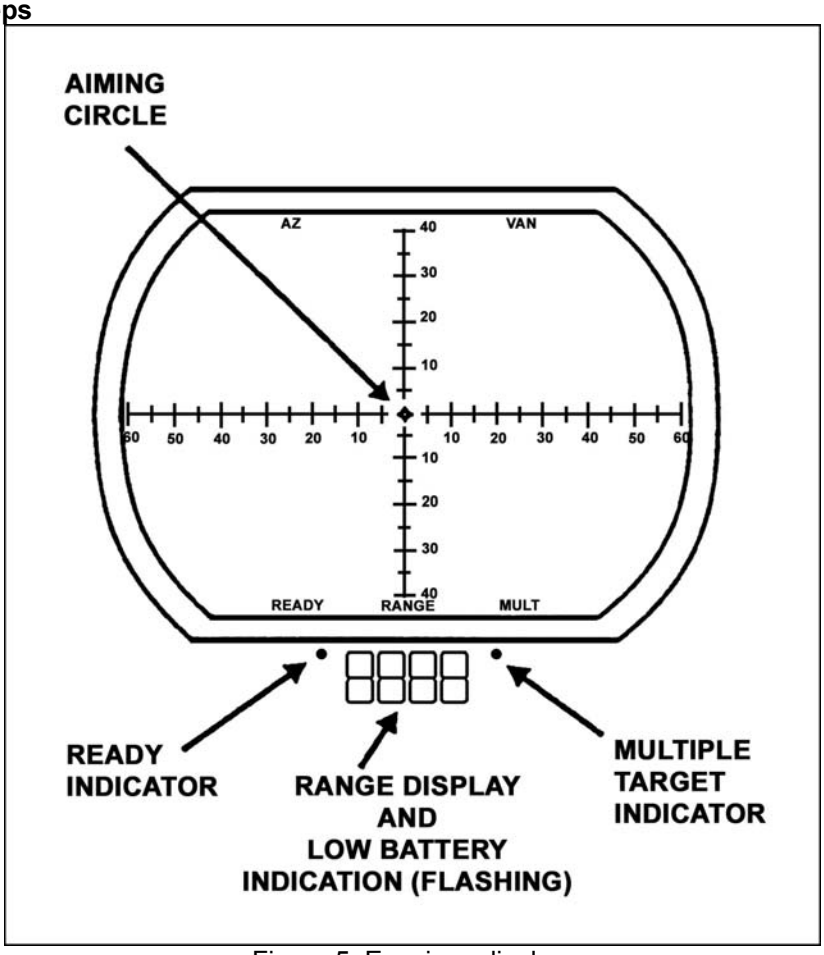



Figure 5. Eyepiece display.

(5) Press and release fire switch.
(6) Pull and turn mode switch to FIRST RTN or LAST RTN.
(7) Press and release charge switch.
(8) Observe display for ready indicator.
(9) View through eyepiece and place aiming circle on a target at a distance greater than 50 meters.
(10) Press and hold fire switch after ready indicator is lit.
(11) Observe display for range value.
(12) Turn mode switch to OFF.
(13) Press lens cap over objective lens and laser window.

2. Operate the MELIOS while hand-held.
   a. Prepare for operation (step 1).
   b. Remove eyeshield plug from eyeshield.
   c. Rotate front lens cap away from objective lens and laser window.
   d. Turn mode switch to FIRST RTN (Figure 1). Go to step f if target is clearly visible.
   e. If target is partially hidden among trees, smoke, or dust--
      (1) Turn mode switch to LAST RTN.
      (2) Look through eyepiece and place reticle aiming circle on target.
      (3) Press and release charge switch.

NOTE: If you do not range a target in eight seconds after the charge switch is pressed, the MLRF will shut down and you will have to press the charge switch again.

   f. When the ready indicator lights--

**Performance Steps**

(1) Hold aiming circle steady on target.
(2) Press and hold fire switch.
(3) Read "Range" at bottom of display.
(4) Release fire switch.

g. Follow shutdown procedures if ranging operations are complete.

3. Operate the MELIOS tripod-mounted:
   a. Prepare for operation (step 1).
   b. Remove tripod from carrying case.
   c. Open tripod legs and secure tripod at the desired height.
   d. Place tripod on a stable surface.
   e. Mount the MELIOS securely on tripod by aligning the mounting hole over the tripod screw and pad.
   f. Tighten screw until the MELIOS is secure on the tripod pad.
   g. Remove eyeshield plug from eyeshield.
   h. Rotate front lens cap away from objective lens and laser window.
   i. If the target is clearly visible, turn mode switch to FIRST RTN and go to step k.
   j. If the target is partially hidden among trees, smoke, or dust--
      (1) Turn mode switch to LAST RTN (Figure 1).
      (2) Look through the eyepiece and place the reticle aiming circle on the target.
      (3) Press and release charge switch (Figure 1).
   k. When the ready indicator lights--
      (1) Press and hold fire switch (Figure 1).
      (2) Read "Range" at bottom of display (Figure 5).
      (3) Release fire switch.
   l. Follow shutdown procedures if ranging operations are complete.

4. Shutdown the MELIOS using the following procedures:
   a. Press and release the charge switch, then wait three seconds.
   b. Press and release fire switch.
   c. Turn mode switch to OFF.
   d. Rotate lens cap over objective lens and laser window.
   e. Place eyeshield plug in eyeshield.
   f. Remove MELIOS from tripod or from around neck.
   g. Remove battery.
   h. Return all equipment to the carrying case.
   i. Close carrying case.

**Evaluation Preparation:** SETUP: At the test site provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to operate the MELIOS AN/PVS-6 infrared observation set both hand-held and tripod-mounted.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Operated the MELIOS AN/PVS-6. | ____ | ____ |
| a. Prepared for operation. | | |
| b. Performed operational test. | | |
| c. Performed hand-held ranging operation. | | |
| d. Performed tripod-mounted ranging operation. | | |
| e. Performed shutdown procedures. | | |

**Evaluation Guidance:** Score the soldier a GO if all performance measures are passed. Score the soldier a NO-GO if any performance measure is failed. If the soldier scores a NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
| --- | --- |
| TM 11-5860-202-10 | TM 11-5860-201-10 |

**Maintain a Mini Eyesafe Laser Infrared Observation Set, AN/PVS-6**

**071-704-0002**

**Conditions:** Given a mini eyesafe infrared observation set (MELIOS), AN/PVS-6, complete with batteries; cleaning compound; lens paper; dry cloth; and TM 11-5860-202-10.

**Standards:** Cleaned and inspected the MELIOS and components for serviceability; reported any deficiencies not corrected to supervisor.

**Performance Steps**

NOTE: Operator maintenance is limited to cleaning, replacing the battery, replacing the shoulder strap for the carrying case, and replacing the neck strap. There are no lubrication requirements for the MELIOS AN/PVS-6.

1. Inspect the MELIOS:
   a. Inspect carrying case and shoulder strap for damage and serviceability.
   b. Inspect the objective lens, laser window, and eyepiece lens for dirt, cracks, and scratches.
   c. Inspect housing, mode switch knob, diopter ring rotation, lens cap, eyeshield plug, lanyard, eyeshield assembly, and neck strap for damage and serviceability.
   d. Inspect battery charge date.
   e. Inspect battery compartment for cleanliness, and ensure battery can be installed.
   f. Inspect battery compartment door gasket for damage.
2. Clean the MELIOS:
   a. Wipe dust and dirt from all components with a dry cloth.
   b. Wipe dust and dirt from the carrying case with a dry cloth.
   c. Dampen a folded lens cleaning tissue with lens cleaning compound. Lightly and slowly wipe the lens. After one stroke, discard tissue. Repeat this procedure until the glass surface is clean.
3. Perform an operational test to ensure the display shows all elements and indicators.

**Evaluation Preparation:** SETUP: At the training site provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to perform operator maintenance on the MELIOS, AN/PVS-6.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inspected the MELIOS. | ____ | ____ |
| 2. Cleaned the MELIOS. | ____ | ____ |
| 3. Performed operational test. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| TM 11-5860-202-10 | TM 11-5860-201-10 |

**Operate Night Vision Goggles, AN/PVS-7B**
**071-710-0008**

**Conditions:** At night, given night vision goggles, AN/PVS-7B, with components, accessories, and batteries.

**Standards:** Inspected night vision goggles AN/PVS-7B for best operational capability; correctly shut down goggles; properly stowed goggles and all accessories in carrying case; and complied with all warnings and cautions associated with the goggles.

**Performance Steps**
WARNINGS
To avoid personal injury or damage to the AN/PVS-7B goggles, consider the following limitations and safety precautions while using the goggles:
1. The goggles require some moonlight, starlight, or both to operate.
2. The amount of available light determines the goggles' level of performance.
3. Operating in a shadow from buildings or trees reduces nightlight.
4. The goggles are less effective for viewing into shadowed and other darkened areas than in lighter areas.
5. The goggles are less effective when viewing through rain, fog, sleet, snow, or smoke.
6. When using goggles from a moving vehicle in the fog, rain, sleet, snow, or smoke, vehicle speed must be reduced to avoid over-driving the range of view.
7. Between the last and first quarters of the moon or during operations requiring the use of a protective mask, or both, the assistant driver should use a night vision device.

1. Prepare the goggles for operation.

CAUTION: Handle all optical components with extreme care and protect against dirt, dust, fingerprints, and excessive moisture.

a. Inventory carrying case content to ensure the following accessories are present (Figure 1):
   (1) Headmount assembly.
   (2) Demist shields.
   (3) Brow pads (medium and thick) (thin pad is attached to headmount assembly).
   (4) Operator's manual.
   (5) Lens paper.
   (6) Carrying case strap.
   (7) Light interference filter (LIF).
   (8) Sacrificial window.
   (9) Batteries (2 BA-3058/U or 1 BA-5567/U).
   (10) Goggles assembly.

**Performance Steps**

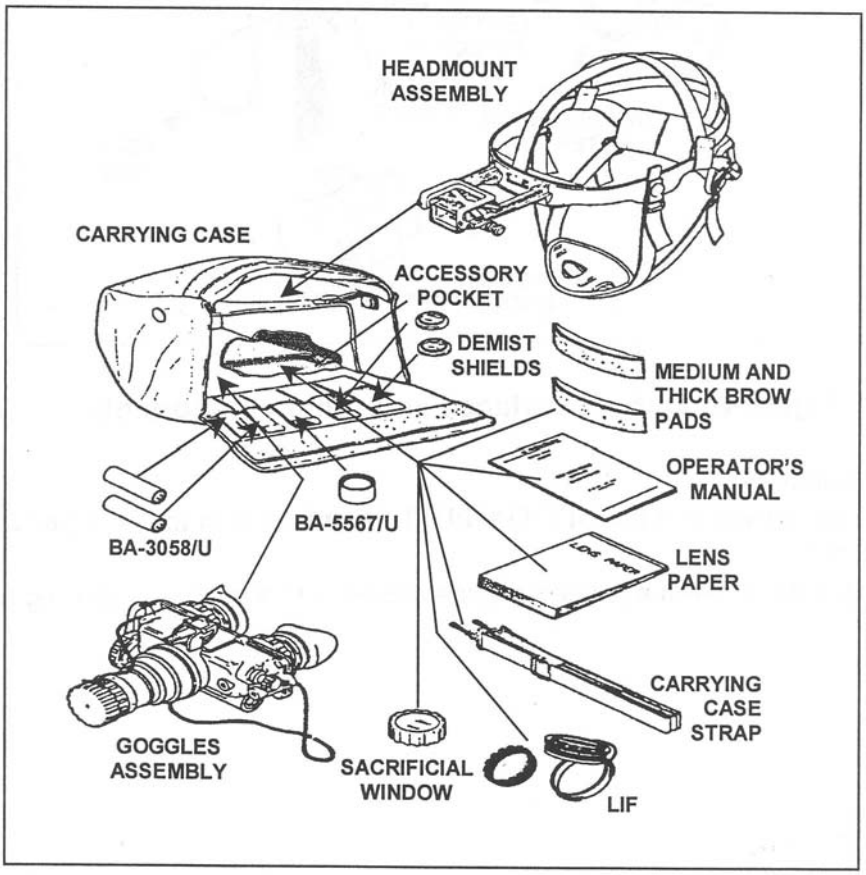



Figure 1. AN/PVS-7B night vision goggles.

b. Inspect the goggles assembly and components for serviceability (Figure 2).

**Performance Steps**

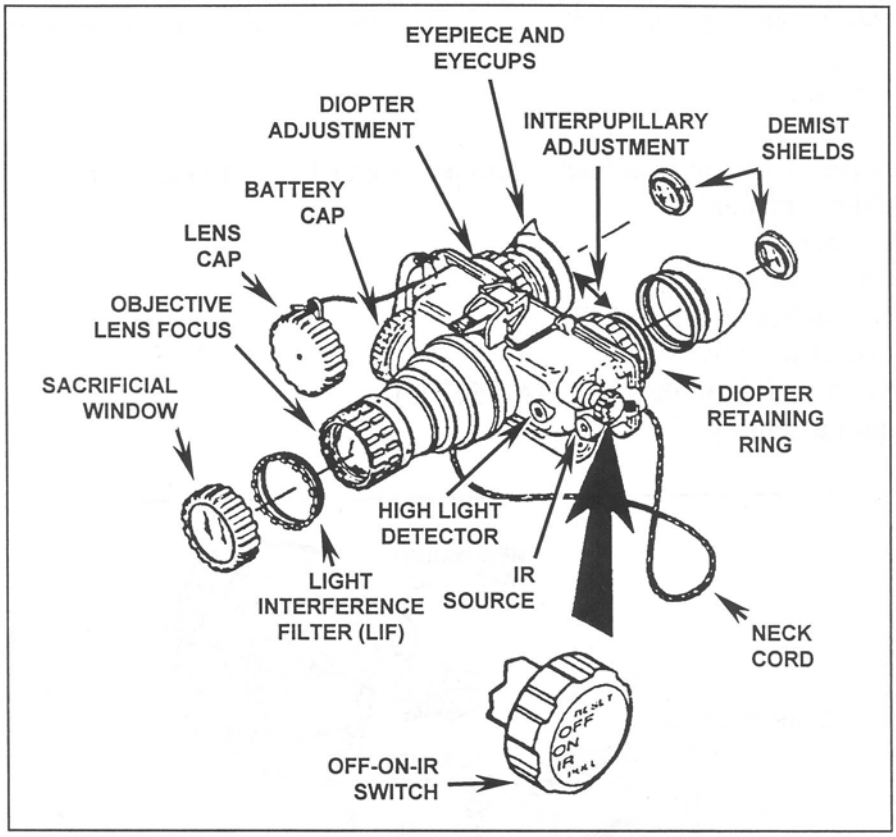



Figure 2. Night vision goggles assembly functional features and accessory items.

(1) Ensure that the goggles assembly rotary switch is in the OFF position. Inspect goggles assembly and components for any damage to optical surfaces, body, eyecups, OFF-ON-PULL/IR switch, and battery cap.
(2) Ensure all optical surfaces are clean. Clean with clean water and lens tissue, if needed.

c. Install batteries (Figure 3).

**Performance Steps**

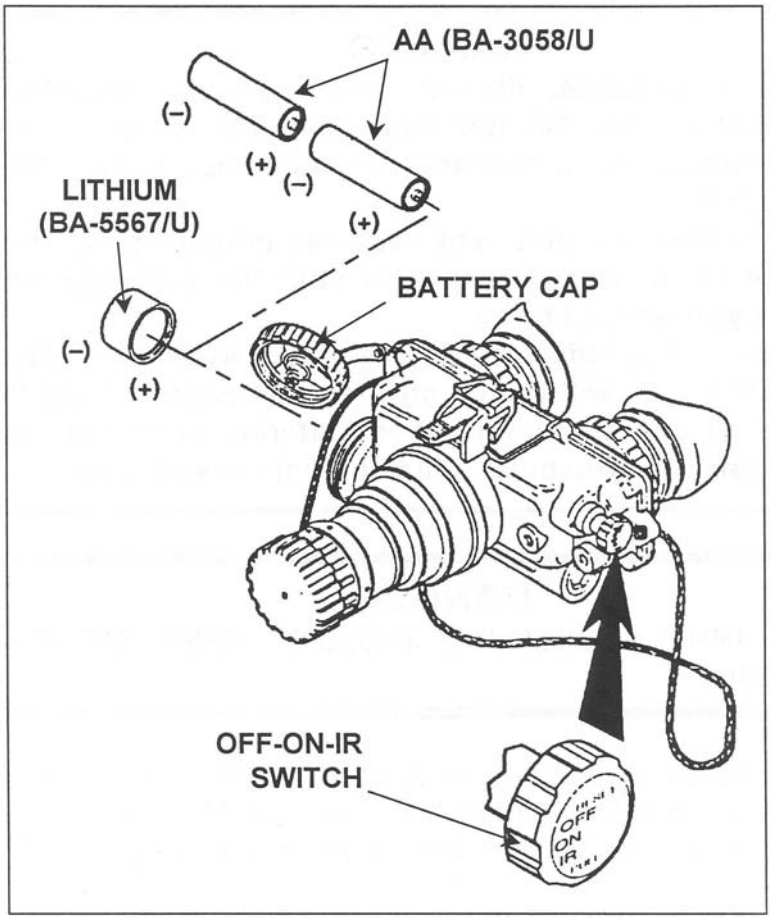



Figure 3. Battery installation.

(1) Check and ensure that the OFF-ON-PULL/IR switch is in the OFF position before installing batteries.
(2) Comply with all warnings and danger statements that apply to handling batteries.

WARNINGS
1. Batteries (alkaline, lithium, and mercury) present a potential hazard. Do not heat, puncture, disassemble, short-circuit, recharge, or otherwise tamper with the batteries.
2. If the batteries compartment becomes unusually hot, turn off the equipment. Try to wait until the batteries cool before you remove them.
3. Batteries have safety vents to prevent explosion. When they vent, you will notice an irritating odor or hear the sound of gas escaping. After batteries vent, they are fairly safe, but you must still handle them with care.

DANGER
IF YOU INHALE SULFUR DIOXIDE, SEEK MEDICAL ATTENTION.

(3) Remove the battery cap. Insert two AA batteries (BA-3058/U) or one lithium battery (BA-5567/U) in the battery compartment, positive end (+) first.
(4) Replace the battery cap. Tighten it firmly to ensure a watertight seal.

d. Perform an operational check.
(1) Position the OFF-ON-PULL/IR switch to ON. Observe that a green glow gradually appears in each eyepiece.
(2) Pull the OFF-ON-PULL/IR switch knob and rotate it clockwise to the IR position. Observe that a red light appears in the left eyepiece, which indicates that the IR source is

**Performance Steps**

operating. The IR source is located on the left front of the goggles. Do not block it while operating the goggles.

(3) Turn the OFF-ON-PULL/IR switch counterclockwise to the OFF position. Observe that the red light and green glow disappear.

2. Operate goggles.
   a. Focusing the goggles. If you normally wear eyeglasses, remove them to operate these goggles. You can focus the goggles, so you will not need your eyeglasses.
      (1) Focus on the image intensifier screen using the diopter adjustment rings.
      (2) Focus on objects at varying distances using the objective focus adjustment.
   b. Handheld operation.
      (1) Position the goggles so that the eyecups seal around your eyes to prevent green glow from escaping.
      (2) Position the OFF-ON-PULL/IR switch to ON.
      (3) Adjust the interpupillary distance by sliding the eyepieces either together or apart so both eyes can observe the entire field of view at the same time.
      (4) To set the diopter adjustment rings, close your left eye and adjust the right diopter ring for the clearest focus on the image intensifier screen. Then, close your right eye and adjust the left diopter ring for the clearest focus on the image intensifier screen.
      (5) Adjust objective lens focus while observing a distant object (at least 4 meters distance) until the sharpest view is obtained.
   c. Head mount operation.
      (1) Adjust the headmount assembly (Figure 4).

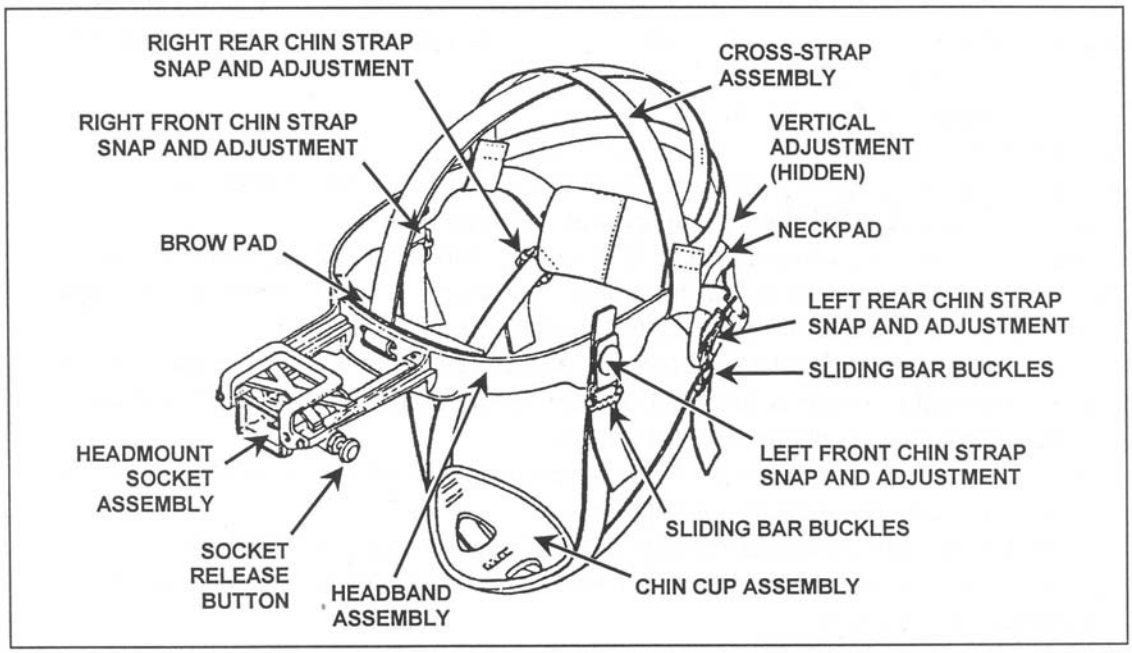



Figure 4. AN/PVS-7B headmount assembly.

( a) Loosen the four chin straps on the headmount assembly until the end of each strap is about 2 inches from the sliding bar buckles.

NOTE: When installing a headmount assembly over a protective mask, make sure you do not break the seal of the protective mask around your face.

( b) Grasp the neck pad assembly with both hands. Pull it over your head and down to the back of your neck. If the head mount is too loose, replace the thin pad with the medium or thick pad. The pads are held in place by hook-pile tape.

( c) Fasten the front and rear snaps in place with your left hand. Hold the chin cup in

**Performance Steps**

position on your chin. Adjust both rear chin assembly straps until you feel light pressure against your chin. Stop. Do not tighten the strap any farther.

( d) Continue to hold the chin cup in position. At the same time, remove slack from the front and rear chin straps. Once you have done so, stop. Do not tighten them any farther.

( e) Make sure cross-strap assembly does not twist. To remove slack from it, adjust the vertical adjustment strap at the neck pad.

( f) Adjust the chin straps and the vertical adjustment strap until both chin cup and the headband assembly are in a comfortable but firm position.

( g) Depress the socket release button. Position the headmount socket all the way forward.

(2) Install the goggles on the headmount assembly.

( a) Align the goggles latch with the headmount socket. Press and hold the goggles latch lever while you place the goggles into the headmount socket. Release the latch when the goggles fully engage the socket.

( b) Depress the socket release button. Move the goggles back toward your eyes until the eyecups and eyepieces are comfortably aligned. The eyecups must seal around your eyes and prevent the green glow from escaping.

(3) Adjust goggles for operation.

( a) Position the OFF-ON-PULL/IR switch to ON.

( b) Adjust the interpupillary distance. Slide the eyepieces either together or apart so you can observe the entire FOV with both eyes at the same time.

( c) Set the diopter adjustment rings. Close your left eye and adjusting the right diopter ring for the clearest focus on the image intensifier screen. Close your right eye and adjust the left diopter ring for the clearest focus on the image intensifier screen.

( d) Adjust the eye relief distance. Press the socket release button. Move the goggles backward or forward to obtain a full field of view of the image intensifier. If necessary, readjust the diopter rings to obtain the best image.

( e) Adjust the objective lens focus while observing a distant object (at least 4 meters away) until you obtain the sharpest possible view.

( f) Readjust the vertical strap assembly until the goggles align with your eyes.

( g) If necessary, adjust the Kevlar or M1 headband inside the helmet for a proper fit over the headmount assembly.

3. Operate goggles under unusual conditions.

a. Extreme darkness.

(1) Pull the OFF-ON-PULL/IR switch out and rotate it clockwise to the IR position.

(2) Ensure the eyecups are positioned to prevent light escaping from the goggles.

WARNING

The infrared source is a light that is invisible to the unaided eye for use during conditions of extreme darkness. However, the enemy can detect it with night vision devices. The infrared source is used to see objects within a distance of 3 meters.

b. Dust and sand. Attach the sacrificial window to protect the objective lens from scratches and other damage.

(1) Remove the sacrificial window from the carrying case.

(2) Carefully push the sacrificial window over the objective lens until it pops.

(3) Turn the sacrificial window clockwise until it snaps in place.

(4) Remove the sacrificial window by reversing the installation procedures.

c. Rainy and humid conditions. Press each eyecup over the diopter retainer ring. Rotate it into correct viewing position.

(1) Remove the eyecups by carefully pulling them off the diopter ring.

(2) Carefully press a Demist shield onto each eyepiece. Do not smudge eyepiece or Demist shields.

(3) Replace eyecups. Press each eyecup over the diopter retainer ring. Rotate it into correct viewing position.

**Performance Steps**

d. Laser threat environment. Install the light interference filter (LIF). Using this filter will slightly reduce system gain.
   (1) Remove the container/wrench from the carrying case.
   (2) Remove the lens cap or sacrificial window from the objective lens of the goggles.
   (3) Open the container/wrench and remove the LIF.
   (4) Hold the LIF by the notched end. Thread it clockwise into the end of the objective lens.
   (5) Use the ridged side of the container/wrench as a wrench. Engage the ridges on the container with the ridges on the LIF. Hand tighten the LIF.
   (6) Place the empty container/wrench back into the pouch in the carrying case.

NOTE: The lens cap and the sacrificial window will fit onto the end of the objective lens with the LIF in place. However, the lens cap and sacrificial window will not snap into place with the LIF attached.

   (7) Replace the lens cap or the sacrificial window onto the end of the objective lens and over the LIF.
   (8) Remove the LIF by reversing the installation procedures.

e. NBC environment
   (1) Place the protective mask on your head per instructions provided with the protective mask.
   (2) Make sure you do not break the seal of the protective mask around your face when you install the headmount assembly over the protective mask.

4. Install and operate the snap-on compass.
   a. Remove the objective lens cover from the goggles. Secure the snap-on compass to the lens with the round part of the activation button facing down.
   b. Turn the goggles on. Push up on the activation button to determine azimuth direction.

5. Attach the 3X magnifier telescope assembly.
   a. Objective focus cover attached. Push the objective focus cover sleeve onto the goggles' objective focus ring.
   b. Objective focus cover not attached to goggles. Screw the 3X magnifier directly into the goggles' objective focus ring.

6. Stow the night vision goggles (Figure 5).

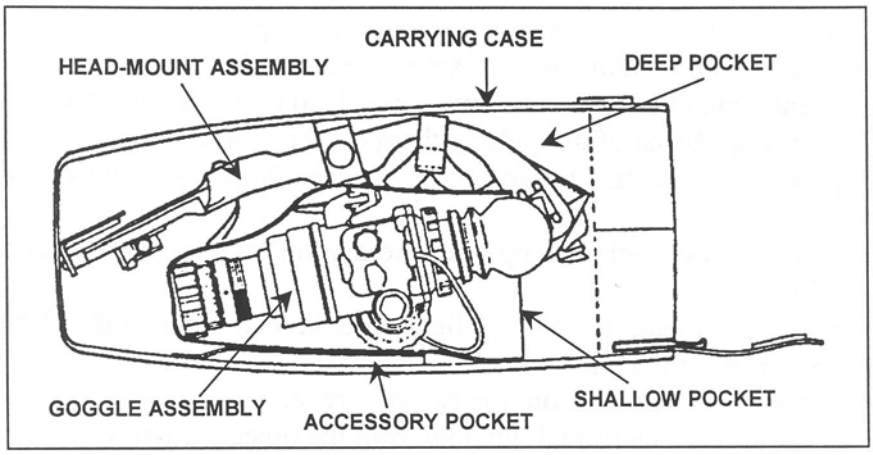



Figure 5. Stow goggles in carrying case.

   a. Shut down the goggles. Move the OFF-ON-PULL/IR switch to OFF.
   b. Remove the goggles from the head mount (if attached). Depress the latch lever and remove the goggles.
   c. Unscrew the battery cap, remove the battery, and replace the battery cap.
   d. Remove the demist shields and sacrificial window, if installed.
   e. Install the lens cap.

**Performance Steps**

f. Ensure the goggles are free of dirt, dust, and moisture.
g. Place the demist shields and the battery into their proper carrying case pockets.

CAUTION: To prevent damage to window, place the sacrificial window at bottom left or right corner of the carrying case accessory pocket.

h. Place the lens paper, sacrificial window, and operator's manual in the accessory pocket located under the shallow pocket that contains the goggles.
i. Place the goggles (objective lens down) into the shallow pocket of the carrying case.
j. Remove the headmount assembly. Unsnap the front and rear straps. Lift the headmount assembly up and off your head. Stow the assembly in the deep pocket of the carrying case. Close the carrying case.

**Evaluation Preparation:** SETUP: Evaluate this task in a classroom where light can be controlled to simulate nighttime. Provide the soldier with a set of night vision goggles, AN/PVS-7B, components, and batteries, as described in the task condition statement.

1. Have the soldier prepare the goggles for operation, operate the goggles using the headmount assembly, shut down the goggles, and stow the goggles.

2. Evaluate the soldier's ability to select and attach the appropriate components by telling him to prepare the goggles for operation in the following conditions: dust and sand, rain or high humidity, or laser threat environment. If a snap-on compass and 3X magnifier is available, evaluate the soldier's ability to attach them to the goggles.

BRIEF SOLDIER: Tell the soldier to prepare the goggles for operation; operate the goggles using the headmount assembly; shut down and stow the goggles; and attach components to operate the goggles in various conditions as instructed. Tell him to notify you before turning the goggles ON and after turning them OFF, so you can darken or lighten the room. Tell the soldier not to energize the goggles when the room lights are on.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Prepared goggles for operation.<br>a. Inventoried contents of the case; ensured all accessories were present.<br>b. Inspected the goggles assembly and components for serviceability.<br>c. Installed batteries correctly.<br>d. Performed an operational check. | ____ | ____ |
| 2. Operated goggles in hand-held mode. | ____ | ____ |
| 3. Operated goggles with head mount.<br>a. Adjusted the head mount assembly for proper fit.<br>b. Installed goggles correctly on the head mount assembly.<br>c. Adjusted goggles for operation. | ____ | ____ |
| 4. Operated goggles during unusual conditions.<br>a. Extreme darkness: operated goggles using IR source.<br>b. Dust and sand: attached the sacrificial window.<br>c. Rainy and humid conditions: installed demist shields to minimize diopter fog.<br>d. Laser threat environment: installed the light interference filter (LIF).<br>e. NBC environment.<br>(1) Placed the protective mask on your head IAW instructions provided with the protective mask.<br>(2) Did not break the seal of the protective mask around your face when you installed the head mount assembly over the protective mask. | ____ | ____ |
| 5. Installed and operated snap-on compass (if available). | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 6. Attached 3X magnifier telescope assembly (if available). | ____ | ____ |
| 7. Stowed the night vision goggles. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 11-5855-262-10-2 |

**Maintain Night Vision Goggles, AN/PVS-7B**
**071-710-0009**

**Conditions:** Given night vision goggles, AN/PVS-7B, with components, accessories, batteries; clean water; clean, lint-free cloths; and a requirement to perform required operator maintenance on the goggles.

**Standards:** Cleaned and inspected night vision goggles, components, and accessories for serviceability; reported unserviceable items to the supervisor; properly stowed the goggles and accessories; and complied with all warnings and cautions associated with these goggles.

**Performance Steps**

1. Inventory the carrying case for the following items (Figure 1).

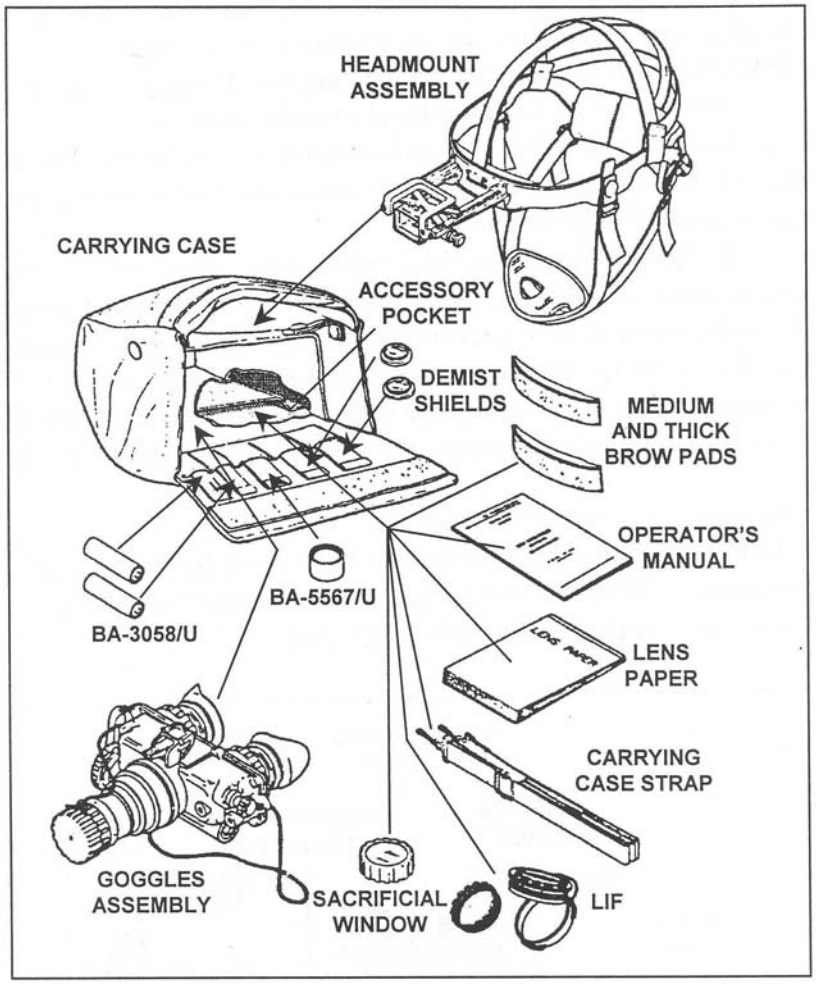



Figure 1. AN/PVS-7B night vision goggles.

a. Headmount assembly.
b. Demist shields.
c. Browpads: medium and thick (the thin pad is attached to the headmount assembly).
d. Operator's manual.
e. Lens paper.
f. Carrying case strap.
g. Light interference filter (LIF).

**Performance Steps**

h. Sacrificial window.
i. Batteries (two BA-3058/U or one BA-5567/U).
j. Goggles assembly.

2. Clean the AN/PVS-7B.
   a. Clean all optical surfaces with lens paper dampened with clean water (water temperature should be between 70 and 80 degrees Fahrenheit) and wipe clean.
   b. Use a clean, lint-free cloth, dampened with clean water, to remove all dirt and grease from all exterior surfaces.

CAUTION
Handle all optical components with extreme care. Protect against dirt, dust, fingerprints, and excessive moisture.

3. Inspect the accessories and goggles for conditions indicated. Take corrective action as indicated for damaged items.
   a. Night vision goggles assembly (Figure 2).

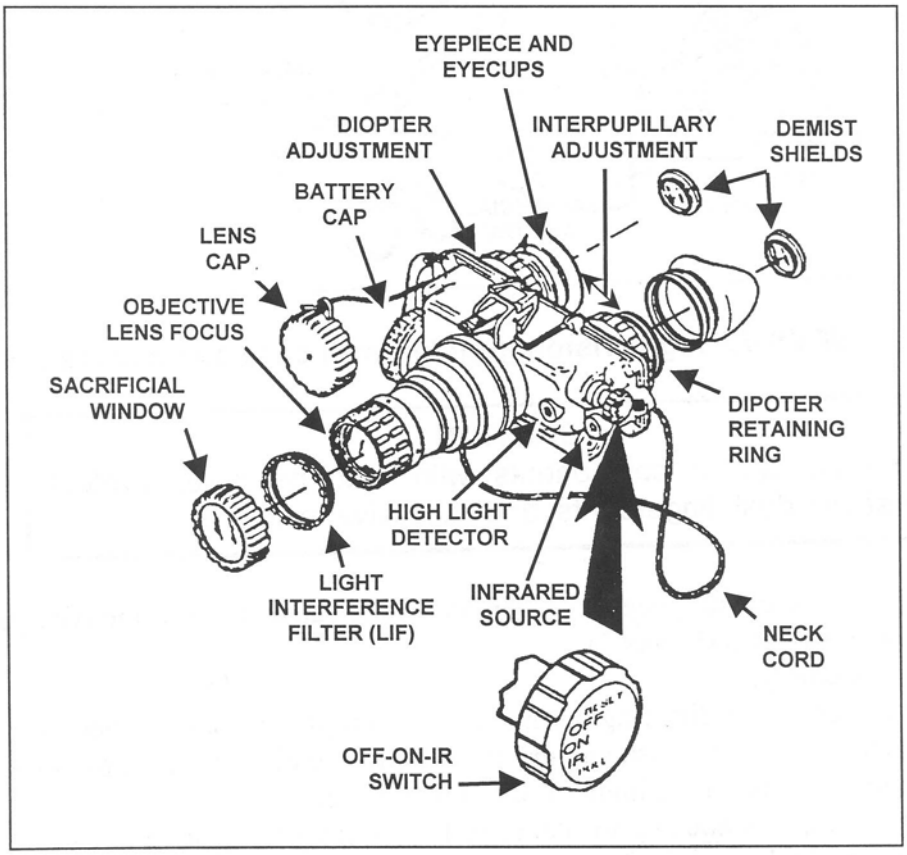



Figure 2. Night vision goggles assembly functional features and accessory items.

(1) Inspect all lenses for dirt, fingerprints, residue, chips, or cracks. If necessary, use clean water and lens tissues to wash and dry the lens. If you observe chips or cracks in a lens, refer to your supervisor for higher level of maintenance.
(2) Inspect the goggles housing for damage. If you observe chips or cracks, refer to your supervisor for a higher level of maintenance.
(3) Inspect the battery compartment for corrosion, defective battery cap spring contact, and preformed packing in the cap. If you find corrosion, or if the battery cap spring is defective, refer to your supervisor for a higher level of maintenance.
(4) Check the diopter adjustment rings to make sure the eyepieces move freely. If they do

**Performance Steps**

not, refer to your supervisor for a higher level of maintenance.

(5) Check the interpupillary adjustment on the eyepiece to see if it moves freely. If it does not, refer to your supervisor for a higher level of maintenance.

(6) Turn the objective lens focus knob to make sure it moves freely. The knob should turn about 1/3 turn, or 120 degrees. If the knob does not move freely, refer to your supervisor for a higher level of maintenance.

(7) Inspect for bent, broken, dried, cracked, torn, dusty, dirty or improperly fitting eye cups. If necessary, clean and dry the eye cups with clean water and a lens tissue. If the eye cups are defective, refer to your supervisor for a higher level of maintenance.

(8) Check the OFF-ON-PULL/IR switch. Move the switch from OFF, to ON and to PULL/IR. Each position should have a definite stopping point. If the knob is broken

(9) Inspect the AN/PVS-7B headmount assembly (Figure 3).

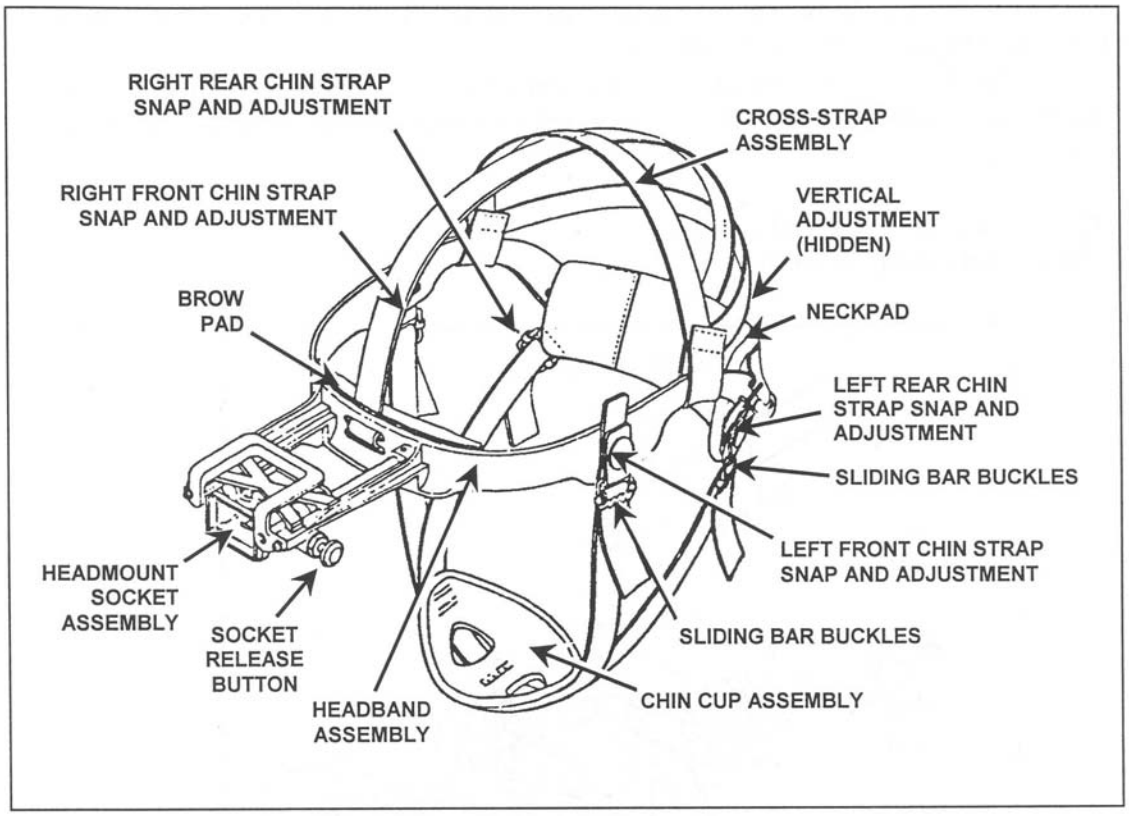



Figure 3. AN/PVS-7B headmount assembly.

( a) Inspect the headmount strap assemblies and browpads for holes, cracks, defective fasteners, or contamination. Remove and replace the browpad by pulling it out (hook-pile tape holds the brow pads in place). Press in a new pad.

( b) Inspect the headmount assembly eye relief. Press the socket release button and check the socket assembly to see if it moves freely. Inspect for dirt and damage. Clean it if needed. If it does not move freely, or if you observe damage, refer to your supervisor for a higher level of maintenance.

( c) Inspect the headmount socket and the goggles latch. Inspect and clean the headmount socket. Check to see if the socket and latch work correctly by inserting the goggles latch into the socket. Verify that they link securely. If the socket assembly does not work properly or if you observe damage, refer to your supervisor for a higher level of maintenance.

(10) Inspect the demist shields for dirt, dust, scratches, or damage. Clean the dry shields only

**Performance Steps**

with dry lens tissues.

(11) Inspect the sacrificial window for dirt, dust, scratches, or damage. If necessary, wash it with clean water and dry it with a lens tissue. If you observe damage, refer to your supervisor for a higher level of maintenance.

(12) Inspect the neck cord for damaged and frayed ends. Retie, if necessary. If you observe damage, refer to your supervisor for a higher level of maintenance.

(13) Inspect the carrying case. Remove all accessories, and shake out all loose dirt or foreign matter. Wipe the interior and exterior with a clean, dry, lint-free cloth. If necessary, use a mild detergent to remove dirt and grease.

(14) Inspect the 3X magnifier. Inspect all lenses for dirt, fingerprints, residue, chips or cracks. If necessary, clean and dry the lens with clean water and a lens tissue. Inspect the housing for damage. If you observe any chips or cracks in the housing, refer to your supervisor for a higher level of maintenance.

(15) Inspect the snap-on compass for dirt and damage. If necessary, clean it with clean water and a cloth. If you observe damage, refer to your supervisor for a higher level of maintenance.

4. Perform an operational check.
   a. Install batteries (Figure 4).

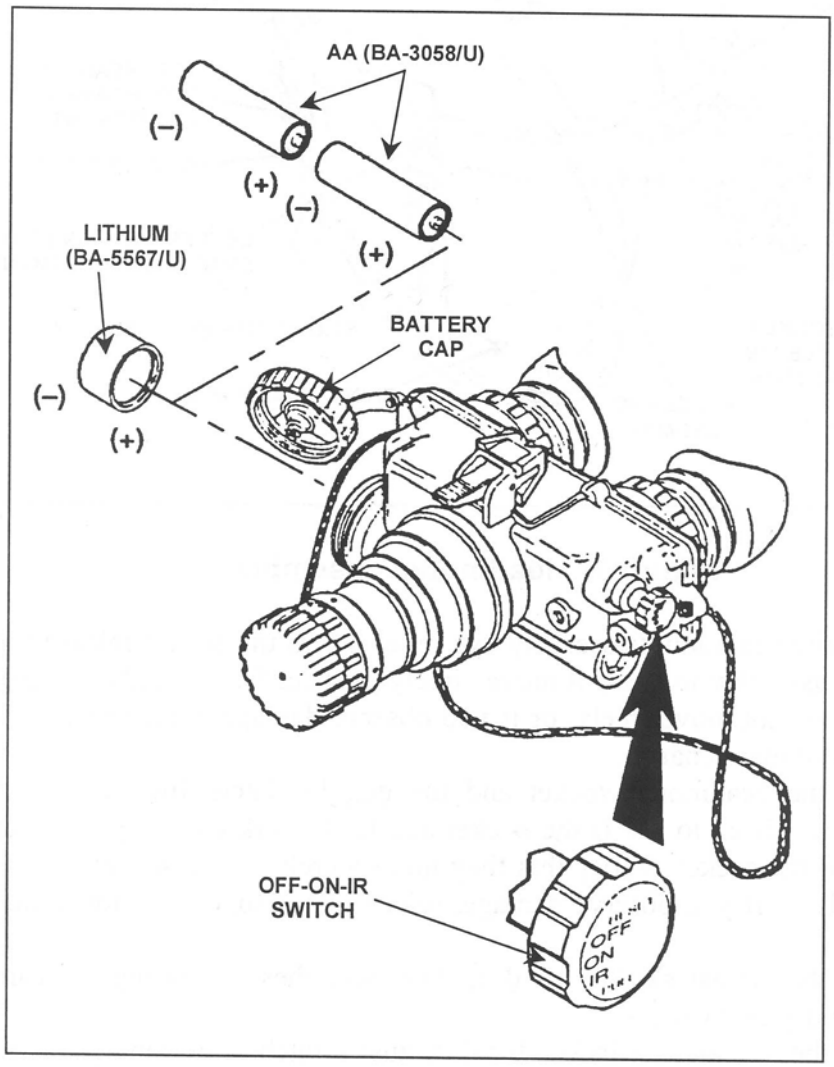



Figure 4. Battery installation.

**Performance Steps**

(1) Check and make certain that the OFF-ON-PULL/IR switch is in the OFF position.
(2) Comply with all cautions, warning, and danger statements.
(3) Remove the battery cap. Insert two AA batteries (BA-3058/U) or one lithium battery (BA-5567/U) in the battery compartment, with the positive end (+) first.
(4) Replace the battery cap and tighten it firmly to ensure a watertight seal.

WARNINGS
1. Alkaline, lithium, and mercury batteries are potential hazards. Do not heat, puncture, disassemble, short circuit, try to recharge, or otherwise tamper with the batteries.
2. If the battery compartment becomes unusually hot, turn off the equipment. Try to wait until the batteries cool before you remove them.
3. Batteries have safety vents to prevent explosion. When they vent, you will notice an irritating odor or hear the sound of gas escaping. After batteries vent, they are fairly safe, but you must still handle them with care.

DANGER
IF YOU INHALE SULFUR DIOXIDE, SEEK MEDICAL ATTENTION.

b. Check goggles for proper operation. Perform the following procedures only in darkened conditions. If you must check the goggles during daylight, use the lens cap to cover the objective lens:
(1) Position the OFF-ON-PULL/IR switch to ON. Note the green glow that gradually appears in each eyepiece.
(2) Pull the OFF-ON-PULL/IR knob. Rotate it clockwise to the IR position. Note the red light that appears in the left eyepiece, which indicates that the IR source is operating. The IR source is located on the left front of the goggles. Do not block the IR source when operating the goggles.
(3) Turn the OFF-ON-PULL/IR switch counterclockwise to the OFF position. Note that the red light and green glow disappear.
(4) Shut down the goggles by positioning the OFF-ON-PULL./IR switch to OFF.

5. Stow the goggles (Figure 5).

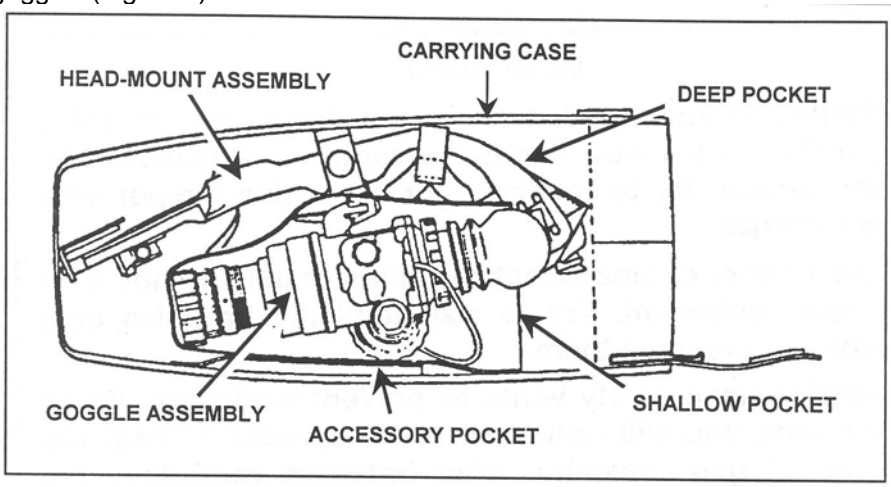



Figure 5. Stow goggles in carrying case.

a. Unscrew the battery cap, remove battery, and replace the battery cap.
b. Place demist shields and battery into their proper carrying case pocket.

CAUTION
Place the sacrificial window at the bottom left or right corner of the carrying case accessory pocket of the carrying case. Close the carrying case.

c. Place the lens paper, sacrificial window, and operator's manual in the accessory pocket located

**Performance Steps**

under the shallow pocket that contains the goggles.

d. Place the goggles (objective lens down) into shallow pocket of carrying case.
e. Stow the headmount assembly in the deep pocket of the carrying case. Close the carrying case.

**Evaluation Preparation:** SETUP: Provide the soldier with equipment and materials listed in the task condition statement.

BRIEF SOLDIER: Tell the soldier to inspect the components, accessories, and goggles for completeness and serviceability and clean them as required; and to perform an operational check, shut down the goggles, and stow them and their accessories.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inventoried carrying case for correct content. | ____ | ____ |
| 2. Cleaned the AN/PVS-7B and accessories using correct cleaning techniques. | ____ | ____ |
| 3. Inspected accessories and goggles for serviceability. | ____ | ____ |
| 4. Performed an operational check. | ____ | ____ |
| 5. Stowed the night vision goggles. | ____ | ____ |
| 6. Complied with safety precautions and warnings. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5855-262-10-2 |

Subject Area 20: RECON-SECURITY: OPSEC AND COMSEC

**Challenge Persons Entering Your Area**

**071-331-0801**

**Conditions:** Given the current challenge and password and a defensive position with a designated sector of fire, your individual weapon, and load-carrying equipment (LCE). Enemy and friendly personnel may enter your sector.

**Standards:** Detected and halted all personnel in your sector and challenged them to use the correct challenge. Personnel with correct password were allowed to pass. Personnel with incorrect password were detained or captured (did not allow the enemy to overhear the password).

**Performance Steps**

1. One person desires to pass.
    a. Upon seeing or hearing someone approach your position, command the person to halt before that person gets close enough to pose a threat. Use a clear voice, just loud enough to be heard.
    b. Seeing the stranger, halt and cover the soldier without exposing your position and ask, "Who is there?" Again, in a clear voice just loud enough to be heard so the enemy will not overhear if nearby.
    c. When the stranger identifies himself or herself, such as "Private Willard, messenger" order him or her, "Advance to be recognized."
    d. Maintain your concealed position and keep the stranger covered with your weapon. When the stranger gets within 2 or 3 meters of you, again order him or her to halt.
    e. Issue the challenge in a soft voice and wait for the stranger to reply with the correct password. Upon hearing the correct password, give permission to pass if you have no doubt. If a doubt still exits, demand further identification or ask a question only a friendly person would be able to answer.

2. A group desires to pass.
    a. The procedure and precautions for a group are almost the same as for one person. Upon seeing or hearing a group approach, order them to halt before they are close enough to pose a threat.
    b. The leader of the group should identify the group such as "Friendly patrol." Since you do not want the whole group to advance at once, order, "Advance one person to be recognized."
    c. When the leader has come forward to be recognized, give the person the challenge.
    d. Once you receive the correct password, have the rest of the patrol advance one by one and ensure the leader identifies each person.
    e. Disarm and detain any person(s) not able to identify themselves to the leader's satisfaction. Then notify your immediate supervisor.

**Evaluation Preparation:** SETUP: Simulate a situation in which soldiers can use the challenge and password. Issue the challenge and password to those who will play the role of friendly troops and the correct and incorrect password to those who will play the role of unidentified troops. The person playing the part of the intruder will vary responses upon being challenged.

BRIEF SOLDIER: Tell the soldier to challenge all those who approach the defensive position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Said, "Halt," before the person was close enough to pose a threat. | ____ | ____ |
| NOTE: Assume the person has halted. | | |
| 2. Said, "Who is there?" Kept the unknown individual covered. | ____ | ____ |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Assume the stranger identifies himself or herself. | | |
| 3. Said, "Advance to be recognized." | ____ | ____ |
| 4. Maintained a concealed position, kept the individual covered, and said, "Halt," when he or she was 2 or 3 meters away. | ____ | ____ |
| 5. Issued the challenge.<br>a. Permitted the person to pass if the password was correct.<br>b. Disarmed (if applicable) and detained if the password was not correct.<br>c. If still doubtful, asked for further identification or asked a question only a friendly person would be able to answer. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 21-75 |
| | FM 22-6 |

Subject Area 22: SUSTAIN: GENERAL

**Perform Individual Camouflage**

**052-191-1501**

**Conditions:** Given grass, bushes, trees, shadows, Battle Dress Uniforms (BDU), pieces of Lightweight Camouflage Screen System (LCSS), skin paint, charcoal, and/or mud for camouflage, load carrying equipment (LCE), Kevlar helmet with camouflage cover, an individual weapon, and an individual fighting position placed on a reverse slope.

**Standards:** Camouflage yourself, your individual equipment, and your individual fighting position to prevent detection by visual, near infrared, infrared, ultraviolet, radar, acoustic and radio sensors. There are no changes to the standards if performed in Mission-Oriented Protective Posture (MOPP) 4.

**Performance Steps**

1. Identify critical camouflage considerations, incorporating an analysis of the following considerations:
    a. Movement.

Note: Movement draws attention. The naked eye and infrared/radar sensors can detect movement.

        (1) Minimize movement, remembering that darkness does not prevent observation.
        (2) Move, slow and smoothly when movement is necessary.
    b. Shape.
        (1) Use artificial materials to break up shapes, outlines and equipment.
        (2) Move, staying in shadows.
        (3) Disguise or distort the shape of your helmet and body with artificial materials when conducting operations close to the enemy.

Note: Gloss or shine caused by light reflecting from smooth or polished surfaces will attract attention. Remember moonlight and starlight can be reflected as easily as sunlight.

    c. Cover or remove the following items eliminating light reflection.
        (1) Mess kits.
        (2) Mirrors.
        (3) Eye glasses.
        (4) Watch crystals.
        (5) Plastic map cases.
        (6) Starched uniforms.
        (7) Clear plastic garbage bags.
        (8) Dust goggles worn on the top of helmets.
        (9) Cigarettes and pipes.
        (10) Red filtered flashlights.

Note: Flashlights - replace all red filters with blue-green filters.

    d. Color. Blend individual camouflage with the surroundings; or at a minimum, objects must not contrast with the background.

Note: When moving from one area to another, change camouflage as required. What works well in one location may draw fire in another.

2. Camouflage your skin.

Note: Exposed skin reflects light.

    a. Cover your skin oils, even if you have very dark skin, using paint sticks. Paint sticks cover these oils and provide blending with the background.

Note: Do not use oils or insect repellant to soften paint sticks. This defeats the purpose of paint sticks by making the skin shiny. Soldiers applying paint should work in pairs because self-application may leave gaps, such as behind the ears.

    b. Use the following table when applying paint on the face:
    c. Paint exposed skin on the back of the neck, arms, and hands with an irregular pattern.

CAUTION

**Performance Steps**
MUD CONTAINS BACTERIA, SOME OF WHICH IS HARMFUL AND MAY CAUSE DISEASE OR INFECTION. MUD SHOULD BE CONSIDERED LAST AS A FIELD EXPEDIENT PAINT.

3. Camouflage your BDUs.
    a. Roll your sleeves down and button all buttons.
    b. Attach leaves, grass, small branches, or pieces of LCSS to your uniform and helmet. These items will distort shapes and blend colors with the natural background.

Note: BDUs provide visual and near infrared camouflage.

    c. DO NOT starch BDUs; this counters the infrared properties of the dyes.
    d. Replace excessively faded and worn BDU's because camouflage effectiveness is lost.

4. Camouflage your personal equipment.
    a. Cover or remove shiny items.
    b. Secure items that rattle or make noise when moved or worn.

5. Camouflage your individual fighting position.
    a. Place your position, considering camouflage as the most important factor.
    b. Place your position out of the direct view of threat forces when possible. Example: Reverse slope defense.
    c. Place your position at night or under other conditions of limited visibility.
    d. Collect spoil in carrying devices for careful disposal.

Note: Spoil may be used to fill sandbags and as a parapet for protection.

    e. Avoid disturbing the natural look of the surroundings.
    f. Use LCSS and natural vegetation to distort the outline of the position.

Note: Use decoy positions to draw enemy attention away from actual fighting positions.

    g. Conduct the camouflage process.
        (1) Camouflage your position as it is built.
        (2) DO NOT leave shiny or light-colored objects exposed.
        (3) DO NOT remove shirts while in the open.
        (4) DO NOT use fires.
        (5) DO NOT leave tracks or other signs of movement.
        (6) DO NOT look up when aircraft fly overhead. The most obvious features on aerial photographs is the upturned faces of soldiers.
    h. Inspect the following.
        (1) Inspect your position from the enemy viewpoint.
        (2) Inspect the camouflage continuously to see that it stays natural looking and conceals the position.
        (3) Change or improve materials when they become ineffective.

**Evaluation Preparation:** SETUP: Ensure that all materials required in the conditions statement are available to the soldier. The individual fighting position may be simulated by using sandbags to form a structure that would offer the individual soldier protection. Dimensions of the structure are at the discretion of the evaluator. The buddy system should be used when applying paint to the face.

BRIEF SOLDIER: Tell the soldier, in preparation for unit defense, he or she is to identify critical camouflage considerations, camouflage himself or herself or a buddy's exposed skin with paint sticks, camouflage his or her individual equipment, and camouglage his or her individual fighting position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Identified critical camouflage considerations. | ____ | ____ |
| a. Movement. | | |
| (1) Minimize movement. | | |
| (2) Move slowly and smoothly. | | |
| b. Shape. | | |
| (1) Break up shapes and outlines. | | |

| Performance Measures | GO | NO GO |
|---|---|---|
| (2) Distort shapes and outlines.<br>c. Covered or removed the following items, eliminating light reflection:<br>(1) Mess kits.<br>(2) Mirrors.<br>(3) Eye glasses.<br>(4) Watch crystals.<br>(5) Plastic map cases.<br>(6) Starched uniforms.<br>(7) Clear plastic garbage bags.<br>(8) Dust goggles worn on the top of helmets.<br>(9) Cigarettes and pipes.<br>(10) Red filtered flashlights.<br>d. Color.<br>(1) Blend camouflage with the surroundings.<br>(2) Objects should not contrast with the background. | | |
| 2. Camouflaged your skin.<br>a. Used paint sticks to paint your face in accordance with the face camouflage chart.<br>b. Used paint sticks to paint exposed areas of your neck, arms and hands with irregular patterns.<br>c. Explained why mud should be considered last as a field-expedient paint. | ___ | ___ |
| 3. Camouflaged your BDUs.<br>a. Rolled down your sleeves and button all buttons.<br>b. Attached leaves, grass, small branches, or pieces of LCSS to your uniform and helmet.<br>c. Do not wear starched BDU's.<br>d. Do not wear excessively faded or worn BDU's. | ___ | ___ |
| 4. Camouflaged your personal equipment.<br>a. Cover or remove shiny items.<br>b. Secure items that rattle or make noise when moved or worn. | ___ | ___ |
| 5. Camouflaged your individual fighting position.<br>a. Explained the most important camouflage consideration for positions.<br>b. Explained when positions should be placed.<br>c. Collected spoil in carrying devices for careful disposal or use for protection.<br>d. Avoided disturbing the natural look of the surroundings.<br>e. Used LCSS and natural vegetation to distort the outline of the position.<br>f. Explained the use of a decoy position.<br>g. Conducted the camouflage process.<br>h. Inspected your position.<br>(1) From the enemy viewpoint.<br>(2) To ensure camouflage stays natural looking and conceals the position.<br>(3) Change or improve ineffective materials. | ___ | ___ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| FM 20-3 | |
| FM 21-75 | |

**Destroy Supplies and Equipment**
**071-600-0001**

**Conditions:** In a combat environment, given an order to destroy supplies and equipment.

**Standards:** Rendered the supplies and equipment useless for their intended function.

**Performance Steps**

1. Select destruction methods. You have received the authority and priority of destruction.

NOTE: Division and higher commanders may delegate their destruction authority when the situation warrants.

a. Self-destruction devices.
b. Improper operation.
c. Fire.
d. Gunfire.
e. Demolition.
f. Mechanical destruction.
g. Use of natural surroundings.

2. Destroy supplies and equipment.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with equipment and supplies for which destruction authority and priority has been received.

BRIEF SOLDIER: Tell the soldier to destroy supplies and equipment damaged beyond repair, according to the established priority.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Selected destruction method. | ____ | ____ |
| 2. Destroyed supplies and equipment that could not be repaired. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 750-244-6 |

**Conduct Combat Operations According to the Law of War**

**181-906-1505**

**Conditions:** You are in combat. You encounter enemy combatants and civilians, and enemy and civilian property. You may encounter enemy prisoners or wounded enemy soldiers, or you may be taken prisoner or wounded by the enemy.

**Standards:** Follow "The Soldier's Rules" conducting combat operations in accordance with the law of war.
1. Fight only enemy combatants.
2. Safeguard enemies who surrender.
3. Do not kill or torture enemy prisoners.
4. Care for the wounded, whether friend or foe.
5. Do not attack medical personnel, facilities, or equipment.
6. Destroy no more than the mission requires.
7. Treat all civilians humanely.
8. Respect private property and possessions. Do not steal.
9. Identify the rights and duties of prisoners of war (PW).
10. Report all violations of the law of war.

**Performance Steps**

1. Fight only enemy combatants. Do not attack:
    a. Civilians.
    b. Enemy soldiers who surrender.
    c. Enemy soldiers who are sick or wounded, and who are out of combat.
    d. Medical personnel.
    e. Aircrew members exiting an aircraft in distress.

2. Safeguard enemies who surrender.
    a. Allow enemies to surrender.
    b. Treat all captives as PWs.
    c. Protect all captives from the dangers of combat.
    d. Evacuate all moveable captives to the rear as soon after capture as possible.

3. Do not kill or torture enemy prisoners.
    a. Treat all prisoners humanely.
        (1) Provide prisoners with food, water, shelter, and medical treatment.
        (2) Do not take money, personal property, or protective equipment from prisoners unless ordered to do so.
    b. Protect prisoners from physical or mental abuse.
        (1) Protect prisoners from acts of violence and intimidation.
        (2) Do not use prisoners as shields or screens, to clear or plant mines or booby traps, or as hostages.
    c. Do not use force or coercion in questioning or interrogating prisoners.

4. Care for the wounded, whether friend or foe.
    a. Collect all wounded personnel.
    b. Treat all wounded, friend or foe, in accordance with medical priorities.
    c. Follow the Golden Rule: Treat enemy wounded as you would want friendly wounded to be treated by the enemy.

5. Do not attack medical personnel, facilities, or equipment.
    a. Do not fire at medical personnel, medical facilities, or medical transport vehicles.
    b. Respect medical service symbols (Red Cross, Red Crescent, the Red Lion and Sun, and the Red Shield of David).
        (1) Use medical service symbols only for medical activities.

**Performance Steps**

(2) Do not hide behind medical service symbols.

6. Destroy no more than the mission requires.
   a. Follow the Rules of Engagement.
   b. Attack only combat targets.
   c. Do not attack protected property such as hospitals, churches, shrines, museums, or undefended places.
   d. Do not destroy property unless required by the necessities of war.

7. Treat all civilians humanely.
   a. Move or detain civilians only for proper cause.
   b. Protect civilians from collective punishment, reprisals, and hostage taking.
   c. Protect women from forced prostitution, rape, and sexual assault.

8. Respect private property and possessions. Do not:
   a. Steal civilian property.
   b. Take war trophies.
   c. Seize property unless ordered to do so.

9. Identify the rights and duties of PWs.
   a. PWs have the right to:
      (1) Receive housing and clothing.
      (2) Receive enough food to stay in good health.
      (3) Receive adequate medical care.
      (4) Maintain proper hygiene.
      (5) Practice their religious faith.
      (6) Send and receive mail.
      (7) Keep personal property except for weapons, military equipment, and military documents.
      (8) Receive packages containing foodstuffs, clothing, and educational, religious, or recreational material.
      (9) Have a prisoners' representative to the PW camp commander.
      (10) Receive humane treatment from their captors.
   b. PWs have the duty to:
      (1) Tell their captors only their name, rank, service number, and date of birth.
      (2) Obey all lawful camp rules.
      (3) Obey the lawful orders of senior prisoners.
      (4) Perform nonmilitary labor which is not humiliating, dangerous, or unhealthy. Officers and NCOs can be required to perform only supervisory work.

10. Report all violations of the law of war.
    a. Do your utmost to prevent criminal acts.
    b. Request clarification of unclear orders.
    c. Refuse to obey an order that is clearly illegal.
    d. Report violations of the law of war to one of the following:
       (1) Chain of command.
       (2) Military police.
       (3) Inspector General.
       (4) A judge advocate.
       (5) A chaplain.

**Evaluation Preparation:** Setup: Test each soldier individually during an Army Training and Evaluation Program (ARTEP) exercise or a field training exercise (FTX). Whenever possible, the best way to test soldiers is to integrate realistic law of war issues into exercise play. At a minimum, orally present the soldier with simulated combat situations and have the soldier either recall or apply "The Soldier's Rules." Brief Soldier: Either: Tell the soldier he or she will have to respond to situations involving the law of war

(The Soldier"s Rules). Or: As a minimum, tell the soldier you will describe a situation involving the law of war and he or she must apply the Soldier's Rules orally.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Situation A: On a patrol, you encounter a group of enemy soldiers walking toward you with their hands raised.<br>a. Allow enemies to surrender.<br>b. Treat all captives as PWs.<br>c. Protect all captives from the dangers of combat.<br>d. Evacuate all moveable captives to the rear as soon after capture as possible. | ____ | ____ |
| 2. Situation B: You take an enemy soldier prisoner.<br>a. Treat all prisoners humanely.<br>b. Protect prisoners from physical or mental abuse.<br>c. Do not use force or coercion in questioning or interrogating prisoners. | ____ | ____ |
| 3. Situation C: On patrol, you encounter a group of enemy soldiers who are sick or wounded and are out of combat.<br>a. Collect all wounded personnel.<br>b. Treat all wounded, friend or foe, in accordance with medical priorities.<br>c. Follow the Golden Rule: Treat enemy wounded as you would want friendly wounded to be treated by the enemy. | ____ | ____ |
| 4. Situation D: You see an enemy field ambulance, marked with a Red Crescent.<br>a. Do not fire at medical personnel, medical facilities, or medical transport vehicles.<br>b. Respect medical service symbols (Red Cross, Red Crescent, the Red Lion and Sun, and the Red Shield of David). | ____ | ____ |
| 5. Situation E: Your patrol encounters sniper fire from a window in a large building within a city. You can neutralize the sniper by direct fire at the window or by destroying the entire building.<br>a. Attack only combat targets.<br>b. Do not attack protected property such as hospitals, churches, shrines, museums, or undefended places.<br>c. Do not destroy property unless required by the necessities of war. | ____ | ____ |
| 6. Situation F: Your unit has been attacked by enemy civilians in hit and run raids.<br>a. Move or detain civilians only for proper cause.<br>b. Protect civilians from collective punishment, reprisals, and hostage taking.<br>c. Protect women from forced prostitution, rape, and sexual assault. | ____ | ____ |
| 7. Situation G: You find abandoned property on the battlefield.<br>a. Do not steal civilian property.<br>b. Do not take war trophies.<br>c. Do not seize property unless ordered to do so. | ____ | ____ |
| 8. Situation H: You are taken prisoner. You are asked questions.<br>a. Tell only name, rank, service number, and date of birth. | ____ | ____ |
| 9. Situation I: You observe a violation of the law of war.<br>a. Do your utmost to prevent criminal acts.<br>b. Report violations of the law of war to one of the following: Chain or command, military police, Inspector General, a judge advocate, or a chaplain. | ____ | ____ |

**Evaluation Guidance:** Score the soldier a GO if all responses are correct. Score the soldier a NO-GO if any response is incorrect. If a response is incorrect, refer the soldier to the appropriate Soldier's Rule for further study.

**References**

| Required | Related |
|---|---|
| AR 350-41 | |
| FM 27-10 | |

Subject Area 24: SUSTAIN: NBC

## MARK NBC CONTAMINATED AREA

## 031-503-1021

**Conditions:** Given an area where NBC weapons have been used. You are in the appropriate MOPP level. You have NBC markers (radiological, biological, and chemical), grease pencil, information necessary to fill out a marker for each type of contamination, the means to hold the markers in place, and a designated location for the sign.

**Standards:** 1. Selected the appropriate marker based upon information provided. 2. Recorded the required information on the marker. 3. Emplaced the marker properly.

**Performance Steps**

1. Once contamination has been located and identified in an area, the area must be marked to warn friendly troops. Markers must be placed where they can be easily seen.
   a. Radiological contamination. Prepare a marker labeled ATOM.
      (1) Print all information on the front side of the marker so that the word ATOM is facing toward you in an upright position.
      (2) Print the dose rate, in centigray per hour (cGyph).
      (3) Print the date and time (local or ZULU, state which).
      (4) Print the date and time (local or ZULU, state which) of the detonation, if known. (If the date and time is not known, print UNKNOWN.)
   b. Biological contamination. Prepare a marker labeled BIO.
      (1) Print all information on the front side of the marker so that the BIO is facing toward you in an upright position.
      (2) Print the type of agent detected. (If unknown, print the word UNKNOWN.)
      (3) Print the date of detection beneath the type of agent.
      (4) Print the time (local or ZULU, state which) of detection beneath the date of detection.
   c. Chemical contamination. Prepare a marker labeled GAS.
      (1) Print all information on the front side of the marker so that the word GAS is facing toward you in an upright position.
      (2) Print the type of agent detected. (If unknown, print the word UNKNOWN.)
      (3) Print the date and time (local or ZULU, state which) of detection beneath the type of agent detected.
2. Position the marker so that the recorded information faces away from the area of contamination and the marker can be easily seen.
   a. Attach the markers to objects such as trees or poles, so that they will be easily visible from all probable routes through the contaminated area.
   b. Place each marker so that the next one can be seen from the one just emplaced.
   c. For radiological contamination, place the markers at the location where the dose rate is measured at 1 cGyph or more.

**Evaluation Preparation:** Setup: Use simulants to produce a contaminated environment for CB agents. When requiring a marker for radiological contamination, tell the soldier the amount of radiation present.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Selected appropriate marker. | ____ | ____ |
| 2. Recorded required information on the marker. | ____ | ____ |
| 3. Emplaced the marker. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any steps are failed (F). If the soldier fails any steps, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| FM 3-3 | |
| TM 3-9905-001-10 | |

**Prepare the Chemical Agent Monitor for Operation**

**031-503-1030**

**Conditions:** Given a protective overgarment ensemble, protective mask with hood attached, a chemical agent monitor (CAM), TM 3-6665-331-10, DA Form 2404 (Equipment Inspection and Maintenance Worksheet), a pencil, and a directive to prepare the CAM for operation in an area where chemical contamination may occur.

**Standards:** Identify the components, controls, and indicators of the CAM. Perform before operations preventive maintenance checks and services (PMCS). Perform required troubleshooting procedures so that the CAM passes the self-test and the confidence test in both G and H modes.

**Performance Steps**

1. Identify components (TM 3-6665-331-10, paragraph 1-9) and controls and indicators (TM 3-6665-331-10, Chapter 2, Section I).
2. Perform before-operations PMCS in accordance with TM 3-6665-331-10, paragraph 2-2.
3. Perform self-test.
    a. Ensure nozzle protective cap is in position on monitor case assembly.
    b. Press ON/OFF push-button switch.

NOTE: If CAM display does not come on, disappears, or flashes on and off, refer to troubleshooting symptoms 3 and 4 in TM 3-6665-331-10, paragraph 3-3.

    c. Check that H mode shows.
        (1) If G mode shows, press G/H mode push-button switch. Turn CAM off, then on again. Verify H mode shows.
        (2) If H mode still does not show, refer to troubleshooting symptom 5 in TM 3-6665331-10, paragraph 3-3. d. Check that markers A and B show.
    d. Check that markers A and B show.
    e. Check that all eight bars show.
    f. Check that three vertical dots show.
    g. Check that BL shows.
    h. Check that WAIT shows.

NOTE: If any display is not shown, refer to troubleshooting symptom 9 in TM 3-6665-331-10, paragraph 3-3.

    i. Check that display clears from self-test after 30 seconds.

NOTE: If display does not clear after 30 seconds, refer to troubleshooting symptom 10 in TM 3--331-10, paragraph 3-3. H mode, WAIT, A and B markers remain.

    j. Check that WAIT clears from display within two minutes.

NOTE: In very cold conditions, the battery may not immediately reach operating level (BL may not go out). If BL is still displayed after five minutes, repeat step 3.

NOTE: An extended warm up period may be necessary if CAMs have been in storage 30 days or longer. Allow CAM to run until it passes confidence test, but not more than 24 hours.

NOTE: If WAIT does not clear within two minutes (only H mode and A and B markers remain), refer to troubleshooting symptom II in TM 3-6665-331-10, paragraph 3-3.

4. Perform confidence test.

NOTE: This test is performed after completing a self-test or when changing modes.

CAUTION: Nozzle protective cap assembly must be stored on environmental cap when not on the front of the CAM. Do not touch the nozzle assembly or the new filtered nozzle standoff; touching could contaminate them. Attach filtered nozzle standoff quickly to prevent dust and contamination from entering the CAM.

    a. Twist counterclockwise and remove nozzle protective cap fiom front of CAM; place nozzle protective cap onto CAM environmental cap and twist clockwise.
    b. Place a filtered nozzle standoff into CAM nozzle assembly.

**Performance Steps**

(1) Pull one filtered nozzle package assembly fiom pocket of carrying harness.
(2) Peel back covering from top of filtered nozzle package assembly until one filtered nozzle standoff is exposed.
(3) Quickly press CAM nozzle assembly into exposed filtered nozzle standoff and remove.
(4) Lay covering back in place across top of filtered nozzle package assembly. Slide package assembly back into pocket of carrying harness.

NOTE: Make sure CAM display indicates H mode.

c. Perform H confidence test as follows:
(1) Remove confidence sample from carrying harness.
(2) Grasp confidence sample with H end exposed.

CAUTION: Do not allow CAM to sample the confidence sample for more than one second. Longer than one second will saturate the CAM with vapor. It is only necessary that at least three bars show for test verification (do not attempt to have all bars show).

(3) Press CAM nozzle assembly firmly into H end of confidence sample for one second. Confidence sample should touch filtered nozzle standoff.
(4) Remove confidence sample.
(5) Verify that at least three bars are displayed after a few seconds.

NOTE: Three dots may appear momentarily; ignore them. If fewer than three dots appear, refer to troubleshooting symptom 8 in TM 3-6665-331-10, paragraph 3-3.

(6) Check that display clears to zero or one bar within two minutes.

NOTE: If CAM does not clear within 2 minutes, refer to troubleshooting symptom 6 in TM 3-6665-331-10, paragraph 3-3.

d. Press G/H mode push-button switch; verify mode changes from H to G.
(1) When WAIT disappears, proceed.

NOTE: If three dots appear following the mode change, ignore them.

(2) If display flashes on and off, go to troubleshooting symptom 4 in TM 3-6665-331-10, paragraph 3-3.

e. Perform G confidence test the same as the H confidence test, using the G end of the confidence sample.
f. Place confidence sample into pocket of carrying harness.

5. If CAM passes self-test and confidence test, it is ready for operation.
6. If CAM fails to respond after you followed troubleshooting procedures, annotate deficiencies on DA Form 2404 and turn CAM in to maintenance.

**Evaluation Preparation:** Setup: Give the soldier an operational CAM with TM 3-6665-331-10, accessories (carrying case and components) and training devices/equipment necessary to perform the task. Use the M58A1 and for all training situations.

Brief Soldier: Tell the soldier to assume MOPP4 and perform the steps necessary to prepare the CAM for operation. Evaluation will be based on individual performance and adherence to safety precautions.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Identified components. | ____ | ____ |
| 2. Identified controls. | ____ | ____ |
| 3. Identified indicators. | ____ | ____ |
| 4. Performed before-operations PMCS. | ____ | ____ |
| 5. Performed self-test. | ____ | ____ |
| 6. Performed confidence test. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 7. Performed troubleshooting procedures, if required. | ____ | ____ |

**Evaluation Guidance:** Score the solider GO if all steps are passed. Score the solider NO-GO ifstep is failed. if the solider scores NO-GO, show him what was done wrong and how to do itcorrectly.

**References**

| Required | Related |
|---|---|
| TM 3-6665-331-10 | TM 3-4230-216-10<br>TM 3-4240-279-10<br>TM 3-6665-307-10 |

**Use the Chemical Agent Monitor**

**031-503-1031**

**Conditions:** Given a chemical agent monitor (CAM) that has been prepared for operation and TM 3-6665-331-10. You are in the appropriate mission-oriented protective posture (MOPP)level. The order has been given to perfrom monitoring procedures for personnel and equipment.

**Standards:** Perform monitoring procedures for personnel and equipment in accordance with TM 3-6665-331-10, paragraph 2-6.

**Performance Steps**

1. Ensure the CAM CAM has been prepared for operation as outlined in task 031-503-1030, Prepare the Chemical Agent Monitor for Operation.

2. Perform operating procedures for changing modes.
    a. To change from G mode to H mode, proceed with the following steps:
        (1) Press the G/H mode push-button switch.
        (2) verify that the display indicates H mode.

NOTE: Wait may be displayed for several seconds.

        (3) When wait has disappeared, proceed.
        (4) If three dots also appear following the mode change, ignore them.
        (5) If the display flashes on and off, refer to troubleshooting symptom 4 in TM 3-6665-331-10, paragraph.
        (6) Perform the confidence test for the H mode.
    b. To change from H mode to G mode, proceed with the following steps:
        (1) Press G/H mode push-button switch.
        (2) Verify that the display indicates G mode.

NOTE: Wait may be displayed for several seconds.

        (3) When wait has disappeared, proceed.
        (4) If three dots also appear following the mode change, ignore them.
        (5) If the display flashes on and off, refer to troubleshooting symptom 4 in TM 3-6665-331-10, paragraph.
        (6) Perform the confidence test for the H mode.

3. Monitor.

CAUTION: Do not contaminate the filtered nozzle standoff by allowing it to come in contact with liquid agent. NOTE: Get to know your operating environment (know local interferents). Do not obstruct the filtered nozzle standoff.

    a. Approach the object to be monitored (land vehicle, terrain, personnel, or casualty) from an upwind position if possible.

Note: It is probable that any contamination will cause a relatively high reading quite quickly. This has the advantage of quickly defining the upwind boundary of the area of contamination. From a downwind position the response will be low initially and will rise as the source of contamination is approached.

    b. Hold the CAM 1/2 inch from the object being monitored.
    c. If the operation of the CAM is in doubt at any time, remove the filtered nozzle standoff and replace the nozzle protective cap assembly on the nozzle assembly.
        (1) When the display has cleared down to one or zero bars, remove the nozzle protective cap assembly and install a new filtered nozzle standoff.
        (2) Perform a confidence test.

NOTE: Monitoring can then continue. The CAM is a vapor monitor and can report only conditions at the front of the nozzle assembly. It is a point monitor only and cannot give a realistic assessment of the vapor hazard over an area from one position.

    d. Move the CAM around the area and carry out a complete reconnaissance to properly assess the vapor hazard in the area.

NOTE: Complete assessment will probably be made in conjunction with other detection methods.If there

**Performance Steps**

is a source of vibration in the area, WAIT may display momentarily when searching for the agent.
NOTE: When a constant number of bars is continually shown on the display, it usually indicates that contamination is present in the surrounding area or on the nozzle.

e. Establish what general vapor hazards exsists around the contaminated person or equipment.

NOTE: If the reading obtained is higher than the background level, then the person or equipment is contaminated. If the reading is the same as the background, then the person or equipment may be contaminated or the CAM may be merely recording the background vapor hazard.

f. Take care when assessing the contamination of an object from the information indicated on the CAM display.

CAUTION: Do not switch the CAM off for end of mission storage if more than one bar is displayed.
NOTE: Switch the CAM off when it is not in use to extend battery life.
NOTE In cold weather, liquid contaminants may not release sufficient vapor to produce a reading on the CAM.
NOTE: A few vapors present in the atmosphere (interferents can, in some cases, give false response on the CAM.
NOTE the situations most likely to give false reading are in enclosed spaces on when sampling near strong vapor sources, such as dense smoke. For example, there may be responses in the galley, the sick bay, or the hanger. Some of the types of vapors that have been found to give false readings are - Aromatic vapors. Included in this group of materials are perfumes and food flavorings. Some brands of after-shave and perfume can give responses in the G mode when the CAM is held close to the skin, for example in casualty handling procedures. Some sweets, such as peppermints and cough lozengers, as well as menthol cigarettes can cause a response in G mode if the breath is exhaled directly into the CAM nozzle. Cleaning compounds. Some cleaning compounds and disinfectants contain additives that give them a pleasent smell. Some of the additives, such as menthol and methyl salicylate, can give false responses in the H or G mode.Cleaning materiaqls are by their very nature spread over large surface areas and, therefore, providea considerable vapor source, particularly in enclosed spaces. Smoke and fumes. The exhuast from some rocket motors and the fumes from some munitions can give responses. Since from some rocket motors and the fumes from some munitions can give responses. Since monitoring with the CAM in these situations is unrealistic, few problems should arise.

g. If you suspect your CAM is giving a false reading, do the following:
   (1) Stay masked.
   (2) Check for obvious vapor sources, such as smoke and known interferents.
   (3) Remove and discard the filtered nozzle standoff. Place the nozzle protective cap assembly onto the front of the CAM case, and reestablish a clear air background.
   (4) Remove the nozzle protective cap assembly.
      ( a) If a false response occurs again, the CAM may not be operable in the immediate area.
      ( b) Remove the source of interferant if possible or replace the nozzle protective cap assembly and remove the CAM from the area.
      ( c) If any malfunctions occur, refer to the operator troubleshooting symptom in TM 3-6665-331-10, Table 3-1.

4. Follow all the safety rules outlined in TM 3-6665-327-13&P.

**Evaluation Preparation:** Setup: Evaluate this task during a field exercise or during a normal training session. Gather all necessary equipment and materials. Provide an area large enough to properly set up the CAM and perform monitoring of personnel and equipment. Develop several sets of conditions for testing purposes. Utilize approved simulants for the CAM to simulate contamination.
Brief Soldier: Tell the soldier to assume MOPP4 and perform the steps necessary to put the CAM into operation.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Ensured the CAM has been prepared for operation. | ____ | ____ |
| 2. Performed operating procedures for changing modes. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 3. Monitored. | ____ | ____ |
| 4. Followed all safety rules in TM 3-6665-331-10 | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If any step is failed, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| TM 3-6665-331-10 | |

**Prepare the Chemical Agent Monitor for Movement**

**031-503-1032**

**Conditions:** Given mission-oriented protective posture(MOPP) Level 4 protective gear, assigned protective mask with hood attached, M8 or M9 detector paper, an M258A1decontaminating kit, an M256 detector kit, a chemical agent monitor (CAM), TM 3-6665-331-10, and the directive to perform monitoring procedures for movement.

**Standards:** Perform the procedures to decontaminate th CAM in accordance with TM 3-6665-331-10, paragraph 2-17, and FM 3-5. Perform the procedures for removing the CAM from operation in accordance with TM 3-6665-331-10, paragraph 2-6f. Perform shutdown procedures in accordance with TM 6665-331-10, paragraph 2-6g. Perform after-operation preventative maintenance checks and services (PMCS) in accordance with TM 3-6665-331-10, paragraph 2-2.

**Performance Steps**

1. Decontaminate a contaminated CAM before shutdown.
    a. Nuclear. For radiological contamination, brush, wipe, or vacuum the contamination from the equipment. The contamination is not destroyed, it is just moved from one place to another. Therefore, take control of the runoff.

CAUTION:Do not decontaminate the CAM or its accessories with M258A1 or M280 decontamination Kits. These kits may cause false positives and temporarily render the CAM inoperative.
CAUTION Decontaminate the nuclear, biological, chemical NBC gloves with hot soapy water or M291 skin decontamination kit.

    b. Biological or chemical. If the CAM or its accessories appear to be contaminated, decontaminate them. Wipe chemical contamination from the metal electronics cases with DS2. After 30 minutes wipe thoroughly with a damp cloth, dry, and wipe with oil. If DS2 is not available or the case is of a material other than metal, wipe with a cloth and hot, soapy water or use a nonstandard decontaminant. For either biological or chemical contamination, use the following procedures:
        (1) Press the ON/OFF push-button switch to turn the CAM off.
        (2) Remove the filtered nozzle standoff and discard it as contaminated waste.

CAUTION: The CAM nozzle assembly must be decontaminated using water only.

        (3) Lightly dampen a cloth with water and wipe the CAM nozzle assembly thoroughly. Discard cloth as contaminated waste.
        (4) Decontaminate the NBC gloves.

CAUTION: Handle the nozzle protective cap assembly carefully to avoid cross-contamination.

        (5) Remove the nozzle protective cap assembly from the environmantal cap. Twist and install the nozzle protective cap assembly over the nozzle assembly.
        (6) Press the ON/OFF push-button switch to turn the CAM on.
        (7) Check for contamination with another CAM known to be free from contamination.
        (8) If this check confirms that the first CAM is contaminated, disconnect the carrying harness by unsnapping both ends. Remove the carrying harness and handle straps. If the carrying harness assembly is contaminated, proceed as follows:
            ( a) Open the carrying harness battery packet and confidence sample packet.
            ( b) Decontaminate NBC gloves.
            ( c) Remove the confidence sample, the spare battery, and the filtered nozzle package assemblies, and check for contamination using another CAM. If contaminated, discard all items except the confidence sample as contaminated waste.
            ( d) Decontarninate the confidence sample using a cloth and hot, soapy water. Wipe dry with clean cloth or let air dry.
            ( e) Decontaminate the NBC gloves.
            ( f) Attach the spare replacement carrying harness from the sealed plastic bag in the carrying case to the CAM.
            ( g) Place the decontaminated confidence sample in the spare carrying harness

**Performance Steps**

assembly.

( h) Place the spare battery and the filtered nozzle package assemblies, if not contaminated, in the spare carrying harness assembly.

(9) Wait until the CAM display clears to one or zero bars in both modes. This may take 10 to 15 minutes. If the CAM does not clear, the nozzle protective cap assembly may be contaminated and may require replacement with the spare from the carrying case assembly. Replace the nozzle protective cap assembly and repeat the previous procedures.

(10) Press the ON/OFF push-button switch to turn the CAM off. Decontaminate the CAM using the procedures and guidelines for electronic equipment in FM 3-5, Chapter 8. Decontaminate the NBC gloves, and check the completeness of decon with another CAM.

( a) Decontaminate the NBC gloves.

( b) Attach the spare replacement carrying harness from the sealed plastic bag in the carrying case to the CAM.

(11) If the carrying case assembly is contaminated, open the carrying case assembly, decontaminate the NBC gloves, remove and decontaminate the sealed accessories as required, discard the carrying case assembly as contaminated waste, and replace the nozzle protective cap assembly if the CAM failed to clear down in previous steps.

NOTE: In conditions below 40?F (4C) take the CAM to a warm area to carry out the shutdown procedures.

2. Remove the CAM from operation.
   a. Remove and discard the filtered nozzle standoff from the nozzle assembly.
   b. When operating in wet conditions try to avoid trapping moisture on the nozzle assembly or inside the nozzle protective cap assembly. Trapped water may result in increased start-up time or reduced sensitivity. Inspect the nozzle assembly for indication of moisture; if droplets of water are present, attempt to shake the moisture off.
   c. Twist and remove the nozzle protective cap assembly from the environmental cap.
   d. Twist and install the nozzle protective cap assembly to the CAM case front end.

NOTE: The CAM normally clears down to one or zero bars within two minutes. If the CAM is contaminated, it may take at least an hour to clear down to zero bars.

   e. Observe the display. If the display shows zero or one bar, press the G/H push-button switch to change modes of operation and observe the display again. If the display shows zero or one bar in both modes, the CAM is ready for shutdown procedures. In conditions below 40degF (4degC) allow the CAM to run an additional five minutes after the display has cleared to zero or one bar. If more than one bar shows, let the CAM run until the display shows zero or one bar.
   f. If the CAM fails to clear down in either mode within an hour, refer to the troubleshooting symptom 7 in TM 3-6665-331-10, Paragraph 3-3. When the display shows zero or on ebar in both modes, press th ON/OFF push-button switch to shut the CAM off.

3. Prepare the CAM for movement.
   a. Do the following to prepare the CAM for movement to a new location and to return the CAM to operation at the new location:
      (1) Remove the CAM from operation.
      (2) Shut down the CAM.
   b. If the carrying case is available, proceed with the following steps:
      (1) Inspect the two filtered nozzle package assemblies in the carrying harness. If either package is empty, replace it with a new one from the lid of the carrying case assembly.
      (2) Inspect the nozzle protective cap assembly. If cap is damaged, replace it with the spare nozzle protective cap assembly stored in the carrying case assembly.
      (3) Place the CAM into the carrying case assembly.
      (4) Flip the pocket with the replacement carrying harness into the carrying case.
      (5) Close the lid on the carrying case. Slide one hand along the hook-and-loop fastener to secure the carrying case.
      (6) Place the CAM back into operation by performing the self-test and the confidence test

**Performance Steps**

explained in task 031-503-1030, Prepare the Chemical Agent Monitor for Operation.

**Evaluation Preparation:** Setup: Evaluate this task during a field exercise or during a normal training session. Gather all necessary equipment and materials. Provide an area large enough to properly set up the CAM and perform monitoring of personnel and equipment. Develop several sets of conditions for testing of personnel and equipment. Use approved simulants for the CAM to simulate contamination.

Brief Soldier: Tell the soldier to assume MOPP4 and perform the steps necessary to put the CAM into operation.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed the procedures to decontaminate the CAM in accordance with TM 3-6665-331-10, paragraph 2-17, and FM 3-5. | ____ | ____ |
| 2. Performed the procedures for removing the CAM from operation in accordance with TM 3-6665-331-10, paragraph 2-6f. | ____ | ____ |
| 3. Performed shutdown procedures in accordance with TM 3-6665-331-10, paragraph 2-6g.. | ____ | ____ |
| 4. Performed after-operation PMCS in accordance with TM 3-6665-331-10, paragraph 2-2. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any step is failed (F). If any step is failed, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| TM 3-6665-331-10 | |

**Protect Yourself and Others From Chemical and Biological Injury/Contamination by Using a Collective Protection Shelter**

**031-506-1052**

**Conditions:** You are in a chemically contaminated area, and at Mission-Oriented Protective Posture (MOPP) level 4. You need to take shelter in a collective protection shelter. You have load carrying equipment (LCE), an M1 or M1A1 waterproof bag, assigned decontamination kit(s) (M258A1, or M291 and M295), M8 detector paper, and replacement MOPP gear. Soldiers in armor units wear the Suit, Contamination Avoidance and Liquid Protection over their MOPP gear; decontaminating apparatus (M11 or M13 DAP); water; and a brush.

**Standards:** Enter and exit a collective protection shelter without becoming a casualty, endangering other shelter occupants, or transferring the hazard to yourself or the shelter interior.

**Performance Steps**

NOTE: The procedures are the same regardless of which type of MOPP ensemble you may have. The only difference comes from masks that have canister filters attached by a flexible hose to the mask; for this arrangement, be sure to bend over so as to not contaminate the flexible hose.

1. Prepare to enter a collective shelter.
    a. Remove LCE, mask carrier, weapon, and helmet; place on an uncontaminated surface (such as a poncho).
    b. Keep your decontamination kit(s) and waterproof bag with you at all times.
    c. Loosen your protective gear.
        (1) Trousers
            ( a) Untie ankle cords.
            ( b) Open velcro and zippers of both legs.
        (2) Jacket
            ( a) Unsnap rear snaps.
            ( b) Unsnap two bottom front snaps (leave top snap closed).
            ( c) Untie waist cord, but leave zipped.
        (3) Mask with hood
            ( a) Unfasten shoulder straps, remove from beneath your arms, and reattach.
            ( b) Loosen neck cord.
    d. Decontaminate the mask and hood.
    e. Decontaminate your gloves.

NOTE: Remember that your are in a contaminated area. Do not lean against anything after you have begun to remove your individual protective equipment.

    f. Roll your hood.
    g. Remove your protective jacket.
    h. Remove your protective trousers.
    i. Remove your protective overboots.
        (1) Stand next to the hot line (the line that separates the contaminated area from the noncontaminated area).
        (2) Unfasten or cut the fasteners on your overboots.

NOTE: At no time should you step on the ground on the contaminated side of the hot line once you have removed your overboots.

        (3) Remove the overboot closest to the hot line. Once the overboot is off, place your exposed combat boot on the clean side of the hot line. Repeat the procedure for the other overboot.

2. Enter a collective protective shelter with an air lock while in MOPP gear.
    a. Enter the air lock.
        (1) Ensure the door is closed.
        (2) Set the purge timer.

NOTE: Discard the used decontamination kit(s) in the receptacle provided.

**Performance Steps**

(3) Decon your gloves again.
(4) Decon the exposed portion of your rolled hood.
(5) Wait for completion of the purge cycle.

b. When timer bell sounds, loosen but don't remove your gloves.
c. Remove mask.
(1) Stop breathing.
(2) Keep eyes open.
(3) Remove mask and hood and place both in the waterproof bag.
(4) Seal the bag shut.
(5) Remove gloves and drop them to the floor.
d. Enter the shelter from the airlock carrying the bag containing your mask and hood.

3. Enter a tank (without an airlock).
a. Mount the tank over the left front road wheel.

NOTE: The following step (3b) is done by only the loader.

b. Decon an area about four feet in diameter around the loader's hatch if contamination is present. Flush the decontaminant away with water.
c. Remove your Suit, Contamination Avoidance and Liquid Protective (SCALP).
(1) Stand just outside the decontaminated area.

NOTE: Discard the used items and removed SCALP over the side of the tank.

(2) Remove the SCALP jacket.
(3) Remove the SCALP trousers.
(4) Remove the SCALP overboot closest to the cleaned area. Once the overboot is off, place your exposed combat boot in the clean area. Repeat the procedure for the other overboot.
d. Decon your protective gloves.
e. Decon your protective gloves.
f. Resume operations as if in a contaminated environment.
g. Remain in MOPP 4 until further decontamination is performed or until testing indicates no hazard is present.

NOTE: If tests reveal no hazard is present, and you are in a buttoned-up overpressure system equipped vehicle, initiate unmasking procedures.

4. Exit a collective shelter or van with an airlock while wearing MOPP gear.
a. Put on clean MOPP gear inside the shelter.
b. Ensure the airlock is unoccupied.
c. Exit the shelter.
(1) Stop breathing.
(2) Step into airlock carrying the bag with your mask and hood.
(3) Don the protective mask.
d. Exit the air lock.

5. Exit a tank without an airlock.
a. Traverse the turret until the main gun is centered over the front slope.
b. Put on mask and protective gloves.

NOTE: The loader must be the first one to exit.

c. Put on the SCALP at the loader's station.
d. Exit the tank through the loader's hatch carrying your decontaminating kit(s).
e. Carry the decontaminating apparatus.
f. If you are the last one to exit, close the loader's hatch.

6. Field expedient shelters may be found or constructed. Use tape and other material to seal cracks around doors and windows to provide a location for temporary rest and relief. The procedures for entering and exiting a structure without an airlock can be adapted to the structure being used.
f. Carefully remove your contamination-avoidance cover (CAC) or the rain suit while standing just outside the decontaminated area to avoid inner garment contact.

**Performance Steps**

g. Discard the CAC or the rain suit over the side of the tank onto the ground.
   (1) Discard the jacket.
   (2) Discard the trousers.
h. Remove the boot covers.
   (1) Take off the boot covers one at a time.
   (2) Place the clean boot inside the decontaminated area each time.
   (3) Discard the boot covers over the side of the tank.
i. Decontaminate the gloves with your personal decontaminating kit, discarding the used wipes over the side of the tank.
j. Lower yourself into the tank through the loader's hatch.
k. Resume operations as if in a contaminated environment.
l. Monitor the interior with detection equipment if you are the loader or are directed to do so.
m. Remain in MOPP4 until further decontamination is performed or until further tests indicate no hazard if the readings are positive.
n. Initiate unmasking procedures if readings are negative and the tank is in the buttoned-up overpressure mode.

8. Exit a tank without an air lock.
   a. Traverse the turret until the main gun is centered over the front slope (any crew member).
   b. Put on the mask and protective gloves (crew members).
   c. Put on the CAC or rain suit and the boot covers at the loader's station.
   d. Exit through the loader's hatch, carrying your personal decontaminating kit.

Note: The loader must be the first to exit.

   e. Carry the decontaminating apparatus.
   f. Close the hatch if you are the last crew member to exit.
   g. Use detection equipment to determine the presence or absence of contamination on the tank and surrounding area if you are the loader.
   h. Initiate unmasking procedures if no contamination is present.
   i. Decontaminate the loader's hatch and an area approximately 4 feet in diameter around it if contamination is present and you are the loader.

**Evaluation Preparation:** Setup: Evaluate this task during a field exercise or during a normal training session. For training and evaluation purposes, use the M58A1 decontamination kit instead of the M258A1. Test the soldier on the type of collective protection shelter appropriate for his mission.

Brief Soldier: Tell the soldier that he or she is to enter and exit the appropriate type of collective protection shelter in a chemically contaminated environment while in MOPP level 4 without becoming a casualty, endangering other shelter occupants, or transferring the hazard to yourself or the shelter interior. Test the soldier on the type of shelter he must be familiar with in the field.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Prepared to enter the shelter.<br>a. Removed personal equipment.<br>b. Retained decontaminating kit(s) and waterproof bag.<br>c. Decontaminated mask and hood.<br>d. Properly removed protective clothing. | ____ | ____ |
| 2. Entered a collective protection shelter or van while in MOPP gear without contaminating himself or the shelter.<br>a. Ran purge cycle.<br>b. Decontaminated gloves and hood.<br>c. Placed mask with hood in waterproof bag and sealed it.<br>d. Removed gloves. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 3. Entered a tank without an air lock without contaminating himself or the tank.<br>a. Mounted tank over left front road wheel.<br>b. Decontaminated area around loader's hatch.<br>c. Removed SCALP.<br>d. Decontaminated gloves.<br>e. Lowered himself into tank through the loader's hatch.<br>f. Continued operations in MOPP4. | ____ | ____ |
| 4. Exited a collective protection shelter or van while in MOPP gear without contaminating himself or the shelter.<br>a. Put on clean MOPP gear inside shelter.<br>b. Ensured air lock was not occupied.<br>c. Stopped breathing.<br>d. Entered airlock carrying bag that contains mask with hood.<br>e. Don mask.<br>f. Exited airlock. | ____ | ____ |
| 5. Exited a tank without an air lock without contaminating himself or the tank.<br>a. Traversed the turret.<br>b. Put on mask and protective gloves.<br>b. Remove the hood (from back to front) from the helmet, detaching it from around the eye lenses and then from the filter hose.<br>NOTE: The loader must be the first one to exit.<br>c. Put on the SCALP at the loader's station.<br>c. Remove the overgarment jacket and trousers with the mask and helmet (if applicable) still using steps 3 through 8 EXCEPT when removing overgarments, bending at the waist to prevent the filter canister and hose from touching the body as the overgarment is removed.<br>d. Exited the tank through the loader's hatch carrying decontaminating kit(s).<br>d. Proceed to the air lock or hot line.<br>e. Carried the decontaminating apparatus.<br>e. Remove the overboots one at a time, placing the exposed boots on the clean side of hot line each time.<br>f. Remove the mask, helmet, and gloves before entering the enclosure.<br>f. If the soldier was the last one to exit, closed the loader's hatch.<br>g. Seal the mask in the M1 or M1A1 bag.<br>h. Carry the mask into the shelter. | ____ | ____ |
| 6. Exit a shelter or van with an air lock while wearing a special-purpose ensemble without contaminating yourself or the shelter.<br>a. Put on clean MOPP gear inside the shelter.<br>b. Make sure the air lock is unoccupied.<br>c. Stop breathing.<br>d. Step into the air lock, carrying the M1 or M1A1 bag.<br>e. Don the protective mask.<br>f. Exit the air lock. | ____ | ____ |
| 7. Enter a tank without an air lock without contam- inating yourself or the tank.<br>a. Mount the tank over the left front road wheel.<br>b. Use detection equipment to determine the presence or absence of contamination on the tank and the surrounding area if you are the loader.<br>c. Decontaminate the loader's hatch and an area approximately 4 feet in diameter around it if contamination is present and you are the loader. (Ensure a 30-minute contact time.)<br>d. Acquire a water can from the left bustle rack only if you are the loader. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| e. Flush decontaminant from the loader's hatch and the surrounding area only if you are the loader. | | |
| f. Carefully remove the CAC or the rain suit while standing just outside the decontaminated area to avoid inner garment contact. | | |
| g. Discard the suit over the side of the tank onto the ground, removing the jacket first and then the trousers. | | |
| h. Remove the boot covers. | | |
| i. Decontaminate the gloves with your personal decontaminating kit, discarding the used wipes over the side of the tank. | | |
| j. Lower yourself into the tank through the loader's hatch. | | |
| k. Resume operations as if in a contaminated environment. | | |
| l. Monitor the interior with detection equipment if you are the loader or are directed to do so. | | |
| m. Remain in MOPP 4 until further decontamination is performed or until further tests indicate no hazard if the readings are positive. | | |
| n. Initiate unmasking procedures if readings are negative and the tank is in the buttoned-up overpressure mode. | | |
| 8. Exit a tank without an air lock without contam- inating yourself or the tank. | ___ | ___ |
| a. Traverse the turret until the main gun is centered over the front slope. | | |
| b. Put on the mask and protective gloves. | | |
| c. Put on the CAC or the rain suit and the boot covers at the loader's station. | | |
| d. Exit through the loader's hatch, carrying your personal decontaminating kit. | | |
| e. Carry the decontaminating apparatus. | | |
| f. Close the hatch if you are the last crew member to exit. | | |
| g. Use detection equipment to determine the presence or absence of contamination on the tank and the surrounding area if you are the loader. | | |
| h. Initiate unmasking procedures if no contamination is present. | | |
| i. Decontaminate the loader's hatch and an area approximately 4 feet in diameter around it if contamination is present and you are the loader. | | |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly. Allow the soldier time to retrain and retest.

**References**

| Required | Related |
|---|---|
| FM 3-4 | |

Subject Area 26: VEHICLES

**Tow a Tracked Vehicle**
**071-200-0002**

**Conditions:** In a field or garrison environment given two tracked vehicles with basic issue items (BII)(one operational vehicle with driver and vehicle commander, and one non-operational vehicle with vehicle commander), tow bar, helper as required, and a requirement to tow the vehicle.

**Standards:** A non-operational tracked vehicle was connected to an operational vehicle and towed to a designated point without causing damage to equipment or injury to personnel.

**Performance Steps**
WARNING
Always use a tow bar when the universal joints on a disabled vehicle are disconnected for the purpose of towing.

CAUTION
The transmission and/or differential on an M113-series vehicle may be damaged if the vehicle is towed faster than 10 miles per hour or for a distance of more than 30 miles.

WARNING
A tow bar must be used if the M113-series vehicle is to be towed more than 30 miles because the towed vehicle will not have brakes when the drive shafts are disconnected.

WARNING
Block the vehicle to be towed to prevent it from rolling.

1. Prepare a vehicle for towing with a tow bar.
    a. Confirm through discussion with the supervisor the method by which the disabled vehicle will be towed and the equipment required.
    b. Align the rear of the towing vehicle with the front or rear of the disabled vehicle.
    c. Remove the pins and shackles from two towing eyes on disabled vehicle.
    d. Install the tow bar on front of the disabled vehicle.
    e. Install the tow bar on the towing pintle of the towing vehicle.

WARNING
When towing an M113-series vehicle with tow cables, do not disconnect the disabled vehicle's drive shafts between the differential and the final drives. Also, do not use tow cables to tow an M113-series vehicle more than 30 miles or faster than 10 miles per hour.

2. Prepare a vehicle for towing with tow cables.
    a. Identify the equipment required for towing a vehicle with tow cables.
    b. Align the rear of towing vehicle with front or rear of the disabled vehicle.
    c. Cross cables in an X to prevent them from entangling and to maintain alignment between vehicles.
    d. Connect the towing cables to the front towing hooks on the disabled vehicle.
    e. Connect the towing cables to the rear tow hook/eyes on the towing vehicle.

NOTE: For towing vehicles backward, attach cables to the rear towing eye hooks of the disabled vehicle. Except in an emergency, do not exceed 5 miles per hour while towing a vehicle backward.

WARNING
Ensure that all hatches are closed before attempting to tow the disabled vehicle.

WARNING
All personnel outside the vehicle should stand well away from tow cables when a tracked vehicle is being

**Performance Steps**
towed. If a cable breaks, soldiers could be injured or killed.

3. Tow the disabled vehicle to a designated location.

NOTE: Towing speed for a BFV should not exceed 15 miles per hour (25 kilometers per hour). Reverse towing should not exceed 5 miles per hour (8 kilometers per hour). When towing an M113-series vehicle in excess of 10 miles per hour or farther than 30 miles, the left and right drive shafts between the differential and the final drive must be disconnected (normally done by organizational maintenance personnel).

a. Ensure that the towed vehicle's hand brake is in the OFF position and the range selector on the BFV in the TOW position.
b. If the vehicle to be towed is an M113-series vehicle, ensure that the range selector is in the N (neutral) position.
c. Position gun tubes and or barrels on the side opposite tow cables or tow bar before moving the vehicles.

CAUTION
When towing downhill, do so slowly; brakes could overheat and become damaged.

d. When using tow cables, tighten the slack in tow cables by moving the vehicles apart slowly before starting the towing operation.
e. After moving the vehicle a short distance, stop the vehicle's movement if the situation permits, and do the following:
   (1) Check the rigging to ensure that all locking pins are properly installed on the towing shackles, tow hooks, tow bar, cables, and the towing pintle.
   (2) Check the cables to ensure that they are not kinked or in danger of breaking.
f. Tow the disabled vehicle to a predesignated point following the guidance of the vehicle commander and in accordance with established towing speed limits and SOPs.
g. When accelerating, do so gradually.
h. Make slow, wide turns when turning.

4. Upon reaching the designated location, bring both vehicles slowly to a halt and remove the tow bar or cables from both vehicles.

5. Return all equipment to its original configuration.

**Evaluation Preparation:** SETUP: At the test site provide all material and equipment according to task conditions statement.

BRIEF SOLDIER: Tell the soldier to connect a non-operational vehicle to an operational vehicle and tow it to a designated point without causing damage to equipment or injury to personnel.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Prepared a vehicle for towing with a tow bar. | ____ | ____ |
| 2. Prepared a vehicle for towing with tow cables. | ____ | ____ |
| 3. Towed the disabled vehicle to a designated location. | ____ | ____ |
| 4. Upon reaching the designated location, brought both vehicles slowly to a halt and removed the tow bar or cables from both vehicles. | ____ | ____ |
| 5. Returned all equipment to its original configuration. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 9-43-2
TM 9-2350-252-10-1
TM 9-2350-261-10

Subject Area 29: VEHICLES: M113-SERIES

**Start an M113-Series Vehicle Using Auxiliary Power**
**071-212-0020**

**Conditions:** In a field or garrison environment, given an M113-series vehicle with a dead battery, an operational vehicle equipped with 24-volt power system and receptacle for auxiliary power cable, an auxiliary power cable (slave cable), and a requirement to start the M113-series vehicle using auxiliary power. Engine cranks slowly, and voltmeter indicates LOW on battery charge level.

**Standards:** The engine of the M113-series vehicle with dead battery was started without damage to either vehicle.

**Performance Steps**
WARNING
1. Exhaust gases can kill. Brain damage can result from heavy exposure. Do not allow personnel between vehicles during slave starting.
2. When starting, carriers can move suddenly and crush personnel. Personnel should stay clear of area between carriers.

1. Position operable (source) vehicle to facilitate proper cable hookup.
2. Ensure master switch is OFF on both vehicles.
3. If vehicle is equipped with an M14 alarm system, disconnect the M182 mount cable.
4. Turn all switches to OFF position in M113-series vehicle that is to be started.
5. Remove protective covers from slave receptacles of both vehicles.

WARNING
Electrical slave cable can be improperly connected causing electrical spark or fire. Personnel can be killed or injured. Equipment can be damaged. Match connection-guide lug and cable prongs with receptacle hole.

6. Connect slave cable to auxiliary power receptacle of M113-series vehicle to be started, then to the auxiliary power receptacle on the source vehicle.
7. Start engine of source vehicle.
8. Turn master switch of M113-series vehicle to be started to ON position and apply engine start procedure to start engine.
9. Turn master switch to OFF on both vehicles.

WARNING
Electric sparking can burn personnel and damage equipment. Disconnect slave cable carefully to avoid sparks.

10. Disconnect slave cables from both vehicles.
11. Install protective covers on auxiliary power receptacles of both vehicles and stow slave cable.
12. Perform all steps without injuring personnel or damaging equipment.

**Evaluation Preparation:** SETUP: At the test site, provide all materials and equipment according to the task condition statement.

BRIEF SOLDIER: Tell the soldier to use a 24-volt power system and receptacle for an auxiliary power cable (slave cable) to start the vehicle using auxiliary power.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Positioned operable (source) vehicle to facilitate proper cable hookup. | ____ | ____ |
| 2. Ensured master switch was set to OFF on both vehicles. | ____ | ____ |
| 3. Disconnected the M182 mount cable, if M113-series vehicle to be started was equipped with an M14 alarm system. | ____ | ____ |
| 4. Turned all switches to the OFF position in M113-series vehicle that was to be started. | ____ | ____ |
| 5. Removed protective covers from slave receptacle of both vehicles. | ____ | ____ |
| 6. Connected slave cable to auxiliary power receptacle of M113-series vehicle to be started, then to auxiliary power receptacle on the source vehicle. | ____ | ____ |
| 7. Started engine of source vehicle. | ____ | ____ |
| 8. Turned master switch of M113-series vehicle to be started to the ON position, and applied the engine start procedures to start engine. | ____ | ____ |
| 9. Turned master switch to OFF on both vehicles. | ____ | ____ |
| 10. Disconnected slave cables from both vehicles. | ____ | ____ |
| 11. Installed protective covers on auxiliary power receptacles of both vehicles and stowed slave cable. | ____ | ____ |
| 12. Performed all steps without injuring personnel or damaging equipment. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

**Required**

**Related**

TM 9-2350-259-10
TM 9-2350-261-10
TM 9-2350-277-10-1

**Drive an M113-Series Vehicle**

**071-212-0021**

**Conditions:** In a field or garrison environment, given an M113-series vehicle, basic issue items, and a requirement to drive the vehicle across varying terrain in all weather conditions.

**Standards:** Driving techniques for operating the vehicle across varying terrain and in all weather conditions are applied. The vehicle is driven safely without damage to the vehicle or injury to personnel.

**Performance Steps**

WARNINGS

1. An unlatched hatch cover could swing and injure personnel. Make sure hatches are secured.
2. Carrier movement can throw you from your seat and injure you. Use of seat belts is mandatory.
3. Rapid starts, sudden stops and sharp turns can throw riders off carrier. Riders thrown from carrier can be killed or injured. Riders must sit inside carrier on seats that are provided. Riders must secure seat belts and wear CVC or regular helmet.
4. Heater and engine exhaust fumes contain deadly poisonous gases. Severe exposure can cause death or permanent brain damage. Exhaust gases are more dangerous in places with poor air flow.
5. To protect yourself and your partners, always obey the following:
   a. Do not run heater or engine indoors unless there is very good air flow.
   b. Do not idle engine for long time unless there is very good air flow.
   c. Do not drive carrier with any power plant access covers open or removed.
   d. Be alert at all times.
   e. Check for the smell of exhaust fumes. If you notice any fumes, open hatch covers, ramp access door, or ramp right away.
6. Noises from carrier or weapons firing from carrier can damage hearing of personnel. All personnel in carrier must wear double hearing protection when carrier or weapon is operated.
7. Loss of control can cause carrier to crash. Avoid oversteering at high speeds to prevent skidding or carrier upset. Use caution when turning on hills or side slopes.
8. When driving the M113A3 model, always observe the following warning: Carrier can pivot steer when transmission controller is in SL position and steering lock pin is not engaged. Personnel can be killed or injured. Make sure transmission is in SL and steering lock pin is engaged (steering locked indicator light should be on) unless carrier is to be steered.
9. Brake pedal is very sensitive. Applying brake hard can cause a sudden stop, causing injury. Apply brakes lightly, and with caution.

1. Perform operational checks.
2. Apply required safety measures such as wearing seat belt and hearing protection, using ground guides, and giving warnings prior to moving the vehicle and lowering or raising the ramp.
3. Apply vehicle starting procedures.

WARNINGS

1. When driving the M113A1 and M113A2 models, observe the following:
   a. Do not press or touch brake lock button while the vehicle is moving.
   b. Never use the pivot steer brakes when driving faster than 15 miles per hour, or with shift lever in a driving range higher than 1-2 except in emergency situations.
   c. Never use pivot steer brakes and differential brakes at the same time.
   d. When steering and braking occurs at 1st notch or after 4th notch on the quadrant, vehicle can skid and crash; personnel can be injured or killed. If steering and braking is not between 2d notch and 3rd notch, do not operate vehicle; notify organizational maintenance through the chain of command.
2. Exhaust gas poisoning causes dizziness, headache, loss of muscle control, sleepiness, coma, and death. If anyone shows signs of exhaust gas poisoning, get all personnel out of the carrier. Make sure they have lots of fresh air. Keep them warm, calm, and inactive. Get medical help. If anyone stops breathing, give artificial respiration.

**Performance Steps**

4. Set gear selector, as required, and drive the vehicle at appropriate speeds based on specific conditions and instructions from supervisor.

WARNING
Do not attempt to change carrier forward or reverse movement by shifting until carrier comes to a complete stop. Above 4 miles per hour if you attempt to shift into reverse (or forward), the carrier will continue in the direction you were moving when you attempted to make the change. Failure to follow the above instructions could result in injury or death to personnel and destruction of equipment or property.

5. Monitor driver controls and gages for normal vehicle operation.

WARNING
Failure to heed the following warnings will result in damage to the vehicle and injury to personnel:
1. Do not climb obstacles higher than 2 feet.
2. Do not drive on grades that exceed 60 percent.
3. Do not drive on side slopes steeper than 30 percent.
4. Do not cross trenches that exceed 5 1/2 feet.
5. Do not ford water that exceeds 40 inches when driving A1 and A2 models, 48 inches when driving the A3 model.

6. Drive the vehicle over trenches, obstacles, shallow streams (3 1/2 feet or less), slopes, hills, and on snow, ice, or mud by applying the appropriate driving technique for the specific condition.
7. During water operations, ensure vehicle is properly prepared. Exercise extreme caution during entry and exit and apply water driving techniques.
8. During reduced visibility, use night vision devices or aids. Vehicle driving techniques remain the same for specific conditions.
9. Apply engine shutdown procedures after completion of mission.

**Evaluation Preparation:** SETUP: At the test site provide all material and equipment according to task condition statement.

BRIEF SOLDIER: Tell the soldier to operate the vehicle across varying terrain and weather conditions. The vehicle must be driven safely without damage to the vehicle or injury to personnel.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed operational checks. | ____ | ____ |
| 2. Applied required safety measures, such as wearing seat belt and hearing protection, used ground guides, and gave warning prior to moving the vehicle and lowering or raising the ramp. | ____ | ____ |
| 3. Applied vehicle starting procedures. | ____ | ____ |
| 4. Set gear selector, as required, and drove the vehicle at appropriate speeds based on specific conditions and instructions from supervisor. | ____ | ____ |
| 5. Monitored driver controls and gauges for normal vehicle operation. | ____ | ____ |
| 6. Drove the vehicle over trenches, obstacles, shallow streams (40 inches or less when driving A1 and A2 model, 48 inches or less when driving the A3), slopes, hills, snow, ice, or mud; applied the appropriate driving technique for the specific condition. | ____ | ____ |
| 7. Ensured the vehicle was properly prepared for water operations. Exercised extreme caution during entry and exit, and applied water driving techniques. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 8. Used night vision devices or aids during reduced visibility. Vehicle driving techniques remained the same for specific conditions. | ____ | ____ |
| 9. Applied engine shutdown procedures after completion of mission. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 9-2350-259-10<br>TM 9-2350-261-10<br>TM 9-2350-277-10-1 |

**Maintain the Mortar System on an M113-Series Vehicle**

**071-212-0022**

**Conditions:** Given an M106A1/A2 carrier, TM 9-1015-215-10 or PMCS extract, the equipment listed, and a requirement to inspect or maintain the mortar related components.

**Standards:** All mortar related components were found serviceable, repaired, or reported to the chain of command.

**Performance Steps**

NOTE: No sequence is required for the following steps.

1. Maintain the standard assembly.
2. Maintain the turntable.
3. Maintain mortar component attachment devices.
4. Lubricate vehicle mortar components.

**Evaluation Preparation:** SETUP: At the test site provide all material and equipment according to the task condition statement.

BRIEF SOLDIER: Tell the soldier to inspect the system of any uncorrected faults recorded on DA Form 2404.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Maintained the standard assembly. | ____ | ____ |
| 2. Maintained the turntable. | ____ | ____ |
| 3. Maintained mortar component attachment devices. | ____ | ____ |
| 4. Lubricated vehicle mortar components. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 9-1015-215-10 |

Subject Area 30: WEAPONS: 120-MM MORTAR

**Perform Safety Checks on a 120-mm Mortar**
**071-090-0001**

**Conditions:** As a gunner, given a ground-mounted 120-mm mortar complete.

**Standards:** Performed safety checks, ensured that the mortar was mounted correctly, and ensured that it was safe to fire.

**Performance Steps**

1. Perform the following safety checks for mask and overhead clearance:
   a. To determine mask clearance, lower the barrel to an elevation of 0800 mils with your head placed near the base of the barrel. Sight along the top of the barrel for obstructions through the full range of traverse.
   b. To determine overhead clearance, raise the barrel to an elevation of 1500 mils with your head near the base of the barrel. Sight along the top of the barrel for obstructions through the full range of traverse.

NOTE: If at any point in the full range of traverse, both at minimum and maximum elevation, an obstruction is found, raise or lower the barrel until the round, when fired, can clear the obstruction. Turn the sight elevation knob until the elevation bubble is level. Read the elevation at this point. Report the deflection and elevation for this point to the squad leader, who in turn must report this information to the fire direction center.

2. Perform the following safety checks to ensure the barrel is locked to the baseplate:
   a. Lock the barrel into the socket of the baseplate with the white line on the barrel facing up.
   b. Align the white line on the barrel with the white line on the buffer housing assembly.

3. Perform safety checks to ensure that--
   a. The buffer housing assembly is locked. This can be done by loosening the buffer housing assembly about one-quarter of a turn and by retightening it until a metallic click is heard.
   b. The cross-level locking knob is hand-tight.
   c. The spreader chain is taut.
   d. The firing selector shows the "F" (fire) position.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment listed in the task condition statement.

BRIEF SOLDIER: Tell the soldier to name and perform the safety checks on the mortar.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Checked mask and overhead clearance. | ____ | ____ |
| 2. Checked that the barrel is locked to the baseplate. | ____ | ____ |
| 3. Checked that buffer housing assembly is locked. | ____ | ____ |
| 4. Checked that the cross-level locking knob is hand-tight. | ____ | ____ |
| 5. Checked that the spreader chain is taut. | ____ | ____ |
| 6. Checked that the firing selector shows the "F" (fire) position. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
| --- | --- |
| | TM 9-1015-250-10 |

**Lay a 120-mm Mortar for Deflection and Elevation**

**071-090-0002**

**Conditions:** As a gunner, given a mounted and leveled 120-mm mortar, complete with M64 sight, laid at a deflection of 2800 mils and an elevation of 1100 mils; emplaced aiming posts; a sight-reticle chart that shows how to obtain a proper sight picture; and a fire command to make small changes to deflection and elevation, and an assistant gunner.

**Standards:** Indexed the given deflection and elevation without error, so that the vertical crossline moved to within 2 mils of an aligned or compensated sight picture.

**Performance Steps**

1. Small deflection and elevation changes.
    a. The gunner continues to turn the deflection micrometer knob until the remainder of the deflection indexes on the deflection micrometer scale. The horizontal line is indexed evenly every 5 mils and numbered every 10 mils.
    b. On the command "SECTION," the gunner moves to the left side of the mortar and assumes a good position.
    c. When the fire command continues, "HIGH-EXPLOSIVE QUICK, NUMBER 2 GUN, DEFLECTION ( )," the gunner places his left hand on the deflection micrometer knob and indexes the deflection. Then, he moves his left hand to the cross-leveling mechanism and waits for the rest of the command.
    d. When the command continues, "CHARGE 2, ELEVATION ( )," he places his right hand on the elevation knob and indexes the elevation.
    e. After indexing the elevation, the gunner places his left hand on the elevation crank and turns it until the elevation (side) bubble centers between the two outer red lines.
    f. While looking through the sight, he places his right hand on the traversing handwheel and moves the vertical line of the sight halfway to the aiming posts. He places his left hand on the cross-leveling mechanism and levels the back bubble.
    g. Using his right hand, the gunner turns the traversing hand wheel crank until the vertical line moves halfway to the aiming posts then he removes his eye from the sight.
    h. He puts his left hand on the cross-leveling mechanism and centers the back bubble between the two red lines.
    i. He repeats the previous steps until the vertical line moves to within 2 mils of the left edge of the aiming posts.
    j. He checks the deflection and elevation to ensure that the data is correct and that both the bubbles remain level.
    k. He announces his gun number followed by the word "up," and then he moves behind the aiming posts bag.

2. Sight reticle chart. The sight reticle has two lines: one vertical, and one horizontal.
    a. The gunner continues turning the deflection micrometer knob until the rest of the deflection is indexed on the deflection micrometer scale. The horizontal line is indexed evenly every 5 mils and numbered every 10 mils.
    b. The new deflection moves the vertical line to the left or right ( ) mils.
    c. The gunner receives and indexes a new elevation, and then levels the elevation bubble.
    d. He looks through the sight and uses his right hand to traverse the vertical line halfway to the aiming posts. He levels the deflection (back) bubble. He continues until the vertical line moves to within 2 mils of the left edge of the aiming posts and both bubbles are level. He ensures that the deflection and elevation are indexed IAW the initial fire command. He announces his point number followed by "Up."

3. Sight picture.
    a. In accordance with the conditions statement, the gunner re-lays the gun on a deflection of 2800 mils and elevation of 1100 mils, which aligns the sight picture.

**Performance Steps**

b. The gunner receives and indexes the deflection.

4. Large deflection and elevation change.
   a. On the command "SECTION," the gunner moves to the left side of the mortar.
   b. The assistant gunner moves to the front of the bipod and kneels down on one knee.
   c. Placing his right hand on the traversing hand wheel crank, the gunner centers the traversing mechanism. The fire command continues, "HIGH-EXPLOSIVE QUICK, NUMBER TWO GUN, ONE ROUND, DEFLECTION (  )."
   d. The gunner receives the deflection and uses his left hand to index it on the deflection micrometer knob.
   e. Upon hearing the last digit of the deflection, the assistant gunner stands up and squats slightly in front of the bipod. The fire command continues, "CHARGE (  ), ELEVATION (  )."
   f. Once the vertical crossline nears the aiming posts (within 20 mils), the gunner checks the elevation vial. He re-lays for elevation, if required, by elevating or depressing the elevating mechanism. He makes final adjustments using the traversing hand wheel, and then he traverses halfway to the aiming point and cross-levels.
   g. The gunner receives the elevation and uses his left hand to index it on the elevation micrometer knob. He places his right hand on the elevation handwheel crank and floats the elevation bubble. When the vertical crossline moves to within 2 mils of the aiming posts, and all bubbles are level, the mortar is laid.
   h. After floating the elevation bubble, the gunner places his right hand on the clamp handle assembly, while keeping one eye (preferably the right) in the sight, and then announces "Up" to the assistant gunner.
   i. The assistant gunner lifts the bipod by squatting slightly, with his legs spread shoulder width. He supports his elbows on his knees while he grabs the bipod legs and lifts them until their feet slightly clear the ground.
   j. With his left hand on the elevation crank, the gunner pushes or pulls the mortar until the vertical line of the sight moves onto the aiming posts. He announces "Down" to the assistant gunner. The gunner removes his eye from the sight and uses his right hand to level the deflection bubble on the cross-leveling mechanism.
   k. The gunner places his eye in the sight and ensures that the vertical line is within 20 mils left or right of the aiming posts. If not, he repeats the previous steps.
   l. He places his right hand on the elevation handwheel crank, and levels the elevation bubble.
   m. He places his right hand on the traversing handwheel crank, places his eye into the sight, and traverses the vertical line of the sight halfway to the aiming posts.
   n. He removes his eye from the sight and uses his left hand to level the deflection bubble on the cross-leveling mechanism.
   o. He places his eye back into the sight and repeats the previous steps until the vertical line moves to within 2 mils of the correct, compensated sight picture.
   p. He checks to ensure that both bubbles are level, that the correct deflection and elevation are indexed on the sight, and that the traversing mechanism is no more than two turns from center. He locks the traversing extension in the center position.
   q. He announces the gun number followed by "Up." The crew falls in behind the aiming posts bag.

NOTE: The sight reticle chart shows the proper sight pictures and explains how to obtain each of them.

5. Large deflection and elevation changes. The gunner can achieve three types of sight pictures while making a large deflection and elevation change:
   a. Compensated left. The rear pole is to the left of the near pole. The vertical crossline is to the left of and equidistant from both the near and far poles.
   b. Compensated right. The rear pole is to the right of the near pole. The vertical crossline is to the right of the far pole equal to the distance at the left side of the near pole.
   c. Aligned. The rear pole hides the near pole.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to lay the mortar for a small deflection and elevation change.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Set the correct deflection on the sight. | ____ | ____ |
| 2. Set the correct elevation on the sight. | ____ | ____ |
| 3. Leveled mortar for elevation. | ____ | ____ |
| 4. Laid on the aiming posts with the vertical crossline within 2 mils of aiming posts and all bubbles leveled. | ____ | ____ |

**Evaluation Guidance:** Cover chart 1, ask and clarify the student's question(s), then move the student for practical application.

Conduct a check on learning and summarize the enabling learning objective.

Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**
ARTEP 7-90-DRILL
TM 9-1015-250-10

**Boresight a 120-mm Mortar**

**071-090-0003**

**Conditions:** As a gunner, given a mounted 120-mm mortar complete with sight, an M45 boresight, a screwdriver, a distant aiming point or sight case, and an assistant gunner.

**Standards:** 1. Distant-aiming-point method. Aligned both the gun sight and the boresight on the same sight picture and ensured that the bubbles were level, the sight had a deflection of 3200 mils and an elevation of 0800 mils, and the mortar was within four turns of center traverse.

2. Sight-case method. Ensured that the sight case was about 25 meters to the front of the mortar. Aligned the sight case so that its long axis (handle) was perpendicular (handle up) to the mortar, with the vertical crosshair of the gun sight aligned on the left edge of the sight case. Aligned the boresight vertical crosshair on the right edge of the sight case. Ensured that all bubbles were level on both the M53 sight and M45 boresight. Set deflection on the M53 sight to 3200 mils and elevation to 0800 mils.

**Performance Steps**

1. The gunner prepares the mortar for boresighting.
    a. From the mounted mortar position, select an aiming point to use for boresighting deflection. This aiming point should be as far as possible from the mortar, but it must be at least 200 meters from the mortar. The aiming point must also be a fixed object.
    b. Set the sight at a deflection of 3200 mils and an elevation of 0800 mils, and lay the mortar on the distant aiming point. Ensure that the mortar is within four turns of center traverse, and that both bubbles on the sight are level.
    c. Place the M45 boresight on the top of the barrel, flush with the rim at the muzzle end of the barrel (Figure 1). Center the cross-level bubble by rotating the boresight and then tighten the clamp screw. Fine adjustment can be made by tapping on either side of the boresight.

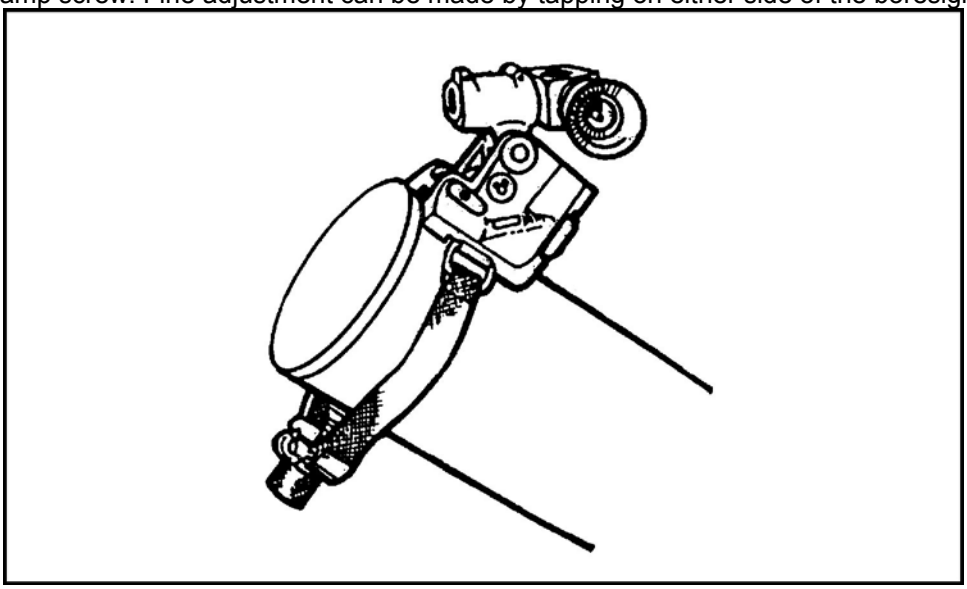


Figure 1. M45 sight flush with rim of muzzle.

    d. The mortar is now prepared for boresighting.

2. The gunner boresights for elevation.
    a. Elevate or depress the mortar, until the boresight elevation bubble is level.
    b. If the sight's elevation bubble is not level, rotate the sight's elevation micrometer knob until the elevation bubble on the sight is leveled.
    c. Check the coarse elevation scale. If the coarse elevation index is not at 8, loosen the two

**Performance Steps**

screws that hold the coarse elevation scale. Slip the scale until the 0800-mil mark meets the reference mark on the housing. If it is plus or minus 20 mils from the 8 (0800) on the elevation scale, the sight should be turned in to organizational maintenance.

d. Ensure the reading on the micrometer elevation scale reads 0 mils on the fine elevation scale index mark. If not, tighten the elevation locking knob. Loosen the two screws on the elevation knob, and slip the micrometer elevation scale until 0 mils is at the index mark. Then tighten the two screws.
e. All bubbles on the sight and boresight should be level, and the elevation scales on the sight should read 0800 mils. If not, repeat the process.
f. The mortar is now boresighted for elevation.

3. The gunner boresights for deflection (distant-aiming-point method).
   a. Look through the boresight elbow telescope. Ensure the vertical crossline is still laid on the aiming point. If not, re-lay on the aiming point using the traversing hand wheel. Ensure the mortar does not traverse more than four turns of center traverse.
   b. If needed, re-lay the cross-level vials on the boresight by tapping the vials on either side of the sight. Use the cross-leveling hand wheel until both vials are level, and the boresight vertical crossline is on the aiming point. These steps may need repeating several times to do this.
   c. Look through the elbow telescope of the M53 sight. Use the deflection micrometer knob of the sight to move the vertical crossline of the sight to the same point on the aiming point on which the boresight is laid. The sight picture on the boresight and the M53 sight must be the same.
   d. After all bubbles are level (deflection and elevation) and the sight pictures are the same, check the deflection scale. The scale should read 3200 mils.
   e. Check the 3200 on the coarse (fixed) deflection (red) scale. If the 3200 is not aligned at the index mark and is + or - 20 mils, the M53 sight should be turned in to organizational maintenance.
   f. Review all procedures for correctness. If procedures are correct, the sight is now boresighted. Remove the boresight. The mortar is boresighted.

4. The gunner boresights for deflection (sight-case method).
   a. Align the long axis (handle) of the M53 sight case perpendicular (handle up) to the barrel 25 meters from the mortar position.
   b. Align the vertical crossline of the boresight on the right side of the sight case.
   c. Using the deflection micrometer knob, align the vertical crossline of the M53 sight on the left side of the sight case.
   d. Look through the boresight elbow telescope. Ensure the vertical crossline is still laid on the right side of the sight case. If not, re-lay on the sight case using the traversing hand wheel or shift the sight case so the right side is aligned with the vertical line of the boresight. If traversing is needed, ensure the mortar does not move more than four turns of center traverse.
   e. If needed, re-level the cross-level vials on the boresight by tapping either side of the sight. These steps may need repeating several times to accomplish this.
   f. Look through the M53 sight elbow telescope. By using the deflection micrometer knob of the sight, move the vertical crossline of the sight to the left edge of the sight case. The vertical line of the boresight should be on the right side of the sight case.
   g. After all bubbles are level and the sight pictures are correct, check the deflection scale. The scale should read 3200 mils.
   h. Check the 3200 on the coarse (fixed) deflection (red) scale. If the 3200 is not aligned at the indexed mark and is plus or minus 20 mils, the M53 sight should be turned in to organizational maintenance.
   i. Review all procedures for correctness. If all procedures are correct, the sight is now boresighted. Remove the boresight. The mortar is ready to fire.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, an aiming point, and personnel as given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to boresight the 120-mm mortar with the M53 sight, using the distant-aiming-point method or the sight-case method.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Distant-aiming-point method (at least 200 meters from mortar). | ___ | ___ |
| a. Placed a deflection of 3200 mils and an elevation of 0800 mils on the sight. | | |
| b. Laid the mortar on the distant aiming point. | | |
| c. Attached boresight and leveled bubbles. | | |
| d. Boresighted the mortar for elevation. | | |
| e. Laid vertical crossline of boresight and sighted on the aiming point. | | |
| f. Boresighted the mortar for deflection. | | |
| g. Ensured mortar was within four turns of center traverse. | | |
| 2. M53 Sight Case Method. | ___ | ___ |
| a. Ensured sight case was about 25 meters from the mortar. | | |
| b. Placed a deflection of 3200 mils and an elevation of 0800 mils on the sight. | | |
| c. Ensured the vertical crossline of the M45 boresight was on the right edge of the sight case. | | |
| d. Boresighted the mortar for elevation. | | |
| e. Boresighted the mortar for deflection. | | |
| f. Ensured the mortar was within four turns of center traverse. | | |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1015-250-10 |

**Prepare 120-mm Mortar Ammunition for Firing**

**071-090-0004**

**Conditions:** As a 120-mm ammunition bearer, given ammunition and fuzes for the 120-mm mortar; a fuze setter and wrenches, and an initial fire command that specifies the type of round and, if required, the action of the fuze and the fuze setting.

**Standards:** Selected the correct round and fuze. If required, attached the fuze; set the fuze action correctly; and set the correct charge.

**Performance Steps**

NOTE: The information found in this task can only be used when firing the ammunition shown. New ammunition is now being developed for the 120-mm mortar.

1. Identification of rounds (NATO colors).

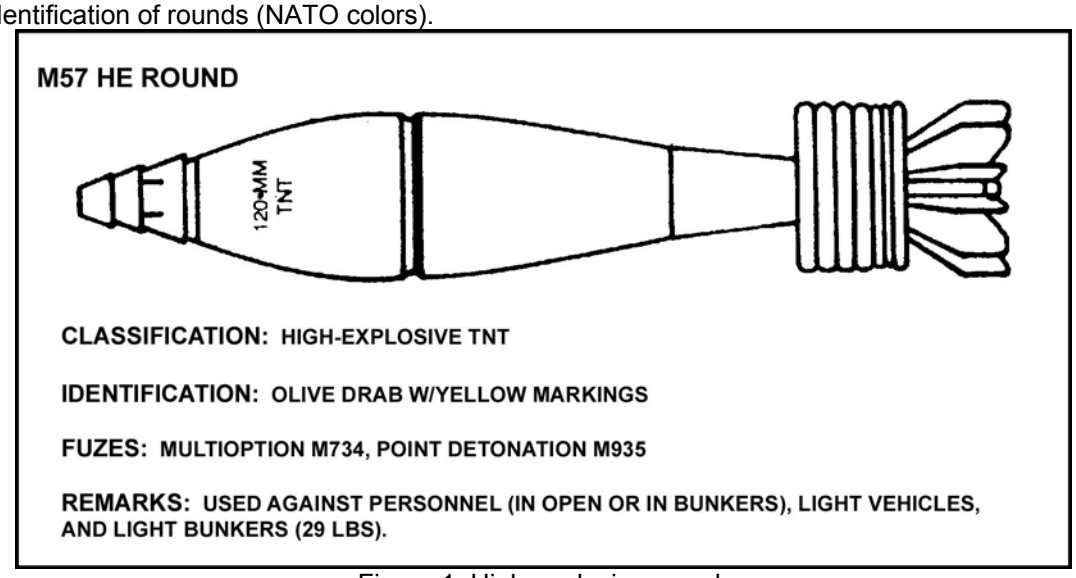



Figure 1. High-explosive round.

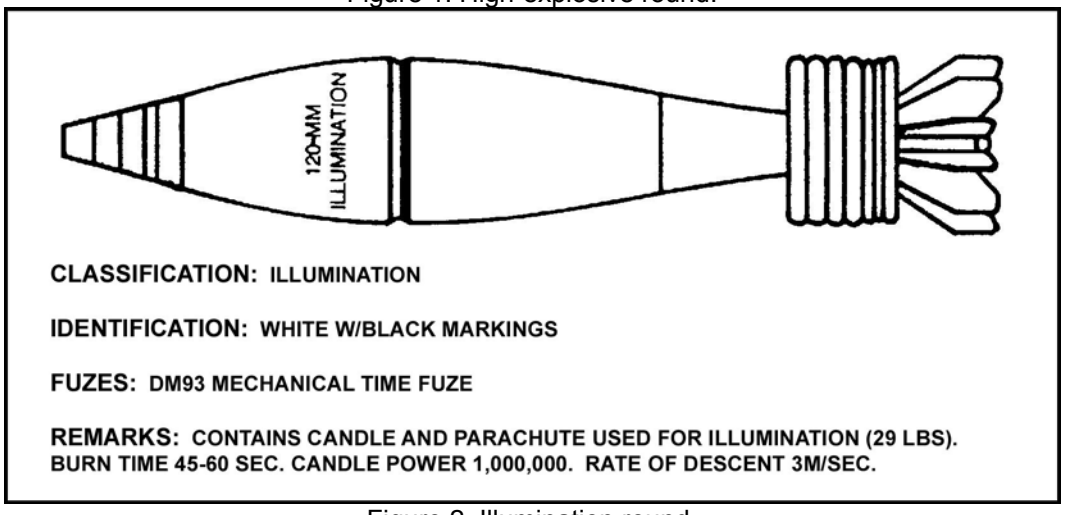



Figure 2. Illumination round.

**Performance Steps**

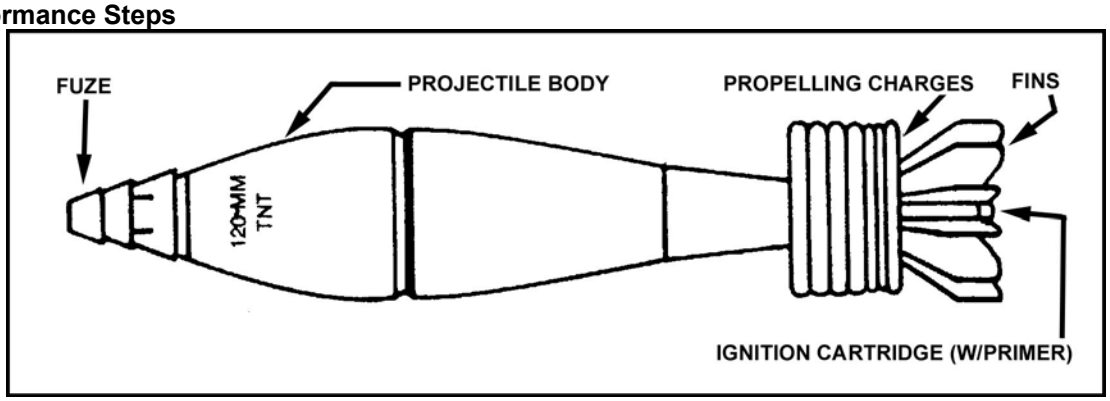



Figure 3. Parts of the 120-mm round.

a. High explosive--olive drab with yellow markings.
b. White phosphorus--light green with red markings.
c. Illumination--white with black markings.

2. Authorized rounds. High-explosive, illumination, and smoke rounds may be fired in the 120-mm mortar (Figures 1, 2, and 3). Each of the rounds is made up as shown in Figure 3.

3. Cutting charges.

CAUTION

PROPELLANT CHARGES ARE NOT INTERCHANGEABLE (DO NOT MIX LOTS).

a. Rounds are always shipped with a complete propellant charge, to include ignition cartridge.
b. In order to cut charges, you must first understand the charge that comes on the round. For the 120-mm mortar, all rounds come with the following increments, which make up the charge. These increments of the charge are placed on the round as shown in Figure 4:

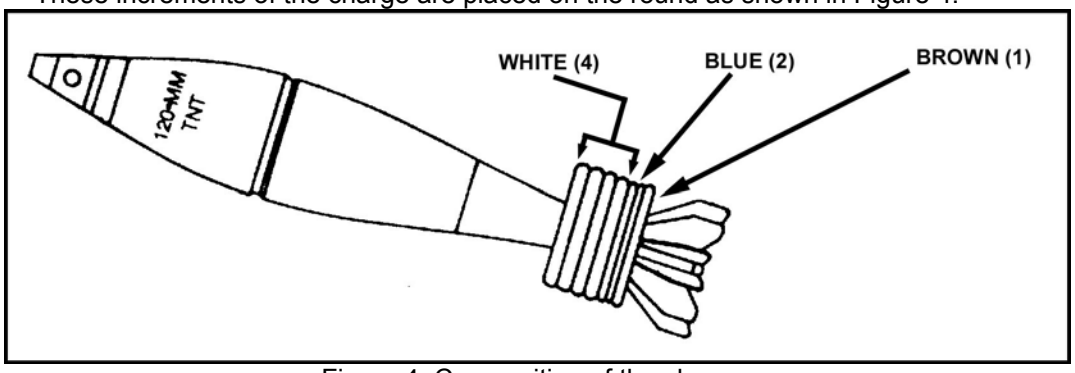



Figure 4. Composition of the charge.

(1) One brown charge (remains at all times).
(2) Two blue charges.
(3) Four white charges.

c. The charge is cut in the following way:

**Performance Steps**

| MORTAR ROUND | CHARGE | MAKEUP OF CHARGE LEFT ON ROUND |
|---|---|---|
| HE M57 | 0 | 1 BROWN |
| WP M68 | 1 | 1 BROWN AND 1 BLUE |
| TP M70 | 2 | 1 BROWN AND 2 BLUE |
| | 4 | 1 BROWN, 2 BLUE, AND 1 WHITE |
| | 6 | 1 BROWN, 2 BLUE, AND 2 WHITE |
| | 8 | 1 BROWN, 2 BLUE, AND 3 WHITE |
| | 10 | 1 BROWN, 2 BLUE, AND 4 WHITE |
| ILLUM M91 | 2 | 1 BROWN AND 2 BLUE |
| | 4 | 1 BROWN, 2 BLUE, AND 1 WHITE |
| | 6 | 1 BROWN, 2 BLUE, AND 2 WHITE |
| | 8 | 1 BROWN, 2 BLUE, AND 3 WHITE |
| | 10 | 1 BROWN, 2 BLUE, AND 4 WHITE |

Mortar charge table.

(1) Each of the rounds is made up as shown in Figure 3.
(2) The only odd charge is charge 1.
(3) If given a charge 4, remove 3 of the white charges. This would leave a charge 4 on the round.

4. Fuzes.
   a. The point-detonating fuze, M935, is a super quick or delay-action fuze. It is shipped preset to the super-quick function.
      (1) To prepare for firing, turn the selector slot in a clockwise direction until the slot aligns with either the SQ (super quick) or the D (delay)(Figure 5).

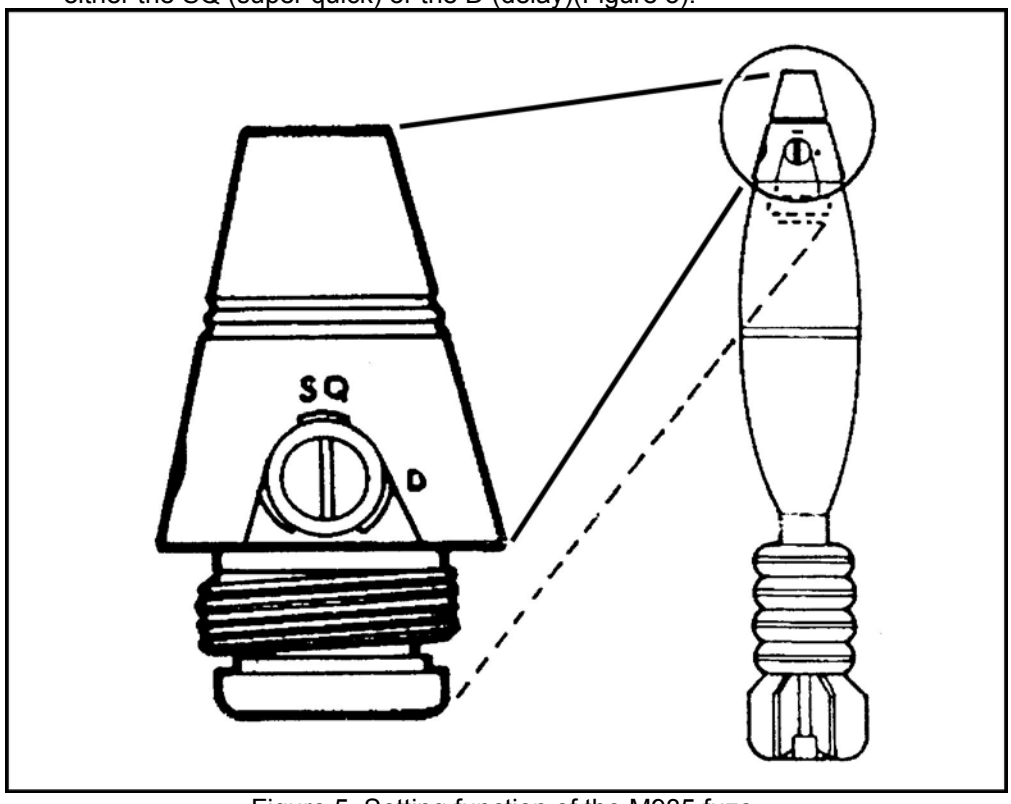



Figure 5. Setting function of the M935 fuze.

      (2) To change settings, turn the selector using the end of a wrench, a coin, or a screwdriver.

**Performance Steps**

(3) When the fuze is set to the delay (D) function, the fuze functions 1/20th of a second after impact.

b. The mechanical time fuze, DM93 (Figure 6), is found only on the illumination round. It is shipoped set on SAFE.

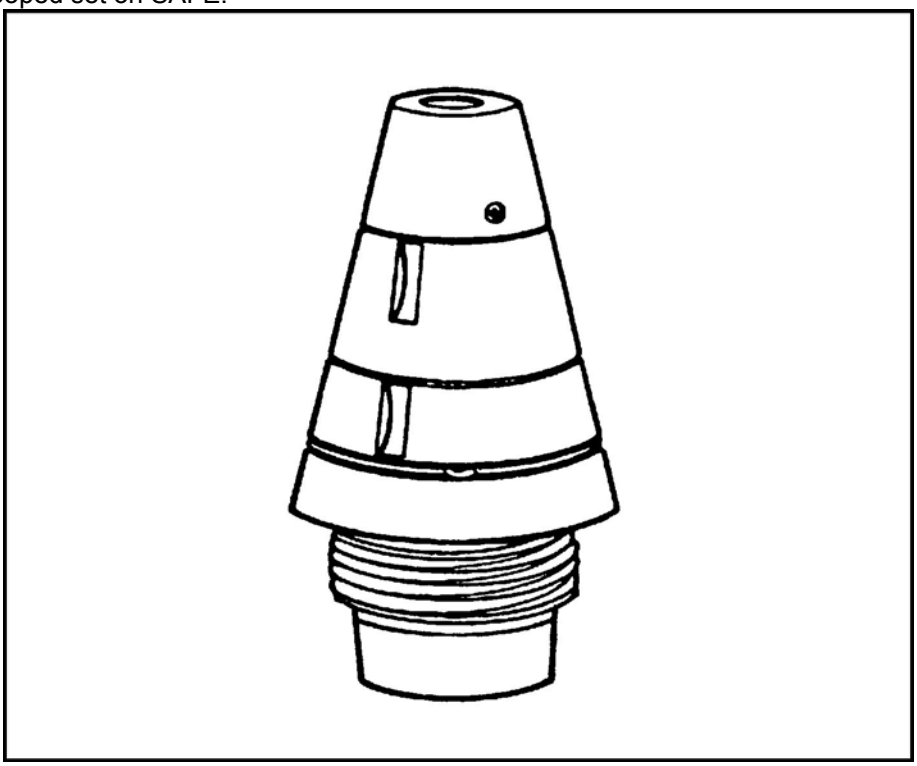


Figure 6. Mechanical time fuze, DM93.

CAUTION: ALWAYS SET FUZE BY TURNING CLOCKWISE. TURNING COUNTERCLOCKWISE COULD DAMAGE THE FUZE. IF YOU TURN IT BEYOND THE DESIRED SETTING, CONTINUE TURNING CLOCKWISE TO REACH THAT SETTING AGAIN.

(1) This time fuze can be set to function at any time, in seconds, from time of firing to achieve an airburst.
(2) The time fuze has a time-scale numbered from 0 to 50 seconds.
(3) To set, use the fuze wrench.
(4) Place the fuze wrench over the tip of the fuze. Rotate the wrench and fuze in a clockwise direction until the correct line and seconds are aligned at the index line.

NOTE: To reset the fuze to SAFE, rotate the wrench and fuze clockwise until the SAFE mark is aligned with the index line.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and tools given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the equipment and tools provided and identify and prepare the proper round for firing.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Selected the correct round as called for. | ____ | ____ |
| 2. Placed the correct charge on the round. | ____ | ____ |
| 3. Set the fuze to proper function (when required). | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 4. Removed safety wire from the fuze (when required). | ____ | ____ |
| 5. Placed the correct time setting on the fuze (when required). | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 43-0001-28<br>TM 9-1015-250-10 |

**Maintain a 120-mm Mortar**

**071-090-0005**

**Conditions:** As a member of a 120-mm mortar crew, given a complete 120-mm mortar, including all required fire-control equipment, tools, paint, lubricants, and cleaning materials.

**Standards:** Inspected, cleaned, spot-painted, and lubricated the mortar and fire-control equipment so that no deficiencies correctable by the crew were present. If a noncorrectable defect was found, or if the bipod had been immersed in water, the crew notified organizational maintenance personnel immediately.

**Performance Steps**

1. Weapon Record Data. The Weapon Record Data (DA Form 2408-4)(Figure 1) is completed during each firing action.
   a. Date. Enter the calendar date for rounds fired--for example, 2 Apr 04 (do not use Julian dates).
   b. Projectile type. Enter the type of projectile and cartridge model--for example, HE M57/WP M568.
   c. Zone or charge. Enter the highest charge fired.
   d. Rounds fired. Enter the total number of rounds fired.
   e. Cumulative rounds fired. Add the number of rounds fired (page 2, column 10d) to the last entry made in column 10f.
   f. Signature column.
      (1) The soldier designated by the unit commander to make entries signs in the signature column. He must include his rank or title.
      (2) When a support unit soldier makes entries, he must identify his unit after his signature and rank or title.
      (3) The unit commander must sign on the first and last lines of the form.

**WEAPON RECORD DATA**

For use of this form, see DA PAMs 738-750 and 738-751; the proponent is ...

4. DSCLOG

REQUIREMENT (CSGL) . SYMBOL

| 1. TUBE SERIAL NO. | 2. CANNON TYPE, MODEL OR SERIES | 3. ORGANIZATION (UIC) | 4. SPECIAL LIFE DATA |
|---|---|---|---|
| 12345 | M30 | B 1/11TH INF REGT | |

| 5. END ITEM IDENTIFICATION | 6. RDS/EFC COMPUTATION |
|---|---|
| BARREL | |

| 7. CANNON SERIAL NO. | 8. RETUBINGS | 9. REBUSHINGS |
|---|---|---|
| 12345 | | |

| 10. Date (a) | Projectile Type (b) | Zone or Charge (c) | Rounds Fired (d) | EFC RDS Fired (e) | Cumulative RDS Fired (f) | Cumulative EFC RDS (g) | Remaining Life (EFC RDS) (h) | Remarks: Recoil Exercise (RE), Gage or Velocity Reading, Safety Inspection (SI) (i) | Signature (j) |
|---|---|---|---|---|---|---|---|---|---|
| | (Previous DA Form 2408-4 final entries) | | | | | | | | |
| 1 OCT 92 | HE M699 | | 262 | | 300 | | | | |

CONTINUE ON REVERSE

DA FORM 1 JAN 79 2408-4 EDITION OF 1 DEC 77 WILL BE USED

Figure 1. Example of completed DA Form 2408-4.

2. Inspecting the mortar.

**Performance Steps**

a. Barrel Assembly.
   (1) Check the barrel for cracks, rust, or loose, missing, dented, or damaged parts.
   (2) Ensure breech cap is not loose. This may be shown by the discoloration around the safety mechanism or base cap (Figure 2) caused by gas leakage.
   (3) Ensure safety shifts from the "F" (fire) position to the "S" (safe) position and back.
   (4) Check for proper fit of the muzzle cap.

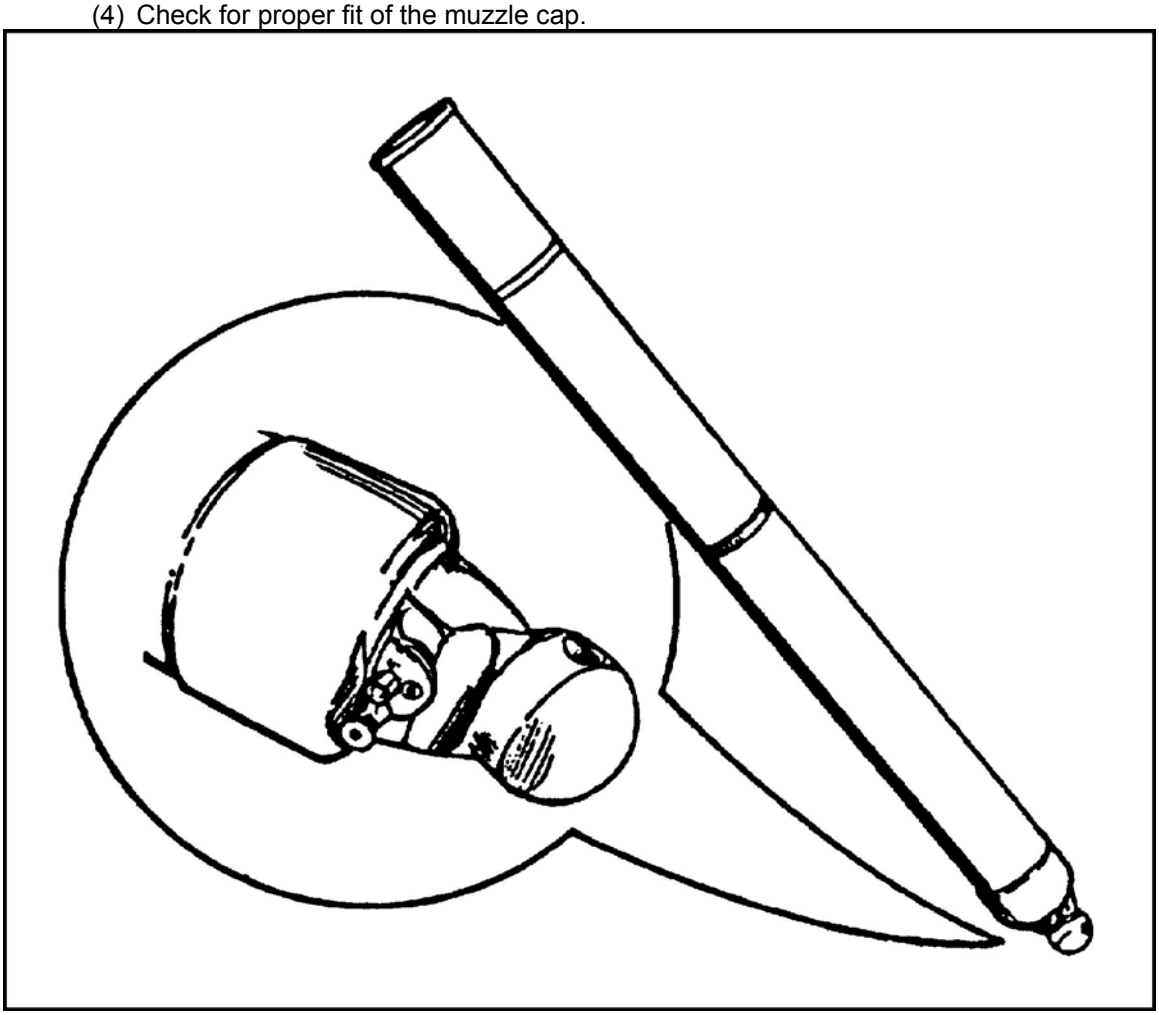


Figure 2. Safety mechanism and base cap.

b. Bipod Assembly.
   (1) Check bipod for cracks, broken welds, rust, and loose, missing, or damaged parts.
   (2) Check that the buffer assembly operates properly and holds the barrel securely.
   (3) Ensure the elevating gear assembly, traversing gear assembly, and cross-leveling mechanism operate smoothly and without binding throughout the entire range of traverse.
c. Baseplate.
   (1) Check the baseplate socket for broken edges, cracks, or rust. No more than 180 degrees of the socket edge can be broken, cracked, or rusted.
   (2) Check the baseplate for cracks or broken welds.
d. Sight unit (M53).
   (1) Check the eyeshield for damage. Check lens and window for smears, cracks, or other obstructions.
   (2) Clean lenses and vials with lens cleaning compound.
   (3) Level vials must not be cracked, broken, or loose in mounting.
   (4) Check rotation of the elevation knob and deflection knob over the entire range of

**Performance Steps**

movement. Motion must be smooth and even.

(5) Check index lines and scales; they must be clear and distinct.

NOTE: For further information on maintenance, refer to TM 9-1015-250-10.

e. Aiming posts.

(1) Check for proper fit. Joints should not be dented out of shape.

(2) Ensure the aiming posts are not bent.

NOTE: Check all parts of the mortar and fire control equipment for scratched or chipped paint. Spot-paint those items that need painting (when required).

CAUTION
USE ONLY GENERAL PURPOSE LUBRICANT (GPL) TO CLEAN OR LUBRICATE THE MORTAR.

3. Maintaining the weapon between uses.
   a. Keep a light coat of preservative lubricating oil on all unpainted metal parts of the mortar and fire control equipment, except in a cold-weather environment (FM 31-70). Use a cleaning staff and rags to oil the bore. Oil all other unpainted surfaces with an oily cloth. Keep all surfaces clean and free of rust.
   b. Aiming post covers are made of a vinyl-coated fabric. To clean, wash them with a mild soap and dry in the shade.

WARNING
THE EXTERIOR SURFACE OF THE BARREL AND THE INTERIOR OF THE BARREL-LOCKING CLAMP MUST BE WIPED FREE OF LUBRICATION BEFORE FIRING, OR THE BARREL-LOCKING CLAMP MIGHT MOVE UP ON THE BARREL DURING FIRING. IF IT DOES SO, SLIDE IT BACK TO THE LOWER STOPPING BAND.

4. Maintaining weapon before firing.
   a. Clean and lightly oil the following moving parts:
      (1) Traversing mechanism surface.
      (2) Elevating mechanism surface.
   b. Tighten all nuts, bolts, and screws. Inspect and dry the bore immediately before firing initial round. Swab the bore with clean dry rags after each 10 rounds fired or after each fire mission.
   c. Clean the exposed surface of the shock absorber inner tube with a dry cloth. Do not lubricate.

5. Maintaining weapon after firing.
   a. Clean the mortar the same day and for the next two days (for a total of three days). Thoroughly clean the bore with rifle bore cleaner (RBC) each day. On the third day, clean the bore with RBC and wipe dry. Then, saturate a wiping cloth with GPL, wring the cloth out, and run it through the bore several times. Clean weekly with RBC, wipe dry, and oil with GPL.
      (1) Clean and lubricate all other parts of the mortar and fire control equipment.
      (2) Tighten all nuts and screws.
      (3) Remove all rusted and repainted parts.
   b. Coat all unpainted outside surfaces with a light coat of GPL. Apply a few drops of oil to the traversing mechanism. Keep all nameplates and serial numbers covered with a light coat of grease.

NOTE: Notify the immediate supervisor and the organizational mechanic if a defective item cannot be corrected by cleaning, lubricating, spot-painting, or adjusting, or if the following items have been immersed in water:

- Elevating mechanism.
- Traversing mechanism.
- Shock absorbers.
- Optical parts.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to perform operator maintenance on a 120-mm mortar and equipment.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Inspected all parts of mortar and fire control equipment. | ____ | ____ |
| 2. Spot-painted parts that need painting. | ____ | ____ |
| 3. Checked and tightened all nuts, bolts, and screws. | ____ | ____ |
| 4. Checked and cleaned traversing and elevation mechanisms. | ____ | ____ |
| 5. Coated nameplate and serial number with a light coat of grease. | ____ | ____ |
| 6. Cleaned and lubricated mortar as required. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**
DA PAM 738-750
FM 31-70
TM 9-1000-202-14
TM 9-1015-250-10

Subject Area 32: WEAPONS: 60-MM MORTAR

## Maintain a 60-mm Mortar
## 071-084-0002

**Conditions:** As a member of a 60-mm mortar crew, given a 60-mm mortar and special tools, material, and equipment needed to perform the required maintenance.

**Standards:** Inspected, cleaned, spot-painted, and lubricated the mortar. For noncorrectable defects or for bipod or sight assemblies that had been immersed in water, the crew notified organizational maintenance immediately.

**Performance Steps**

1. Clean and Lubricate:

NOTE: Do not use cleaner, lubricate, or preservative (CLP) to clean or lubricate the mortar.

   a. Spot-paint parts that are painted.
   b. Coat nameplates and serial numbers with clear lacquer.
   c. At least once every six months, check for application of modification work orders.

2. Canvas/plastic/vinyl items:
   a. Check for loose grommets, loose buckles, rips, mildew, rot, grease, and dirt.
   b. Remove mildew with a dry cloth. Remove oil, grease, and dirt with soap and warm water; rinse with clear water.

3. Barrel assembly:
   a. Inspect for dirt, carbon, and cracks/dents/bulges; remove firing pin and check for cracks/wear.
   b. Place firing selector at T, S, and D positions and check firing mechanism. Trigger should not fire with selector at "S."
   c. Remove dirt with rags and remove carbon with rifle bore cleaner.
   d. Oil barrels and bore.

4. Bipod assembly:
   a. Check for cleanliness and ensure that:
      (1) Sliding bracket grips bipod leg firmly when locking nut is tightened.
      (2) Adjusting nut precisely controls cross-leveling with a minimum of looseness.
      (3) Elevating mechanism operates smoothly up and down.
      (4) Traversing mechanism operates smoothly over entire range in both directions.
      (5) Shock absorbers return to normal position when pulled down.
   b. Clean with dry rags.
   c. Lubricate with oily cloth; oil internal parts of elevating and traversing mechanism.

5. Baseplate assemblies, M7 and M8:
   a. Check the M7 for scratches or chipped surfaces, bent or broken ribs; check socket for smooth operation; and check the assembly for overall cleanliness.
   b. Check the M8 for scratches or chipped surfaces, bent or broken ribs; check socket latch for smooth operation.
   c. Lubricate moving parts.
   d. Clean with rags, and spot-paint.

NOTE: Notify immediate supervisor and the organizational mechanic if a defective item is detected that cannot be corrected by cleaning, lubricating, spot-painting, adjusting, or if the following items have been immersed in water.

1. Elevating mechanism (bipod).
2. Traversing mechanism (bipod).
3. Shock absorbers (bipod).

**Performance Steps**
4. Optical parts (sight).

NOTE: Conduct a check on learning and summarize the enabling learning objective.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to perform operator maintenance on a 60-mm mortar and associated fire control equipment. Tell the soldier to inform you of any defect that he cannot correct.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Spot-painted parts that needed repainting. | ____ | ____ |
| 2. Coated nameplates and serial numbers with clear lacquer. | ____ | ____ |
| 3. Checked canvas items for rips, oil, grease, mildew, and dirt. | ____ | ____ |
| 4. Checked barrel assembly for dirt, carbon, and cracks/dents/bulges. | ____ | ____ |
| 5. Checked firing selector at "T," "S," and "D" positions. | ____ | ____ |
| 6. Cleaned and oiled barrel and bore. | ____ | ____ |
| 7. Checked and cleaned bipod assembly. | ____ | ____ |
| 8. Checked and cleaned baseplate assembly. | ____ | ____ |
| 9. Lubricated all moving parts. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1010-223-10 |

**Perform Misfire Procedures on a 60-mm Mortar While in the Handheld Mode**
**071-084-0003**

**Conditions:** Given a 60-mm mortar in the handheld mode, a misfire condition, and an assistant gunner.

**Standards:** Fired the round, removed the round from the barrel or secured a barrel that had a misfired round, and reported the misfire to the chain of command.

**Performance Steps**

1. Announce "Misfire."

NOTE: The crew will evacuate 50 meters to the side of the mortar. However, this is not a standard for the gunner.

2. Attempt to fire the round.
   a. Place the selector switch on "S."
   b. Bounce the mortar (attempt to dislodge the round).
   c. Place the selector switch on "T."
   d. Activate the trigger mechanism twice.

NOTE: If the round fires, proceed to step 3. If the round does not fire, proceed to step 4.

3. Check/dump/swab the bore and continue the mission.

WARNING
Never stand in front of the tube while removing a round. After raising the base of the mortar, do not lower it again until the round is removed (the round may slide to the base and fire). Never put your hands in front of the muzzle.

4. Remove the round from the tube.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and material given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to perform misfire procedures on a 60-mm mortar while in the handheld mode.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Announced "Misfire." | ____ | ____ |
| 2. Attempted to fire the round. | ____ | ____ |
| 3. Checked/dumped/swabbed the bore. | ____ | ____ |
| 4. Removed round from the tube. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-90 |
| | TM 9-1010-223-10 |

**Engage Targets with a 60-mm Mortar While Firing in the Handheld Mode**

**071-084-0004**

**Conditions:** As a gunner, given a 60-mm mortar barrel, an M8 baseplate, a firing position, high-explosive (HE) ammunition, a target (within 1,000 meters) that you can observe from the firing position, an assistant gunner, and a squad leader.

**Standards:** Engaged the target, fired in the handheld mode, used a maximum of four rounds at charge 1. Fired the fourth round so that it impacted within 50 meters of the target.

**Performance Steps**

1. Direct-lay method. During engagement of a target using the handheld, direct-lay method, the gunner has full responsibility for placing effective fire on the target.

DANGER
THIS PROCEDURE SHOULD BE USED ONLY WHEN DESTRUCTION OF THE TARGET IS MORE IMPORTANT THAN THE SAFETY OF THE CREW.

   a. If the mortar is fired at a range greater than 300 meters with charge 0 or 900 meters with charge 1, the baseplate must be braced against some type of support--for example, stump, tree, rock, or sandbags. This stops the mortar from kicking back and unseating the baseplate.
   b. The most accurate method of fire in the handheld mode is by trigger fire; however, drop fire may be used when a greater volume of fire is needed.

NOTES:
1. When firing trigger fire, the gunner must dig in and seat the baseplate as much as possible before firing the first round.
2. When firing trigger fire, the gunner must release the trigger after a round is fired or the mortar will drop fire on the next round.

   c. When ready to take the target under fire--
      (1) The gunner places the select on "T" (trigger fire).
      (2) The gunner points the barrel in the direction of the target.
      (3) The gunner indexes the floating ball of the range indicator at the estimated range for the charge being used.
      (4) The assistant gunner prepares the round with the correct charge and fuse setting. On order from the gunner, he drops the round down the mortar barrel.
      (5) The gunner carefully aligns the target over the top of the barrel or along one side of the barrel, ensuring that the range is indexed, then slowly squeezes the trigger. Jerking the trigger will throw the round off target.
      (6) After firing the round, the gunner observes the impact of the round, determines the range to fire, and how much left or right of the target he will have to go to pick his new aiming point. Then, he repeats (1) through (5).

NOTE: The next round to be fired should be loaded during the time of flight of the preceding round.

2. Direct-alignment method. Although the 60-mm mortar can be fired handheld in the direct-alignment method, doing this is not recommended.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and material given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the materials and information provided and place effective fire on the target.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Gunner placed the selector on "T" (trigger fire). | ____ | ____ |
| 2. Gunner pointed the barrel in the direction of fire. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 3. Gunner aligned the target over the top of the barrel or along one side of the barrel. | ____ | ____ |
| 4. Gunner indexed the range. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**
FM 23-90
TM 9-1010-223-10

**Place a 60-mm Mortar into Action While in the Handheld Mode**

**071-323-4101**

**Conditions:** Given a 60-mm mortar (bipod, barrel, and sight); a mounting deflection and elevation; a requirement to place the mortar into action; and the following (depending on the firing mode):

1. Bipod mounted: M7 baseplate; base stake, direction stake, or aiming post; and an assistant gunner.

2. Handheld mode: M8 baseplate, firing location, and a general direction of fire.

**Standards:** 1. Bipod mounted. Assembled the mortar, positioned it at the designated location, and laid it on the designated aiming point.

2. Handheld mode. Assembled the mortar for handheld firing, positioned it at the designated location, and oriented in the general direction of fire.

**Performance Steps**

1. Position the baseplate.
2. Lock the barrel to the baseplate.
3. Attach the bipod assembly to the barrel.
4. Attach the sight to the bipod.
5. Lay on the aiming point.
6. Position the baseplate
7. Connect the barrel to the baseplate.
8. Orient and support the barrel from a firing position.

**Evaluation Preparation:** SETUP: At the test site provide all materials and equipment according to the task condition statement.

BRIEF SOLDIER: Tell the soldier to lay the weapon on a predesignated aiming point in the handheld mold.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Identified the function of mortar components. | ____ | ____ |
| 2. Obtained a sight picture. | ____ | ____ |
| 3. Leveled and cross-leveled a mortar. | ____ | ____ |
| 4. Performed small and large deflection and elevation changes. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

## Lay a 60-mm Mortar for Deflection and Elevation
## 071-323-4102

**Conditions:** As a gunner, given an assistant gunner and a mounted 60-mm mortar, with the sight set on a deflection of 2800 mils and an elevation of 1100 mils, and two aiming posts placed out at 50 and 100 meters on a referred deflection of 2800 mils.

**Standards:** 1. Within 35 seconds, made small deflection and elevation changes to the sight as specified in the initial fire command; ensured that both bubbles on the sight were level and the vertical crossline was within 2 mils of the left edge of the aiming posts.

2. Within 75 seconds each, made the following large deflection and elevation changes:

a. Without a saddle change--

(1) Correctly set the mortar sight for deflection and elevation as specified in the initial fire command.

(2) Ensured that both bubbles on the sight were level, that the vertical crossline of the sight was no more than 2 mils from the compensated sight picture, and that the traversing mechanism was no more than two turns to the right or left of the center position.

b. With saddle change--

(1) Moved the bipod from the lower to upper, or from the upper to the lower saddle.

(2) Correctly set the mortar sight for deflection and elevation as specified in the initial fire command.

(3) Ensured that both bubbles on the sight were level, that the vertical crossline of the sight was no more than 2 mils from the compensated sight picture, and that the traversing mechanism was no more than two turns to the right or left of the center position.

**Performance Steps**
NOTE:

Small changes:
* Deflection - 20 to 60 mils
* Elevation - 35 to 90 mils

Large changes:
* Deflection - 200 to 300 mils
* Elevation - 100 to 200 mils

NOTE: A one-quarter turn on the adjusting nut equals a full turn on the traversing handwheel.

1. Small Changes to Deflection and Elevation.
   a. Check the sight on the prelaid mortar to ensure that the mortar is within two turns of traverse and that the vertical crossline is on the left edge of the aiming post.
   b. After receiving a command to change deflection and elevation, make the changes on the sight, lay the mortar for elevation, and traverse onto the aiming post by turning the traversing handwheel and the adjusting nut in the same direction.
   c. When satisfied with the sight picture (Figure 1) announce "Up."
   d. Repeat all elements given in the fire command.

**Performance Steps**

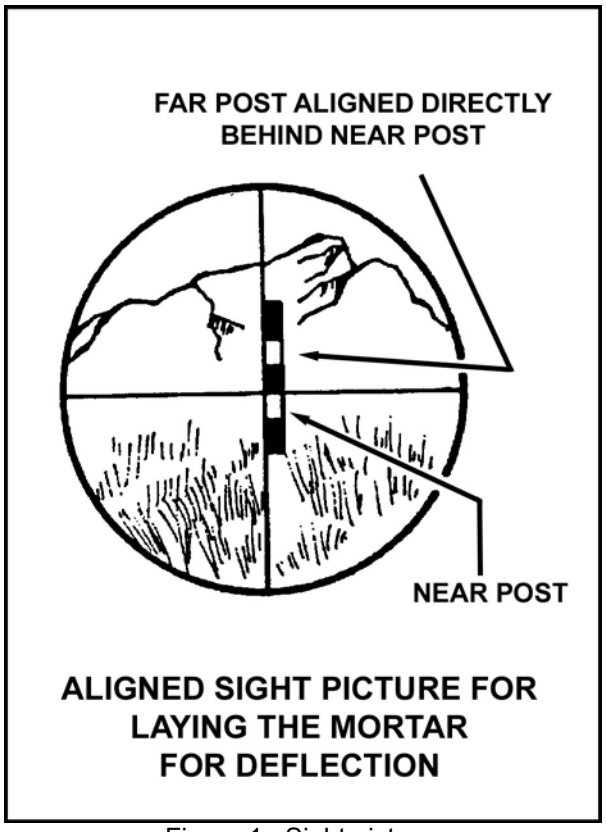



Figure 1. Sight picture.

e. Squad leader: After the gunner announces "UP," check the mortar to see whether he performed the exercise correctly.

2. Large Changes to Deflection and Elevation.
   a. After receiving a fire command to change to deflection and elevation, make the changes.
   b. Squad leader: Check the mortar.
   c. Gunner: As soon as you announce the sight data, place it on the sight, elevate the mortar until the elevation bubble floats freely, and center the traversing bearing. This ensures a maximum traversing capability after making the movement.
   d. With a saddle change--
      (1) Place the mortar into action with the bipod in the lower saddle. Lay the sight on the aiming posts with a referred deflection of 2800 mils and an elevation of 1100 mils.
      (2) After receiving a complete initial fire command to make large deflection and elevation changes, shift the bipod from the lower to the upper saddle, or vice versa.
      (3) Repeat each element of the fire command and place the deflection and elevation on the sight.
      (4) Assistant gunner: Position yourself in front of the bipod in a kneeling position, with one hand on the traversing handwheel and one on the dovetail.
      (5) Gunner: Loosen the collar-locking knob and open the collar.
      (6) Assistant gunner: Raise or lower the bipod to the saddle, as required.
      (7) Gunner: Relock the collar.
      (8) Assistant gunner: Move the legs of the bipod to or from the baseplate, as needed for the saddle used.
      (9) Gunner: Elevate and rough-level the elevation bubble, then ensure that the traversing bearing centers.
      (10) Assistant gunner: Lift the bipod until its feet clear the ground (Figure 2).

**Performance Steps**

Figure 2. Lifting the bipod.

(11) Gunner: Move the mortar and align the sight approximately on the aiming posts.

Note: Either the gunner or the assistant gunner can shift the bipod.

(12) Gunner: Take up the proper compensated sight picture (Figure 3) and fine-level the sight. When you are satisfied with the sight picture and all bubbles are level, announce, "Up."

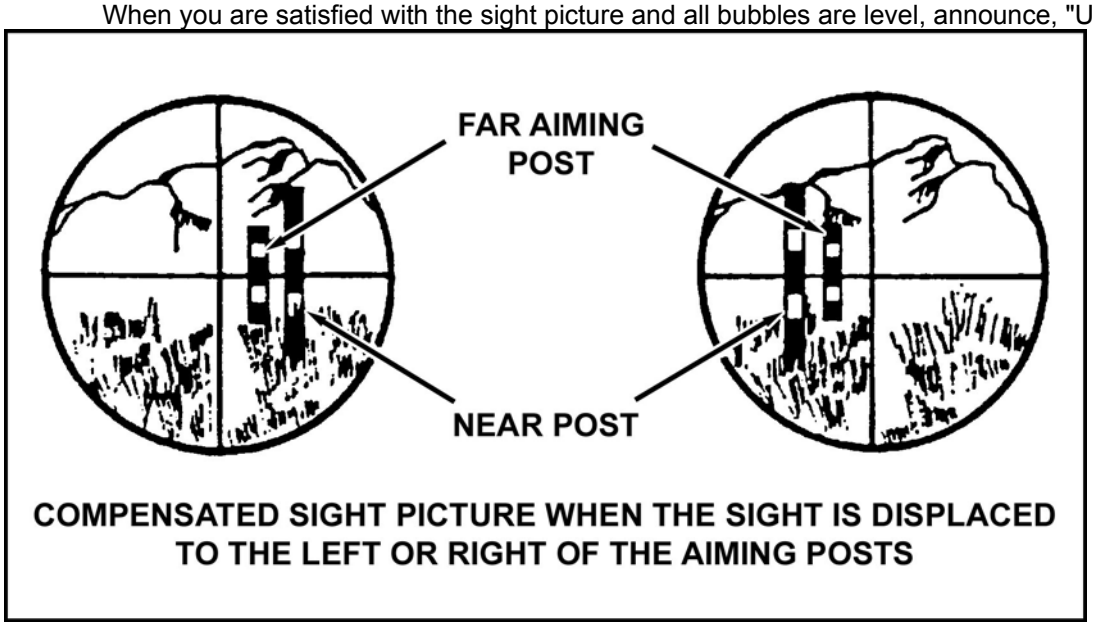



Figure 3. Compensated sight picture.

**Performance Steps**

(13) Squad leader: Check the mortar.

e. Ammunition bearer: Move into position to the front of the bipod on your right knee. Grasp the bipod legs, palms out, and lift them enough to allow lateral movement of the mortar.
f. Gunner: While the ammunition bearer steadies the mortar, move it, keeping the traversing mechanism level. To move it, place the fingers of your right hand in the muzzle, and your left hand on the left bipod leg. Now move it until the vertical line on the sight aligns roughly with the aiming post.
g. Gunner: Push down on the mortar to signal the ammunition bearer to lower the bipod.
h. Gunner: Center the elevation bubble, then lay the mortar for deflection, taking the proper sight picture. After you do this, the mortar should be within two turns of center of traverse.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to make small deflection and elevation changes on a 60-mm mortar (without the aid of an assistant gunner) and to make large deflection and elevation changes on a 60-mm mortar (with or without the aid of an assistant gunner).

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. The gunner must meet the following requirements to perform small deflection and elevation changes:<br>a. Correctly set deflection and elevation change.<br>b. Leveled both bubbles on the sight (within outer red lines).<br>c. Placed the vertical crossline within 2 mils of the left edge of the aiming posts.<br>d. Made the changes in 35 seconds. | ____ | ____ |
| 2. The gunner must meet the following requirements to perform large deflection and elevation changes without saddle change:<br>a. Correctly set deflection and elevation change (no tolerance).<br>b. Leveled both bubbles on the sight (within outer red lines).<br>c. Placed the vertical crossline within 2 mils of the compensated sight picture.<br>d. Centered the traversing mechanism to within two turns of center traverse.<br>e. Made the changes in 75 seconds. | ____ | ____ |
| 3. The gunner must meet the following requirements to perform large deflection and elevation changes with saddle change:<br>a. Correctly set deflection and elevation (no tolerance).<br>b. Leveled both bubbles on the sight (within outer red lines).<br>c. Moved the bipod from lower to upper or upper to lower saddle.<br>d. Placed the vertical crossline of the sight within 2 mils of the compensated sight picture.<br>e. Centered the traversing mechanism to within two turns of center traverse.<br>f. Made the changes in 75 seconds. | ____ | ____ |
| 4. The gunner repeated each element of the fire command. | ____ | ____ |

**Evaluation Guidance:** Check learning and summarize the enabling learning objective.

Begin timing for each standard when the last number of the elevation is announced; stop time when the gunner announces "UP."

Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 23-90
FM 23-91
TM 9-1010-223-10

**Boresight a 60-mm Mortar**

**071-323-4103**

**Conditions:** As the gunner, given an assistant gunner, a mounted 60-mm mortar complete with an M64 sight, an M115 boresight, screwdrivers, and a distant aiming point.

**Standards:** Using either of the following methods, boresighted the 60-mm mortar so that the sight had a deflection of 3200 mils and an elevation of 0800 mils, and the mortar was within two turns from center traverse.

1. Distant-aiming-point method. Aligned both the sight unit and the boresight on the same aiming point (at least 200 meters from mortar), and leveled all bubbles on sight and boresight.

2. Sight-case method. Ensured that the sight case was located 10 meters from the mortar. Aligned the vertical crosshair on the mortar sight on the left edge of the yellow or black circle on the sight case. Aligned the vertical crosshair on the boresight on the right side of the circle. Leveled all bubbles on the sight and the boresight.

**Performance Steps**

1. Prepare the 60-mm mortar for boresighting.
    a. Mount the mortar with a deflection of 3200 mils and an elevation of 0800 mils with bubbles level.
    b. Place the M115 or M45 boresight on the mortar barrel and lay the vertical crossline on the aiming point, with all bubbles level.

2. Calibrate for elevation. After ensuring that the elevation and cross-level bubbles are level, check the elevation bubble on the sight. If the bubble is not level--
    a. Turn the elevation micrometer knob on the sight until the elevation bubble is level.
    b. Check to see whether the coarse elevation index points to "8." If not, loosen the two screws and slip the scale until it does. Tighten the screws.
    c. Check to see whether the fine elevation index points to "0" on the elevation micrometer knob scale. If not, loosen the two screws on the end of the knob and slip the scale until it does. Tighten the screws.

3. Calibrate for deflection using the distant-aiming-point method. Ensure that the vertical crossline of the boresight aligns on the distant aiming point (at least 200 meters), and that the bubbles are level on the sight and boresight, then--
    a. Check to see whether the vertical crossline of the sight lies on the same point as the boresight. If not, turn the deflection micrometer knob until it does.
    b. Check to see whether the coarse-deflection-scale index points to "32." If not, press down on the scale until it unlocks, turn the scale until it points to "32," then release the pressure until the scale relocks into position.
    c. Check to see whether the red line on the inner coarse-deflection scale aligns with "32." If not, lift up on the locking lever, pivot the elbow telescope out of the way, and loosen the two screws. Turn the inner coarse-deflection scale until the red line does point to "32." Then, tighten the two screws, reposition the elbow telescope, and push down on the locking lever to secure it.
    d. Check to see whether the fine-deflection index points to "0" on the deflection-micrometer-knob scale. If not, push the scalloped rim of the fine scale toward the sight body until the scale releases. Turn the scale until it points to "0," then release the scalloped rim and relock the scale.
    e. Check to see whether the fine-deflection red-index arrow aligns with the red-index line (at the "0") on the outer fine-deflection scale. Check to see whether the fine-deflection black arrow aligns with "0" on the fine-deflection micrometer scale. If not, tighten the deflection-locking knob

**Performance Steps**

and loosen the two screws on the deflection knob. Depress the outer fine-deflection micrometer scale and set the red index line to the red index arrow. Depress the fine-deflection micrometer scale, then turn it until it aligns with the "0" at the fine-deflection black arrow. Tighten the two screws and loosen the deflection-locking knob.

4. Calibrate for deflection using the sight case. Use the yellow or black circle on the side of the sight case for boresighting the mortar only when you cannot use the distant aiming point. This procedure is the same, except that you will lay the boresight and sight on two different aiming points.
   a. Place the sight case at least 10 meters from the mortar, with the yellow or black circle facing the mortar.
   b. After ensuring that the bubbles on the boresight and sight are level, the assistant gunner moves the sight case right or left until the vertical crossline of the boresight aligns with the right edge of the (yellow or black) circle.
   c. Look through the sight and check to see whether the vertical crossline on the sight aligns with the left edge of the circle. If not, calibrate the sight for deflection the same as you would with the distant-aiming-point method.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to boresight a 60-mm mortar using the distant-aiming-point and sight-case methods, with or without the aid of an assistant gunner.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Distant-aiming-point method: | ____ | ____ |
| a. Placed a deflection of 3200 mils and an elevation of 0800 mils on the sight. | | |
| b. Leveled all bubbles on the sight and boresight. | | |
| c. Aligned both vertical crosslines of the sight and boresighted on the same aiming point. | | |
| d. Ensured that the mortar was within two turns of center traverse. | | |
| e. Corrected scales that need correcting. | | |
| 2. Sight-case method: | ____ | ____ |
| a. Ensured that the sight case was located at least 10 meters from the mortar position. | | |
| b. Placed a deflection of 3200 mils and an elevation of 0800 mils on the sight. | | |
| c. Leveled all bubbles on the sight and boresight. | | |
| d. Aligned the vertical crossline of the boresight on the right edge of the circle. | | |
| e. Aligned the vertical crossline of the mortar sight on the left edge of the yellow or black circle on the sight case. | | |
| f. Ensured that the mortar was within two turns of center traverse. | | |
| g. Corrected scales that needed correcting. | | |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-90 |
| | FM 23-91 |
| | TM 9-1010-223-10 |

**Perform Safety Checks on a 60-mm Mortar**

**071-323-4104**

**Conditions:** Given a mounted 60-mm mortar, complete with sight.

**Standards:** Performed the mortar safety checks and ensured that the mortar was safe to fire.

**Performance Steps**

1. Check mask and overhead clearance.
   a. To determine mask clearance, lower the barrel to an elevation of 0800 and sight along the top of the barrel with the eye near the baseplate.
   b. To determine overhead clearance, raise the barrel to an elevation of 1511 and sight along the top of the barrel with your eye near the baseplate.

NOTE: If the full range of elevation cannot be obtained throughout the entire sector of fire, raise or lower the barrel until rounds clear the obstruction. Turn the elevation knob on the sight until elevation bubble is level then read the elevation and report it to the fire direction center (FDC).

2. Make sure the barrel is locked to the baseplate, the open end of the socket cap is pointed in the direction of fire, and the handle assembly is up.
3. Check the yoke coupling.
   a. Make sure the coupling knob is seated and hand-tight.
   b. Make sure the coupling is properly seated in the appropriate saddle.
      (1) Low saddle for elevations: 1101 to 1511 mils.
      (2) High saddle for elevations: 0800 to 1100 mils.
4. Check that the spread cable is not tangled and is taut between the bipod legs.
5. Check that the locking nut on the bipod leg is hand-tight.
6. Check that the SELECTOR switch is on drop-fire.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to perform safety checks on a 60-mm mortar.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Checked mask and overhead clearance. | ____ | ____ |
| 2. Ensured the barrel was locked to the baseplate. | ____ | ____ |
| 3. Ensured the yoke coupling knob was hand-tight. | ____ | ____ |
| 4. Ensured the spread cable was taut between the bipod legs. | ____ | ____ |
| 5. Ensured the locking nut on the bipod was tight. | ____ | ____ |
| 6. Ensured the SELECTOR switch was on drop-fire. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1010-223-10 |

**Prepare 60-mm Mortar Ammunition for Firing**

**071-323-4106**

**Conditions:** As the ammunition bearer, given any of the following rounds: M720 with fuze M734 (multi-option), M888 with fuze M935, M302A1, and M83A3; and initial fire command designating type of round, charge, and fuze setting

**Standards:** Within one minute after the FDC gave the initial fire command, selected the required round, and set the fuze (when applicable) and charge, as specified in the fire command.

**Performance Steps**

1. Identify the rounds using the criteria provided below.

CAUTION - WHEN FIRING THE M720 OR THE M888 ROUNDS FOM THE M19 MORTAR, DO NOT FIRE ABOVE A CHARGE 2.

   a. M888 HE -Olive Drab, Yellow Markings, Yellow Bands with M888 HE on the body.
   b. M720 HE-Olive Drab, Yellow Markings, Yellow Bands with M720 HE on the body.
   c. M302 Smoke (WP) - Light Green Red Markings, Yellow Bands.
   d. M83 Illuminating (Illum)- White, Black Markings.

2. Set the fuse.
   a. Set the M935 fuse for the M888 HE round by turning the dial using a flat tip screw driver to superquick (SQ) or delay (D) designated in the fire command.

CAUTION - IF UPON REMOVAL OF THE SAFETY WIRE, A BUZZING SOUND IN THE FUZE IS HEARD, OR THE BORE-RIDING SAFETY PING COMES OUT OF THE FUZE, THE ROUND SHOULD NOT BE USED, THERE IS A POSSIBILITY THAT THE FUZE HAS ARMED.

   b. Set the multi-option fuse for the M720 HE round to the mode specified in the fire command M734 multi-option fuse. Set the multi-option fuse for the M720 HE round to the mode specified in the fire command by turning the nose cone to align the index mark with the required mode: Near-surface (NS), Impact (IM), Delay (D).

NOTE: No tools are needed to set the fuse. The fuse can be set an unlimited number of times without damage to the fuse action.

   c. Put in the fuse for the M302 Smoke.

The M83 illuminating round is used with M65 time fused which is fixed. It burns for approximately 14.5 seconds.

   d. Remove the safety wires.

3. Set the charge.
   a. M720HE: Remove horseshoe charges until the charge given in the fire command remains on the round.
   b. M888 HE; M302 Smoke (WP); M83 Illumination (Illum): Lifts the wire clip and removes the required number of charges; leaving only the numbers of charges specified in the fire command.

4. Inspect the rounds for serviceability before firing.

**Evaluation Preparation:** SETUP: Test on a live-fire range, providing all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the equipment and information provided and to prepare the 60-mm mortar ammunition for firing.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Identified the types of round required for the fire mission. | ____ | ____ |
| 2. Placed the specified charge on the round. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 3. Set the fuse to the designated setting. | ____ | ____ |
| 4. Removed the safety wire. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 9-1010-223-10 |

Subject Area 33: WEAPONS: 81-MM MORTAR

**Maintain an 81-mm Mortar**

**071-086-0002**

**Conditions:** As a member of an 81-mm mortar crew, given an 81-mm mortar and tools, equipment, and materials necessary to perform the required maintenance.

**Standards:** Inspected, cleaned, spot-painted, and lubricated the mortar. For noncorrectable defects or for bipod or sight assemblies that had been immersed in water, the soldier notified organizational maintenance immediately.

**Performance Steps**

1. Lubricating Instructions:

NOTE: These lubrication instructions are mandatory

   a. General purpose lubricating oil (GPL oil) is the prime lubricant. LAW may be used for continuous subzero environments.
   b. Intervals are based on usual operating conditions. For unusual operating conditions, perform the lubricating procedures more often. When the weapon is not in use, the intervals may be extended if proper lubrication procedures have been followed.
   c. Dry cleaning solvents (SD) and paint thinners (TPM) are flammable. Do not clean parts near an open flame or in a smoking area. Dry cleaning solvents and paint thinners evaporate quickly and have a drying effect on the skin. When used without protective gloves, these chemicals may irritate or crack the skin.

2. Clean parts with dry cleaning solvent and dry before lubricating.

3. Lubrication.
   a. Inspect for dirt, carbon, cracks, dents, and bulges; remove firing pin and check for cracks and wear. Check color graduation marks; they should be 1 1/2 inches long, and 17 and 21 inches from the muzzle.
   b. Remove dirt with rags, and remove carbon with rifle bore cleaner.
   c. Oil barrels and bore.
   d. Repaint graduation marks.

4. Lubricate the cannon bore, firing pin, and outside surfaces with GPL oil once a week.

5. Bipod assembly.

NOTE: Immediately after firing, and for two consecutive days thereafter, clean the cannon bore with RBC. After the third cleaning, wipe dry and lightly coat with general purpose lubricating oil. When mortar is not being fired, clean weekly with RBC, and lubricate with general purpose lubricating oil.

NOTE: Clean and wipe the entire outside of cannon, bipod, and baseplate with general purpose lubricating oil weekly.

NOTE: Carefully clean, as needed, the cooling fins at breach end of cannon to assure maximum heat transfer. Do not allow dirt or foreign matter to build up on the cooling fins.

NOTE: Mortar mount should be cleaned and lubricated semiannually by support maintenance.

NOTE: Move to gun line and perform PE.

NOTE: Conduct a check on learning and summarize the enabling learning objective.

   a. Check for cleanliness and ensure that--
      (1) Sliding bracket grips bipod leg firmly when locking nut is tightened.

**Performance Steps**

(2) Adjusting nut precisely controls the crosslevel and has a minimum of looseness.
(3) Elevating mechanism operates smoothly up and down.
(4) Traversing spindle operates smoothly over entire range in both directions.
(5) Shock absorber clevis, when pulled outward, returns to normal position.

b. Clean with dry rags and spot-paint.
c. Lubricate with oily cloth; oil internal parts of elevating and traversing mechanisms.

6. Baseplate assembly, M23A1 and M3.
   a. Check the M23A1 for scratched or chipped surfaces and bent or broken ribs; check the socket for smooth operation; check latches for locking action; and check the assembly for overall cleanliness.
   b. Check the M3 for scratched or chipped surfaces and bent or broken ribs; check the socket for smooth operation; and check the assembly for overall cleanliness.
   c. Clean with rags and spot-paint.
   d. Lubricate moving parts.

NOTE: Notify immediate supervisor and the organization mechanic if a defective item is detected that cannot be corrected by cleaning, lubricating, spot-painting, or adjusting, or if the following items have been immersed in water:

1. Elevating mechanism (bipod).
2. Traversing mechanism (bipod).
3. Shock absorber (bipod).
4. Optical parts (sight).

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, tools, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the equipment, tools, information provided, and to perform operator maintenance on an 81-mm mortar and associated fire control equipment.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Spot-painted parts that are painted. | ____ | ____ |
| 2. Coated nameplates and serial numbers with clear lacquer. | ____ | ____ |
| 3. Checked and cleaned barrel assembly. | ____ | ____ |
| 4. Checked and cleaned bipod assembly. | ____ | ____ |
| 5. Checked and cleaned baseplate assembly. | ____ | ____ |
| 6. Lubricated all moving parts. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-90 |
| | TM 9-1220-246-12&P |

**Lay an 81-mm Mortar for Deflection and Elevation**

**071-086-0003**

**Conditions:** Given a mounted 81-mm mortar laid on aiming posts with a referred deflection of 2800 mils and elevation of 1100 mils; a fire command requiring a deflection and elevation change; and an assistant gunner.

**Standards:** Placed the data contained in the fire command on the sight; attained an aligned or compensated sight picture; and centered the elevation and cross level vials.

**Performance Steps**

NOTE: Elevation changes may be made in conjunction with large or small deflection changes. The gunner may use the deflection/elevation sequence, which provides the most speed and accuracy.

1. Perform an elevation change.
   a. Place new data on the sight.
   b. Level the elevation vial.
   c. Check/correct the sight picture.
2. Perform a small deflection change.
   a. Place new data on the sight.
   b. Traverse to align sight hairline with aiming posts.
   c. Check/correct elevation level.
   d. Recheck/correct sight picture.
3. Perform a large deflection change.
   a. Place new data on the sight.
   b. Shift and traverse to align sight hairline with aiming posts.
   c. Check/correct elevation level.
   d. Recheck/correct sight picture.
4. Perform simultaneous deflection and elevation changes.
   a. Place new data on the sight.
   b. Elevate or depress barrel until approximate level is attained.
   c. Shift and traverse to align sight hairline with aiming posts.
   d. Check/correct elevation level.
   e. Recheck/correct sight picture.

**Evaluation Preparation:** SETUP: At the test site, provide an 81-mm mortar with sight and aiming posts placed out on a referred deflection.

BRIEF SOLDIER: Tell the soldier to use the equipment and information provided and lay an 81-mm mortar for deflection and elevation with the aid of an assistant gunner and an ammunition bearer.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed an elevation change. | ____ | ____ |
| 2. Performed a small deflection change. | ____ | ____ |
| 3. Performed a large deflection change. | ____ | ____ |
| 4. Performed simultaneous deflection and elevation changes. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 23-91
TM 9-1015-249-10

**Perform Safety Checks on an M252 81-mm Mortar**
**071-086-0004**

**Conditions:** As a gunner, given a mounted M252 81-mm mortar complete with sight.

**Standards:** Made the safety checks and ensured the mortar was safe to fire.

**Performance Steps**

1. Check mask and overhead clearance as follows:
   a. To determine mask clearance, lower the barrel to 0800 mils elevation and sight along the base of the barrel with the eye near the baseplate.
   b. To determine overhead clearance, raise the barrel to 1500 mils elevation and with the elevation bubble level, sight along the top of the barrel with the eye near the baseplate.

NOTE: If full range of elevation cannot be attained, raise or lower barrel until rounds clear obstruction, turn elevation knob on sight until bubble is level, read the elevation, and report it to the squad leader. He, in turn, reports it to the fire direction center (FDC).

2. Check the mortar to ensure that:
   a. The barrel is locked to the baseplate and the open end of the socket cap is pointing in the direction of fire.
   b. The firing pin recess is facing upward.
   c. The bipod-locking latch is locked, securing the barrel clamp.
   d. The leg-locking hand-wheel is tight.

NOTE: Move to gun line and perform PE.

NOTE: Conduct a check on learning and summarize the enabling learning objective.

**Evaluation Preparation:** SETUP: At the test site, provide a mounted M252 81-mm mortar complete with sight.

BRIEF SOLDIER: Tell the soldier to use the mortar provided and to perform safety checks.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Not to be sequence scored. | | |
| NOTE: The following requirements must be met to perform safety checks on an M252 81-mm mortar. | | |
| 1. Checked mask and overhead clearance. | ____ | ____ |
| 2. Ensured the barrel was locked to the baseplate and the open end of the socket cap was pointed in the direction of fire. | ____ | ____ |
| 3. Ensured the firing pin recess was facing upward. | ____ | ____ |
| 4. Ensured the bipod-locking latch was locked, and then secured the barrel clamp. | ____ | ____ |
| 5. Ensured the leg-locking handwheel was tight. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1015-249-10 |

**Boresight an M252 81-mm Mortar**

**071-086-0005**

**Conditions:** As a gunner, given a mounted M252 81-mm mortar complete with sight, an M45 boresight, screwdrivers, a distant aiming point, and an assistant gunner.

**Standards:** Boresighted the mortar using the distant-aiming-point method; aligned both the sight unit and the boresight on the same aiming point, which is at least 200 meters from the mortar; ensured that all bubbles were level; set a deflection of 0 mils and an elevation of 0800 mils on the sight, and ensured that the mortar was within two turns of center traverse.

**Performance Steps**

NOTE: After the mortar has been mounted, the sight is placed into the dovetail slot. A deflection of 0 mils and an elevation of 0800 mils are set onto the sight, and bubbles are level.

1. Boresight for elevation.
    a. Attach the M45 boresight to the barrel below, touching the upper stop band (Figure 1). Center the cross-level vial by slightly rotating the boresight on the mortar barrel. Slight movements may be made by loosening the clamp screw and lightly tapping the boresight body. When the bubble is centered, tighten the clamp screw.

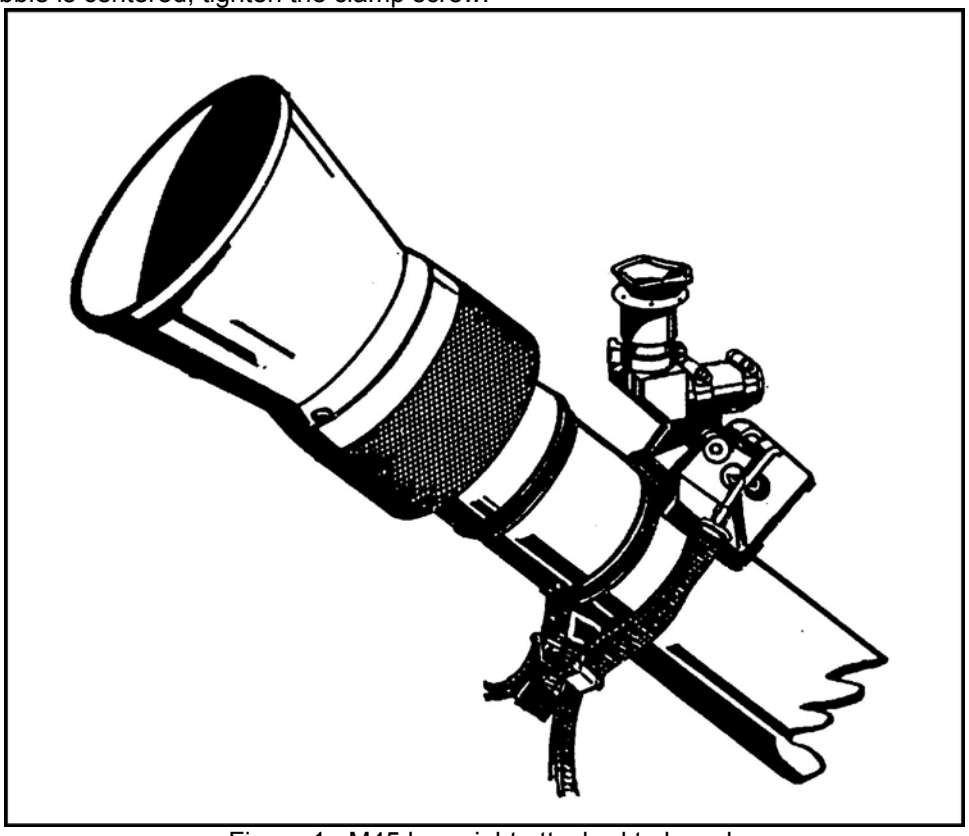


Figure 1. M45 boresight attached to barrel.

    b. Ensure the sight is set at an elevation of 0800 mils.
    c. Elevate or depress the barrel until the elevation vial on the M45 boresight is centered. The mortar is now set at 0800 mils (45 degrees) elevation.
    d. Rotate the elevation knob on the sight until the elevation bubble is centered. If necessary, level the cross-level bubble.
    e. If the elevation scale does not read 0800 mils, adjust the scale as follows:
        (1) Loosen the two slot-headed screws on the outside of the elevation knob. Slip the

**Performance Steps**

elevation fine scale until the "0" mark on the scale aligns with the reference mark on the housing. Tighten the two screws to secure the scale.

(2) Recheck that all bubbles are level.

2. Boresight for deflection.
   a. Ensure the M45 boresight is still attached to the barrel as shown in Figure 1.
   b. Ensure the sight is set at a deflection of 0 mils and is pointed to the rear.
   c. Select a distant aiming point as far from the mortar as possible, and at least 200 meters away from it.
   d. By shifting or traversing the mortar, align the vertical crossline of the boresight onto the distant aiming point.

NOTE: The mortar must remain within two turns of center traverse.

   e. Ensure that the crossline bubble remains centered, since the mortar may cant during a traverse. With the boresight aligned on the distant aiming point, level the sight by centering the cross-level bubble.

NOTE: If the mortar is initially mounted on the distant aiming point, it decreases the amount of traverse needed to align the crossline on the distant aiming point after boresighting for elevation.

   f. With the boresight aligned on the distant aiming point and all bubbles on the sight and boresight centered, check that the vertical crossline of the sight is aligned with the distant aiming point. If not, proceed as follows:
      (1) Turn the deflection micrometer knob until the vertical crossline of the sight is aligned with the distant aiming point. Lock the deflection knob.
      (2) Slip the coarse deflection scale to read 0 mils against the white arrow below the scale by pushing down the scale and rotating it. Release the scale so that the internal springs return it to the LOCKED position.
      (3) Slip the micrometer deflection scale by pushing the scalloped rim of the fine scale toward the sight body and turning it until the fine scale reads 0 mils against the black scale. Allow the springs to return the scale to the LOCKED position.
      (4) The red line on the inner coarse deflection scale should align with the "32" on the coarse deflection scale. If not, lift up on the locking lever, pivot the elbow telescope out of the way, and loosen the two screws. Turn the inner coarse deflection scale until the red line is at "32". Tighten the two screws. Then reposition the elbow telescope and secure it by pushing down on the locking lever.
      (5) The fine deflection red index arrow should align with the red index line on the outer fine deflection scale. The fine deflection black arrow should align with "0" on the fine deflection micrometer scale. If not, tighten the deflection locking knob and loosen the two screws on the deflection knob. Depress the outer fine deflection micrometer scale, and set the red index line to the red index arrow. Depress the fine deflection micrometer scale, and turn to align "0" with the fine deflection black arrow. Tighten the two screws and loosen the deflection locking knob.

3. Ensure all bubbles are level, the scales read 0 mils and 0800 mils, and the boresight and the sight are aligned on the same point. If so, remove the boresight.

4. Index 3200 mils on the sight. The mortar is now prepared to be laid.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and tools given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the equipment and tools provided, boresight the mortar for elevation and then for deflection. Point out to the soldier the distant aiming point to use. Tell him the assistant gunner will assist him in shifting the mortar, if required.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Mounted the M45 boresight. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 2. Placed a deflection of 0 mils and an elevation of 0800 mils on the M64 sight. | ____ | ____ |
| 3. Laid the mortar so that the sight and boresight are on the same aiming point, at least 200 meters away. | ____ | ____ |
| 4. Ensured mortar remained within two turns of center traverse. | ____ | ____ |
| 5. Leveled all bubbles on the sight and boresight (within outer red lines). | ____ | ____ |
| 6. Corrected elevation scales, as required. | ____ | ____ |
| 7. Checked alignment of sight and boresight on the distant aiming point. | ____ | ____ |
| 8. Corrected deflection scales, as required. | ____ | ____ |
| 9. Rechecked all bubbles, scales, and alignment on distant aiming point. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**

TM 9-1015-249-10

**Prepare 81-mm Mortar Ammunition for Firing**

**071-321-3905**

**Conditions:** Given a fire command that specifies the type round and fuze (the M374A2 high-explosive round, with or without the M524A5 or M532 fuze; the M375A2 white phosphorus round, with the M524A5 or M532 fuze; or the M301A2 A3 illumination round, with M84A1 fuze); the charge and the fuze setting; an M25 fuze setter, an M18 fuze wrench, and a strap wrench.

**Standards:** Presented the fuze, charge, and number of rounds specified in the fire command to the assistant gunner.

**Performance Steps**

1. Identify rounds (Figure 1).

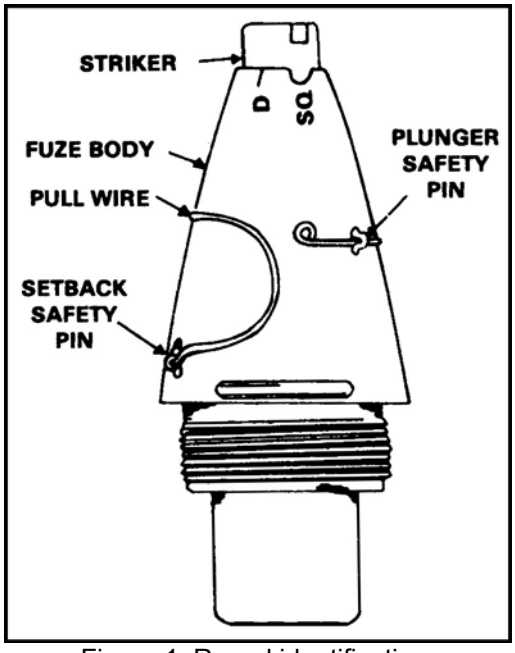



Figure 1. Round identification.

   a. High explosive - olive drab (OD) with yellow markings.
   b. White phosphorus - light green with red markings.
   c. Illumination - white with black markings.

2. Set fuzes.
   a. M524A5 (Figure 2).

**Performance Steps**

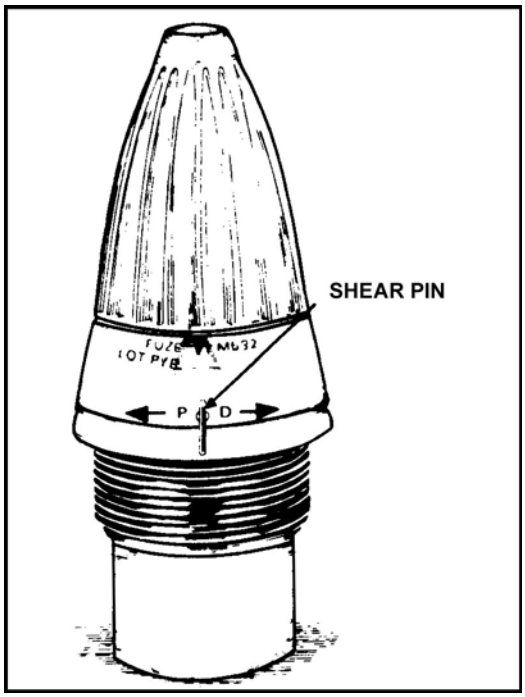
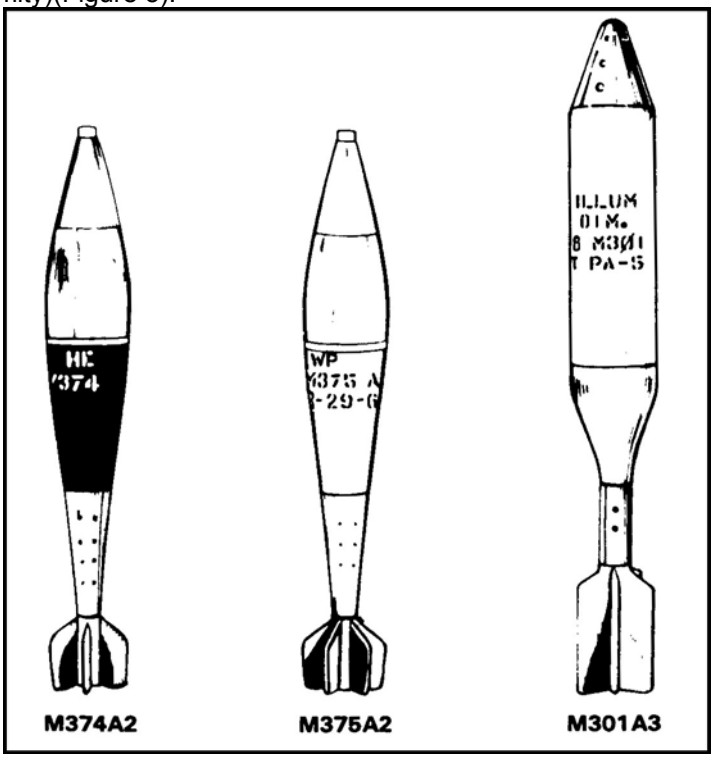



Figure 2. Setting the fuse.

(1) To prepare for firing, turn the slot in the striker to align with the SQ index for "super quick" or D index for "delay" on the fuze body, depending upon which action of fuze is desired.
(2) Just before insertion of round into the mortar, remove the safety pull wire, which removes both safety pins.
(3) The M524A5 arms between 1.25 and 2.5 seconds after firing.

b. M532 (proximity)(Figure 3).



**Performance Steps**

Figure 3. Standard "A" 81-mm mortar ammunition.

(1) To prepare the M532 fuze for firing, place it on the round, as there are no rounds manufactured with the M532 fuze attached.
(2) To attach the fuze to the round, use the M18 fuze wrench and the strap wrench. Insert the fuze (with wavy washer in position). Use the M18 wrench to tighten the fuze to the body so no clearance exists between the fuze and the body of the projectile.
(3) This fuze provides an airburst 1 to 6 meters above the target, depending on the angle of fall. The lower the angle of fall, the higher the burst. The higher the angle of fall, the lower the burst.
(4) To convert the round to point detonating, super quick (PDSQ), rotate the top portion of the fuze one-third turn in either direction. This breaks the external shear pin and internal wiring. There is no delay capability for this fuze.

c. M84 and M84A1.
(1) The M84 is a time fuze whose time scale can be set to function from 1 to 25 seconds after firing, in 1-second intervals.
(2) The M84A1 has a time scale numbered from 0 to 50 seconds in 2-second intervals.
(3) The M25 fuze setter is used to set the time by placing it over the six raised ribs on the fuze and turning counterclockwise until the desired time is indexed. If the time setting has been passed, do not turn fuze back. Continue turning counterclockwise and start over.

NOTE: If the time setting has been passed, do not turn fuze back. Continue turning counterclockwise and start over.

(4) The charge given in the fire command is the number of charges to remain on the round. To remove charges, unbutton each charge and ensure that all charges removed are not taken from one side. When firing charge 1, use only the yellow spiral charge; charges 2 through 9 are white.
(5) Inspect all rounds and fuzes for serviceability prior to firing.

CAUTION
To transport mortar ammunition in mortar carriers, store rounds in ammunition racks in their fiber containers with seals unbroken. During firing, prepare only the number of rounds required for the mission for immediate expenditure. Protect the propelling charges and ignition cartridge of these rounds by slipping one end of a fiber container over the base of the round. Repack unused rounds, and keep unused charges in a container (ammunition box) with the lid closed for disposal in accordance with unit SOP.

**Evaluation Preparation:** SETUP: Evaluate this task on a live-fire range. At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to prepare 81-mm mortar ammunition for firing.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Identified the ammunition.<br>a. High explosive (HE).<br>b. White phosphorous (WP).<br>c. Illumination (ILL). | ____ | ____ |
| 2. Set the fuzes in the following manner:<br>a. Turned the slot in the striker to align "D" for delay or "SQ" for super quick.<br>b. Pulled the safety wire and pins before firing the round.<br>c. Used the M18 fuze wrench and strap wrench to emplace an M532 fuze.<br>d. Tightened the fuze to the body of the round so that no clearance existed between the fuze and the body of the projectile.<br>e. Used the M25 fuze setter to set the time setting on the M84 or M84A1 fuze.<br>f. Turned the fuze counterclockwise until the desired time was indexed. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| g. Did not remove all charges from one side of the round. | | |
| 3. Checked for serviceability. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-90 |

Subject Area 34: WEAPONS: M9 PISTOL

**Perform a Function Check on an M9 Pistol**
**071-004-0002**

**Conditions:** Given an M9 pistol with a magazine.

**Standards:** Performed operational checks in correct sequence and determined whether the M9 pistol would function correctly or not.

**Performance Steps**
WARNING
Ensure the pistol is clear before you perform a function check.

1. Place the safety lever in SAFE position.
2. Insert the empty magazine into the magazine well.
3. Retract the slide fully and release it. The slide should lock to the rear.
4. Depress the slide stop and allow the slide to return fully forward. At the same time, the hammer should fall to the full forward position.
5. Squeeze and release the trigger. The firing pin block should move up and down. The hammer should not move.
6. Place the safety lever in the FIRE position.
7. To check the double action, squeeze the trigger. The hammer should cock and fall.
8. Squeeze the trigger again, and hold it to the rear. While holding the trigger to the rear, manually retract and release the slide. Release the trigger. You should hear a click, but the hammer should not fall.
9. To check the single action, squeeze the trigger. The hammer should fall.
10. If the pistol functions as indicated during the checks, it is operational.

**Evaluation Preparation:** SETUP: At the test site, provide the equipment listed in the task condition statement.

BRIEF SOLDIER: Tell the soldier to perform a function check based on the steps in this task and determine whether or not the M9 pistol functions correctly.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Placed the safety lever in the SAFE position. | ____ | ____ |
| 2. Inserted the empty magazine into the magazine well. | ____ | ____ |
| 3. Retracted the slide fully then released it. | ____ | ____ |
| 4. Depressed the slide stop and allowed the slide to return fully forward. | ____ | ____ |
| 5. Squeezed and released the trigger. | ____ | ____ |
| 6. Placed the safety lever in FIRE position. | ____ | ____ |
| 7. Checked the double action by squeezing the trigger. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 8. Squeezed the trigger again and held it to the rear, at the same time manually retracting and releasing the slide. Released the trigger. A click should have been heard. The hammer should not have fallen. | ____ | ____ |
| 9. Checked the single action by squeezing the trigger. The hammer should have fallen. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 9-1005-317-10 |

**Correct Malfunctions of an M9 Pistol**

**071-004-0005**

**Conditions:** Given an M9 pistol; a loaded magazine with 9-mm ammunition; cleaner, lubricant, and preservative (CLP); lubricating oil, Arctic weather (LAW); lubricating oil, semifluid, automatic weapon (LSA); bore brush; wiping rags; M4 cleaning rod (handle with one section and a swab holder); and small-arms cleaning swabs.

**Standards:** Without damage to the pistol, eliminated malfunctions caused by faulty action of either the pistol or the ammunition while in an environment that required engagement of targets.

**Performance Steps**

WARNING:
Always keep the pistol pointed in a safe direction during the following procedures.

1. Perform immediate action.
    a. When the slide is fully forward and the pistol fails to fire, apply immediate action as follows:
        (1) Ensure the safety lever is in FIRE position.
        (2) Squeeze the trigger again.
        (3) If the pistol does not fire, ensure that the magazine is fully seated, retract the slide to the rear, and release.
        (4) Squeeze the trigger.
        (5) If the pistol still does not fire, remove the magazine and retract the slide to eject the chambered cartridge. Insert a new magazine, retract the slide, and release to chamber another cartridge.
        (6) Squeeze the trigger.
        (7) If the pistol does not fire, replace the ammunition.
        (8) If the pistol fails to fire again, clear the pistol and perform remedial action IAW step 2.
    b. When the slide is not fully seated forward, remove finger from the trigger. With the other hand, try to push the slide fully forward. If the slide will not move forward, proceed as follows:
        (1) Place safety lever in SAFE position.
        (2) Remove the magazine.
        (3) Grasp the slide and retract it to the rear, locking it with the slide stop.
        (4) Inspect the chamber and remove any obstructions.
        (5) Insert another loaded magazine into the pistol.
        (6) Release the slide.
        (7) Place the safety lever in the FIRE position, aim, and squeeze the trigger.
        (8) If the pistol does not fire, clear the pistol and perform remedial action IAW step 2.

2. Perform remedial action.
    a. Ensure the pistol is clear.
    b. Disassemble the pistol and inspect for dirty, corroded, missing, or damaged parts.
    c. Clean dirty or corroded parts. Replace missing or damaged parts.
    d. Lubricate and assemble the pistol.
    e. Inspect magazine for damaged parts. Replace magazine if necessary.
    f. Check for dirty or damaged ammunition. Clean or replace ammunition.
    g. Perform a function check.
    h. Load the pistol and try to fire.
    i. If the pistol does not fire, clear the pistol and notify your supervisor.

**Evaluation Preparation:** SETUP: Provide equipment and materials listed in the condition statement. Use performance steps in the training outline to evaluate performance of the task.

BRIEF SOLDIER: Tell the soldier the pistol stopped firing and to perform immediate and remedial action on the pistol.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Performed immediate action. | ____ | ____ |
| 2. Performed remedial action. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 9-1005-317-10 |

Subject Area 37: WEAPONS: GENERAL

**Zero an M68 Sight**

**071-705-0003**

**Conditions:** Given an M68 sight, a zeroed M16-series rifle, a zeroed M4 carbine, a zeroed M4 modular weapon system, components, battery (0E890) DL1/3N, 25-meter range, and the appropriate ammunition.

**Standards:** Zeroed an M68 sight by firing accurately at a zeroed target, and impacted the center mass with a three-round shot group upon zero confirmation.

**Performance Steps**

1. Place an M68 sight into operation.
2. Zero the M68 sight:
   a. Open front and rear lens covers (Figure 1).

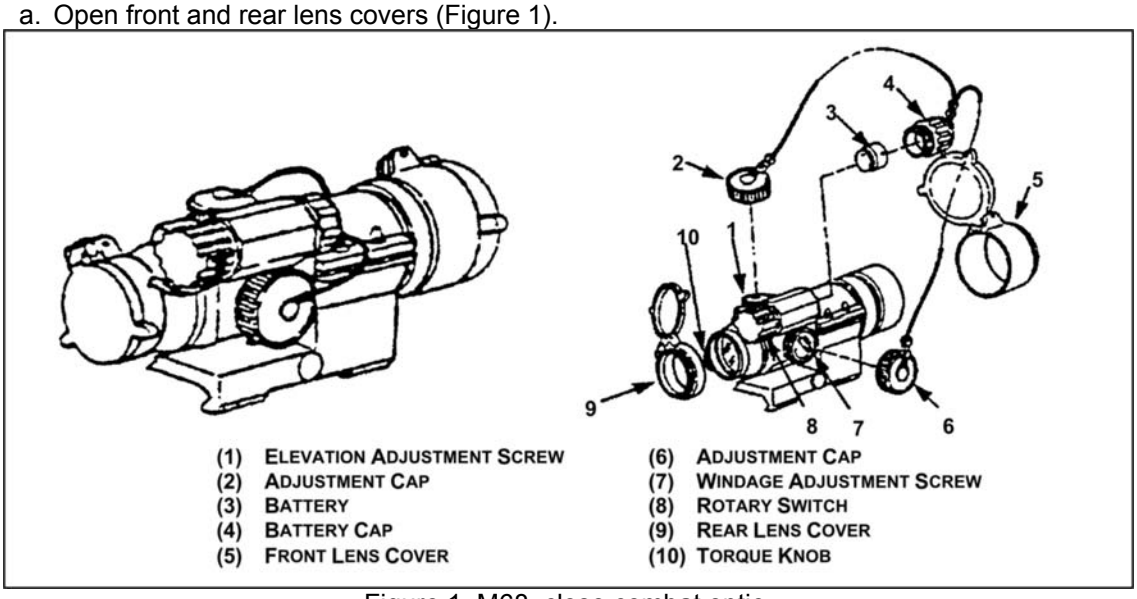



Figure 1. M68, close combat optic.

   b. Turn rotary switch clockwise until red dot intensity contrasts suitably with target background.
   c. Look through sight to get a rough estimate of zeroing adjustment required. When looking through iron sights, the red dot should appear on top of the front sight post.
   d. If adjustment is required, remove adjustment screw caps from adjustment screws by turning them counterclockwise (Figure 1).

NOTE: Each click of the adjustment screw makes a 4-millimeter movement of the point of impact at 25 meters (1/2 minute of adjustment).

   e. Insert an adjustment tool (coin, screwdriver, or knife) in adjustment screw slot. Turn adjustment screw as follows:
      (1) To move the point of impact to the right, turn the windage adjustment screw counterclockwise.
      (2) To move the point of impact to the left, turn the windage adjustment screw clockwise.
      (3) To move point of impact up, turn the elevation adjustment screw counterclockwise.
      (4) To move the point of impact down, turn the elevation adjustment screw clockwise.
   f. Repeat steps (c) through (e) until sight is roughly zeroed.
   g. Confirm zeroing by firing at least three shots at a zeroing target. Check the impact points on the zeroing target to confirm accuracy.

NOTE: After initial firing, check to ensure that the mount and sight (M16-series or M4-series) are secure.

**Performance Steps**

On M16-series, hand tighten the mounting bolt on the mount, then hand tighten the torque knob on the sight until it snaps twice. On the M4-series, hand tighten the torque knob on the sight until it snaps twice.

h. If zeroing is accurate, fire three more shots to confirm. If zero is not accurate, repeat steps (e) through (g) until zeroing is complete.

i. Install adjustment cap by rotating clockwise and hand tighten.

NOTE: Sight picture - place the red dot on center mass of the target and engage.

**Evaluation Preparation:** SETUP: When the borelight is not available, use the iron sights on a zeroed weapon to zero the M68 sight. On an M4-series carbine, reconfirm zero if the M68 sight is moved to a different slot on the rail.

BRIEF SOLDIER: Tell the soldier that each click of the adjustment screw makes a 4-millimeter movement of the point of impact at 25 meters (1/2 MOA) and that the aiming method (two eyes open or one eye open) used to zero must be used to engage targets.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Opened lens covers and turned the rotary switch clockwise until the red dot intensity contrasted suitably with the target background on the M68 sight. | ____ | ____ |
| 2. Looked through the sight to get a rough estimate of the zeroing adjustment required. | ____ | ____ |
| 3. Removed (if required) the adjustment screw caps from the adjustment screws by turning them counterclockwise. | ____ | ____ |
| 4. Inserted (if required) an adjustment tool (coin, screwdriver, knife) in the adjustment screw slot and made the appropriate adjustments. | ____ | ____ |
| 5. Zeroed the M68 sight by firing and striking the zero target center mass with a three-round shot group. | ____ | ____ |
| 6. Confirmed zero by firing another three-round shot group at a zero target, checked the impact points on the target, confirmed accuracy. | ____ | ____ |
| 7. Installed the adjustment (did not use tools) caps by rotating clockwise and hand tightened. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-9 |
| | TM 9-1005-319-10 |
| | TM 9-1240-413-12&P |

**Boresight an M68 Sight**

**071-705-0004**

**Conditions:** Given an M68 sight with components, boresight target, and battery (0E890) DL1/3N.

**Standards:** Centered the red dot of an M68 sight on the black dot of the boresight target striking center mass.

**Performance Steps**

1. Check the alignment of the borelight.
    a. Place the appropriate mandrel with the borelight attached in the muzzle of the weapon.
    b. Turn on the borelight so that the laser beam strikes the boresight target offset 10 meters away.
    c. Slowly rotate the borelight one-half turn (180 degrees) while watching the beam on the target area (note any circular pattern made).
    d. If the beam remains stationary, the laser is boresighted, go to step 3 and use the appropriate boresight target for the weapon being boresighted.
    e. If the beam rotates in a circle, adjust the windage or elevation (or both) until the beam remains stationary or rotates on itself, no more than 1 centimeter (go to step 2).
2. Adjust the borelight (if necessary).
    a. Move the target to a distance of 2 meters.
    b. Mark the location of the laser beam.
    c. Slowly rotate the borelight one-half turn.
    d. Note the new location of the laser beam.
    e. Adjust the windage and elevation until the laser beam moves one-half the distance to its original location.
    f. Continue this procedure until the laser beam remains stationary (or spins upon itself within one centimeter) when the bore light is rotated.
    g. Move the target to a distance of ten meters and recheck the boresight (repeat this process at 10 meters if necessary).
3. Boresight the M68 sight to the weapon.
    a. Select the boresight target offset for the appropriate weapon (M16-series rifle, M4 carbine, or M4 modular weapon) and the M68 sight (Figures 1 and 2).

**Performance Steps**

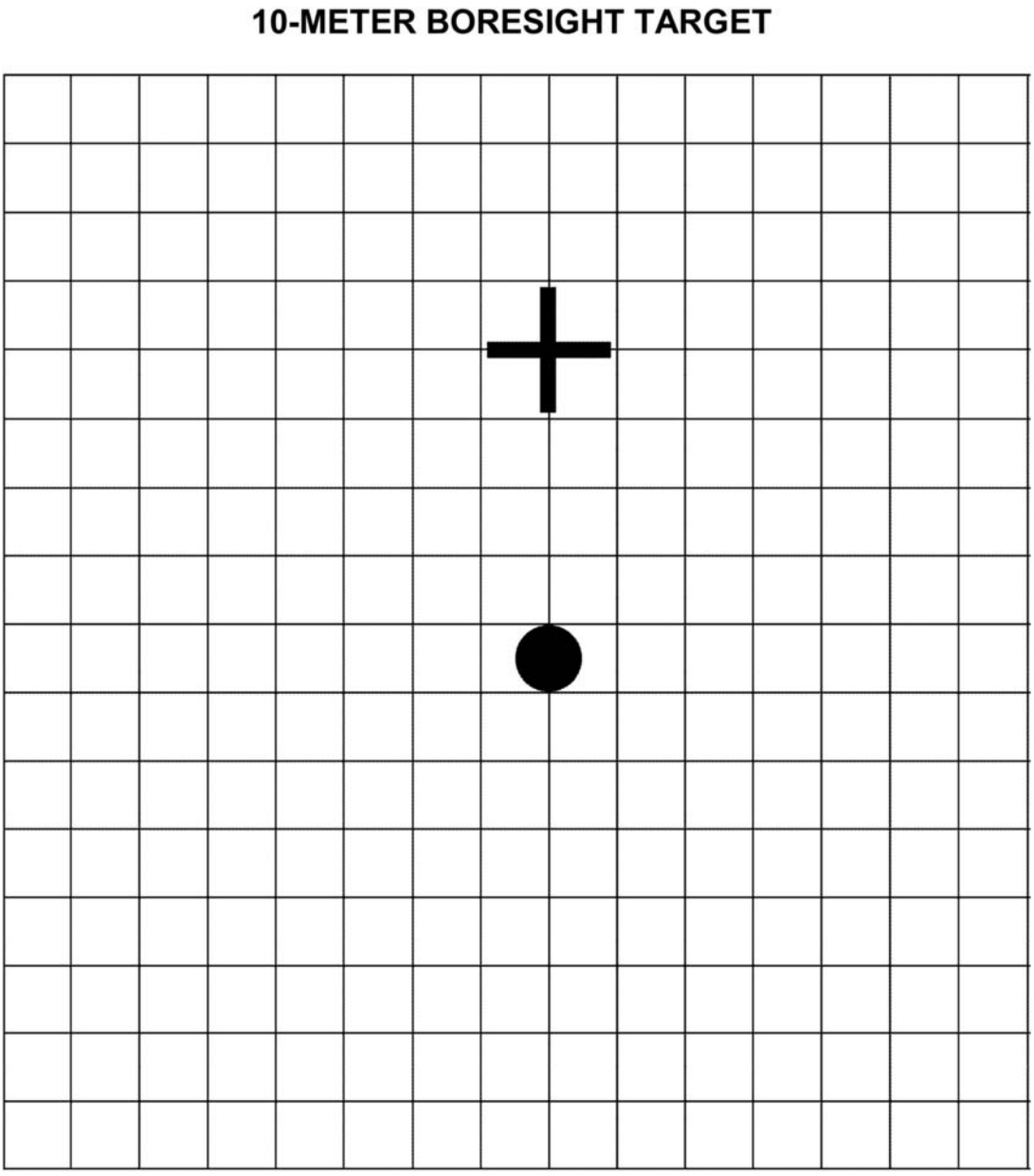



Figure 1. 10-meter boresight target for M16-series rifle.

**Performance Steps**

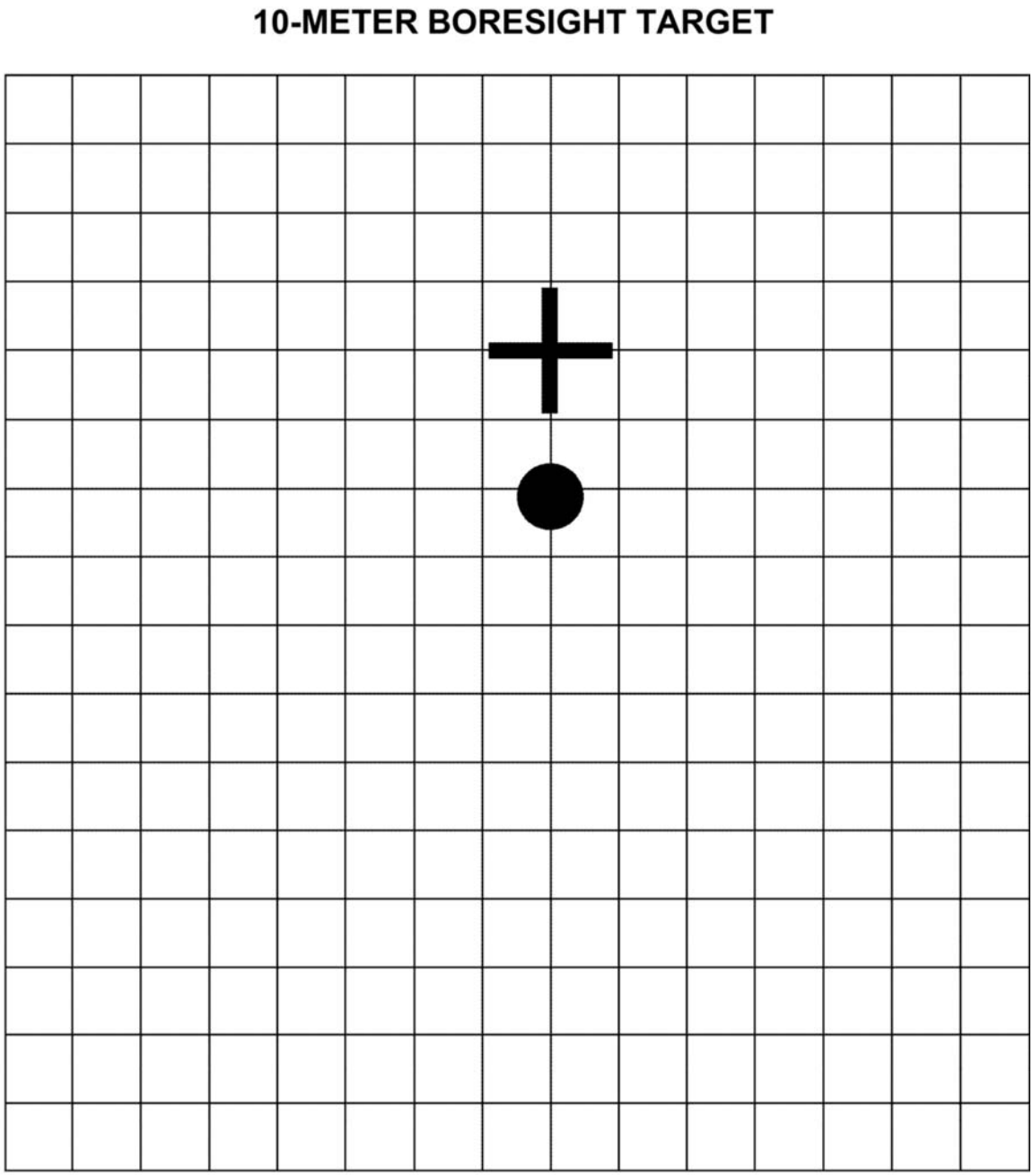



Figure 2. 10-meter boresight target for M4-series carbine.

b. Position the weapon so the borelight strikes the black dot on the boresight target.
c. Adjust the M68 sight until the red dot is centered on the cross on the boresight target offset.
d. The weapon is boresighted when the laser borelight is on the black dot and the red dot (from the M68 sight) is centered on the cross.

4. Sight adjustments for the M68 sight are as follows:

**Performance Steps**

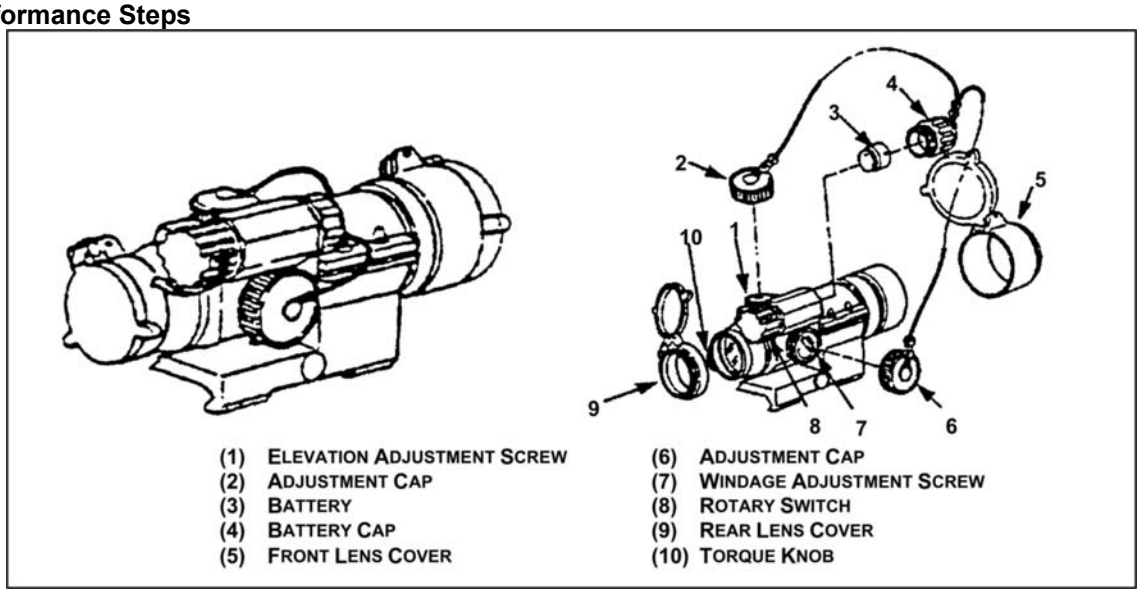



Figure 3. M68, close combat optic.

a. Elevation adjustments screw (Figure 3): One click at 25 meters equals 4 millimeters; clockwise equals down.
b. Windage adjustment screw (Figure 3): One click at 25 meters equals 4 millimeters; clockwise equals left.
c. Rotary switch--10 positions (Figure 3):
   (1) Position 1 equals OFF.
   (2) Position 2 equals NIGHT.
   (3) Position 3 through 10 equals daytime intensity.

**Evaluation Preparation:** SETUP: Before boresighting the weapon and M68 sight, zero the iron sights as outlined in FM 23-9.

BRIEF SOLDIER: Tell the soldier to boresight the weapon without damaging equipment or injuring personnel.

NOTE: At ranges of 150 meters and beyond, the effects of parallax are minimal. However, at ranges of 25 meters and closer, parallax exists and the firer must ensure that the red dot is centered while boresighting or zeroing.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Checked the alignment of the borelight. | ____ | ____ |
| 2. Adjusted the borelight (If necessary). | ____ | ____ |
| 3. Boresighted the M68 sight to the weapon. | ____ | ____ |
| 4. Made appropriate sight adjustments. | ____ | ____ |

**Evaluation Guidance:** Score then soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores a NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-9 |

**References**

| Required | Related |
| --- | --- |
| | TM 9-1240-413-12&P |

**Maintain a Bayonet**

**071-000-0004**

**Conditions:** Given an M9 multipurpose bayonet system; small-arms repairman tool kit; abrasive cloth; cleaner, lubricant and preservative (CLP); lubricating oil, Arctic weapon (LAW); lubricating oil, semifluid, automatic weapon (LSA); dry cleaning solvent; rubber gloves; solid film lubricant; wash pan; wiping rag; M16 rifle or M4 carbine; and a requirement to perform required operator maintenance on the bayonet.

**Standards:** Cleaned and inspected the M9 bayonet system and reported any deficiencies not corrected to supervisor.

**Performance Steps**

1. Inspect the M9 bayonet.
    a. Check function of lock release levers by placing bayonet on rifle lug. Ensure bayonet is securely retained and mounts and dismounts without interference.
    b. Inspect blade for cracks, nicks, or blunted point.
    c. Inspect and check handguard for cracks or looseness.
    d. Inspect handle for cracks, breaks, or looseness.
    e. Inspect for broken or dulled saw teeth.
    f. Inspect for broken, cracked, or chipped "false edge" on blade.
    g. Remove cap screw and latch assembly. Check for rust.
    h. Inspect for loose, cracked, or broken cap screw.

2. Inspect the scabbard.
    a. Inspect for cracks, cut or worn fabric or web gear.
    b. Inspect for cracked or broken buckle of attaching assembly.
    c. Inspect for cracked or broken scabbard body.
    d. Inspect for bent or broken belt fastener.
    e. Inspect for cracked or broken screwdriver tip or wire cutter plate/stud.
    f. Inspect for broken or missing sharpening stone.
    g. Inspect snaps to ensure they function.

3. Disassemble the M9 bayonet.

NOTE: Refer to Figure 1 for the following steps.

    a. Unscrew and remove cap screw (1).
    b. Remove latch assembly (2).
    c. Remove handle (3) from blade assembly (4).

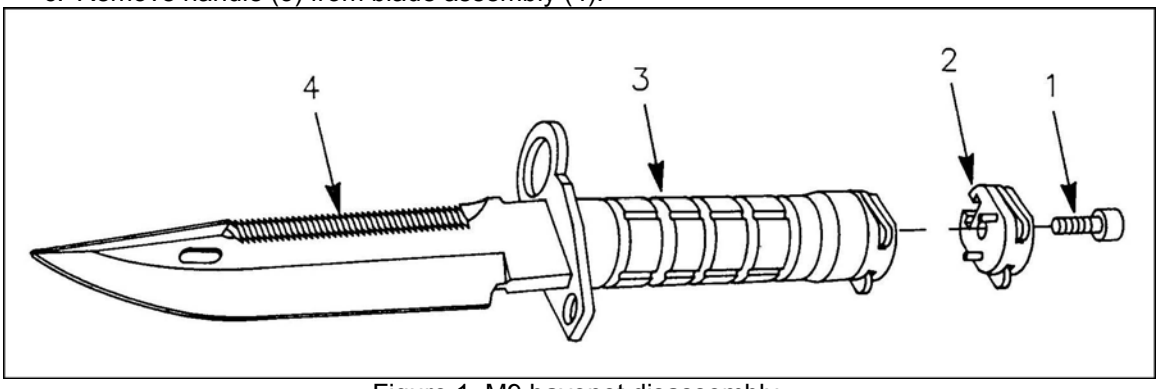



Figure 1. M9 bayonet disassembly.

4. Clean the M9 bayonet.
    a. Reestablish finish as follows:

WARNING

**Performance Steps**

Dry cleaning solvent is flammable and should not be used near an open flame or in a smoking area. Use only in a well-ventilated area. This solvent evaporates quickly and has a drying effect on the skin. When used without gloves, it may irritate, inflame, or cause cracks in the skin.

(1) Remove all lubricant from surfaces to be treated with dry cleaning solvent. Wear rubber gloves and use wash pan and brush to apply dry cleaning solvent.
(2) Roughen surface using abrasive cloth.
(3) Apply solid film lubricant to shiny surfaces. Allow to dry 16 to 24 hours before handling.
(4) Wipe bayonet with wiping rag and apply a light coat of CLP.

5. Reassemble the M9 bayonet.

NOTE: Refer to Figure 2 for the following steps.

a. Install handle (1) on bayonet assembly (2) with small holes (3) for latch assembly (4) facing away from large hole (5) in hand guard (6).
b. Install latch assembly (4) with locking lug (7) lined with large hole in hand guard (6).
c. Install and tighten cap screw (8) until tight.

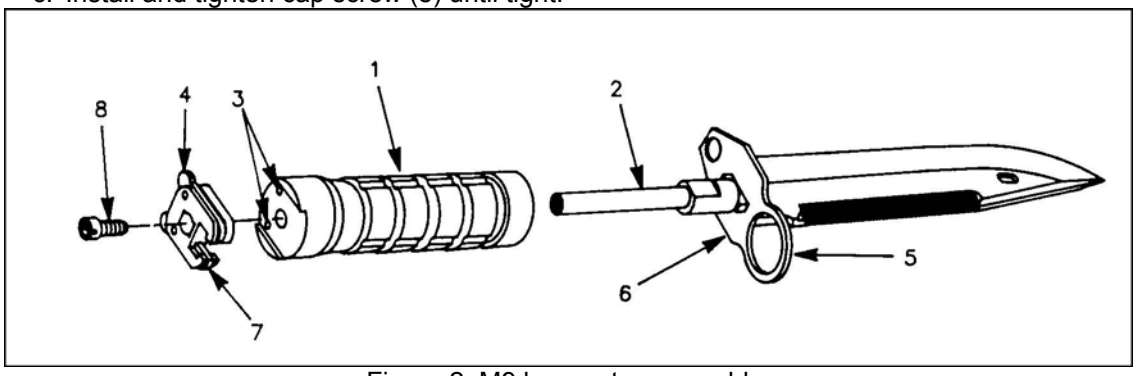



Figure 2. M9 bayonet reassembly.

6. Disassemble the M9 scabbard.

NOTE: Refer to Figure 3 for the following steps.

a. Remove attaching assembly load bearing end (1).
b. Separate attaching assembly scabbard end (2) by removing two socket head screws (3).

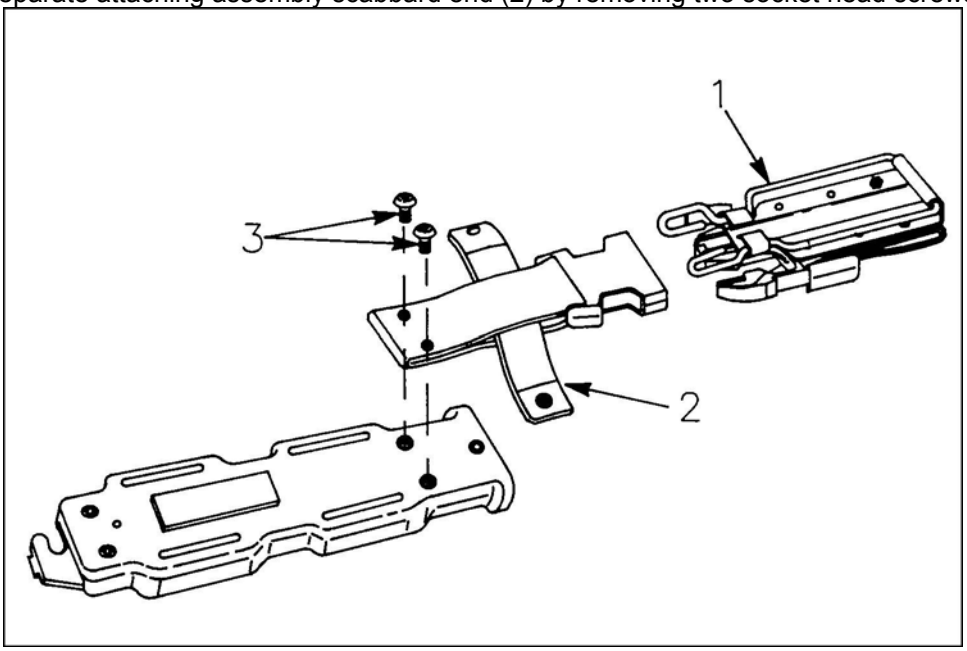



Figure 3. M9 scabbard disassembly.

**Performance Steps**

7. Clean the M9 scabbard.
   a. Use solid film lubricant on shiny metal surfaces (see step 4).
   b. Wipe metal parts of scabbard with wiping rag and apply a light coat of CLP.
   c. Clean the scabbard body assembly with wiping rag.
   d. Clean the load bearing end and attaching assembly with wiping rag.

8. Reassemble the M9 scabbard.
   a. Position attaching assembly scabbard end (1) on scabbard body assembly (2) so that fastener will close around M9 bayonet. Install two socket head screws (Figure 4).

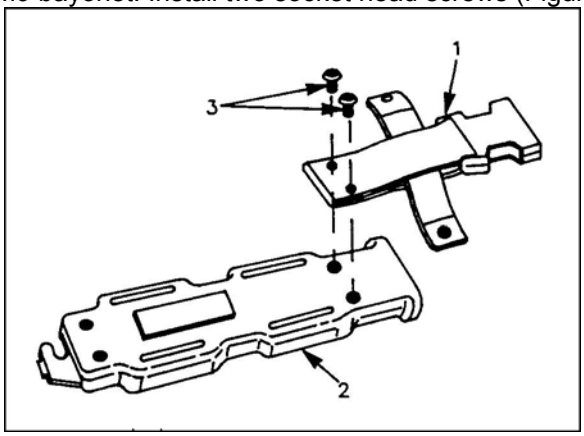



Figure 4. M9 scabbard reassembly.

   b. Install attaching assembly load bearing end (1) with plastic portion (2) towards M9 scabbard (3) as shown (Figure 5).

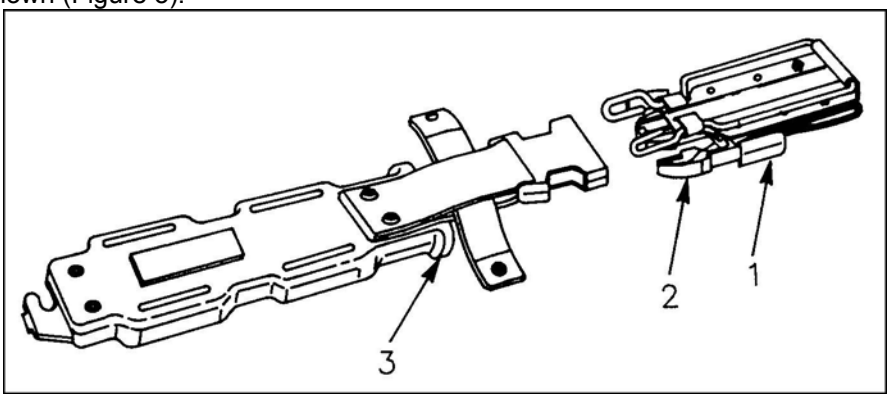



Figure 5. M9 scabbard reassembly (continued).

   c. Insert bayonet into the scabbard.
   d. Fasten snap of restraining strap.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to inspect the bayonet system for completeness and serviceability, and clean the parts of the system as required.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inspected the M9 multipurpose bayonet system. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 2. Disassembled the M9 bayonet. | ____ | ____ |
| 3. Cleaned the M9 bayonet. | ____ | ____ |
| 4. Reassembled the M9 bayonet. | ____ | ____ |
| 5. Disassembled the M9 scabbard. | ____ | ____ |
| 6. Cleaned the M9 scabbard. | ____ | ____ |
| 7. Reassembled the M9 scabbard. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 100-14 |

**Engage an Enemy with a Bayonet**
**071-326-0100**

**Conditions:** Given a bayonet attached to an M16-series rifle or an M4 carbine.

**Standards:** Killed, captured, or forced the enemy to withdraw.

**Performance Steps**

1. Assume the attack position.
2. Perform attack movements.
   a. Thrust.
   b. Butt stroke to head.
   c. Slash.
   d. Butt stroke to groin.
   e. Smash.
   f. Whirl.
3. Perform defensive movements.
   a. Parry right and left.
   b. Parry right and thrust.
   c. Parry right, slash, and butt stroke.
   d. Low block.
   e. Side block (left and right).
   f. High block.

**Evaluation Preparation:**
SETUP: At the test site, provide the soldier with a pugil stick, padded helmet, chest protector, pugil gloves, and groin protector.

BRIEF SOLDIER: Tell the soldier to engage an enemy.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Assumed the attack position. | ____ | ____ |
| 2. Performed attack movements. | ____ | ____ |
| 3. Performed defensive movements. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**Operate M145 Telescope, Straight**

**071-703-0001**

**Conditions:** Given an M145 telescope, straight.

**Standards:** Placed the M145 telescope, straight, into operation without damaging equipment.

**Performance Steps**

1. Install and check the battery.
    a. Remove the battery cap by turning it counterclockwise and holding the rotary reticle switch stationary.

CAUTION
Before installing the battery, inspect the threads on the battery housing and battery cap to ensure that they are free of moisture and dirt, and the O-ring in the battery cap is present. Failure to do so could result in loss of power and shorten battery life.

    b. Insert battery with positive end to cap.
    c. Reinstall battery cap by holding the rotary reticle illumination switch stationary while turning the battery cap clockwise until snug.
    d. Open rear lens cover. Turn rotary reticle illumination switch and look through rear lens. Verify that the reticle is illuminated. If not, replace the battery.

2. Turn the elevation adjustment dial.
    a. Rotate the silver lock to the UP position.
    b. Turn the elevation adjustment dial counterclockwise to move the elevation up.
    c. Turn the elevation adjustment dial clockwise to move the elevation down.

3. Turn the windage adjustment screw.
    a. Turn the windage adjustment screw clockwise to move the windage to the left.
    b. Turn the windage adjustment screw counterclockwise to move the windage to the right.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to place the M145 telescope into operation.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Installed and checked the battery. | ____ | ____ |
| 2. Turned the elevation adjustment dial--<br>a. Clockwise to move it up.<br>b. Counterclockwise to move it down. | ____ | ____ |
| 3. Turned the windage adjustment screw--<br>a. Clockwise to move left.<br>b. Counterclockwise to move right. | ____ | ____ |

**Evaluation Guidance:** Score the soldier a GO if all performance measures are passed. Score the soldier a NO-GO if any performance measure is failed. If the soldier scores a NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1240-415-13&P |

**Maintain M145 Telescope, Straight**

**071-703-0002**

**Conditions:** Given an M145 telescope with components, battery (OE890) DL1/3N, clean water, optical lens cleaning compound, lens paper, soft cloth, and a requirement to perform operator maintenance on the sight.

**Standards:** Cleaned and inspected the M145 telescope components and accessories for serviceability; reported unserviceable items to the supervisor.

**Performance Steps**

1. Inspect the M145 telescope, straight.
    a. Inspect the exterior of the sight for loose or missing parts and cleanliness.
    b. Inspect for visual obstruction of target image, dust, dirt, pits or moisture on optical surfaces and loose or broken optical elements by looking through the sight. Ensure that the 300m, 500m, 700m, and 800m marks in the reticle are visible.
    c. Inspect the battery cap and ensure that battery cap threads are clean and undamaged. Ensure the O-ring and spring is in the battery cap.
    d. Inspect mount for damage that will prevent sight from being installed.
    e. Inspect both lens covers and ensure they can be snapped in place.
    f. Inspect torque limiting knob for damage that will prevent sight from being installed.
    g. Inspect torque limiting shaft and ensure threads are not stripped.
    h. Inspect and ensure signature reduction device and laser filter is present.
    i. Report any deficiencies not correctable to supervisor.
2. Clean the M145 telescope, straight.
    a. Clean the exterior of the M145 telescope, straight, and metal components by flushing with water and wiping with a soft cloth.
    b. Clean the lens.
        (1) Remove large particles from exposed lens surfaces by first blowing on the surfaces. Blow as much dust and dirt as possible from the exposed lens surfaces. Gather the center of a sheet of lens paper and use the edges to brush dust from the front and back lens.
        (2) Remove mud using optical lens cleaning compound or by splashing water onto the lens.
        (3) When all visible particles of dust and dirt have been removed, moisten a piece of lens paper and gently wipe over the lens surface. Dry with clean lens paper.
    c. Remove the signature reduction device by rotating in a counterclockwise direction. Clean the signature reduction device by running water through the honeycomb. Shake out excess water and leave to dry.
    d. Remove the laser filter by rotating in a counterclockwise direction. Clean the laser filter with lens paper.
    e. Replace the laser filter and signature reduction device by screwing clockwise onto the front objective lens.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to inspect the M145 telescope and components for completeness and serviceability, clean the telescope and components, and report any problems to his supervisor as required.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inspected the M145 telescope, straight, and reported all deficiencies not correctable to supervisor. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 2. Cleaned the M145 telescope, straight, using correct cleaning procedures. | ____ | ____ |

**Evaluation Guidance:** Score the soldier a GO if all performance measures are passed. Score the soldier a NO-GO if any performance measure is failed. If the soldier scores a NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 9-1240-415-13&P |

Subject Area 38: WEAPONS: HG/MINES/DEMOLITIONS

**Locate Mines by Visual Means**

**052-192-1021**

**Conditions:** Given a field location suspected of having mines and tripwires.

**Standards:** The soldier will locate possible mine sites and visually search suspected areas for mines and tripwires. No visible mines, parts of mines, or tripwires will be overlooked.

**Performance Steps**

1. Visually locate possible mine sites by identifying the following areas:
   a. Likely avenues of approach.
   b. Key intersections and turnouts.
   c. Trails, paths, and cleared spots in wooded areas.
   d. Approaches and exits to bridges, fords, and tunnels.
   e. Wood lines.
   f. Depression and ditches.
   g. Open fields and grasslands.
2. Visually search possible mine sites for suspected mines and trip wires:
   a. Loose dirt, tall grass, trip wires, and any disturbed ground in or around helicopter landing sites.
   b. Signs of road repairs--holes filled with asphalt or other material.
   c. Mud smears, grass, sticks, loose dirt, dung, or other material on roads.
   d. Shoulders of roads at likely ambush sites.
   e. Trip wires near known or suspected AT mines.
   f. Signs placed in trees, on posts, or stakes.
   g. Tunnels under roads.
   h. Any unusual or out of place material.
   i. Wilted plants or brush.
   j. Souvenirs such as flags, equipment, and supplies.
   k. Areas that local civilians avoid.
   l. Culverts and bridges.
3. Report all suspected areas to the team/squad leader.

NOTE: Conduct a check on learning and summarize the learning activity.

**Evaluation Preparation:** SETUP: Simulate a mined and tripwired area.

BRIEF SOLDIER: Tell the soldier to look at the terrain and visually locate possible mined and tripwired areas.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Visually located possible mine sites by locating the following areas:<br>a. Likely avenues of approach.<br>b. Key intersections and turnouts.<br>c. Trails, paths, and cleared spots in wooded areas.<br>d. Approaches and exits to bridges, fords, and tunnels.<br>e. Wood lines.<br>f. Depressions and ditches.<br>g. Open fields or grassland. | ____ | ____ |
| 2. Visually searched possible mine sites for suspected mines and tripwires. | ____ | ____ |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| a. Loose dirt, tall grass, tripwires, and any disturbed ground in or around helicopter landing sites.<br>b. Signs of road repairs--holes filled with asphalt or other material.<br>c. Mud smears, grass, sticks, loose dirt, dung, or other material on roads.<br>d. Shoulders of roads at likely ambush sites.<br>e. Tripwires near known or suspected AT mines.<br>f. Signs placed in trees, on posts, or on stakes.<br>g. Tunnels under roads.<br>h. Any unusual or out of place material.<br>i. Wilted plants or brush.<br>j. Souvenirs such as flags, equipment, and supplies.<br>k. Areas that local civilians avoid.<br>l. Culverts and bridges. | | |
| 3. Reported all suspected areas to the team leader/squad leader. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| FM 20-32 | DVC 05-14<br>DVC 05-17<br>DVC 5-17<br>EN5501<br>ENG 051-142 |

**Install an M21 Antitank (AT) Mine**

**052-192-1117**

**Conditions:** As a combat-engineer squad member in a field environment, given an M21 AT mine, an M120 booster, an M607 fuze, an M26 arming wrench, an entrenching tool, G697 silicone grease, and sandbags.

**Standards:** Installed an M21 AT mine, in the proper sequence, without causing the mine to detonate.

**Performance Steps**

1. Inspect the mine and components.

CAUTION: IF THERE IS A PROBLEM IN ANY OF THE FOLLOWING STEPS, NOTIFY THE NONCOMMISSIONED OFFICER IN CHARGE (NCOIC).

a. Check to see if the mine is dented, cracked, or damaged. If it is, do not use it.

b. Ensure that there is no obvious damage to the M607 fuze. Remove the closure cap and, while keeping your hand clear, inspect the fuze assembly by removing the D ring (cotter pin) and stop band to ensure that the plastic collar is intact. Rotate the fuze around the U-band in a 360-degree circle, inspecting the entire fuze (Figure 052-192-1117-1).

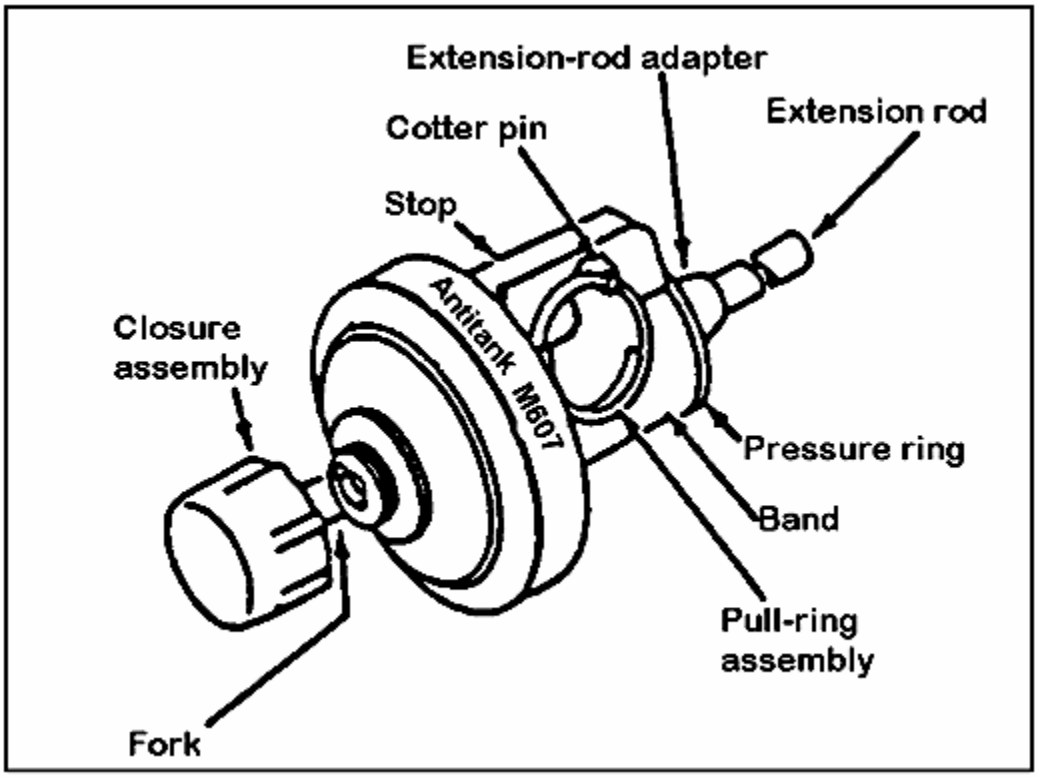



Figure 052-192-1117-1
M607 Fuze

c. Replace the stop band, D ring and closure cap.

CAUTION: IF THE TOP OF THE FUZE TURNS WITH THE STOP AND BAND, THE NECK OF THE FUZE IS BROKEN.

2. Insert the booster.

a. Turn the mine upside down. Use the screwdriver end of the M26 wrench to remove the closing plug from the bottom of the mine by turning the plug counterclockwise (Figure 052-192-1117-2).

**Performance Steps**

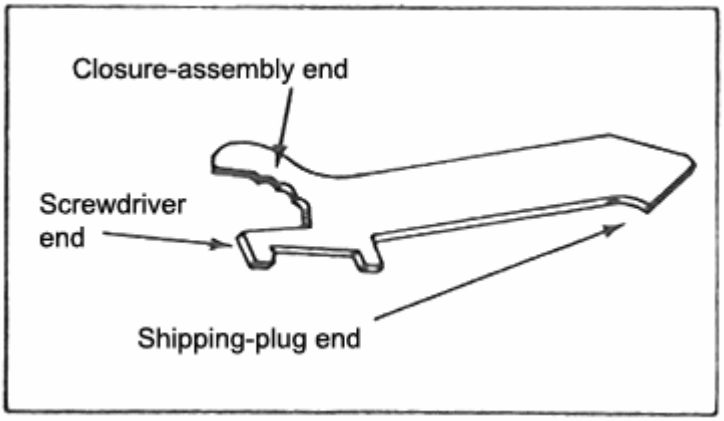



Figure 052-192-1117-2
M26 Wrench

b. Examine the booster well for foreign material. If foreign material is present, gently tap the side of the mine with your hand to dislodge it.

CAUTION: IF THE FOREIGN MATERIAL CANNOT BE REMOVED, REPLACE THE CLOSING PLUG. DO NOT USE THE MINE.

c. Insert the M120 booster, with the washer side toward the fuze, into the booster well.
d. Use the M26 wrench to replace the closure plug, with the gasket side toward the booster, and turn clockwise.

NOTE: For long-term emplacement, smear G697 silicone grease on the threads of the closing-plug assembly.

3. Fuze the mine.
   a. Turn the mine over. Use the M26 wrench to remove the shipping plug from the fuze well on top of the mine (Figure 052-192-1117-3).

**Performance Steps**

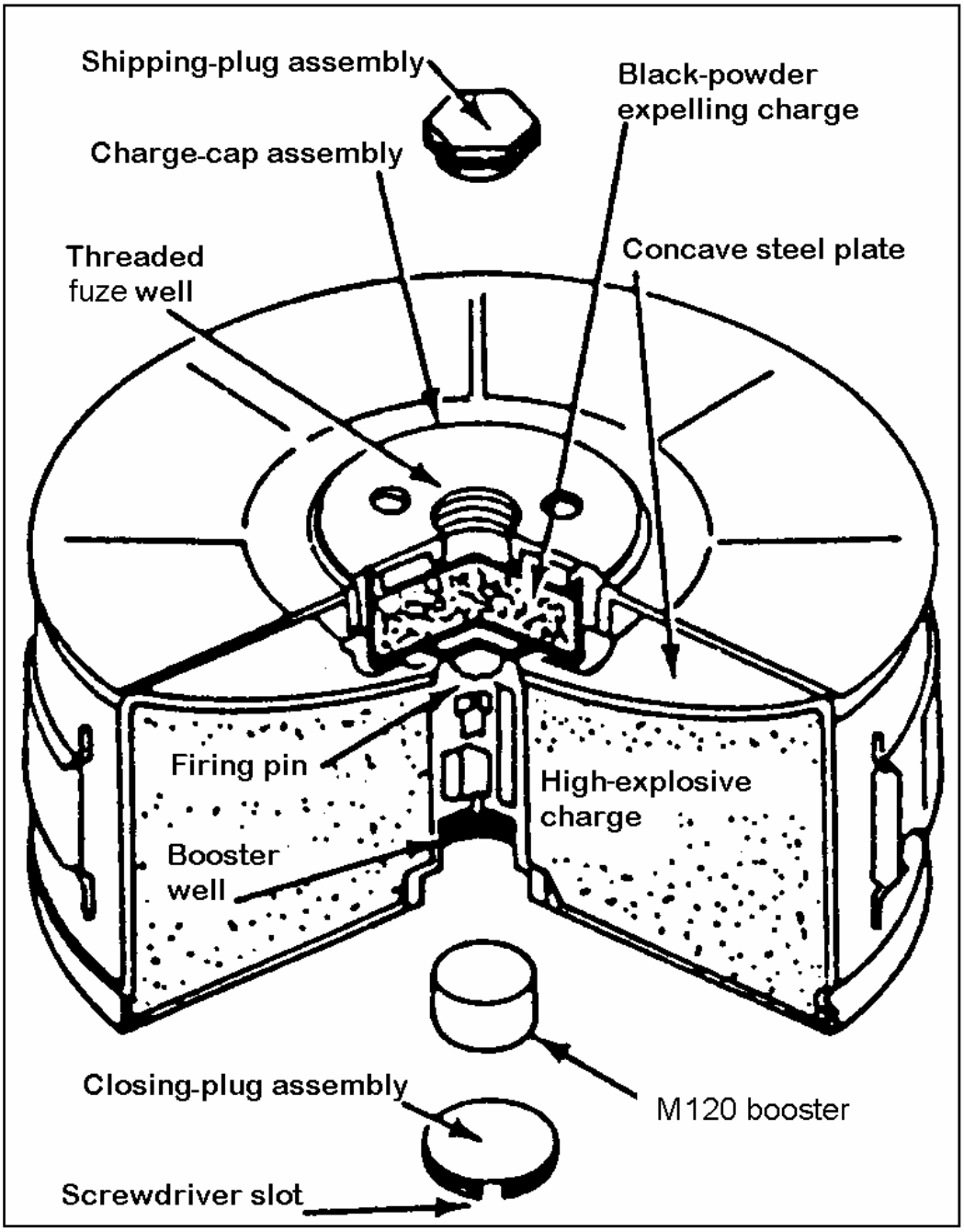



Figure 052-192-1117-3
View of M21 AT Mine

b. Examine the fuze well for foreign material. If foreign material is present, gently shake the mine to dislodge it.

CAUTION: IF THE FOREIGN MATERIAL CANNOT BE REMOVED, DO NOT USE THE MINE.

c. Use the M26 wrench to remove the closure assembly from the M607 fuze. Ensure that the gasket remains in place on the fuze.

d. Screw the fuze, hand tight, into the fuze well and set the mine to the side.

NOTE: For long-term emplacement, smear G697 silicone grease on the fuze threads.

**Performance Steps**

4. Dig a hole to fit the mine.

NOTE: Mines with extension rods should be placed in tall grass, if possible.

a. Dig a hole deep enough so that the top of the mine will be at ground level (Figure 052-192-1117-4).

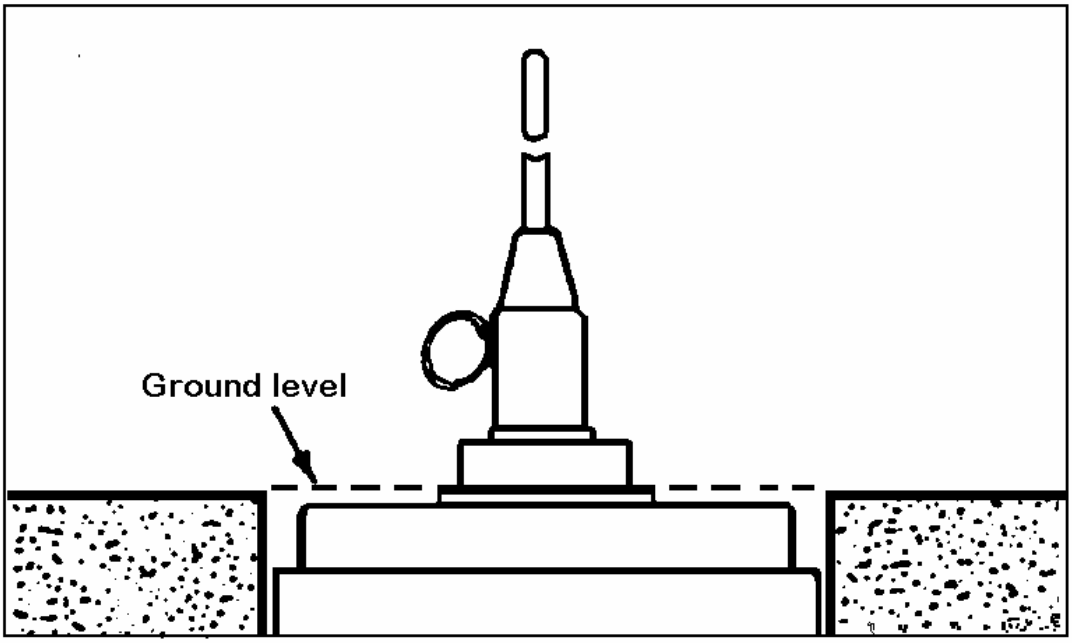



Figure 052-192-1117-4
M21 AT Mine in a Hole

b. Check the bottom of the hole to ensure that the ground is solid enough to support the mine. If necessary, place a flat object under the mine to provide a firm foundation. Allow additional depth for the object.

5. Emplace the mine.
   a. Put the mine in the hole.
   b. Cover the mine with soil until it is level with the top of the mine.
   c. Press the soil firmly around the sides of the mine.

NOTE: Ensure that no soil falls around or under the plastic collar.

6. Assemble the extension rod.
   a. Assemble the three pieces of the extension rod.
   b. Screw the extension rod on the M607 fuze.

WARNING: DO NOT TILT THE EXTENSION ROD. A 20-DEGREE TILT OF THE EXTENTION ROD WILL DETONATE THE MINE.

7. Arm the mine.
   a. Squeeze the end of the cotter pin together on the pull ring (Figure 052-192-1117-5).
   b. Remove the cotter pin by holding the fuze firmly in one hand and pulling on the pull ring with the other hand.
   c. Remove the safety stop and safety band from the fuze slowly and carefully.

8. Camouflage the mine.
   a. Add twigs, grass, or other materials to make the area look natural. Ensure that no pressure is applied to the tilt rod or the fuze.

**Performance Steps**

b. Place the excess soil in sandbags and remove it from the area.
c. Give the band and stop, the pull-ring assembly, the shipping plugs, and the closure assembly to the NCOIC.

**Evaluation Preparation:** SETUP: Provide the soldier with the items listed in the condition statement. Use inert equipment when performing this task.

BRIEF SOLDIER: Observe the soldier's performance for any improper procedures that may cause the mine to detonate.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inspected the mine and components. | ____ | ____ |
| 2. Inserted the booster. | ____ | ____ |
| 3. Fuzed the mine. | ____ | ____ |
| 4. Dug a hole to fit the mine. | ____ | ____ |
| 5. Emplaced the mine. | ____ | ____ |
| 6. Assembled the extension rod. | ____ | ____ |
| 7. Armed the mine. | ____ | ____ |
| 8. Camouflaged the mine. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

**Required**

**Related**
FM 5-34
GTA 05-10-036
GTA 05-10-037

**Remove an M21 Antitank (AT) Mine**

**052-192-1118**

**Conditions:** As a combat engineer squad member in a field environment, given the location of an emplaced M21 AT mine, an M26 arming wrench, a band and stop, cotter pins, a shipping plug, and a closure assembly.

**Standards:** Removed an M21 AT mine, in the proper sequence, without causing the mine to detonate.

**Performance Steps**

WARNING: BEFORE ATTEMPTING TO DISARM AND REMOVE THE MINE, CHECK FOR BOOBY TRAPS, DAMAGE, OR MALFUNCTIONS TO THE MINE. IF ANY OF THESE CONDITIONS EXIST, NOTIFY THE NONCOMMISSIONED OFFICER IN CHARGE (NCOIC). DO NOT ATTEMPT TO DISARM THE MINE.

1. Disarm the mine.

WARNING: DO NOT APPLY PRESSURE TO THE TILT ROD OR FUZE AT ANY TIME.

a. Clear the camouflage away from the mine.
b. Attach the safety band and safety stop to the fuze (Figure 052-192-1118-1).

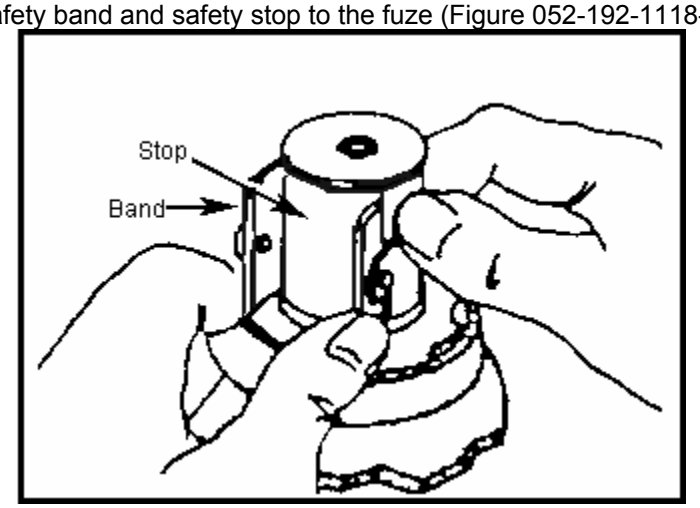



Figure 052-192-1118-1
Attaching thte Band and Stop

c. Insert the cotter pin into the safety band and safety stop. Spread the ends of the cotter pin (Figure 052-192-1118-2).

**Performance Steps**

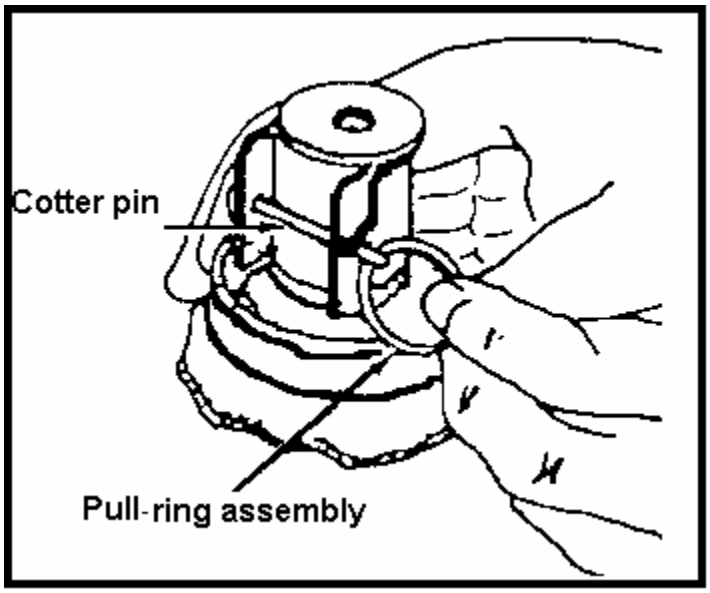



Figure 052-192-1118-2
Inserting the Cotter Pin

d. Unscrew and remove the extension rod.

2. Check for antihandling devices (AHDs).
   a. Hold the mine firmly in place with one hand. Do not put pressure on the fuze.
   b. Feel for the AHDs, with the other hand, by digging around the sides and underneath the mine.

WARNING: IF YOU FIND AN AHD, STOP AND NOTIFY THE NCOIC. DO NOT REMOVE THE MINE.

3. Remove the mine.
   a. Remove the mine from the hole.
   b. Remove the fuze from the mine.
   c. Install the closure assembly on the fuze.
   d. Install the shipping plug into the fuze well of the mine.
   e. Remove the closing plug from the bottom of the mine.
   f. Remove the booster from the mine.
   g. Install the closing plug into the booster well.

**Evaluation Preparation:** SETUP: Provide the soldier with the items listed in the condition statement. Use inert equipment when performing this task.

BRIEF SOLDIER: Observe the soldier's performance for any improper procedures that may cause the mine to detonate.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Disarmed the mine. | ____ | ____ |
| 2. Checked for AHDs | ____ | ____ |
| 3. Removed the mine. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 20-32
FM 5-34
GTA 05-10-036
GTA 05-10-037

Subject Area 39: WEAPONS: M136 LAUNCHER (AT4)

**Perform Misfire Procedures on an M136 Launcher**
**071-054-0003**

**Conditions:** Given an armed M136 launcher (AT4) that has misfired.

**Standards:** Applied misfire procedures so that the AT4 can be fired, or ensured the weapon cannot fire, and informed the supervisor of the misfire.

**Performance Steps**

1. Perform misfire procedures.
   a. When the launcher fails to fire, immediately shout "MISFIRE."
   b. Continue to hold the launcher pointed in the area of the target.
   c. Release the red safety catch.
   d. Immediately recock the cocking lever, check the backblast area, aim, fully depress and hold down the red safety catch, and press the red trigger button.

NOTE: If the launcher still fails to fire, repeat steps 1a through 1d above.

   e. If the launcher again fails to fire, release the red safety catch and return the cocking lever to the SAFE (uncocked) position.
   f. Remove the launcher from the shoulder while keeping the muzzle pointed toward the target area.

WARNING
If transport safety pin cannot be reinserted, do not move the weapon. Notify the NCOIC.

   g. While cradling the launcher with the left arm, reinsert the transport safety pin.

NOTE: In a training situation only, after inserting the transport safety pin, wait two minutes. Keep the launcher pointed toward the target area.

   h. Carefully lay the launcher on the ground, muzzle pointed toward the target area.

2. Immediately use another launcher to engage the target.

**Evaluation Preparation:** SETUP: At the test site, provide an expended AT4 or a tracer trainer in the ready-to-fire configuration.

BRIEF SOLDIER: Tell the soldier to assume a correct standing, ready-to-fire position with the launcher. Tell the soldier to go through the firing procedure. Tell him go through the misfire procedures.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: The performance measures are scored in sequence. | | |
| 1. Shouted "MISFIRE." | ____ | ____ |
| 2. Released the red safety catch. | ____ | ____ |
| 3. Recocked the cocking lever. | ____ | ____ |
| 4. Tried to refire after checking the backblast area. | ____ | ____ |
| 5. Repeated performance measures 1 through 4 when the launcher failed to fire. | ____ | ____ |
| 6. Returned the red safety lever to the SAFE (uncocked) position. | ____ | ____ |
| 7. Removed the launcher from the shoulder while keeping the muzzle pointed at the target area. | ____ | ____ |
| 8. Replaced the transport safety pin. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 9. Placed the launcher on the ground with the muzzle pointed toward the target area. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| FM 3-23.25 | |

Subject Area 40: WEAPONS: M16 SERIES RIFLE

**Mount a Night Vision Sight, AN/PVS-4, on an M16-Series Rifle**
**071-008-0001**

**Conditions:** Given an M16-series rifle; night vision sight, AN/PVS-4, with storage case; one battery BA-5567/U (or two BA-3058 with AA battery adapter); expended cartridge case, and mounting knob assembly.

**Standards:** Secured night vision sight, AN/PVS-4, to the M16-series rifle so that it was stable and could be used to effectively engage targets without damage to equipment.

**Performance Steps**
WARNING
Be sure no rounds are in the weapon before attempting to mount the AN/PVS-4. The weapon must be on SAFE.

CAUTION: The AN/PVS-4 is a precision electro-optical instrument and must be handled carefully at all times.

1. Inspect equipment.
    a. Visually inspect equipment for obvious damage and or missing parts.
        (1) Mounting knob assembly.
            ( a) Stripped threads.
            ( b) Missing nuts or washers.
        (2) AN/PVS.
            ( a) Batteries.
            ( b) Controls and indicators.
    b. If serviceability is questionable, return to maintenance personnel as non-operational.

2. Mount the AN/PVS-4 to the rifle.
    a. Using the luminous lines on the AN/PVS-4 and carrying handle, align the threaded hole on the sight mounting adapter of the AN/PVS-4 with the hole in the carrying handle of the rifle.
    b. Attach mounting knob assembly.
        (1) Insert the threaded end of mounting knob assembly through hole in carrying handle into hole of AN/PVS-4.
        (2) Turn mounting knob clockwise to the right with firing hand until tight (if necessary, place empty cartridge case over the lever arm to increase leverage as the mounting knob assembly is tightened).

NOTE: If you encounter difficulty, turn the sight and the rifle upside down. Place the rifle handle onto the sight mounting adapter, lining up the adapter. Place the mounting knob assembly through the hole in the handle and rotate clockwise.

    c. Test the AN/PVS-4 to ensure it is mounted securely. Grasp it and attempt to move it back and forth.
    d. If the AN/PVS-4 does move, retighten the mounting knob.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier all equipment and material given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to mount the AN/PVS-4 on an M16-series rifle.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inspected equipment. | ____ | ____ |
| 2. Mounted the AN/PVS-4 to the rifle. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
| --- | --- |
| | TM 11-5855-213-10 |

**Dismount a Night Vision Sight, AN/PVS-4, from an M16-Series Rifle**
**071-008-0002**

**Conditions:** Given an M16-series rifle with mounted AN/PVS-4, storage case, and carrying bag. The AN/PVS-4 is in the OFF position, with batteries installed, and is mounted with the mounting knob assembly.

**Standards:** Removed the AN/PVS-4 night vision sight from the rifle, and removed the batteries from the sight. Placed the sight, batteries, and mounting knob assembly in the storage case without damaging them.

**Performance Steps**

1. Dismount the AN/PVS-4 from the M16-series rifle.
   a. Unscrew mounting knob assembly in a counterclockwise direction until the assembly is free, remove it from the weapon.
   b. While removing the mounting knob assembly, hold the AN/PVS-4 and then remove it from the rifle.
   c. Remove batteries.
2. Place items in the storage case.
   a. Place batteries and mounting knob assembly into designated compartments in the storage case.
   b. Place AN/PVS-4 into carrying bag and then into designated compartment in the storage case.
   c. Close top of storage case and fasten all four latches.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and material shown in the task condition statement.

BRIEF SOLDIER: Tell the soldier to remove the AN/PVS-4 from the M16-series rifle and replace it in its storage case.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Dismounted the AN/PVS-4 from the M16-series rifle. | ____ | ____ |
| 2. Placed items in the storage case. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5855-213-10 |

**Mount an AN/PAS-13 Thermal Weapon Sight on an M16-Series Rifle**

**071-008-0004**

**Conditions:** Given an M16-series rifle, AN/PAS-13-series thermal weapon sight (TWS) with M4 spacer installed, carrying case, and one battery (BA-5347A/U or BB-2847/U).

**Standards:** Secured the TWS to the M16-series rifle so that it was stable and could be used to effectively engage targets without damage to equipment.

**Performance Steps**

1. Check to ensure rifle is clear and the selector lever is on SAFE.
2. Inspect TWS and components.
   a. Visually inspect equipment for completeness, obvious damage, and missing parts.
   b. If serviceability is questionable, return to maintenance personnel as nonoperational.
3. Install TWS on an M16-series rifle.
   a. Install mounting bracket.
      (1) Lower the rear sight of the M16 all the way down.
      (2) Place the threaded rod of the mounting bracket through the hole in the carrying handle of the rifle.
      (3) Secure the bracket by screwing the thumb wheel on the threaded rod (hand tighten only).
   b. Install TWS.
      (1) Loosen the knob on the TWS mount interface.
      (2) Select a slot on the rail for mounting the TWS. Any slot may be used as long as the mount interface does not extend over the edge of the rail. The slot selected should also allow you to effectively aim and fire the rifle while sighting through the TWS.
      (3) Place the bar of the mount interface in the selected slot. Hand tighten the knob until it clicks at least twice.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier that he must mount thermal weapon sight AN/PAS-13 on the M16-series rifle.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inspected TWS and components. | ____ | ____ |
| 2. Installed TWS on an M16-series rifle. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5855-309-12&P |

**Dismount an AN/PAS-13 Thermal Weapon Sight from an M16-Series Rifle**
**071-008-0005**

**Conditions:** Provide an M16-series rifle with a mounted AN/PAS-13-series thermal weapon sight (TWS) and a TWS carrying case with basic issue items. The TWS brightness control switch is at the OFF position, and the battery is installed.

**Standards:** Removed the TWS from the rifle without damage to equipment and stowed the TWS, battery, and spacer in correct place in the carrying case.

**Performance Steps**

1. Check to ensure rifle is clear and the selector lever is on SAFE.
2. Remove the TWS from the rifle
   a. Secure the TWS with one hand to prevent it from falling, and loosen the knob on the mount interface until the TWS is free of the rail.
   b. Remove the TWS from the weapon.
   c. Unscrew the thumb wheel from the threaded rod and remove the mounting bracket from the weapon.
3. Stow the TWS and components parts.
   a. Ensure brightness knob is at the OFF position.
   b. Ensure objective lens cover is installed.
   c. Remove the battery, close and secure battery door.
   d. Stow the TWS and battery in their proper compartments in the carrying case.
   e. Close carrying case.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to remove the thermal weapon sight, AN/PAS-13 from the M16-series rifle and stow it in its case.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Checked to ensure the weapon is clear. | ____ | ____ |
| 2. Removed the TWS from the M16-series rifle. | ____ | ____ |
| 3. Stowed the TWS and component parts. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5855-309-12&P |

**Zero an AN/PAS-13 Thermal Weapon Sight to an M16-Series Rifle**

**071-008-0006**

**Conditions:** On a range or on terrain suitable for firing small arms, given an AN/PAS-13 thermal weapon sight (TWS) mounted on an M16-series rifle and magazines with 5.56-mm ammunition. You have a cutting tool (knife or scissors), adhesive tape, E-type silhouette or E-type thermal silhouette; M16-series 25-meter zeroing target located 25 meters from the firing point.

**Standards:** Adjusted TWS so that a round fired from the rifle, used correct sight alignment, impacted 8.1 squares (7.3 centimeters) below the aim point on the zeroing target.

**Performance Steps**

1. Prepare an M16-series rifle 25-meter zeroing target for TWS zero.
    a. Cut out a hole four squares wide by four squares high from the center of the M16-series rifle 25-meter zeroing target.
    b. Cut a piece of corrugated cardboard the same size as the M16-series rifle 25-meter zeroing target.
    c. Measure one inch from each side of the cardboard and cut out a rectangle. You should have a one-inch cardboard frame.
    d. Tape the cardboard frame to the back of the M16-series rifle 25-meter zeroing target.
    e. Affix the target to a standard E-type silhouette or E-type thermal silhouette located 25-meters from firing position.

2. Assume a supported firing position and place the TWS into operation.

3. Adjust TWS controls for rounds to impact at desired aim point on 25-meter zeroing target.
    a. Set FOV ring to WIDE position.
    b. Press and release RETICLE SELECT switch until display shows M16 reticle.
    c. Use RETICLE ADJUST switch to set azimuth and elevation indicators to zero (000L and 000D).

NOTE: The TWS reticle zeroing aim point is the aim point located between the zeroing aim lines.

    d. Load the rifle and place selector lever on SEMI.
    e. Aim center mass at the 25-meter zeroing target and fire three-round shot groups until you obtain a shot group that is 4 centimeters or less in diameter. Check tightness of sight after first three-round shot group. Tighten if necessary.
    f. Adjust reticle to move center of shot group to the zero point of impact. The zero point of impact for the M16-series rifle is 8.1 squares (7.3 centimeters) below target aim point.
        (1) Determine azimuth and elevation adjustment required to move the center of the shot group to the desired point of impact.

NOTE: At 25-meter range, each increment (one click) of azimuth or elevation moves the strike of the round 1 ¼ centimeter for medium weapon thermal sight (MWTS) WFOV and ¾ centimeter for MWTS NFOV and HWTS WFOV. However, when calculating for adjustments, use one click of azimuth or elevation to move strike of round one square on the 25-meter zeroing target.

        (2) Use the RETICLE ADJUST switch to adjust reticle position up (U), down (D), left (L) or right (R).
        (3) Fire and adjust reticle until five or six consecutive shots are within desired point of impact.
        (4) If the sight is mounted on a squad leader's weapon, set FOV ring to narrow (N) position and repeat zero procedures.
        (5) Record setting of azimuth and elevation indicators.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to zero the thermal weapon sight AN/PAS-13 on the M16-series rifle.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Prepared an M16-series rifle 25-meter target for TWS zero.<br>a. Cut out a hole four squares wide by four squares high from the center of the target.<br>b. Cut a piece of corrugated cardboard the same size as the M16-series rifle 25-meter zeroing target.<br>c. Measured 1 inch from each side of the cardboard and cut out a rectangle. A one inch cardboard frame was formed.<br>d. Taped the cardboard frame to the back of the M16-series rifle 25-meter zeroing target.<br>e. Affixed the target to a standard E-type silhouette thermal sight located 25-meters from firing position. | ____ | ____ |
| 2. Assumed a supported firing position and placed the TWS into operation. | ____ | ____ |
| 3. Adjusted TWS controls for rounds to impact at the desired aiming point on 25-meter target.<br>a. Set FOV ring to WIDE position.<br>b. Pressed and released RETICLE SELECT switch until display showed M16 reticle.<br>c. Used RETICLE ADJUST switch to set azimuth and elevation indicators to zero (000L and 000D).<br>d. Loaded the rifle and placed the selector lever on SEMI. | ____ | ____ |
| 4. Fired three-round shot groups until a 4-centimeter or less shot group was obtained. | ____ | ____ |
| 5. Adjusted the reticle moving the center of the shot group to the zero point of impact.<br>a. Determined azimuth and elevation adjustment required.<br>b. Adjusted reticle position.<br>c. Fired and adjusted weapon until six consecutive rounds were within the zero point of impact.<br>d. Set the FOV ring to N (narrow) for squad leader's weapons.<br>e. Recorded azimuth and elevations indicator settings. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 11-5855-309-12&P |

## Mount an AN/PAQ-4-Series Aiming Light on an M16-Series Rifle

**071-008-0008**

**Conditions:** Given a cleared M16-series rifle, an AN/PAQ-4-series aiming light, M16-series mounting bracket, M16A1 barrel adapter, and a requirement to mount the aiming light to your rifle.

**Standards:** Attached and secured the AN/PAQ-4-series aiming light, the M16A1 barrel adapter, and the M16-series to the M16-series rifle.

**Performance Steps**

WARNING

Make sure the weapon is clear and on SAFE before proceeding.

1. On the rifle, first attach the M16A1 barrel adapter to the barrel to compensate for the smaller diameter of this barrel. When attaching the M16-series mounting bracket over the barrel adapter, make sure that the tabs on the adapter engage the cutouts on the bracket jaws.
    a. Fully loosen the bracket knob and position the M16-series mounting bracket on the rifle, so that the bracket jaws clamp around the barrel and the front sight post fits through the bracket's cut out.

NOTE: Before clamping the bracket to the barrel, make sure that the front sight post is not in contact with the bracket.

    b. Hand tighten the bracket knob to clamp the bracket to the barrel. Fold down the metal ring.
    c. Rotate the IAL ON/OFF switch CW to the #5 OFF (vertical) position.
    d. Position the aiming light on the bracket mounting rail. Hand tighten the thumbscrew to secure the aiming light.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to mount the AN/PAQ-4-series aiming light on the M16-series rifle.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Ensured the weapon was clear. | ____ | ____ |
| 2. Installed the sight on the M16-series rifle. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5855-301-12&P |

**Dismount an AN/PAQ-4-Series Aiming Light from an M16-Series Rifle**
**071-008-0009**

**Conditions:** Given an AN/PAQ-4-series aiming light mounted on an M16-series rifle and a requirement to dismount it from the rifle.

**Standards:** Removed the AN/PAQ-4-series and M16A1 barrel adapter without damaging the M16-series mounting bracket or without injury to personnel.

**Performance Steps**

1. Remove the aiming light from the mounting bracket by loosening the thumbscrew.
2. Remove the topmost portion of the mounting bracket by loosening the mounting screws. Set these parts aside.
3. Remove the bracket caps and set them aside with the small screws and washers.
4. Remove the top portion of the mounting bracket.
5. Screw the topmost portion of the bracket back onto the bracket.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier that he must remove the AN/PAQ-4-series aiming light from an M16-series rifle.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Removed the aiming light. | ____ | ____ |
| 2. Removed and set aside the topmost portion of the mounting bracket. | ____ | ____ |
| 3. Removed and set aside the bracket caps with the small screws and washers. | ____ | ____ |
| 4. Removed the top portion of the mounting bracket. | ____ | ____ |
| 5. Screwed the topmost portion of the bracket back onto the bracket. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5855-301-12&P |

## Zero an AN/PAQ-4-Series Aiming Light to an M16-Series Rifle
## 071-008-0010

**Conditions:** Given an AN/PAQ-4-series aiming light mounted on an M16-series rifle, an M16A2 25-meter zeroing target, and a requirement to zero the rifle.

**Standards:** Zeroed the M16-series rifle with the AN/PAQ-4-series aiming light mounted when 2 out of 3 rounds hit the designated strike zone.

**Performance Steps**

1. Boresight the AN/PAQ-4-series aiming light to the M16-series rifle.
    a. Check the alignment of the borelight.
        (1) Place the appropriate mandrel with the borelight attached in the muzzle of the weapon.
        (2) Turn on the borelight so that the laser dot strikes the target (offset) 10 meters away.
        (3) Slowly rotate the borelight a half turn (180 degrees) while watching the dot made by the laser on the target area.
        (4) If the dot remains stationary, the laser is boresighted.
        (5) If the dot rotates in a circle, the windage or elevation or both must be adjusted until the dot remains stationary or rotates on itself no more than 1 centimeter.
    b. Adjust the borelight (if necessary).
        (1) Move the target to a distance of 2 meters.
        (2) Mark the location of the laser dot.
        (3) Slowly rotate the borelight a half turn.
        (4) Note the new location of the laser dot.
        (5) Adjust the windage and elevation until the laser dot moves half way back to its original location.
        (6) Continue the procedure until the laser dot remains stationary (or spins upon itself within 1 centimeter) when the borelight is rotated.
        (7) Move the target to a distance of 10 meters and recheck the boresight.
    c. Boresight the AN/PAQ to the weapon.
        (1) Position the weapon so the borelight strikes the small dot on the boresight target.
        (2) Zero the aiming light by turning both windage and elevation knobs (for the pointer and illuminator) fully clockwise until they stop. Rotate counterclockwise 5 ½ turns and align the white dot on the adjuster with the center of the front adjuster flange.
        (3) Adjust the aiming light until the emitted laser is on the appropriate dot on the boresight target.
        (4) The weapon is boresighted when the laser bore light is on the small dot and the emitted laser is on the cross.

NOTE: You must use a night vision goggle to see the dot from the laser. Boresight zeroing must be conducted at 10 meters.

2. Zeroing.
    a. When the weapon is sighted precisely center mass of the 25-meter target, the beam appears dimmer. Fire a round at this time.
        (1) Choose the appropriate 25-meter strike zone for the weapon you are using and draw the strike zone on the 25-meter zero target.
        (2) Staple the 25-meter zero target on an E-type silhouette and cut a 4-centimeter square out of the center through both the target paper and the E-type silhouette. Then place the target on the 25-meter range.
        (3) Fire a three-round shot group. Remember to fire when the infrared aiming light's beam goes through the 4-centimeter cut-out in the target (the beam will appear dimmer).
        (4) Triangulate the three-round shot group and adjust the windage and elevation knobs on the aiming light to move the impact of the rounds to the designated strike zone.
        (5) Repeat steps 3 and 4 until five out of six rounds from two consecutive shot groups are within the designated strike zone.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to zero the AN/PAQ-4-series aiming light to an M16-series rifle.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Placed the AN/PAQ-4-series aiming light into operation. | ____ | ____ |
| 2. Zeroed the aiming light to the M16-series rifle. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 11-5855-301-12&P |

**Engage Targets with an M16-Series Rifle Using an AN/PAQ-4-Series Aiming Light**
**071-008-0011**

**Conditions:** Given an M16-series rifle with a mounted and zeroed AN/PAQ-4-series aiming light, magazines, ammunition, individual combat equipment, and stationary or moving targets (personnel) at engageable ranges.

**Standards:** Detected and determined range to targets. Fired the weapon and engaged the targets in the assigned sector of fire. Applied correct marksmanship fundamentals and target engagement techniques to hit or suppress the target or forced the enemy to move.

**Performance Steps**

1. Assume an appropriate firing position based on the situation. The firing position should protect you from enemy fire and observation, yet allow you to place effective fire on targets in your sector of fire.
   a. Foxhole. Advantages: best when available. Disadvantages: no overhead cover.
   b. Prone. Advantages: steady, easy to assume, low silhouette, and easily adapted to use of cover and support. Disadvantages: terrain and vegetation irregularities can limit effectiveness.
   c. Prone supported. Advantages: steadier than prone, other advantages the same as prone. Disadvantages: same as prone.
   d. Kneeling. Advantages: used when firing from behind something, used on ground that is level or gently sloping upward. Disadvantage: exposed to small arms fire.
   e. Kneeling supported. Advantages: steadier than kneeling, other advantages the same as kneeling. Disadvantages: exposure to small arms fire.
   f. Standing. Advantages: used in assault to surprise targets or when other positions are not appropriate. Disadvantages: exposure to small arms fire.
2. Identify targets in your designated sector of fire.
3. Determine range to a target.
4. Load and fire on targets using appropriate engagement techniques.
   a. Load the weapon.
   b. Use the appropriate aiming technique.

NOTE: When used with the M16A1/A2, the IAL is activated in the #4 ON MOMENTARY position only.

   (1) Press the ON/OFF switch against the weapon handguard to activate the IAL. The IAL will project an infrared pulsing spot towards the target.
   (2) Engage the target when the IAL is on the desired point of impact.
   (3) Engage a stationary target using reference points or sighting points.
   (4) Engage a target moving towards you as you would a stationary target.
   (5) Engage a target moving laterally using the new single lead technique by placing the trailing edge of the front sight post at the center of the target. This method causes the lead to increase automatically as the range increases.
   (6) Engage multiple targets by first firing at the one presenting the greatest danger (usually the closest) and then rapidly proceeding to the next target.

   c. Use the quick-fire technique when you do not have time to aim properly. Use this technique on targets within 30 meters of your location. (This technique works best in urban terrain or heavy bush.)
      (1) Use the standing position.
      (2) Use the raised stock-well, looking 2 or 3 inches above the sights on a plane that is level with the barrel.
      (3) Look at the target and not at the sights.
   d. Fire on the targets until you destroy them or until you receive an order to cease fire.

**Evaluation Preparation:** SETUP: At a live-fire range, provide the equipment and materials listed in the task condition statement. Turn off the sight after evaluation.

BRIEF SOLDIER: Tell the soldier to engage all targets in his assigned sector.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Assumed an appropriate firing position based on the situation. | ____ | ____ |
| 2. Identified targets in your designated sector of fire. | ____ | ____ |
| 3. Determined range to a target. | ____ | ____ |
| 4. Loaded and fired on targets using appropriate engagement techniques. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

**Required**

**Related**
FM 23-9
TM 11-5855-301-12&P

## Zero an M16A4 Rifle

## 071-310-0001

**Conditions:** On a 25-meter range, given an M16A4 rifle, 18 rounds of 5.56-mm ammunition, a 300-meter zero target, and sandbags for support. One of the following situations exists:

1. You receive a rifle that you have never fired.
2. Your rifle is returned after repair.
3. You think something may have changed the battlesight zero.

**Standards:** Battlesight zeroed your rifle so that five out of six rounds, in two consecutive shot groups, struck within the 4-centimeter circle on the target and used 18 rounds or less. Bullets that broke the line of the 4-centimeter circle were accepted.

**Performance Steps**

1. Determine if you must establish a mechanical zero for the rifle. The rifle must have the mechanical zero established if the rifle--
   a. Is being returned to service after direct support (DS) or general support (GS) maintenance.
   b. Has not been zeroed for you.
   c. Has been dropped or otherwise damaged.
2. Select the unmarked, long-range aperture on the rear sight for zeroing.
3. Set the sights to the mechanical zero, if required.
   a. Set the front sight (consisting of a rotating post with a spring-loaded detent).
      (1) Depress the detent using a pointed object such as a cartridge.
      (2) Rotate the post up or down so the notched disk is flush with the top of the front sight post well.
   b. Set the rear sight to the center.
      (1) Align the index mark on the 0-2 aperture with the center line on the windage scale and the mark on the receiver.
      (2) Rotate the elevation knob down until the range scale mark "6/3" is aligned with the mark on the left side of the receiver.
      (3) Rotate the elevation knob two clicks clockwise past the "6/3" mark.

NOTE: The sight picture is obtained by aligning the rear sight and the front sight with the proper aiming point for your target. The sight picture depends on sight alignment and placement of the aiming point.

4. Establish the sight picture.
   a. Align the sights.
      (1) Center the top of the front sight post in the center of the rear sight.
      (2) Draw an imaginary horizontal line through the center of the rear aperture so that the top of the front sight post touches the line.
      (3) Draw an imaginary vertical line through the center of the rear aperture that bisects the front sight post.
      (4) Verify the sight picture.

NOTE: When you concentrate on the front sight post, the rear sight aperture will be blurred.

   b. Align the aiming point.
      (1) Position the top of the front sight post center mass of the scaled silhouette target.
      (2) Confirm that an imaginary vertical line drawn through the center of the front sight post splits the target.
      (3) Confirm that an imaginary horizontal line drawn through the top of the front sight post splits the target.
5. Fire a three-round shot group at the target.
6. Triangulate the shot group on the target.

**Performance Steps**

7. Repeat steps 5 and 6 until the shot group falls within 4 centimeters.

NOTE: The target is divided by labeled vertical and horizontal lines. It also has pictures of the front and rear sights with a direction arrow to assist you with adjusting the sights.

8. Adjust the sights to move the shot group within the zero circle if required.

NOTE: Do not adjust the sights if the shot group meets the task standard.

   a. Adjust the elevation.
      (1) Find the horizontal line (right-to-left) nearest the center of the shot group.
      (2) Follow the line either left or right to the nearest edge of the target.
      (3) Identify the number of clicks and the direction of the adjustment shown at the edge of the target.
      (4) Adjust the front sight in the indicated direction and number of clicks.
      (5) Record the adjustment made on the target.
   b. Adjust the windage.
      (1) Find the vertical line (up-and-down) nearest the center of the shot group.
      (2) Follow the line either up or down to the nearest edge of the target.
      (3) Identify the number of clicks and the direction of the adjustment shown at the edge of the target.
      (4) Adjust the rear sight in the indicated direction and number of clicks.
      (5) Record the adjustment made on the target.

9. Fire a three-round shot group.

10. Repeat step 8 if the shot group is not within the 4-centimeter circle on the target.

11. Repeat steps 9 and 10 until the shot group is within the circle.

12. Compute the battlesight zero.

13. Label the rifle with the battlesight zero.
   a. Record the battlesight zero on the tape.
   b. Attach the tape to the rifle.

**Evaluation Preparation:** SETUP: On a 25-meter firing range, the soldier should have his or her assigned rifle and magazine. Give the soldier 18 rounds of 5.56-mm ball ammunition, a sandbag for support, and a rifle shot group analysis card (GTA 21-1-4).

NOTE: You can train rifle marksmanship skills using any and all rifle marksmanship training devices (for example, Weaponeer, Basic Rifle Marksmanship, DVC 07-57). The live-fire evaluation of a soldier's ability to zero the rifle requires firing on the standard zero range. The performance of this task for the common task test (CTT) can be done in conjunction with live fire on the standard zero range or during a unit weapon qualification firing cycle.

BRIEF SOLDIER: Tell the soldier to battlesight zero the rifle using no more than 18 rounds. Provide the soldier with a scenario that requires him or her to establish a mechanical zero.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Selected the unmarked, long-range aperture. | ____ | ____ |
| 2. Established the mechanical zero, if necessary.<br>a. Set the front sight by rotating the post so the notched disk was flush with the front sight post well.<br>b. Set the rear sight.<br>(1) Aligned the index mark on the 0-2 aperture with the center line of the windage scale and the mark on the receiver.<br>(2) Rotated the elevation knob down until the range scale mark "6/3" was | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| aligned with the mark on the left side of the receiver.<br>(3) Rotated the elevation knob two clicks clockwise past the "6/3" mark. | | |
| 3. Established the sight picture.<br>a. Aligned the sights.<br>b. Aligned the aiming point. | ____ | ____ |
| 4. Fired a three-round shot group. | ____ | ____ |
| 5. Triangulated the shot group. | ____ | ____ |
| 6. Repeated performance measures 3 and 4 until the shot group fell within 4 centimeters. | ____ | ____ |
| 7. Adjusted the sights to move the shot group to within the zero circle, if necessary. | ____ | ____ |
| NOTE: Do not adjust the sights unless necessary. | | |
| 8. Repeated performance measures 3 through 6 until five of six rounds, in two consecutive groups, are within the 4-centimeter circle on the target. | ____ | ____ |
| 9. Used no more than 18 rounds total. | ____ | ____ |
| 10. Recorded the battlesight zero. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. If the rifle does not require adjustment, score performance measure 6 acceptable if the soldier demonstrates with the target that the sights are within acceptable parameters. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-9<br>TM 9-1005-249-10 |

**Construct Field-Expedient Firing Aids for an M16A1/A2 Rifle**

**071-311-2006**

**Conditions:** As a member of a squad in a defensive position, given an M16A1 or M16A2 rifle, a magazine and ammunition, sticks or rocks and boards available in the area, instructions on target location(s) within the individual's sector of fire, and left and right limits of the sector.

**Standards:** Properly emplaced and aligned aiming and sector stakes on identifiable probable enemy avenues of approach, assault positions, and automatic weapons positions. Included left and right sector stakes to mark the sector of fire. When stakes were properly placed, they allowed placement of rounds in selected target areas or positions. All fires were within the sector of fire.

**Performance Steps**

NOTE 1: Use sector stakes to control the weapon within a sector of fire during limited visibility.

NOTE 2: Use aiming stakes to align a weapon on a known point or target during limited visibility.

1. Sector stakes. Sector stakes mark the left and right limits of your sector of fire (Figure 1).
   a. Use tree limbs 1 to 1 1/2 inches in diameter or pieces of an ammunition box about 18 inches long for the sector stakes.
   b. Ensure the stakes are sturdy; they must stick out of the ground far enough to keep you from pointing and firing your rifle out of the sector.
   c. You must also drive the stakes far enough into the ground so that the rifle will not knock them down if it hits them.

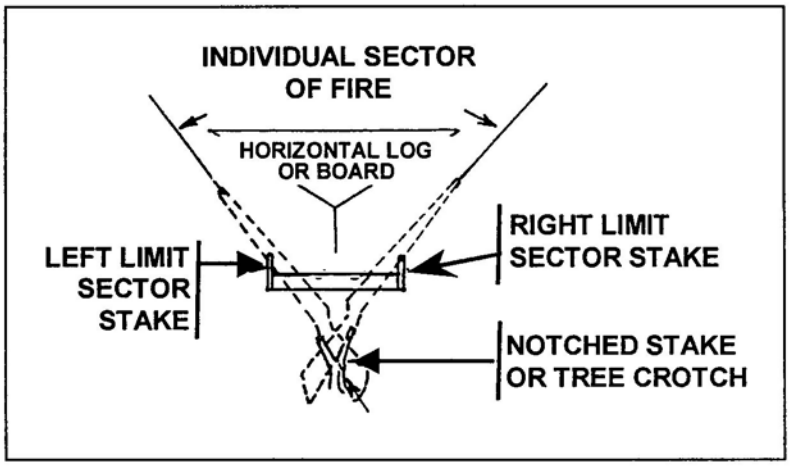



Figure 1. Sector stakes.

2. Aiming stakes. During limited visibility, aiming stakes help in placing fire on avenues of approach or on specific targets.
   a. Locate probable enemy positions or likely avenues of approach within your sector.
   b. Select forked tree limbs 12 to 14 inches long.
   c. Drive one stake into the ground near the edge of the fighting position. The stock of your rifle rests on this stake. The stake should be high enough to allow the rifle stock to fit comfortably against your shoulder.
   d. Place additional stakes forward of the stock stake and align each with a target or avenue of approach. Firmly drive each stake into the ground. Adjust the stakes so that, in a firing position, when the rifle is placed on the stock and forward stakes, the fire will strike its intended target (Figure 2). To fire, hold your shoulder firmly against the butt plate and the barrel in the aiming stakes.

**Performance Steps**

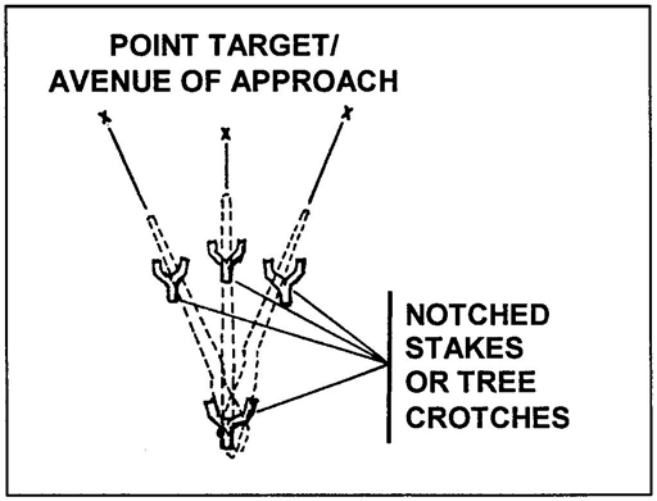



Figure 2. Aiming stakes.

NOTE: The soldier must hold the weapon in the exact position he held it when he positioned the stakes.

**Evaluation Preparation:** SETUP: At the test site, provide a prepared fighting position, an M16A1 or M16A2 rifle, one magazine with ammunition, and forked stakes and sticks. Show the soldier his sector of fire and the target(s) to be laid on.

BRIEF SOLDIER: Tell the soldier to emplace the M16A1 or M16A2 rifle using the field-expedient method with the materials provided.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Emplaced the sector stakes so that the rifle could not be fired outside the assigned sector of fire, and so that they could not be knocked down when touched with the rifle. | ____ | ____ |
| 2. Emplaced the aiming stakes so each target was hit when the rifle was fired. The aiming stakes provided a stable rest for the rifle. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 21-75 |
| | TM 9-1005-317-10 |

**Zero a Night Vision Sight, AN/PVS-4, to an M16-Series Rifle**
**071-315-2307**

**Conditions:** Given an AN/PVS-4 mounted on a zeroed M16-series rifle, a magazine with 18 rounds of ammunition, a silhouette target (with a 25-meter zeroing target attached) 25 meters from the firing point, and sandbags.

NOTE: Ensure that the AN/PVS-4 has the M16, M203 sight reticle installed.

**Standards:** Placed the center of a three-round shot group 7 centimeters below the target aiming point.

NOTE: You may zero the sight during daylight or dark. If in daylight, use the daylight cover.

**Performance Steps**
CAUTION: Prolonged use of the sight under high light without a daylight cover will damage the image-intensifier assembly.

1. Assume a good prone-supported position 25 meters from the target.
2. Place the sight into operation.

WARNING: Do not use the sight without the eyeguard attached or weapon recoil may cause personnel injury.

3. Adjust the azimuth and elevation controls so that the reticle aiming point is about in the center of the sight's field of view.
4. Fire three rounds to seat the sight on the weapon. Fire them into a safe area; try not to hit the zero target. Retighten the mounting knob.
5. Place the zeroing range aiming point of the reticle on the target aiming point; fire three rounds to obtain a good shot group (Figure 1). Use either the M16A1 25-meter zero target shown in Figure 2 or the M16A2 25-meter zeroing target shown in Figure 3. When zeroing the night vision sight, you can use either of these targets with either the M16A1 or M16A2 rifle. Use the marginal information on the target to adjust the sights on the rifle--not the night vision sight.

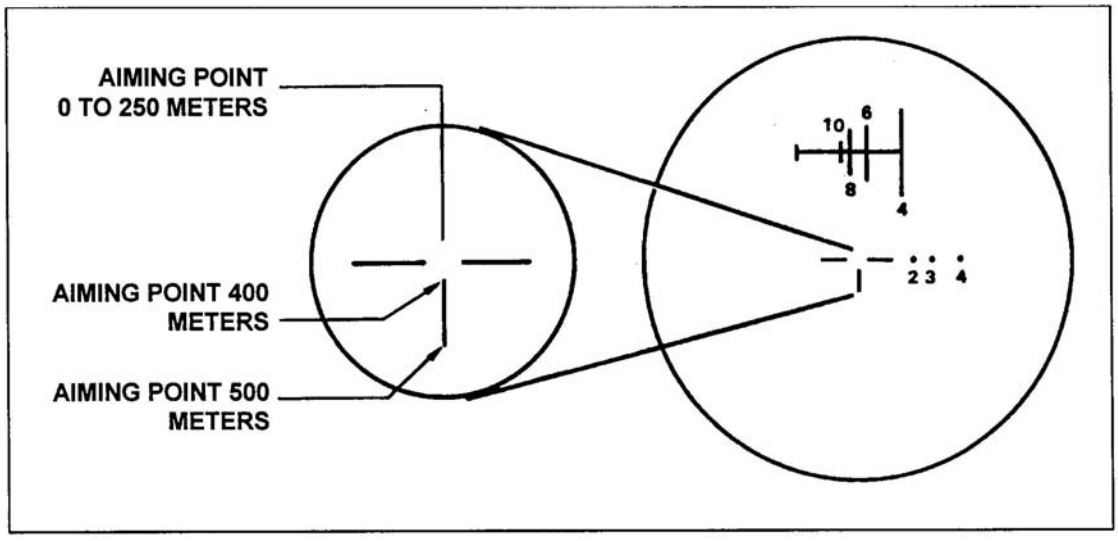



Figure 1. Zero aiming point.

6. Locate the center of the shot group. From the center of the group, adjust the reticle to move the center of the shot group to a point 7 centimeters (10 1/2 squares on the M16A1 target; 7.8 squares

**Performance Steps**

on the M16A2 target) directly below the target aiming point (Figures 2 and 3). Mark the reticle adjustment actuators to show the direction of round impact movement.

a. Each click of the azimuth or elevation adjustment actuator moves the strike of the round 0.63 centimeter (1/4 mil or about 1/4 inch at a 25-meter range).
b. On the M16A1 zero target, 1-1/2 squares equals 1 centimeter and 10 1/2 squares equals 7 centimeters (Figure 2). On the M16A2 zero target, each square is .9 centimeter and 7.8 squares equal 7 centimeters (Figure 3).

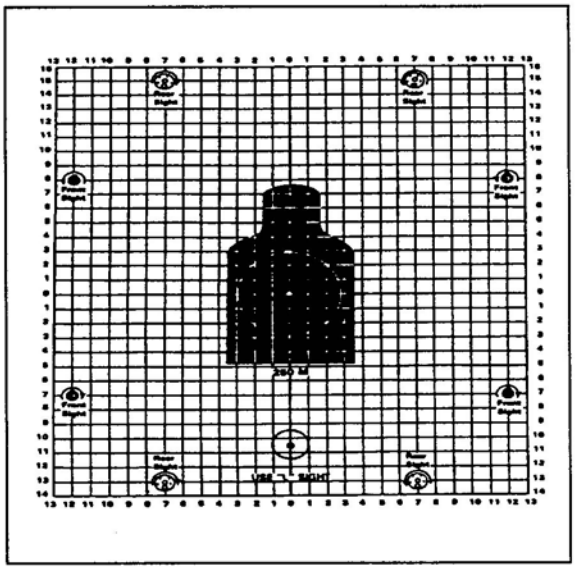


Figure 2. M16A1 zeroing target.

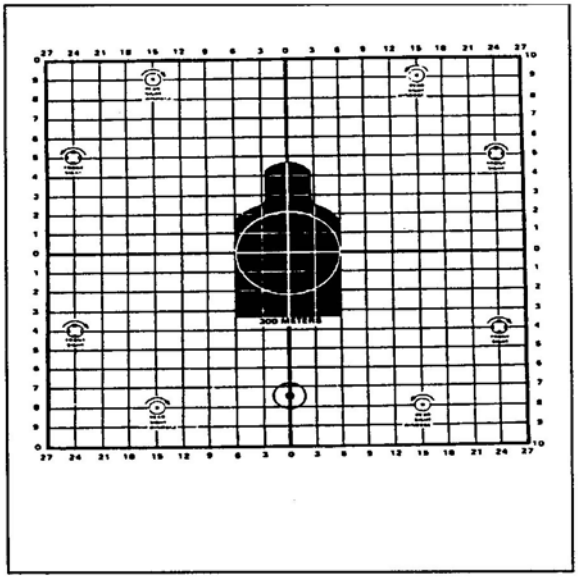


Figure 3. M16A2 zeroing target.

7. Perform the following actions after you adjust the controls:
   a. Move a weapon so that the reticle aiming point is again on the target aiming point.
   b. Repeat Steps 5 and 6 until the center of the shot group is 7 centimeters below the target aiming point as shown in Figures 4 and 5.

**Performance Steps**

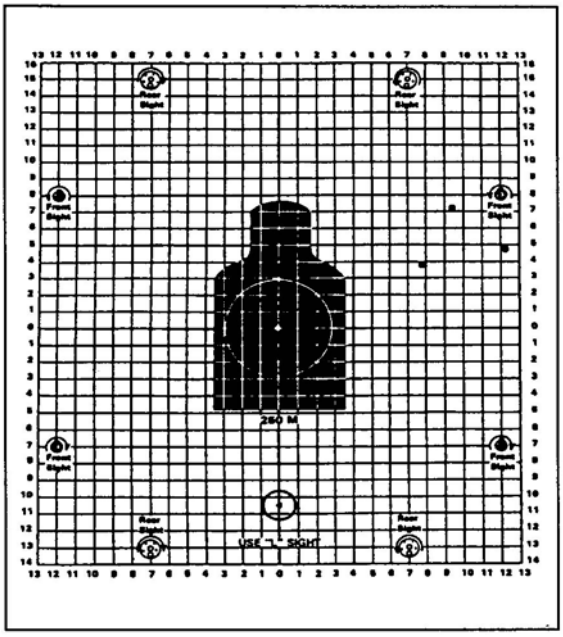



Figure 4. Sample 25-meter zeroing target for M16A1.

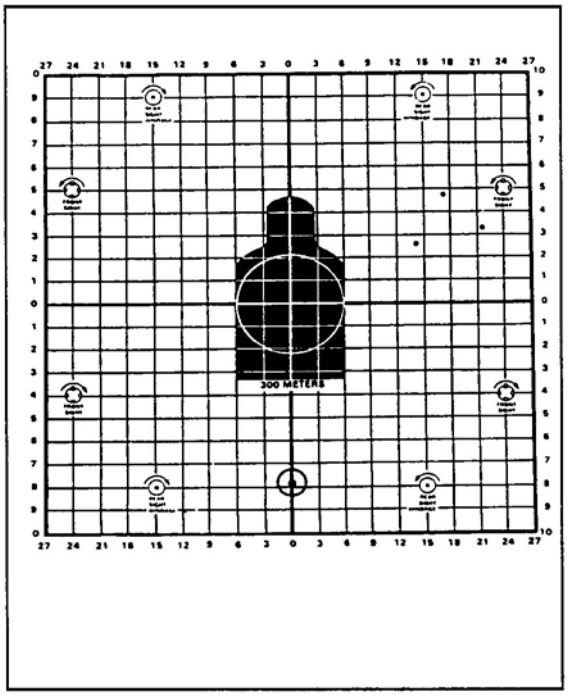



Figure 5. Sample 25-meter zeroing target for M16A2.

8. During zeroing, make sure the soldier places reticle aiming point (Figure 1) on the target aiming point in the silhouette's center of mass. Figure 6 shows what a zeroed shot group should look like.

**Performance Steps**

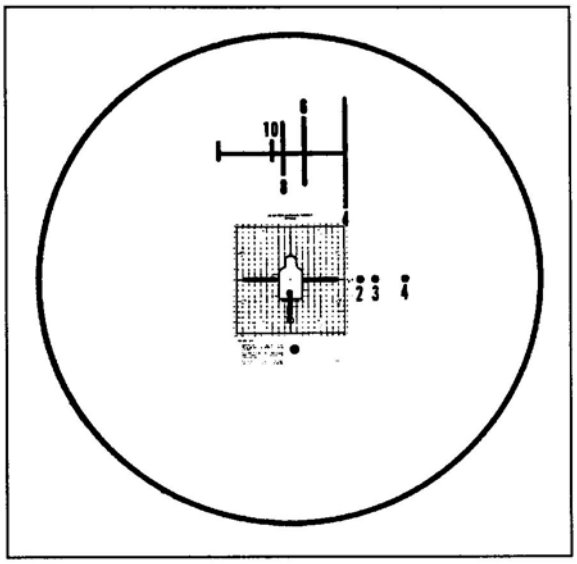



Figure 6. Sight picture and zeroed shot group.

EXAMPLE:
From the center of the shot group in Figure 4, move the azimuth adjustment actuator 11 clicks to the left. Move the elevation adjustment actuator down 17 clicks.
From the center of the shot group in Figure 5, move the azimuth adjustment actuator 9 clicks to the left. Move the elevation adjustment actuator 16 clicks.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and materials given in the task condition statement. Also provide a bipod for the rifle.

BRIEF SOLDIER: Tell the soldier to zero the AN/PVS-4 to the rifle within 18 rounds or less.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Placed the AN/PVS-4 sight into operation. | ____ | ____ |
| 2. Zeroed the AN/PVS-4 sight to the rifle within 18 rounds or less. | ____ | ____ |
| 3. Removed the AN/PVS-4 sight from operation. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5855-213-10 |

Subject Area 52: WEAPONS: MORTARS

## Engage Targets with a 60-mm, 81-mm, or 120-mm Mortar Using Direct Lay
## 071-074-0004

**Conditions:** As a gunner, given an assistant gunner, a complete, ground-mounted, 60- or 81-mm mortar; a target between the mortar's minimum and maximum ranges that, when mortar is placed into action, lies in sight of the gunner; and sufficient ammunition to adjust on and destroy the target.

**Standards:** Destroyed or disabled the target using the least possible resources. Used the most appropriate method of engagement to obtain the maximum effect. Selected ammunition appropriate for the target type.

**Performance Steps**

1. Refer the mortar sight.
2. Center the traverse bearing.
3. Place elevation data on the mortar sight.
4. Level the mortar (approximate level).
5. Shift the mortar (if necessary).

NOTE: The mortar will require shifting unless the target is within two turns of traverse after the above steps have been completed. If the target is within two turns of traverse, the mortar may be traversed onto the target to obtain the lay described in step 6. If the mortar is traversed to the target, step 5 will be bypassed.

6. Lay the mortar on the target
7. Give the command "FIRE," or inform the squad leader that the mortar is "Up."
8. Observe the burst of the round

NOTE: If a first round hit is obtained, "fire-for-effect" can be fired immediately. If the first round misses the target, rounds must be adjusted after step 13.

9. Level and cross-level the mortar.
10. Refer the sight to the point of impact.

NOTE: If the round is determined to be over or short, the squad leader will issue a command to elevate or depress the barrel, for example, "Up one turn.

11. Elevate/depress the barrel.
12. Relay the mortar on the target.
13. Fire the mortar (as described in step 7 above).

NOTE: Repeat steps 8 through 13 until the target is hit, at which time the squad leader may end the mission or "fire-for-effect" if deemed appropriate.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier that when he uses trigger fire, he must dig in the baseplate and seat the mortar as much as he can before firing the first round; and he must release the trigger after firing a round.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Referred to the mortar sight. | ____ | ____ |
| 2. Centered the traverse bearing. | ____ | ____ |
| 3. Placed elevation data on the mortar sight. | ____ | ____ |
| 4. Leveled the mortar. | ____ | ____ |
| 5. Shifted the mortar. | ____ | ____ |
| 6. Laid the mortar on the target. | ____ | ____ |
| 7. Gave the command "FIRE," or informed the squad leader that the mortar was "Up." | ____ | ____ |
| 8. Observed the burst of the round. | ____ | ____ |
| 9. Leveled and cross-leveled the mortar. | ____ | ____ |
| 10. Referred the sight to the point of impact. | ____ | ____ |
| 11. Elevated/depressed the barrel. | ____ | ____ |
| 12. Relayed the mortar on the target. | ____ | ____ |
| 13. Fired the mortar. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-90<br>FM 23-91<br>TM 9-1015-250-10 |

**Refer and Realign Aiming Post**

**071-074-0005**

**Conditions:** As a gunner, given a laid mortar, the sight of which has been referred to a given deflection; an assistant(s) skilled at emplacing aiming posts; and sufficient aiming posts to suit the terrain, with or without aiming-post lights.

**Standards:** Emplaced posts at the required distances from the mortar, terrain permitting, or as otherwise instructed by the squad or section leader; where both posts, when viewed with the mortar sight set on the referred deflection, aligned along the left edge of the sight's vertical crosshair.

**Performance Steps**

1. Recheck the lay of the mortar.
2. Dispatch the assistant with the aiming posts.

NOTE:
1.The assistant should move approximately 50 meters along the mortar line of sight, drop the near post, continue for another 50 meters (total 100), and turn, facing the gunner and awaiting signals.
2. At night, the post light would be turned on/flashed, or other prearranged signal would be used to let the gunner know that the assistant was ready to begin adjustments. The assistant would attempt to hold the post vertical, and the gunner would determine when to place the post into the ground by aligning the light with the sight vertical hairline, as the bottom of the post may not be visible. The canting (final adjustment) process will be the same.

3. Align the bottom of the far aiming post.
4. Have the assistant emplace the post.
5. Remove cant from the aiming post.
6. Signal proper emplacement.

NOTE: The assistant will move to the near post and prepare to repeat the process, using the near post.

7. Repeat the process in steps 3, 4, 5, and 6 for the near post.

NOTE:
HARD TERRAIN: In the event the assistant(s) must brace the aiming posts, the same process must be followed; however, the surface may not allow penetration of the post. In such cases, the assistant(s) may have to attempt to secure and align the post simultaneously.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier that he must use the equipment and information provided to refer and realign the aiming post, and that he must use either the distant-aiming-point or sight-box method.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Rechecked the lay of the mortar. | ____ | ____ |
| 2. Dispatched the assistant with the aiming posts. | ____ | ____ |
| 3. Aligned the bottom of the far aiming post. | ____ | ____ |
| 4. The assistant emplaced the post. | ____ | ____ |
| 5. Removed cant from the aiming post. | ____ | ____ |
| 6. Signaled proper emplacement. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 7. Repeated measures 3 through 6 for the near post. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-90 |
| | FM 23-91 |

**Manipulate a 60-mm, 81-mm, or 120-mm Mortar for Traversing and/or Searching Fire**
**071-074-0006**

**Conditions:** As a gunner, given a layed 60- or 81-mm mortar; commands to conduct a traversing or searching fire mission, or both; and ammunition as specified in the fire command.

**Standards:** Applied fire-command data to the sight; relayed the mortar before firing; and fired the required number of rounds. Between rounds, applied the required number of traversing or elevating turns in the specified direction and executed all fire commands.

**Performance Steps**

1. Prepare the mortar for traverse. At this point, the FDC/squad leader will issue subsequent fire commands.
2. Re-lay the mortar. The FDC determines the method of fire, but he may delegate this authority to the squad leader who may, in turn, be delegate it to the gunner.
3. Fire the first round.
4. For searching fire only, elevate or depress the mortar to the second round position. For traversing or simultaneous traversing and searching fire, traverse the mortar to the second round position.
5. Fire the second round. If additional rounds are required by the fire command, go to the next step 6 below.
6. Complete the mission using the process described in steps 4 and 5.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the equipment and information provided and to manipulate a mortar for traversing or searching fire.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Prepared the mortar for traverse. | ____ | ____ |
| 2. Re-laid the mortar. | ____ | ____ |
| 3. Fired the first round. | ____ | ____ |
| 4. Traversed the mortar to the second round position. | ____ | ____ |
| 5. Fired the second round. | ____ | ____ |
| 6. Completed the mission using the process described in measures 4 and 5. | ____ | ____ |
| 7. Elevated or depressed the mortar to the subsequent round position. | ____ | ____ |
| 8. Traversed the mortar to the second round position. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-90 |

**References**

**Required**

**Related**

FM 23-91
TM 9-1015-249-10
TM 9-1015-250-10

## Emplace Aiming Posts
## 071-074-0008

**Conditions:** Given a soldier, a mortar layed in position; a gunner who knows the hand-and-arm signals used with aiming posts; aiming posts, and aiming-post lights.

**Standards:** Emplaced the aiming post in the position and at the attitude indicated by the gunner.

**Performance Steps**

1. Inspect/prepare aiming posts.
   a. Determine whether posts are straight and in otherwise serviceable condition.
   b. If posts are joined, they form a single straight post.
   c. If using lights, the light attaches to the post, and functions as designed.
   d. Repair, replace, or report unserviceable posts or lights.
2. Determine the general location to use.
   a. Select post locations 100 meters and 50 meters away from the mortar, along the sight line.
   b. If conditions require closer emplacement, select maximum distance attainable.
   c. Attain maximum safe movement speed.
3. Align an aiming post.
4. Secure an aiming post.
5. Once the post is emplaced, observe the gunner to ensure that readjustment is not necessary. Multiple readjustments may be required, which consist of repeating steps 3 and 4. Repeat the process until the gunner is satisfied with the emplacement.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to emplace aiming posts.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Inspected/prepared aiming posts. | ____ | ____ |
| 2. Determined the general location to be used. | ____ | ____ |
| 3. Aligned an aiming post. | ____ | ____ |
| 4. Secured an aiming post. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-90 |
| | FM 23-91 |

**Fire a Mortar**

**071-074-0037**

**Conditions:** In all conditions, given a mounted 60-mm, 81-mm, 120-mm, or 4.2 inch mortar; a fire command; and fuzed practice or live ammunition.

**Standards:** Fired the number and type of rounds specified in the fire command safely and quickly.

**Performance Steps**

1. The gunner assumes a correct firing position.
   a. Upon the command, FIRE MISSION, assume the assistant gunner's position on the right side of the mortar.
   b. Stand about even with the muzzle of the mortar barrel, facing to the rear.

2. The assistant gunner loads the mortar.
   a. Upon the command, HANG IT, turn at the waist to the left and accept the round from the ammunition bearer.

NOTE: With the 60-mm mortar, there is no ammunition bearer. Therefore, the assistant gunner must secure the round from the stockpile himself.

   b. (The ammunition bearer should hold the round with the fuze pointing to the rear.) Accept the round from the ammunition bearer with the right hand under the round and the left hand on top of the round.
   c. Turn at the waist to the right while lifting the round to the height of the muzzle of the barrel.
   d. Guide the round into the barrel until the body/shoulder of the round is within the barrel (Figure 1).

Figure 1. Assistant gunner inserting the round.

   e. When loading the 4.2-inch, M329A2 HE round, the engraved rotating band (Figure 2) must engage the lands and grooves of the barrel. To do this, insert the round until the engraved band reaches the lands and grooves. Rotate the round to the right (clockwise) until the engraved band engages the lands and grooves. Continue to turn the round clockwise while lowering the round until the shoulder of the round is in the barrel. This procedure is called "indexing the round."

**Performance Steps**

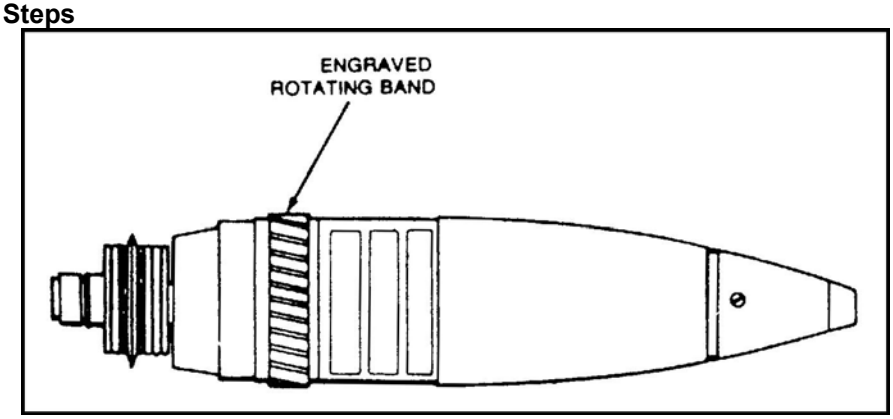



Figure 2. M329A2 HE round.

f. Once the round is inserted into the barrel the proper distance, the assistant gunner shouts back, "Hanging."

3. The assistant gunner fires the round.
   a. Upon the command, FIRE--

WARNING
IF THE ROUND FAILS TO SLIDE DOWN THE BARREL, DO NOT FORCE IT.

   (1) Release grip on the round, and allow it to slide through the hands and down the barrel.
   (2) After releasing the round, pass hands downward along the barrel while bending at the waist.

WARNING
KEEP THE HEAD BELOW THE MUZZLE UNTIL THE ROUND FIRES TO AVOID THE MUZZLE BLAST.

   (3) When bending at the waist to lower the head below the muzzle, turn away from the mortar.
   (4) In this position, the assistant gunner is ready to accept the next round to fire.

   b. After the number of rounds given in the fire command have been fired, the assistant gunner shouts the number of rounds fired, for example, "Number two, ten rounds completed."

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and commands given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to correctly assume the position of the assistant gunner and fire the rounds given in the fire command, and that he is to use correct terminology.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Assumed the proper assistant gunner's position. | ____ | ____ |
| 2. Correctly accepted a round from the ammunition bearer. | ____ | ____ |
| 3. Correctly hung the round. | ____ | ____ |
| 4. Correctly released the round and moved into position to accept the next round. | ____ | ____ |
| 5. Used correct terminology. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
| --- | --- |
| | FM 7-90 |

**Reciprocally Lay a Mortar Using a Laid Mortar**
**071-074-0038**

**Conditions:** Given a mortar laid for direction (by any method); a second mounted mortar with crew and calibrated sights; a mounting azimuth; and a referred deflection.

**Standards:** Brought the 0- to 3200-mil line of the second mortar sight within 1 mil of parallel from the 0- to 3200-mil line on the sight of the mortar used for laying.

**Performance Steps**
NOTE: For this task, the #2 mortar (gun) has been laid, and the #1 gun is to be reciprocally laid (#2 normally being the base gun). The section leader is positioned at the #2 gun and will use its sight for the lay.

1. Have the #1 gunner sight on the #2 gun sight. The correct command was issued, to which the gunner responded and announced, "Aiming point identified." The section leader observed the actions of the crew and made corrections as necessary.
2. Determine the first deflection for the #1 gun. The back azimuth of the sight reading taken on the #1 gun's sight lens was determined.
3. Have the #1 gunner apply the deflection and lay on the #2 gun sight. The deflection determined in step C was formatted into the correct command and issued to the #1 gunner. The section leader observed the actions of the crew and made corrections as necessary.
4. Determine subsequent deflection for the #1 gun. The back azimuth of the sight reading taken on the #1 gun's sight lens was determined.
5. Have the #1 gunner apply the subsequent deflection and re-lay on the #2 gun sight. The deflection determined in step 4 was formatted into the correct command and issued to the #1 gunner. The section leader observed the actions of the crew and made corrections as necessary.
6. Complete the lay. The process outlined in steps 2 through 5 were repeated until the #1 gunner announced, "No 1, zero mils (or one mil), mortar lay." The section leader confirmed the lay and made corrections as necessary.
7. Apply the referred deflection. The section leader announced (or had the FDC announce) the referred deflection along with the command to realign aiming posts. All information was formatted into the appropriate command. The section leader observed the actions of the crew(s) and made corrections as necessary.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to reciprocally lay one mortar using a second, laid mortar.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Had the #1 gunner sight on the #2 gun sight. | ____ | ____ |
| 2. Determined the first deflection for the #1 gun. | ____ | ____ |
| 3. Had the #1 gunner apply the deflection and lay on the #2 gun. | ____ | ____ |
| 4. Determined subsequent deflection for the #1 gun. | ____ | ____ |
| 5. Had the #1 gunner apply the subsequent deflection and re-lay on the #2 gun sight. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 6. Completed the lay. | ____ | ____ |
| 7. Applied the referred deflection. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-90 |
| | FM 23-91 |

**Maintain Fire Control Equipment**

**071-076-0001**

**Conditions:** Given a sight (M53 or M64), an instrument light (M53 or M42), aiming post lights (M14, M58, or M59), aiming posts (M1A2 or M14), and necessary cleaning equipment.

**Standards:** Inspected all items, lightly lubricated moving parts, and cleaned and spot-painted as needed.

**Performance Steps**

1. Maintain sighting and fire-control equipment.
   a. Inspection. Inspect all parts for cracks, excessive wear, and rust. Lightly lubricate moving parts (but not switches) so they operate smoothly. Remove rust with a crocus cloth, and paint the spot if it is on a painted surface. Coat nameplates and serial numbers with clear lacquer.
   b. Sight units (M53 and M64).
      (1) Ensure lenses are clean and dry, dovetail bracket is free of burrs and dents, knobs operate smoothly; and deflection/elevation scales are dry.
      (2) Remove dust from lenses with camel-hair brush. Wipe each lens with lens cleaning tissue. Remove grease or oil from the lens with lens cleaning compound. Remove oil from the deflection/elevation scales with a clean, dry rag.
      (3) Lubricate sight locking devices with a small amount of PL special preservative.
   c. Aiming post lights.
      (1) M14.
         ( a) Ensure that the battery case is dry and free of corrosion and rust, that the light bulb works, the switch operates smoothly and locks at desired setting; the filters are clean; and the clamp holds the unit firmly to the aiming post without bending out of shape.
         ( b) Remove rust from the case with crocus cloth and corrosion with a toothbrush and rag. Dry entire item with rag and clean filters with lens tissue.
      (2) M58 and M59.
         ( a) Each of these aiming post lights comes in sets of three: two green and one orange. Ensure lenses and attachment bracket are intact and that the bracket is not bent.
         ( b) Remove corrosion with a toothbrush and rag, dry the entire item with a rag, and clean the lens with lens tissue.
   d. Instrument light M53 or M42.
      (1) Ensure that the rheostat knob operates smoothly and remains at the desired setting, that the battery case is dry and free of corrosion and rust, and that the light bulbs work. Check cables for bad insulation.
      (2) Remove rust from battery contacts with a crocus cloth and remove corrosion with a toothbrush and rag. Wipe cables with a clean, dry rag.
   e. Aiming posts M1A2 and M14.
      (1) Check for proper fit. Ensure joints are not dented or bent out of shape. Check for cleanliness and scratched or chipped body.
      (2) Clean with dry rags. Sand chipped paint with a crocus cloth, and repaint as necessary.

2. Observe the following precautions with the M64 sight unit and aiming post lights M58 and M59 aiming post lights.
   a. Safety. The radioactive material used in these instruments is tritium gas (H3) sealed in glass tubes. It poses no hazard to the user when intact and illuminates the instrument for night operations. Tampering with or removing this gas in the field is prohibited by federal law. If there is no illumination, the radiological protection officer must be notified. If skin contact is made with any area contaminated with tritium, the skin and area must be washed immediately with nonabrasive soap and water.

      WARNING; IF YOU GET TRITIUM GAS (H3) ON YOUR SKIN OR CLOTHES, WASH THEM IMMEDIATELY WITH NONABRASIVE SOAP AND WATER.

**Performance Steps**

b. Identification. Radioactive self-luminous sources are identified by means of radioactive warning labels (Figure 1). These labels should not be defaced or removed, and should be replaced immediately when necessary. The local radiological protection officer should be consulted for instructions on handling, storage, or disposal.

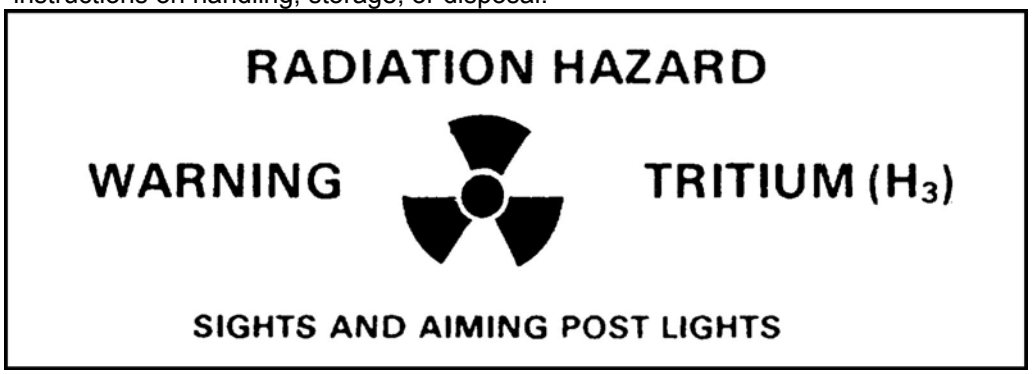



Figure 1. Radioactive warning labels.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment required for the type of mortar assigned as well as necessary cleaning equipment.

BRIEF SOLDIER: Tell the soldier to inspect, detect, and report unserviceable components while cleaning, lubricating, and spot-painting the fire-control equipment.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Inspected all equipment and report unserviceable items. | ____ | ____ |
| 2. Cleaned and lubricated as needed. | ____ | ____ |
| 3. Removed rust and spot-paint. | ____ | ____ |
| 4. Covered nameplates and serial numbers with clear lacquer. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 7-90 |

## Store Mortar Ammunition

## 071-321-4012

**Conditions:** As a squad leader, given the mission of storing a designated amount of high-explosive (HE), white phosphorus (WP), or illumination ammunition for the 60-mm, 81-mm, 120-mm, or 4.2-inch mortar in either a ground-storage area or in the mortar carrier.

**Standards:** Stored the ammunition so that both it and the storage site met storage requirements.

**Performance Steps**

1. Selection of the storage site.
    a. Select an area that is flat and slightly higher than the surrounding terrain to prevent rainwater from getting under the stacked ammunition.
    b. Never select a storage site in a depression, a gully, or at the base of a hill.
    c. Whenever possible, select a site under trees or bushes. In addition to camouflaging the ammunition, foliage provides shade and some protection from the elements.
2. Preparation of the storage site.
    a. In preparing the site, use some type of dunnage to keep the ammunition at least 6 inches off the ground. The dunnage may be logs, pallets, perforated steel planking, empty ammunition boxes, or whatever else can be found.
    b. Prepare a separate storage site for each type and lot number of ammunition to be stored. If there are separate fuses, prepare a site for them.
    c. Dig suitable trenches around the outer edge of the dunnage to prevent water from flowing under the ammunition.
3. Stacking ammunition in the storage area.
    a. The recommended method for temporary field stacking and storage of boxed HE and illumination ammunition is shown in Figure 1. This method of stacking provides some ventilation that permits open, uncovered storage of ammunition for several months without extensive deterioration of boxes or ammunition.

**Performance Steps**

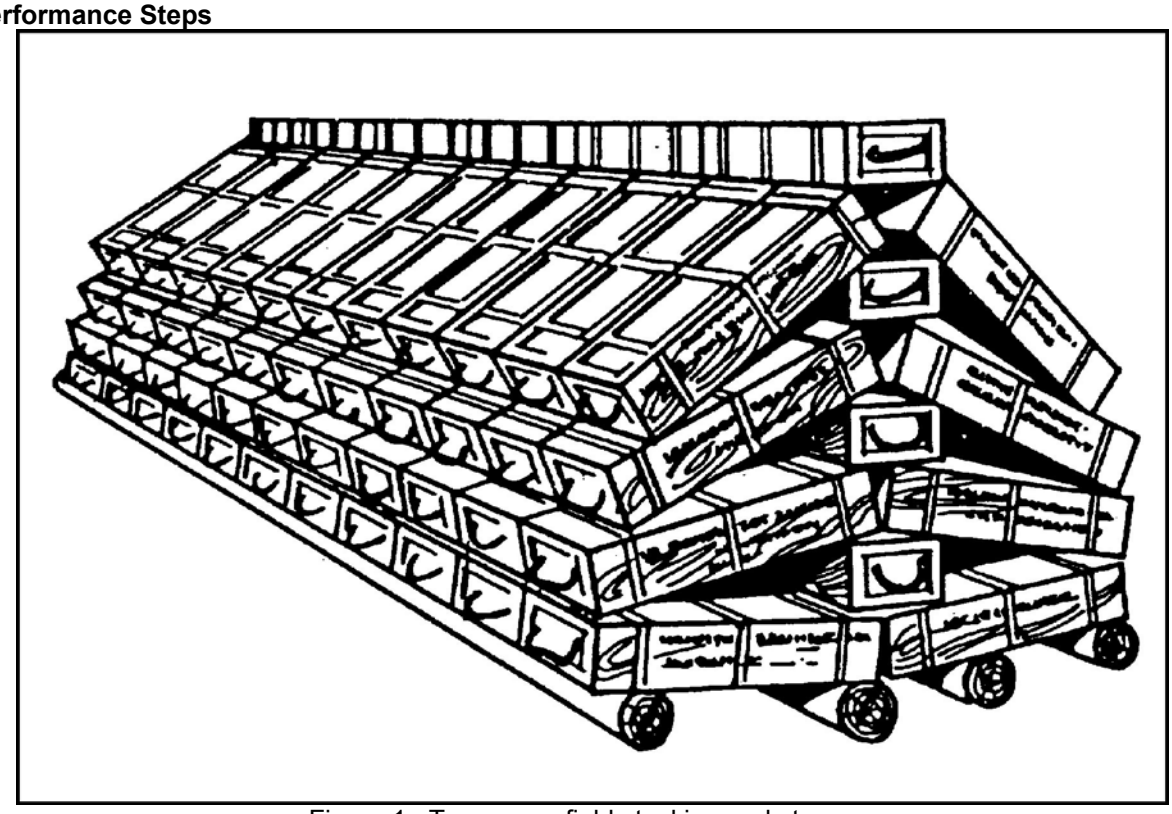


Figure 1. Temporary field stacking and storage.

b. Boxed WP ammunition must be stored on the dunnage, fuse UP. WP ammunition should not be stacked more than one layer (one box) high. There must be space between boxes and rows for ventilation (Figure 2).

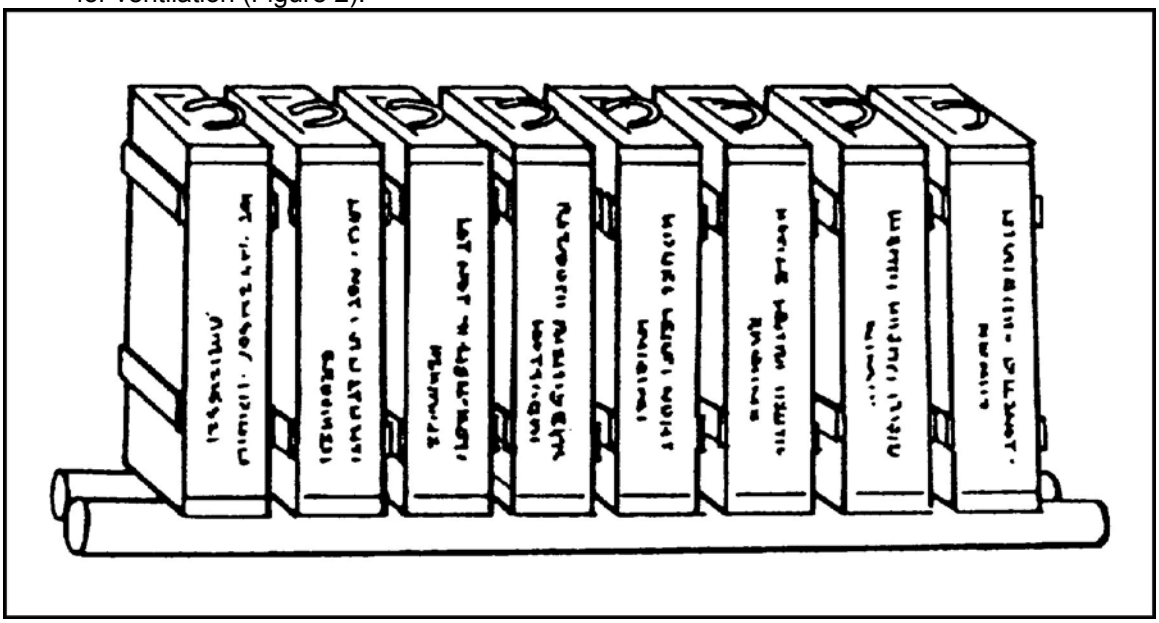


Figure 2. Storage of WP ammunition.

c. Firebreaks of sufficient width to prevent the spread of fire should be cleared and maintained. Since firebreaks around ammunition stacks are easily detected by aerial reconnaissance, restrictions in their use must be considered.

**Performance Steps**

4. Storage of ammunition on mortar carrier.
    a. When storing ammunition, personnel will store HE ammunition in the horizontal racks on the right side of the carrier. The ammunition is stored in its fiber containers with seals unbroken. A small amount of HE ammunition with the seals broken should be stored in the vertical ready rack on the left side of the carrier. This ammunition is prepared and ready for immediate firing.
    b. All WP ammunition carried is stored in the ready rack, fuse UP, in its fiber containers with seals unbroken. Should the tactical situation require the carrying of more WP than can be stored in the vertical rack, personnel will still store the ammunition vertically in the carrier.
    c. Personnel will manage and store illumination ammunition the same as HE ammunition.

5. Storage of ammunition in extreme environments.
    a. Desert storage. Cover rarely exists in the desert. Isolated cover is conspicuous and invites special attention from enemy reconnaissance. Therefore, trees or brush should not be used as a storage site. Shadows and regularly shaped patterns are conspicuous and must be avoided by the use of small, irregular lines and rows. Low, irregular stacks covered by brush or stone, or garnished to resemble bushes must be used. In the desert, dispersion of ammunition is extremely important.
    b. Cold climate storage. Ammunition stacks in the open in cold climates must be kept off the ground by the use of heavy dunnage. This prevents stacks from sinking in the softened ground after a thaw, and it allows surface water to flow under or around stacks without touching the ammunition. Stacks should be covered to keep out snow and water, but they must be ventilated to reduce condensation, which would cause the boxes to freeze together.
    c. Tropics storage. The terrain and climate in the tropics make the selection of storage sites for ammunition especially important. Heavy rains may convert level, firm ground into a sea of mud. Rain followed by intense sunlight produces conditions of heat and humidity, which accelerate the deterioration of ammunition and packing materials. The squad leader must be alert for termites. Termites can eat through dunnage, ammunition boxes, and fiber containers, causing deterioration of ammunition, packing, and dunnage.

**Evaluation Preparation:** SETUP: Test this task during a live-fire exercise. Provide all equipment, personnel, ammunition, and information normally given for live fire.

BRIEF SOLDIER: Tell the soldier he must pick and prepare an ammunition-storage site. He must also supervise and ensure that the ammunition is loaded correctly on the mortar carrier.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Selected a storage area that met as closely as possible the ammunition storage area requirements. | ____ | ____ |
| 2. Supervised the proper preparation of the storage site. | ____ | ____ |
| 3. Supervised the storage of ammunition including separation by type, lot number, and proper stacking. | ____ | ____ |
| 4. Supervised the proper storage of ammunition on the mortar carrier. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1300-206 |

## Camouflage a Mortar Firing Position
## 071-326-0518

**Conditions:** During daylight in the field, given natural camouflage material or a Lightweight Screening System (LSS) with poles; and either a ground-mounted mortar-firing position or an M106A1 or M577 armored carrier and a crew.

**Standards:** Camouflaged the vehicle or the constructed mortar position sufficiently to prevent ground or air observation, and in time for the mortar to deliver fire support.

**Performance Steps**

1. Movement into a mortar firing position.
    a. While moving into the mortar position, the crew must control movement of tracked or wheeled vehicles to avoid detection and must eliminate track or wheel marks around the position.
    b. All vehicles should travel over the same route. This prevents the enemy from knowing how many vehicles are present.
    c. The route taken to the position should follow existing paths, roads, fences, or natural lines in the terrain pattern.
    d. Exposed routes should not end at the position.
    e. If only a short part of the route into or around the position is exposed, tree branches should be used to sweep out the tracks.
    f. Traffic into and out of the mortar position should be minimal.

2. Construction and camouflage of ground-mounted mortar position.
    a. To camouflage a position in grassy terrain--
        (1) Mark off a circle on the ground the size of the mortar position to include the parapet around the pit.
        (2) Dig up the sod within this circle and lay it aside.

NOTE: Sod is a section of grass-covered surface soil held together by matted roots; turf.

        (3) Dig in the position using as much of the dirt as needed to build the parapet around the position. Remove the extra dirt from the position and conceal it under trees or bushes or in gullies.
        (4) Use the sod to re-cover the parapet and the sides of the pit. Place grass on the floor of the pit.
        (5) Use small bushes or trees on part of the parapet to break up the outline, but do not use them all around the parapet. This would form a circle easily seen on an aerial photograph. Use larger branches to conceal the mortar within the position.
    b. Grassy terrain camouflage rules usually apply to all terrain; the prepared position must blend with the surrounding terrain.
    c. When camouflaging the position, the crew must be able to quickly place the mortar into operation. Camouflage must not block the view of aiming posts.
    d. The aiming posts and the aiming circle must also be camouflaged if they are to be left in place.

3. Camouflage nets.
    a. When using LSS nets, ensure the coloration blends with the surrounding terrain and vegetation.
    b. With nets as with natural materials, emplace them so they do not interfere with the mortar when firing.
        (1) When using nets with either the ground-mounted or carrier-mounted mortar, raise the nets above the ground-mounted position or the top of the carrier (Figure 1).

**Performance Steps**

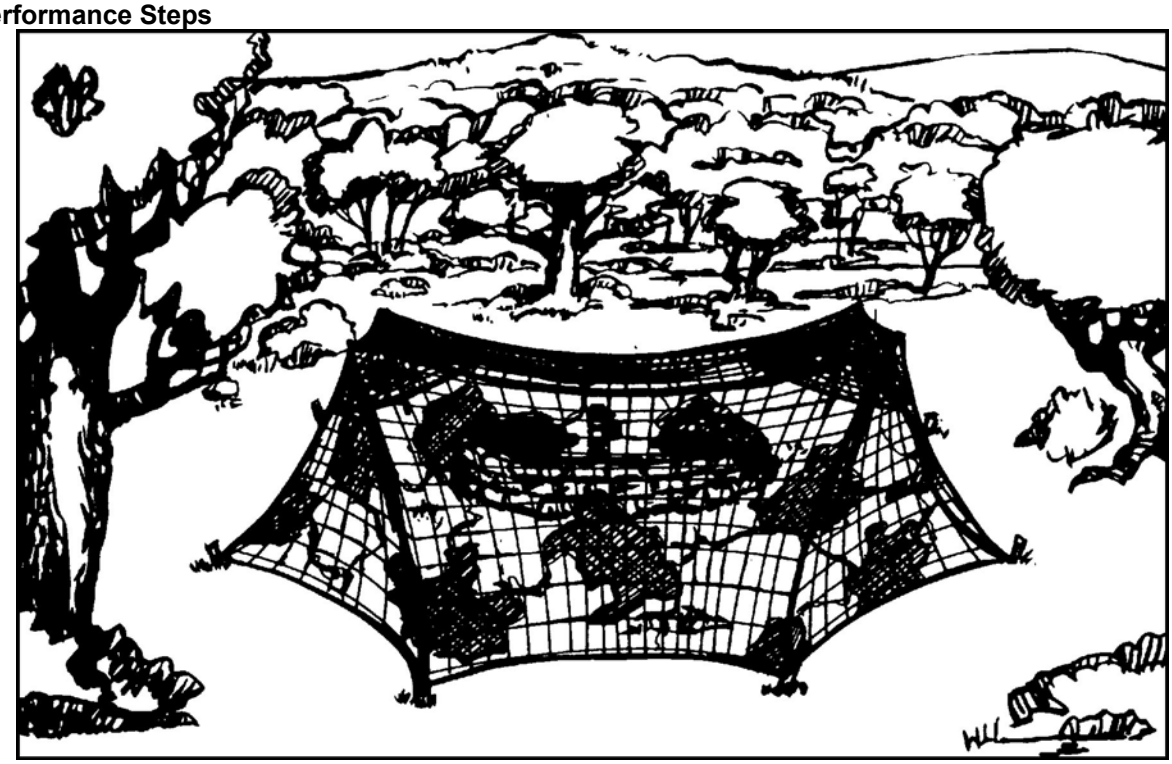


Figure 1. Nets used for camouflage.

(2) To raise the LSS nets, the crew must use poles (Figure 2) or small trees with small branches at the top.

**Performance Steps**

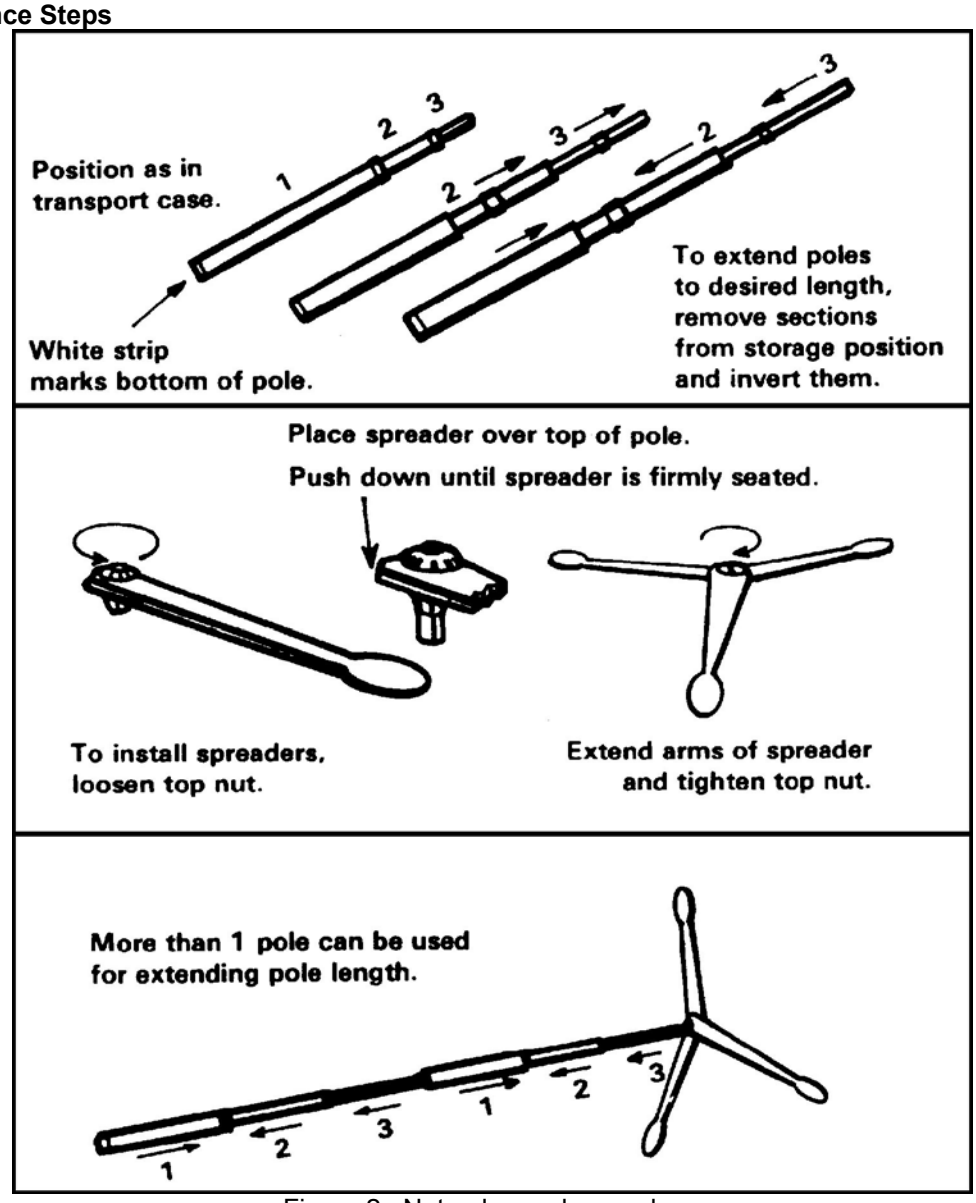



Figure 2. Net poles and spreaders.

(3) When using poles or small trees, drape the nets over the mortar position or carrier to break up the outline. This is important when the mortars are carrier-mounted.

(4) In using nets to camouflage the mortar position, set up and secure the side of the net in the direction of fire so that it can be dropped quickly to let the mortar fire.

( a) In the ground-mounted or carrier-mounted role, place two poles on the direction-of-fire side of the net just even with or forward of the front edge of the mortar position with the corners staked down (Figure 3). When a fire command is given, two crew members release the net from the stakes. Then, using the two front poles, they lift the net over and lay it behind the mortar (Figure 4).

**Performance Steps**

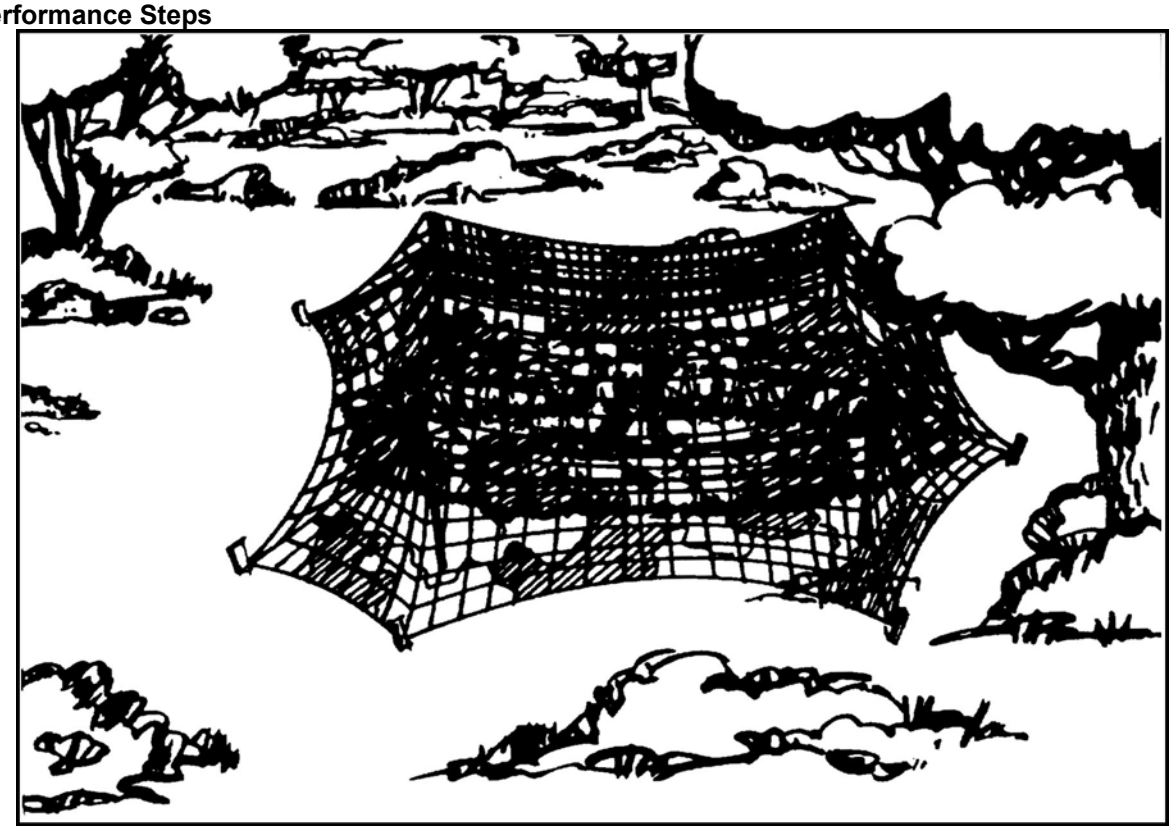


Figure 3. Net with sides and corners staked down.

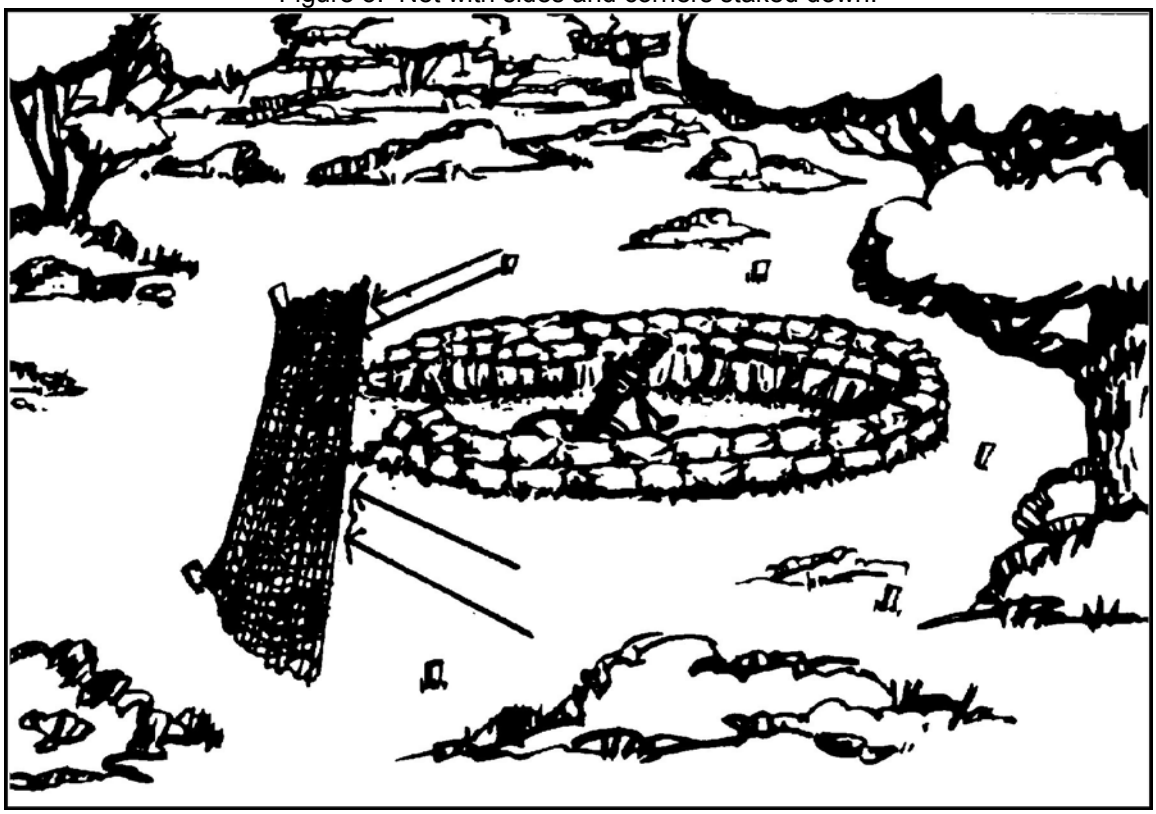


Figure 4. Net released from stakes.

**Performance Steps**

( b) When the mission is complete, replace the poles and attach the net corners to the stakes.

**Evaluation Preparation:** SETUP: Test this task during a field-training exercise. Provide all equipment, materials, and situation given in the Task Condition statement.

NOTES:
1. Test mechanized units on camouflaging both carrier-mounted and ground-mounted positions.
2. Test Infantry units only on camouflaging ground-mounted positions.

BRIEF SOLDIER: Tell the soldier that, as the squad leader, he must supervise the unit's movement into position and their camouflaging of the position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Used correct procedure in moving into the position. | ____ | ____ |
| 2. Concealed tracks leading into and around the position. | ____ | ____ |
| 3. Used natural camouflage material to properly camouflage position. | ____ | ____ |
| 4. Used camouflage nets to properly camouflage position. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 20-3 |
| | FM 21-75 |

Skill Level 2

Subject Area 5: COMMUNICATIONS: GENERAL

**Guide a Helicopter to a Landing Point**

**071-334-4001**

**Conditions:** Given a prepared landing site for a UH-1 or UH-60 helicopter (the location of which is known to the pilot), individual TOE equipment, night vision goggles, FM radio (SINCGAR), and the appropriate arm-and-hand signals to guide the helicopter to the landing site and land the helicopter on the landing site.

**Standards:** Guide the helicopter to a safe landing by MEDEVAC request, identifying the landing site to the pilot and controlling the landing using the correct arm-and-hand signals.

**Performance Steps**

CAUTION: During training, dispose of all batteries IAW unit SOP.

1. As the aircraft approaches, provide the pilot with tactical and security information. Tell him of conditions that may affect his landing such as terrain, weather, landing site markings, and possible obstacles.
   a. Confirm information or answer any questions the pilot may have pertaining to the landing site.
   b. Maintain communications with the pilot during the entire operation.
2. Identify the landing site and guide the pilot in.
   a. Once the pilot is within your area, he establishes radio contact with the unit for positive identification.
   b. The pilot will be oriented to the landing site by using the clock method (12 o'clock is always the direction of flight). Tell the pilot the time position of your location. (For example: "The LZ is now at 3 o'clock to your position.")
   c. Mark or identify the landing site:
      (1) Day--The only signals required are colored smoke and a signalman. VS-17 marker panels may be used to mark the landing site, but are NOT used any closer than 50 feet to the touchdown point. In addition to identifying the landing site, the smoke will give the pilot the wind direction and speed.
      (2) Night--The landing site and touchdown point are marked by an inverted "Y" composed of four lights (Figure 1).

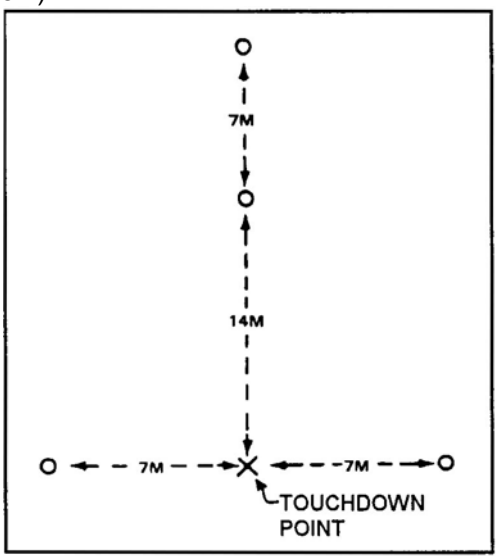



Figure 1. Night Marking.

**Performance Steps**

3. Use arm-and-hand signals (Figures 2 through 9).

Figure 2. Arm guidance.

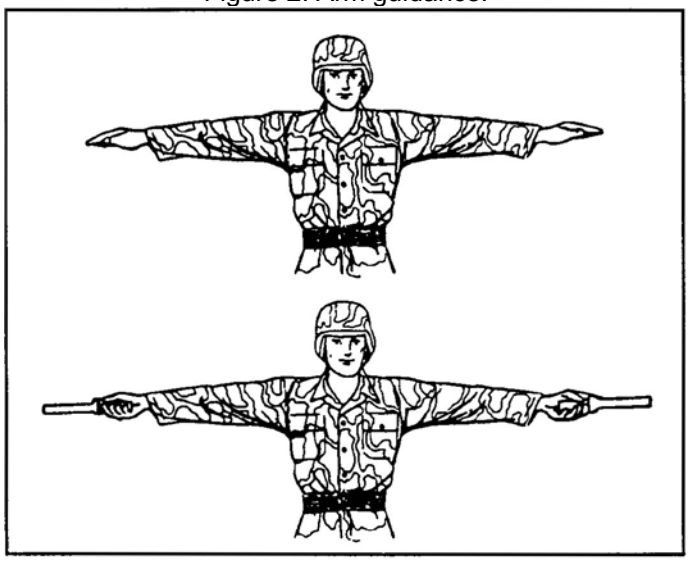


Figure 3. "Hover" signal.

**Performance Steps**

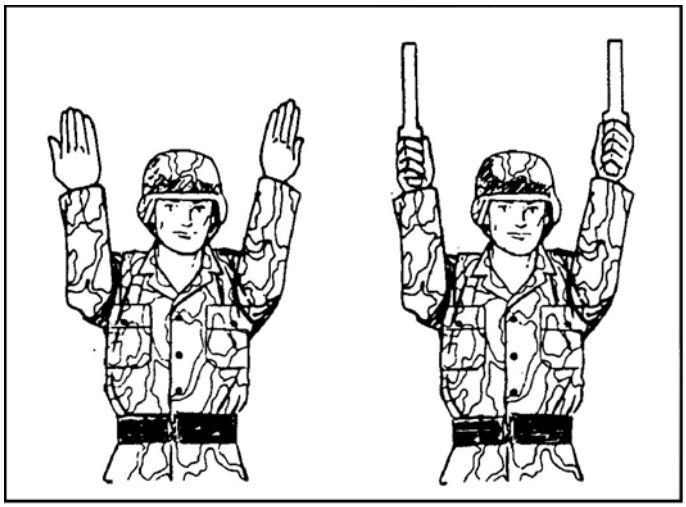


Figure 4. "Move ahead" signal.

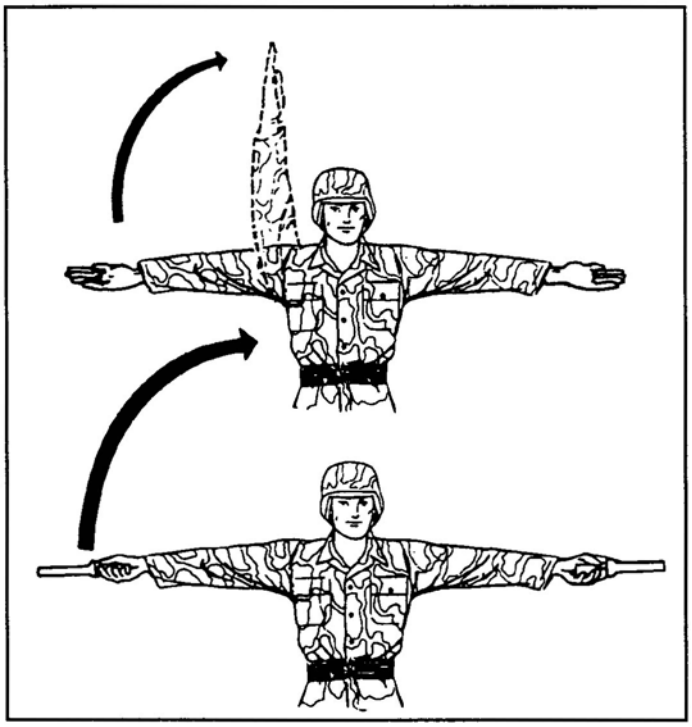


Figure 5. "Move to right" signal.

**Performance Steps**

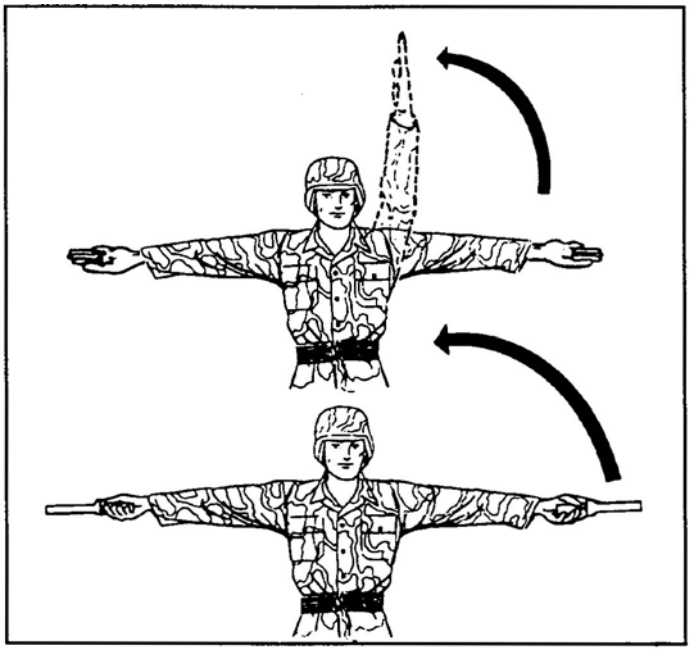


Figure 6. "Move to left" signal.

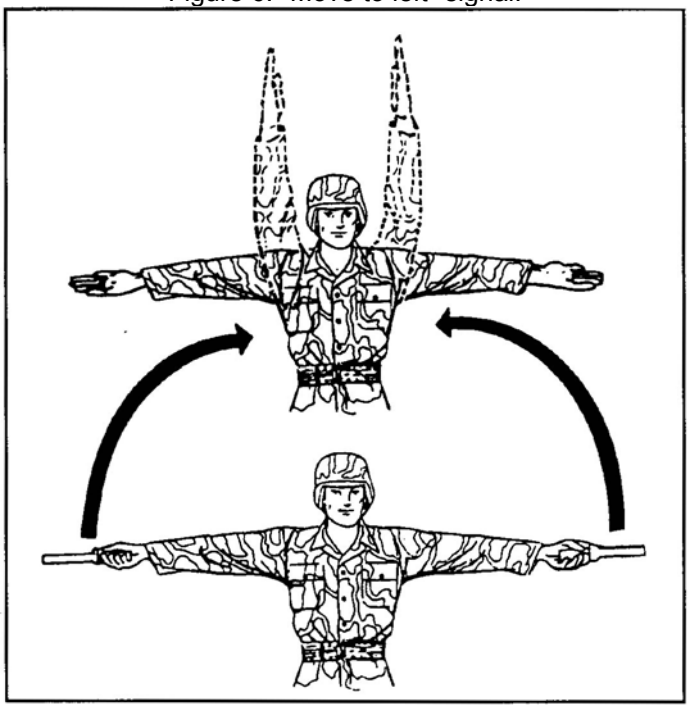


Figure 7. "Move upward" signal.

**Performance Steps**

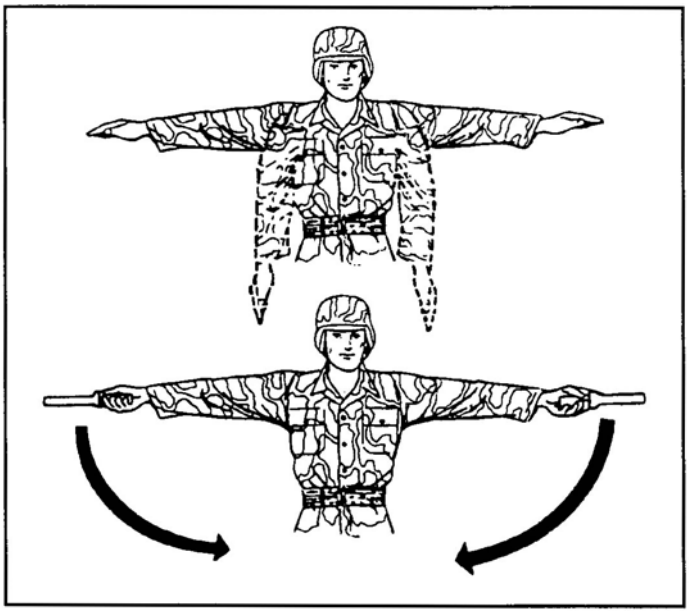


Figure 8. "Move downward" signal.

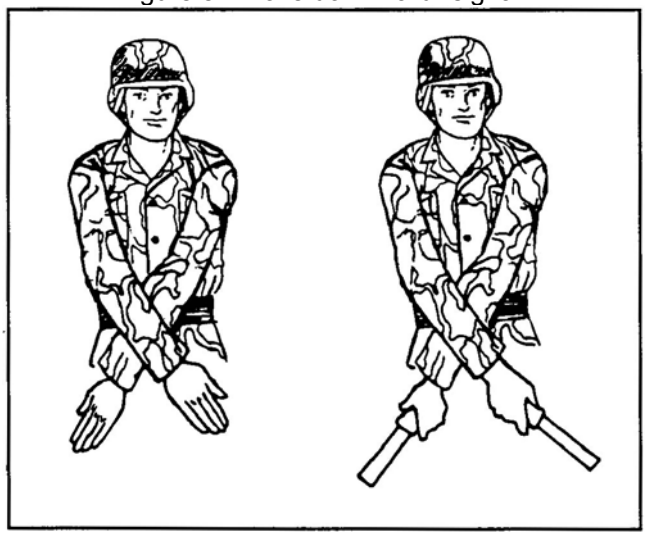


Figure 9. "Land" signal.

a. The signal man's position when directing a helicopter is to the right front of the aircraft where he can be seen best by the pilot. The signal man's position for utility helicopters is 30 meters to the right front of the aircraft during day or night operations.
b. Signals at night are given by using lighted batons or flashlights. In the illustrations, one of the men is using a lighted wand. This is a flashlight with a plastic wand attached to the end. The flashlight is used when there is decreased visibility.
c. The speed of the arm movement indicates the desired speed of aircraft compliance with the signal.

NOTE: The "hover" signal should be used to change from one arm-and-hand signal to another. For example, assume that the signalman desires to land an approaching helicopter and that the signalman has given the helicopter the "move ahead" signal. The helicopter is now positioned directly over the desired landing area. Before giving the helicopter the signal to move downward, the signalman should execute the "hover" signal. This gives the pilot time to change from the "move ahead" to the "move downward" signals.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement. For test purposes, the tester may act as the pilot.

BRIEF SOLDIER: Tell the soldier to land the helicopter using arm-and-hand signals.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Advised the pilot of changes to the information given. | ____ | ____ |
| 2. Identified the landing site to the pilot. | ____ | ____ |
| 3. Controlled the landing using arm-and-hand signals. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 21-60 |
| | FM 7-8 |

Subject Area 7: COMMUNICATIONS: RADIO

**Maintain an AN/PRC-126 Radio**

**071-810-0001**

**Conditions:** Given a complete AN/PRC-126 radio; cleaning equipment, including clean rags and a soft bristle brush; and a requirement to perform maintenance.

**Standards:** Ensured all components were present, cleaned, and serviceable, and reported all unserviceable or damaged items.

**Performance Steps**

1. Maintain the transmitter/receiver. Clean all foreign matter from the cases, knobs, switches, connectors, and covers. Clean corrosion, debris, or other foreign matter from the battery compartment and terminals.
2. Maintain antennas. Fully assemble, clean and mount on the radio. Ensure all parts are present, the flexible boots are free of cracks, and that milled surfaces are free of dents and corrosion. Report all deficiencies to supervisor or communications NCO on DA Form 2404(Equipment Inspection Maintenance Worksheet).
3. Maintain canvas webbing. Clean webbing and check it for serviceability.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with materials according to the task condition statement.

BRIEF SOLDIER: Tell the soldier that within 30 minutes to perform operator preventive maintenance checks and services on radio set.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed routine checks. | ____ | ____ |
| 2. Performed PMCS. | ____ | ____ |
| 3. Completed DA Form 2404. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5820-1025-10 |

**Operate an AN/PRC-126 Radio**
**071-810-0002**

**Conditions:** Given an operational AN/PRC-126 radio complete and a BA-5588/U serviceable battery.

**Standards:** Sent and received transmissions and selected and pre-set channels on the radio.

**Performance Steps**

1. Install a battery
2. Place the receiver/transmitter (R/T) into operation.
   a. Install an antenna.
   b. Turn OFF/ON control to the ON position.
   c. Wait for operating frequency to appear on the display.
   d. Use the indicated channel or select another.
   e. Listen for the antenna warning signal and disable if necessary.
   f. Listen for the low voltage tone and change battery if necessary.
   g. Adjust volume control.
   h. Press the PUSH TO TALK (PTT) button to transmit.
   i. Release the PTT button to receive.
3. Program channels in the R/T.
   a. Locate the SET/INC buttons.
   b. Set the channel switch to the channel to be programmed. The set must be ON to perform this step.
   c. Press SET to place the R/T in the program mode.
   d. Press INC until the leftmost digit of the channel appears in the display.
   e. Press SET to program (lock in) the digit.
   f. Repeat steps d and e until all digits of the channel have been programmed.
   g. Press SET LOAD will appear on the display.
   h. Repeat steps b through g to program additional channels.

**Evaluation Preparation:** SETUP: At the test site provide all materials according to task condition statement.

BRIEF SOLDIER: Tell the soldier the radio set must be assembled and a communication checked with another station within 5 minutes.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Installed a battery. | ____ | ____ |
| 2. Placed the R/T into operation.<br>a. Installed an antenna.<br>b. Turned OFF/ON control to the ON position.<br>c. Waited for operating frequency to appear on the display.<br>d. Used the indicated channel or selected another channel.<br>e. Listened for the ANT warning signal and disable if necessary.<br>f. Listened for the low voltage tone and change the battery if necessary.<br>g. Adjusted the volume control.<br>h. Pressed the (PTT) button to transmit.<br>i. Released the PTT to receive. | ____ | ____ |
| 3. Programmed channels in the R/T<br>a. Located the SET/INC buttons.<br>b. Set channel to channel to be programmed. Ensure the set is ON. | ____ | ____ |

**Performance Measures** **GO** **NO GO**

c. Pressed SET to place the R/T in the program mode.
d. Pressed INC until the leftmost digit of the channel being programmed appeared in the display.
e. Pressed SET to program (lock in) the digit.
f. Repeated steps d and e until all channel digits were programmed.
g. Pressed SET until LOAD appeared on the display.
h. Repeated steps b through g until all required channels were programmed.

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 11-5820-1025-10 |

Subject Area 9: MOVE: BASIC TACTICS

**Locate a Target by Polar Plot**

**061-283-1003**

**Conditions:** Given a map of the target area, binoculars, declinated M2 compass, and target.

**Standards:** Locate the target within ñ250 meters of the actual location. Announce the target location within 30 seconds after identification. Express direction to within 10 mils and within ñ100 mils of the actual direction. Express distance to the nearest 100 meters.

**Performance Steps**

1. Determine direction to the target. Direction may be determined by use of a compass, computed by adding or subtracting differences from a known direction, determined by use of a map, or estimated.
2. Estimate distance to the target.
   a. Distance can be estimated by the football-field method. A football field is 100 yards long, which is about 100 meters. Therefore, a target that is about seven football fields away from the OP is at a distance of about 700 meters.
   b. The flash-to-bang method is another method of estimating distance. After observing a flash or burst in the target area, the observer counts the number of seconds until he hears the sound. He then multiplies the number of seconds times 350 (350 meters per second is about the speed of sound) to obtain the estimated distance--for example, 3 seconds x 350 = 1,050 meters, expressed as a distance of 1,000 meters.

NOTE: The speed of sound of 350 meters per second will only be used when estimating distance to adjust artillery fire. For all other times that the flash-to-bang method is used to estimate distance, use 330 meters per second.

**Evaluation Preparation:** Setup: Ensure that the target is readily identifiable to the soldier, and that the equipment listed in the task conditions statement is present and operational. Brief Soldier: Identify the target to the soldier. Tell the soldier to use the polar-plot method to determine the location of the target within 30 seconds. NOTE: Ensure that the tested soldier understands exactly what is expected of him; do not help him.

| **Performance Measures**<br>NOTE: Sequence is scored. | **GO** | **NO GO** |
|---|---|---|
| 1. START TIMING THE SOLDIER: Determine the direction within ñ100 mils of actual direction; express it to the nearest 10 mils. | ____ | ____ |
| 2. Determine the distance to the target within ñ250 meters of the actual distance. | ____ | ____ |
| 3. Determine the vertical (up or down) within ñ5 meters. If there are no obvious differences, ignore the vertical shift. | ____ | ____ |
| 4. Complete Steps 1 through 3 in sequence. | ____ | ____ |
| 5. Complete Steps 1 through 3 within 30 seconds. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed (P). Score the soldier NO-GO if any steps are failed (F). If the soldier fails any steps, show what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 6-30 |

## Control Movement of a Fire Team

**071-326-5605**

**Conditions:** As a fire team leader or assistant scout squad leader, while moving in a tactical environment, given specific instructions by the squad leader as to the movement technique to be used, the route to the overwatch position, and the actions to be taken there.

**Standards:** 1. React immediately to all of the squad leader's orders or instructions.
2. Keep the interval between fire teams (if in a trail team) appropriate to the given movement technique and to the terrain.
3. Move to the overwatch position and use the terrain to provide cover and concealment for the fire team.
4. Recognize the fire team members' use of the following (and correct them when necessary):
a. Camouflage, cover and conceal.
b. Individual interval appropriate to terrain and visibility, while keeping all team members in sight.
c. Noise and light discipline.
d. Security measures (soldiers are alert and ready to act).
e. Response to leader's lead-by-example actions.

NOTE: Corrections may be made orally or with arm-and-hand signals.

**Performance Steps**

1. Thoroughly understand the mission. Know--
    a. The destination of the team.
    b. The route the team will use.
    c. The actions to take when the team arrives at the destination.
    d. The location of the squad leader.
    e. The location of the overwatch team.
2. Inform the team members of the mission.
3. Be proficient in battle drill techniques, and apply the squad leader's instructions and unit SOPs:
    a. Use camouflage, cover, and concealment techniques.
    b. Keep individual intervals.
    c. Maintain noise and light discipline.
    d. Take security measures.
    e. Respond to lead-by-example actions.
    f. Respond to hand signals.
4. Maintain a visual or radio contact with the squad leader.
5. Use the lead-by-example technique to control the fire team.
    a. Control the desired interval (normally, it should be 10 meters between individuals) between the fire teams and team members. This may vary depending on terrain, visibility, and movement techniques.
    b. Make quick visual reconnaissance of the next overwatch position designated by the squad leader, and lead the fire team through the terrain that offers the best cover and concealment available.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Using the instructions and information given by the squad leader, tell the soldier the route to the overwatch position; tell him that the movement technique and the actions to be taken will be given to him.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Understood the mission.<br>a. Know where the team is to move.<br>b. Know the route to use.<br>c. Know the action to be taken upon arrival.<br>d. Know the location of the squad leader.<br>e. Know the location of the overwatch team. | ____ | ____ |
| 2. Informed the team members of the mission. | ____ | ____ |
| 3. Used the proper battle drill techniques.<br>a. Use camouflage, cover, and concealment.<br>b. Control the individual intervals.<br>c. Enforce noise and light discipline.<br>d. Enforce security measures.<br>e. Use arm-and-hand signals. | ____ | ____ |
| 4. Maintained visual or radio contact with the squad leader. | ____ | ____ |
| 5. Used the lead-by-example technique.<br>a. Control the desired interval between the fire teams and team members (normally 10 meters between individuals).<br>b. Lead the fire team through the terrain that offers the best cover and concealment.<br>c. Stay within 50 meters of the designated route. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 7-7<br>FM 7-8 |

**Select an Overwatch Position**

**071-326-5606**

**Conditions:** As a fire team leader, given the direction of the enemy threat, route and destination of a bounding element, and a designated area to select an overwatch position.

**Standards:** Selected the fire team's position within the designated area that provides--
1. Cover and concealment.

2. Observed good fields of fire from the overwatch position, along the route of the bounding element up to its destination.

NOTE: The range of the fire team's weapons must be considered. The overwatching element must be able to support by fire, if necessary.

**Performance Steps**

1. The bounding overwatch technique is used when contact is expected. One fire team advances while the other team is in an overwatch position ready to fire.
2. The key to this movement technique is the proper use of terrain. All members of the squad must exploit all natural cover and concealment. Exposure to possible enemy observation must be kept to a minimum. A bound is normally made to a position about 100 to 150 meters forward of the overwatch team. The terrain, the range of the overwatch fire team's weapons, and the ability of the squad leader to control all elements of his squad must be considered.
3. In these bounds, the squad leader has both fire teams move along the same general line of advance. On occupying an overwatch position, the fire team leader must ensure that all team members can support the bounding team by fire when needed. A change in the team's position within the general location designated by the squad leader may be necessary.

**Evaluation Preparation:** SETUP: At the test site, provide all materials and equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier that he will select a fire team position within the designated area.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Provided observation and good fields of fire. | ____ | ____ |
| 2. Provided cover and concealment. | ____ | ____ |
| 3. Provided support for bounding element's advance. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 7-7 |
| | FM 7-7J |
| | FM 7-8 |

Subject Area 16: NAVIGATE: GENERAL/COMPASS/MAP

**Orient a Map Using an M2 Compass**
**071-520-0001**

**Conditions:** Given a calibrated M2 compass (declinated or nondeclinated), a 1:50,000 standard military map of the area in which the compass is to be used, and the requirement to orient the map.

**Standards:** Aligned the terrain features depicted on the map with the actual ground terrain features.

**Performance Steps**

1. Place the compass to a north south grid line on a level map. Place the compass cover toward the top of the map. The compass black index line is parallel to grid north.
2. Rotate the map and compass as a unit, until the angle formed by the black index line and the compass needle match the direction printed on the maps declination diagram.

NOTE: Remember to point the compass north arrow in the same directions as the magnetic north arrow and the compass reading (equal to the GM angle) or 6400 mils minus GM angle will be easy to see. If the GM angle is less than 50 mils, the soldier need not line up the north arrow, as the differences will have little affect.

3. Alternate Method. Draw a magnetic north line on the map from any north south and east west grid line intersection using a protractor. Align the straightedge of the compass along this magnetic line. Rotate the map and compass as a unit, until the north arrow falls beneath the compass's fixed black index line.

NOTE: Some maps have a built in protract consisting of a pivot point "P" on the south neat line of the map and several degrees of arc along the north neat line of the map. The GM line is obtained by connecting pivot "P" with appropriate value of the GM angle as taken from the declination diagram on the arc. The map and compass arcs then turned as a unit until the north arrow falls beneath the fixed black index line on the compass.

**Evaluation Preparation:** SETUP: Select an area that is free of magnetic interference (power lines, vehicles). Provide a field table, map, protractor, pencil, paper, and M2 compass.

BRIEF SOLDIER: Direct the soldier to the material provided. Tell him to orient the map to the ground using the compass. Tell him to use the G-M angle shown by the declination diagram if it exceeds three degrees.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Determined whether G-M angle exceeded 3 degrees. | ____ | ____ |
| 2. Aligned the side of the compass with one of the north south grid lines. | ____ | ____ |
| 3. Pointed the cover of the compass toward the top of the map. | ____ | ____ |
| 4. Oriented the map. | ____ | ____ |
| 5. Corrected the orientation of the map when G-M angle exceeded 3 degrees or 50 mils. | ____ | ____ |

**Evaluation Guidance:** Score the soldier a GO if all performance measures are passed. Score the soldier a NO-GO if any performance measure is failed. If the soldier scores a NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 21-26
TM 9-1290-333-15

Subject Area 19: RECON-SECURITY: NIGHT VISION DEVICES

**Control Use of Night Vision Devices**
**071-710-0004**

**Conditions:** Given a fire team-sized element located in a defensive position at night, with assigned night vision devices and a platoon early warning system (PEWS), operate the devices.

**Standards:** The element's sector is covered by observation; and PEWS cover any dead space.

**Performance Steps**

1. The night observation plan must ensure overlapping sectors of observation similar to sectors of fire. Assign each night vision device a sector of observation. If possible, any device mounted on a weapon should have a matching sector of fire for the weapon.
2. Thermal sights should be kept on the wide field of view settings for normal use. When a target is detected and engagement is begun, the sight should be set to a higher magnification. Other devices should be required to cover portions of the sector of observation for the brief time that a normal target engagement takes.
3. Some device should be placed forward of the firing positions to help provide early warning. Night observation and listening posts using night vision devices can provide target identification for organic direct and indirect fire weapons.
4. Dead space can be covered using the PEWS. Defiles, gullies, wooded areas, and other areas that cannot be observed using night vision devices should be covered using PEWS sensors.
5. The efficiency of an observer decreases rapidly after 30 minutes. This is true when using night vision devices. Observers should be rotated at least every 30 minutes. Observer teams should be relieved about every two hours.
6. During night movement, using a three-man element at squad level may help in detecting and destroying the enemy. The three-man element consists of one soldier who has night-adapted vision and uses no vision devices, one soldier who is using the AN/PVS-5 or AN/PVS-7 night vision goggles, and one soldier who is using an M16A1 or M16A2 rifle and AN/PVS-4 night vision sight. Use of this technique provides the element with a wide range of viewing capability. Personnel and equipment should be rotated frequently so that soldier vision "burnout" does not occur. The soldier with night-adapted vision does not take turns on the night vision equipment. He is rotated with another soldier who has night-adapted vision.

**Evaluation Preparation:** SETUP: This task should be evaluated during a field training exercise. Otherwise, provide the soldier with the personnel and equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to assign duties and responsibilities to the personnel of his fire team for use of night vision devices.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Assigned overlapping sectors of observation. | ____ | ____ |
| 2. Set thermal sights on wide field of view. | ____ | ____ |
| 3. Assigned the device to an observation post. | ____ | ____ |
| 4. Used PEWS in dead space. | ____ | ____ |
| 5. Rotated operators at least every 30 minutes. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 6. Employed a three-man element during movement. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 23-1
TM 11-5855-213-10
TM 11-5855-238-10
TM 11-5855-262-10-1
TM 9-1425-484-10
TM 9-2350-252-10-2

Subject Area 20: RECON-SECURITY: OPSEC AND COMSEC

## Enforce Operations Security
## 071-730-0006

**Conditions:** In a combat environment, given a mission to conduct a tactical operation.

**Standards:** The enemy was denied information on planned, ongoing, and completed operations. The unit practiced: camouflage, physical security, noise and light discipline, information security, authentication procedures, document security, sign and countersign, and terrain masking.

**Performance Steps**

1. Identify operations security requirements.
    a. Counter surveillance.
        (1) Camouflage and concealment.
        (2) Positions.
        (3) Noise and light discipline.
    b. Physical security.
        (1) Observation posts.
        (2) Patrols.
        (3) Stand-to.
        (4) Silent watch.
        (5) Mounted and dismounted security.
    c. Signal security.
        (1) Communications procedures.
        (2) Electronic counter-countermeasures.
        (3) Encoded and decoded information.
    d. Information security.
        (1) Foreign nationals kept out of troop areas.
        (2) Weapons and ammunition kept covered whenever possible.
        (3) Vehicle markings and unit patches.
        (4) Mail was censored.
2. Disseminate operational security information.
3. Make on-the-spot corrections.

**Evaluation Preparation:** SETUP: At the test site, provide the leader with a mission to conduct a tactical operation.

BRIEF SOLDIER: Tell the soldier to be familiar with camouflage, physical security, noise and light discipline, information security, authentication procedures, document security, sign and countersign, and terrain masking procedures.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Enforced counter surveillance. | ____ | ____ |
| 2. Enforced physical security. | ____ | ____ |
| 3. Enforced signal security. | ____ | ____ |
| 4. Enforced information security. | ____ | ____ |
| 5. Disseminated operational security information. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 6. Made on-the-spot corrections as required. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 7-7 |
| | FM 7-7J |

Subject Area 22: SUSTAIN: GENERAL

**Charge a Battery Using a PP-7382/TAS Battery Charger**
**071-316-2538**

**Conditions:** Given a PP-7382/TAS battery charger, one to six nickel cadium batteries, an AC or DC power source, and a requirement to charge a battery.

**Standards:** The batteries have been charged as a result of placing the PP-7382/TAS battery charger into operation.

**Performance Steps**

1. Remove battery cover.
2. Place the input power on/off circuit breaker switch to the OFF position.
3. Remove power cable from battery cover.

NOTE: Power cable W1 is used with a DC power source, power cable W2 is used with an AC power source.

4. Remove connector cover from connector J7.
5. Connect the end of power cable which mates with connector J7 to the J7 input power connector.
6. Set input power on/off circuit breaker to ON.
7. Check to ensure that the input power indicator light illuminates.

NOTE: If input power indicator light fails to light, remove and replace lamp.

8. Releases latch and opens one or both battery covers.
9. Insert one to six batteries into battery charger, engaging battery connectors with battery charger connectors J1 - J6.

NOTE: Batteries should be clean before inserting them into battery charger.

10. Close battery covers and secure latch.
11. Rotate timers reset select switch and watch for the appropriate channel indicator light to illuminate.
12. Repeat steps 10 and 11 for each of remaining batteries that were installed.
13. Rotate timers reset select switch to zero.

NOTE: Charging is complete when channel charging indicator goes out.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to charge a battery using a PP-7382 battery charger.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Prepared charger for operation. | ____ | ____ |
| 2. Correctly placed batteries into charger. | ____ | ____ |
| 3. Placed charger into operation. | ____ | ____ |
| 4. Charged batteries. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
| --- | --- |
| | TM 9-5855-254-14 |

**Enforce Preventive Medicine**

**071-600-0005**

**Conditions:** In a combat environment, given a squad and TO&E equipment.

**Standards:** Ensured soldiers practiced personal hygiene, consumed only purified rations, and prevented heat and cold injuries.

**Performance Steps**

1. Ensure soldiers practice personal hygiene.
   a. Inspect soldiers daily for signs of poor hygiene or insect bites.
   b. Ensure soldiers dispose of body waste safely.
   c. Ensure soldiers use repellents and protective clothing.
   d. Instruct soldiers to clean their body and clothing on every possible occasion.
2. Ensure soldiers consume only those consumables that has been issued or approved.
   a. Ensure soldiers consume only rations from approved sources.
   b. Ensure soldiers purify water taken from field sources.
3. Ensure soldiers practice heat injury prevention.
   a. Order soldiers to drink extra water before work details.
   b. Ensure soldiers drink small quantities of water while they work.
   c. Ensure soldiers work and rest in shade whenever possible.
   d. Modify uniform requirements IAW with the heat conditions.
   e. Inspect frequently ensuring policies are enforced.
   f. Use buddy system to monitor each soldier.
4. Ensure soldiers practice cold injury prevention.
   a. Inspects soldiers to ensure clothing is worn in loose layers.
   b. Ensure soldiers remove unnecessary clothing layers.
   c. Ensure soldiers exercise as the mission permits.
   d. Use buddy system to monitor each soldier.
   e. Ensure soldiers keep hands and feet as dry and clean as the mission permits.

**Evaluation Preparation:** SETUP: In a pre-selected area before or during a road march or in a bivouac site ensure each soldier practices preventive medicine.

BRIEF SOLDIER: Tell the soldier to properly demonstrate the procedures for foot care before and during a road march, by purifying water, properly disposing of human solid waste, and preventing heat and cold injuries.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Ensured soldiers practiced personal hygiene.<br>a. Inspected soldiers daily for signs of poor hygiene or insect bites.<br>b. Ensured soldiers disposed of body waste safely.<br>c. Ensured soldiers used repellents and protective clothing.<br>d. Instructed soldiers to clean their body and clothing on every possible occasion. | ____ | ____ |
| 2. Ensured soldiers only consumed approved or issued consumables.<br>a. Ensured soldiers only consumed rations from approved sources.<br>b. Ensured soldiers purified water taken from field sources. | ____ | ____ |
| 3. Ensured soldiers practice heat injury prevention.<br>a. Ordered soldiers to drink extra water before work details. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| b. Ensured soldiers drank small quantities of water as they worked. | | |
| c. Ensured soldiers worked and rested in shade whenever possible. | | |
| d. Modified uniform requirements IAW with the heat conditions. | | |
| e. Inspected frequently ensuring policies are enforced. | | |
| f. Used buddy system to monitor each soldier. | | |
| 4. Ensured soldiers practice cold injury prevention. | ____ | ____ |
| a. Ensured soldiers clothing was worn in loose layers. | | |
| b. Ensured soldiers removed unnecessary clothing layers. | | |
| c. Ensured soldiers exercised as the mission permitted. | | |
| d. Used buddy system to monitor each soldier. | | |
| e. Ensured soldiers kept hands and feet as dry and clean as the mission permitted. | | |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 21-10 |
| | FM 21-10-1 |

Subject Area 35: WEAPONS: FDC MBC

**Place a Mortar Ballistic Computer into Operation**

**071-082-0001**

**Conditions:** As a computer in a fire-direction center (FDC), given an M23 mortar-ballistic computer (MBC) with all components, and a battery (either lithium battery BA-5588/U or mercury battery BA-1588/U).

**Standards:** Correctly inserted an internal battery or connected the mortar-ballistic computer (MBC) to an external power source so that the MBC is operational.

**Performance Steps**

1. Prepare the MBC for internal battery operation.
   a. Remove the MBC from its field case (Figure 1).

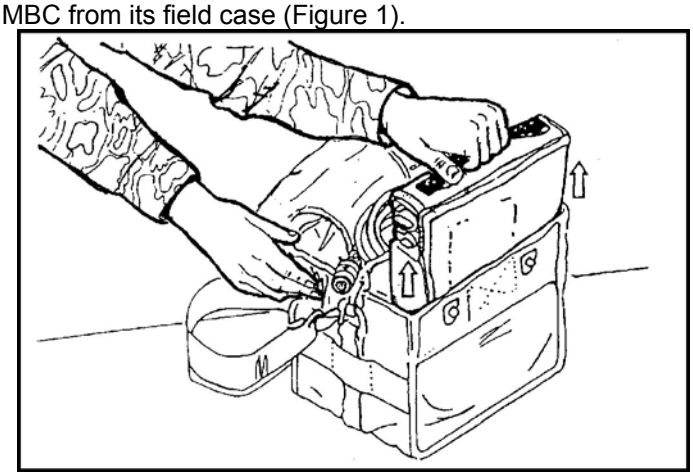


Figure 1. Removal of MBC.

   b. Open the top flap of the MBC case, and open the battery compartment cover (Figure 2).

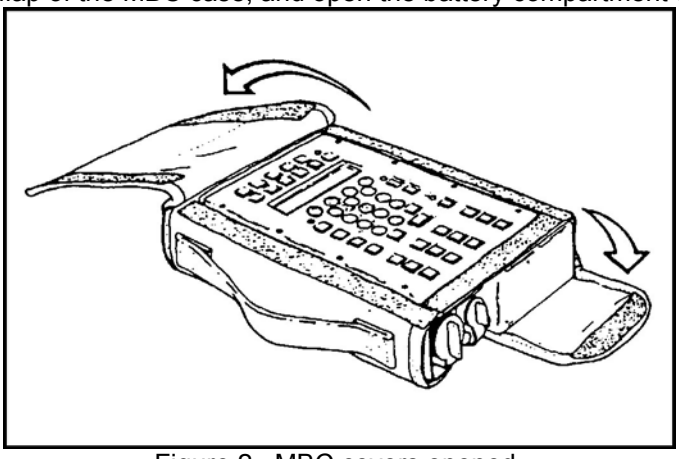


Figure 2. MBC covers opened.

   c. Open the bottom flap, release the two battery cover latches, and lift off the battery compartment cover (Figure 3).

**Performance Steps**

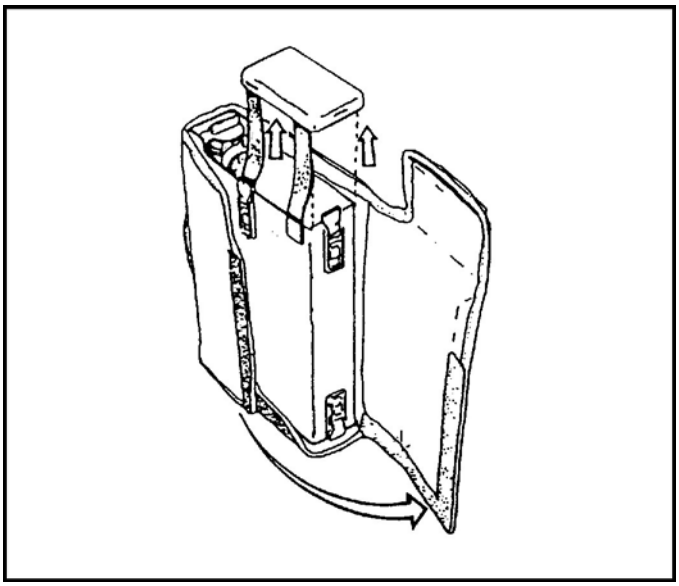


Figure 3. Battery compartment opened.

d. Two straps are attached to the battery compartment cover. These straps help to remove the battery from the battery compartment when changing or removing a used battery. Install these under the battery (Figure 4).

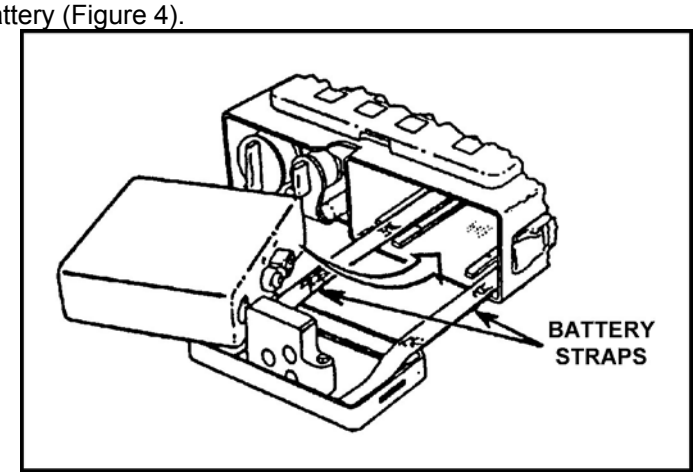



Figure 4. Battery straps on proper position.

e. A white plastic spacer is attached to the battery compartment cover (Figure 5). When using the BA-1588/U (mercury) battery, move the spacer down on a 45-degree angle (Figure 6). When using the BA-5588/U (lithium) battery, leave the spacer upright. The lithium battery is about twice as long as the mercury battery (Figure 7).

**Performance Steps**

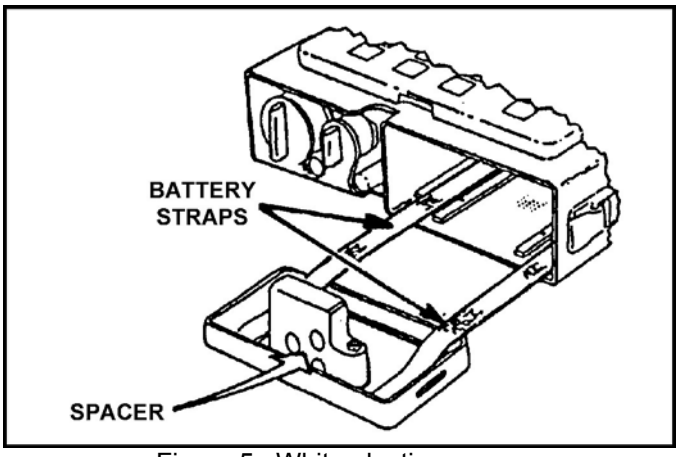



Figure 5. White plastic spacer.

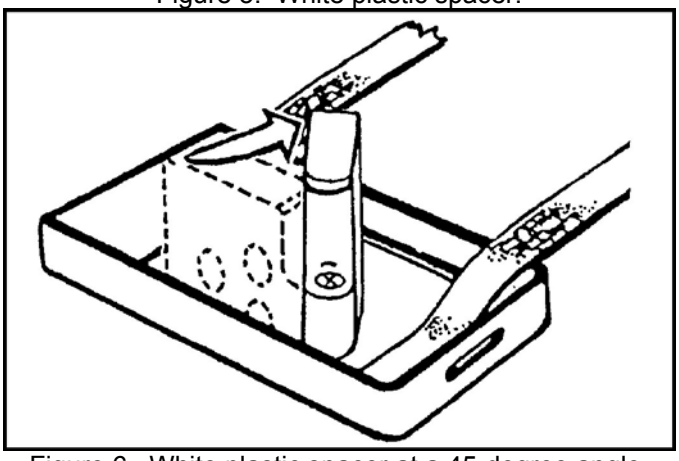


Figure 6. White plastic spacer at a 45-degree angle.

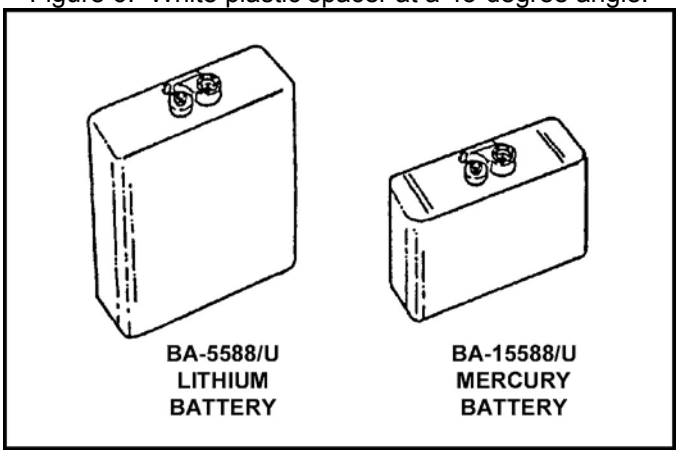



Figure 7. Batteries used with MBC.

f. Ensure the battery snaps into the connectors. Close and refasten the cover latches. Close all but the top flap, which is left open to provide access to the keyboard.
g. The MBC is now ready to operate using internal battery power.

2. Prepare the MBC to operate on the vehicle battery.
   a. Remove the vehicular battery cable (Figure 8) from the field case.

**Performance Steps**

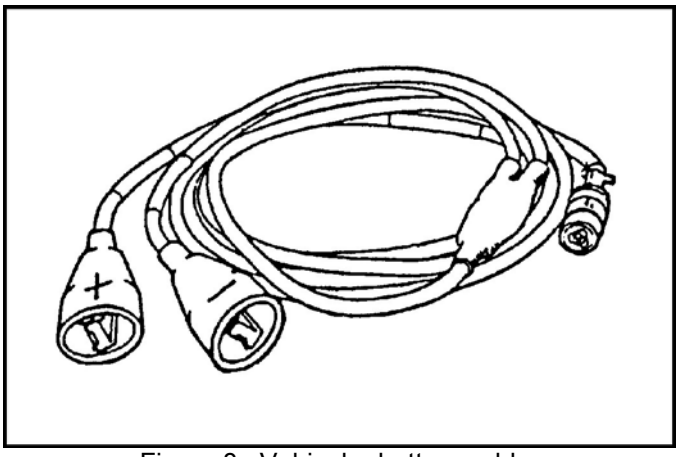



Figure 8. Vehicular battery cable.

b. Remove the dust cover from the MBC's power connector (Figure 9). This is the smaller of the two connectors on the bottom of the MBC.

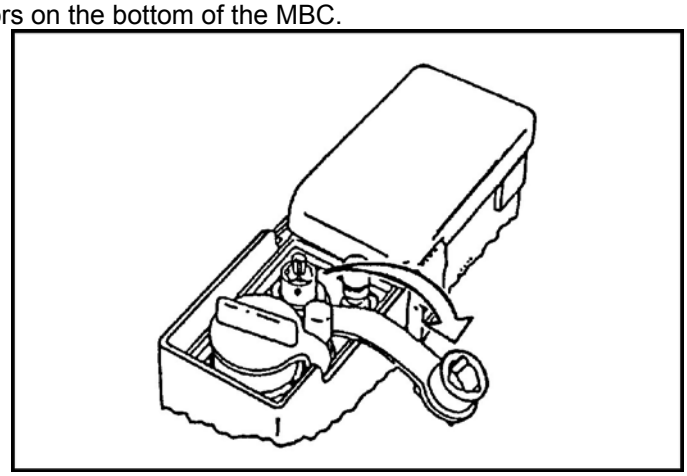


Figure 9. MBC power connector.

c. Plug the cable labeled DMD into the MBC power connector (Figure 10).

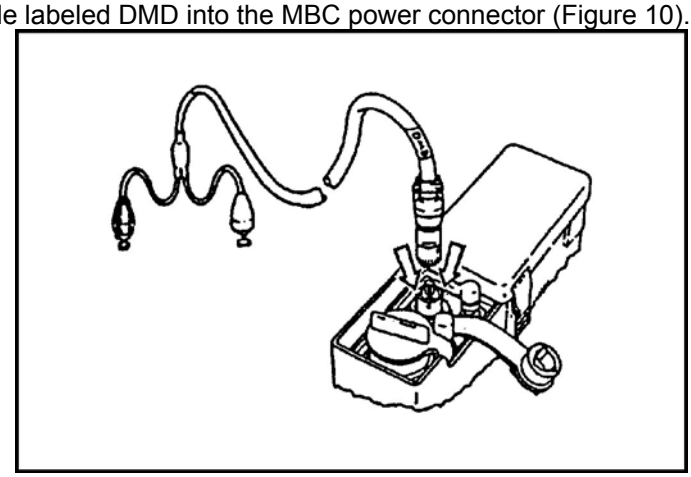


Figure 10. Attachment of cable to power connector.

d. The vehicular battery cable has one red battery clamp and one black battery clamp. Attach the red clamp to the positive battery post and the black clamp to the negative battery post (Figure 11).

**Performance Steps**

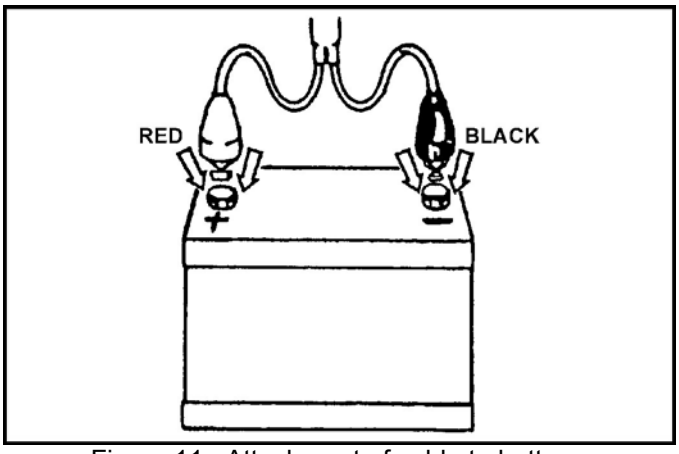


Figure 11. Attachment of cable to battery.

e. The MBC is now ready to operate using external battery power.

**Evaluation Preparation:**
SETUP: At the test site, provide all equipment and materials given in the task condition statement. Pack all equipment in the field case.

BRIEF SOLDIER: Tell the soldier to place the MBC into operation first using internal, then external, battery power, and tell him to repack all equipment in the field case when done.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Internal battery operation.<br>a. Opened the battery compartment cover.<br>b. Positioned battery straps.<br>c. Inserted and snapped the battery into position.<br>d. Closed and latched the battery compartment cover and closed all but the top flap.<br>e. Correctly removed the battery using the battery straps.<br>f. Closed cover and all flaps. | ____ | ____ |
| 2. External battery operation.<br>a. Removed the vehicular battery cable from the field case.<br>b. Removed the dust cover from MBC power connector.<br>c. Connected the DMD end of the power cable to the power connector.<br>d. Connected the red clamp to the positive post and the black clamp to the negative post on the battery.<br>e. Turned off MBC. Disconnected the power cable from the battery and MBC, and replaced the dust cover on the MBC power connector. | ____ | ____ |
| 3. Replaced all equipment in the field case. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1220-246-12&P |

**Conduct a System Self-Test on a Mortar Ballistic Computer**

**071-082-0002**

**Conditions:** As a computer in a fire-direction center (FDC), given a mortar ballistic computer (MBC) and battery (BA-1588/U or BA-5588/U).

**Standards:** Conducted the system self-test and determined the operating condition of the MBC. Identified and reported any nonfunctioning elements.

**Performance Steps**

NOTE: The MBC has four built-in self-test circuits that allow it to check its own operating condition. The self-test covers the microprocessor, all switches and keys, display screens, and modem.

CAUTION: NEVER CONDUCT A MODEM SELF-TEST WHILE THE MBC IS CONNECTED TO A RADIO. THIS COULD DAMAGE THE MBC.

1. The computer conducts the MBC self-test.
   a. Press the ON/OFF switch on the MBC. The display should read, POWER UP TEST. At this time, the MBC is performing internal checks. When this is complete, the display reads READY (Figure 1).

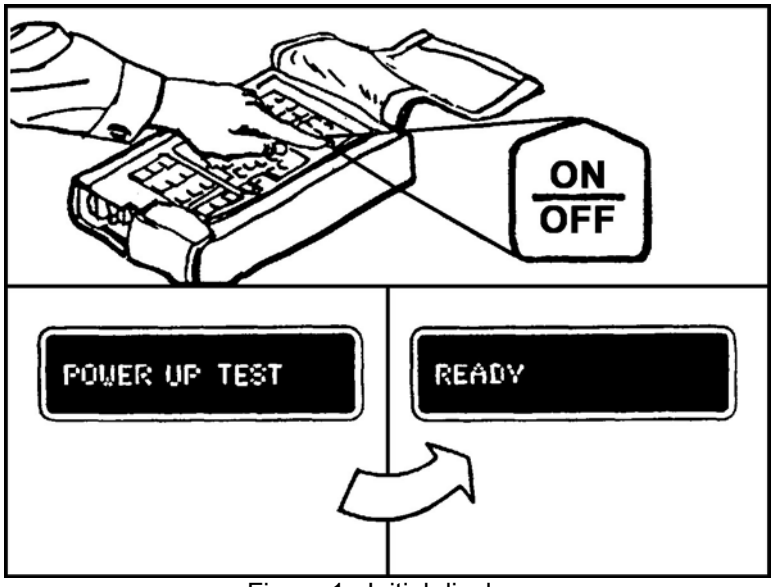



Figure 1. Initial display.

   b. Check the BATT LOW light. If the light is flashing, replace the battery before proceeding with the self-test (Figure 2).

**Performance Steps**

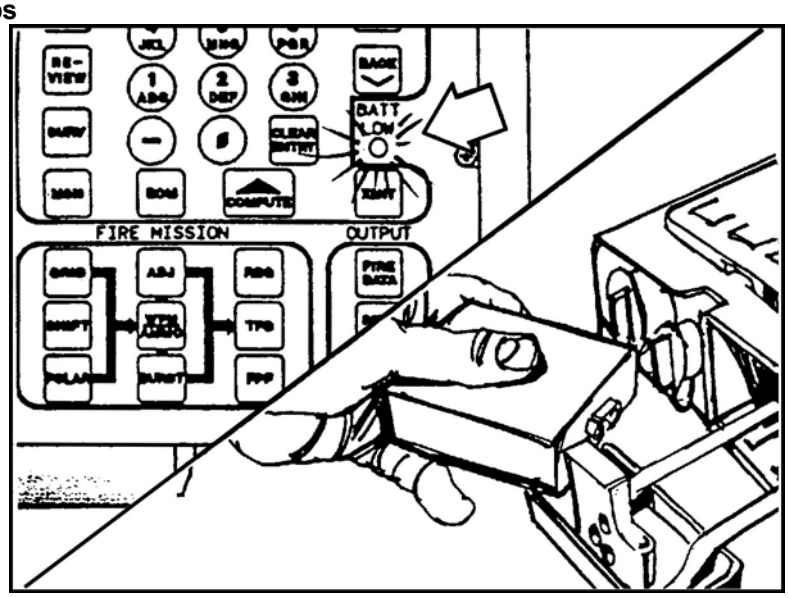



Figure 2. Battery low indicator.

c. If the battery is functioning, begin the test by pressing the TEST switch (Figure 3). The display reads REVISION NO. (*).

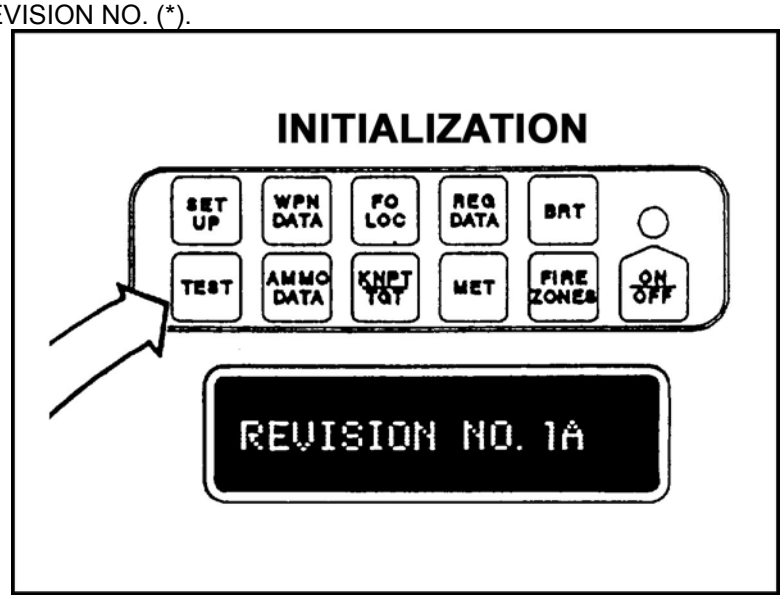



Figure 3. TEST switch.

NOTE: If during the self-test the display does not show the proper response, notify immediate supervisor.

d. Press the sequence (SEQ) switch. The display now shows the main test menu (Figure 4). Notice that the character blocks are flashing, indicating that the MBC is waiting for a selection.

**Performance Steps**

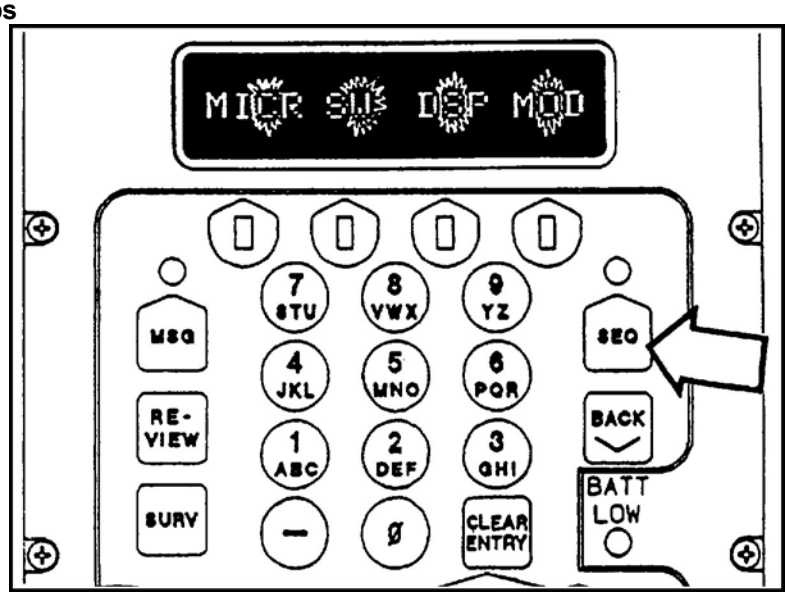



Figure 4. Menu display.

2. The computer conducts the microprocessor self-test.
   a. Test the microprocessor first. Press the first DISPLAY switch just below the first flashing character block (Figure 5).

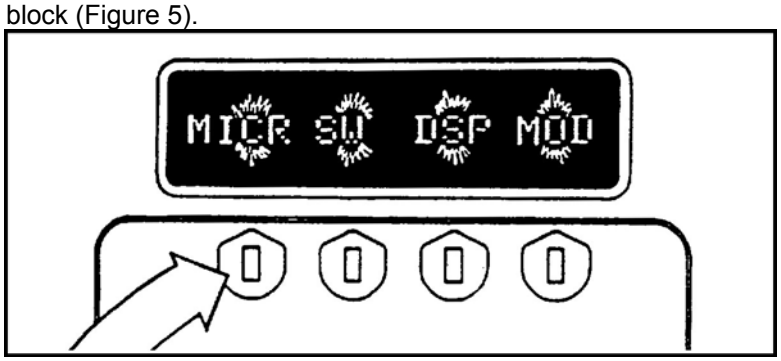



Figure 5. First DISPLAY switch.

   b. The display should show TESTING MICR. The test takes about 38 seconds to complete. At the end of the test, the display shows, MICR: PASS (Figure 6).

**Performance Steps**

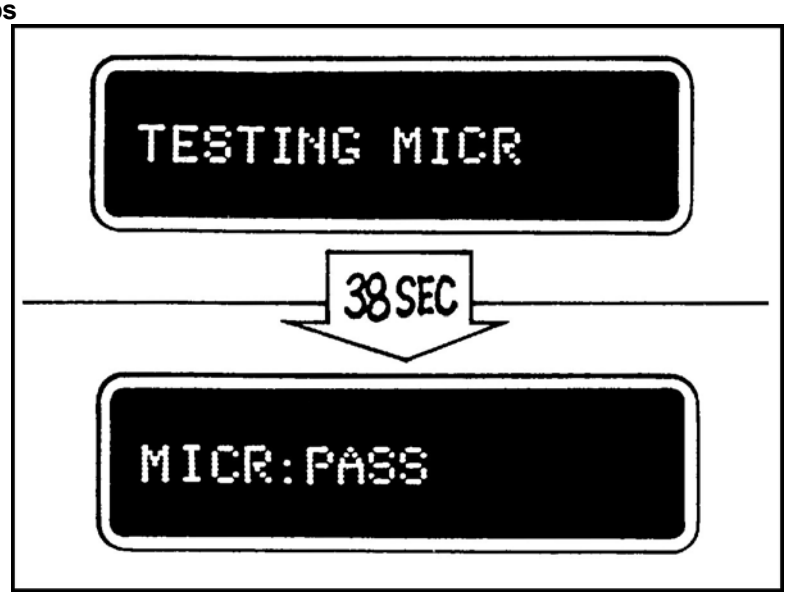



Figure 6. Display.

3. Conduct the switch self-test (SW).
   a. Press the REVIEW switch to display the test menu.
   b. Proceed with the switch test (Figure 7) by pressing the second DISPLAY switch.

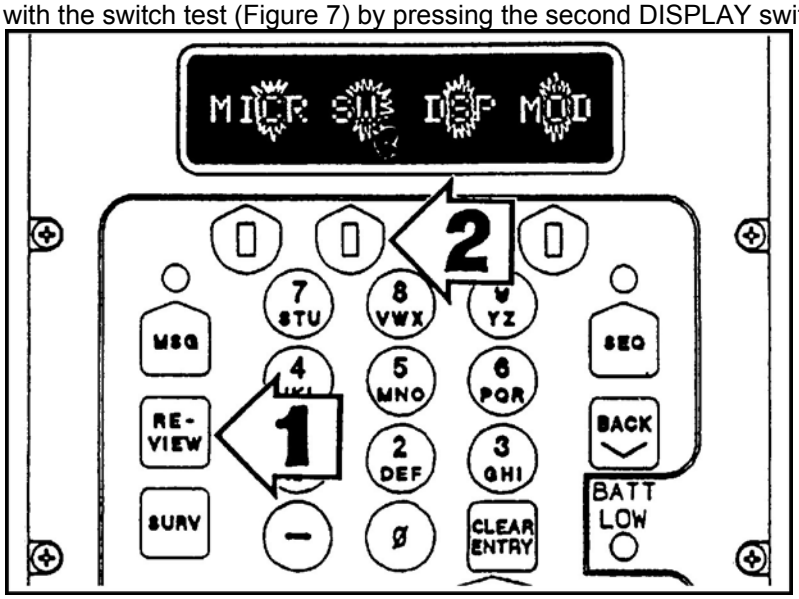



Figure 7. Switch test.

   c. During the switch test, the MBC shows which switch to press next. After you press the switch shown on the display, the MBC shows the next switch to press (A and B, Figure 8).

**Performance Steps**

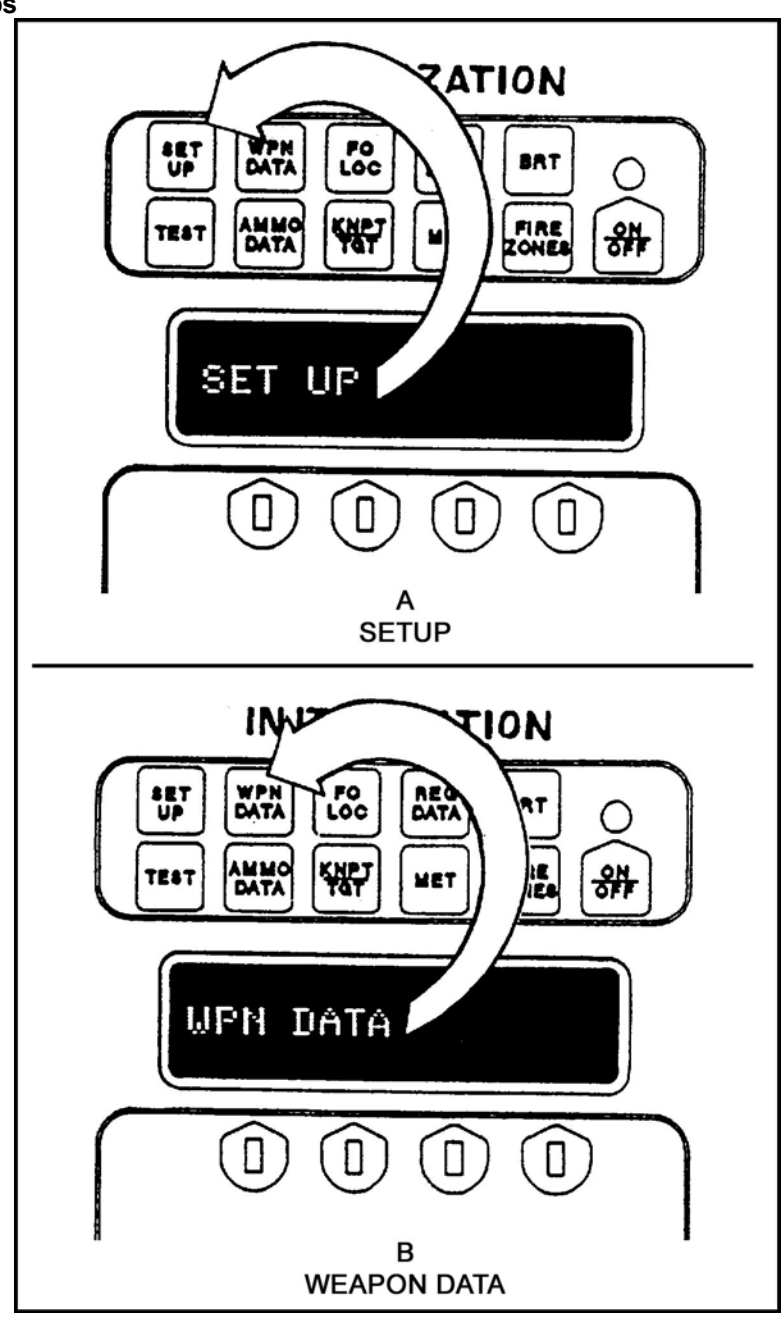



Figure 8. Setup and weapon data displays.

d. If during the test you happen to press the wrong switch or if the switch is not working, the display will read ERROR (Figure 9). Press the right switch to correct this.

**Performance Steps**

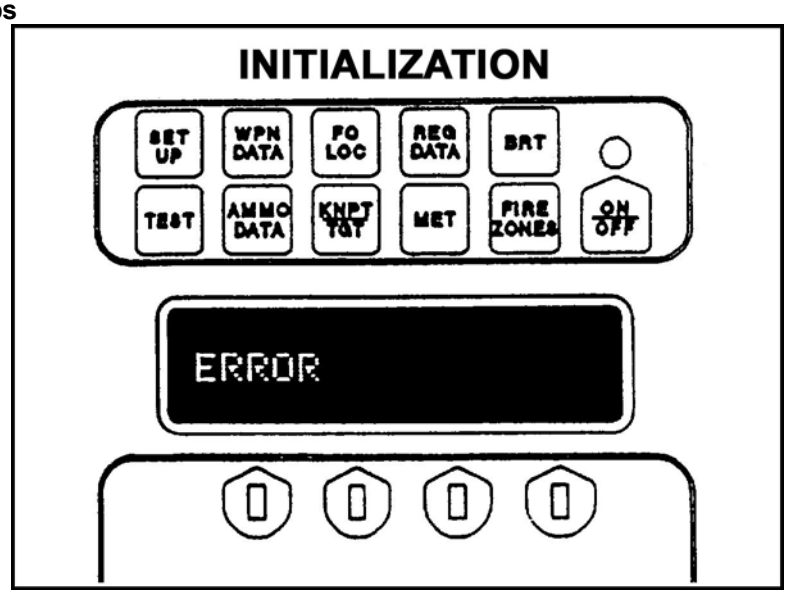



Figure 9. Error display.

e. After you press the last switch shown on the display, the MBC shows END OF TEST for a few seconds, then READY. The switch self-test is now complete (Figure 10).

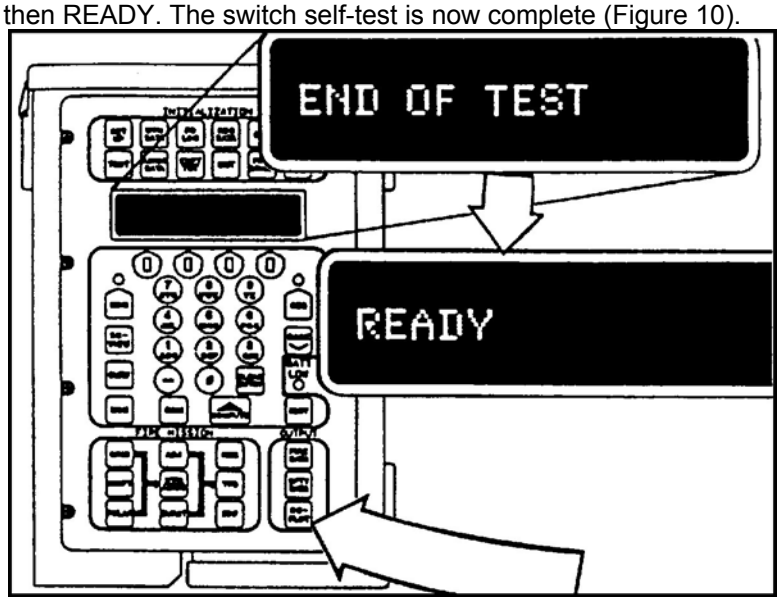



Figure 10. End of switch test.

4. Conduct the display self-test (DSP).
   a. Press the REVIEW switch to display the test menu.
   b. Select the display test by pressing the third DISPLAY switch (Figure 11).

**Performance Steps**

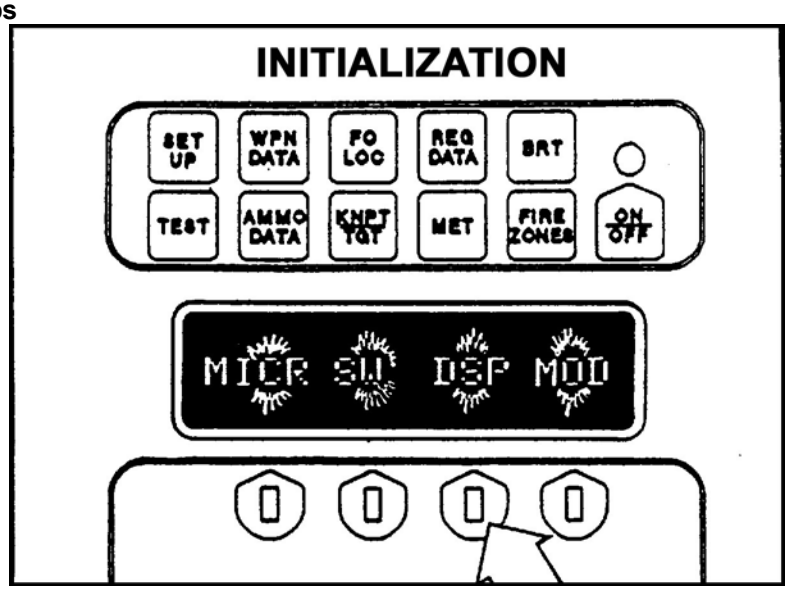



Figure 11. Third DISPLAY switch.

c. In the first part of the test, the MBC lights up four character blocks at a time (Figure 12). Check each block closely for any unlighted dots. Then press the SEQ (sequence) switch (Figure 4) to move to the next set of character blocks.

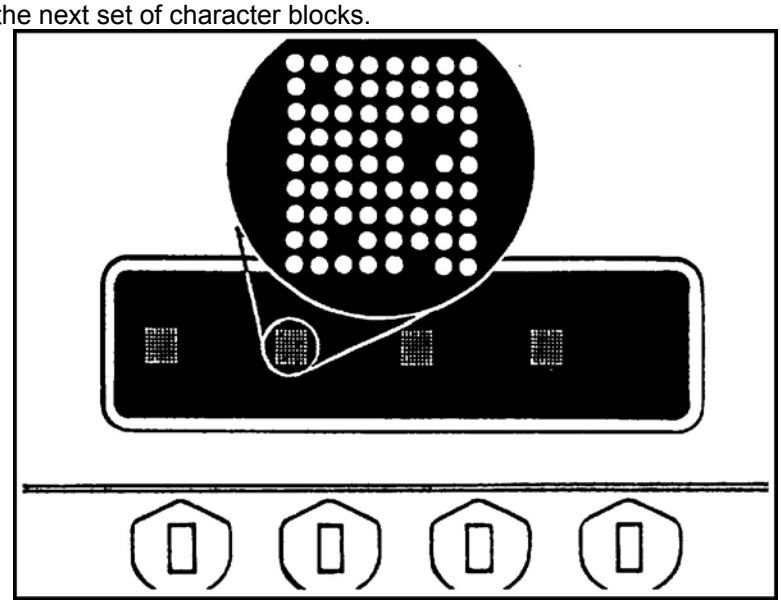


Figure 12. Character block display.

d. Continue pressing the SEQ switch, always checking for unlighted dots. After the last set of character blocks is displayed, the screen displays the characters "A" through "P." Check each character to make sure it is formed correctly (Figure 13).

**Performance Steps**


Figure 13. First character display.

e. Press the SEQ switch again. The screen now shows "Q" through "5." Once again, check all characters for unlighted dots (Figure 14).

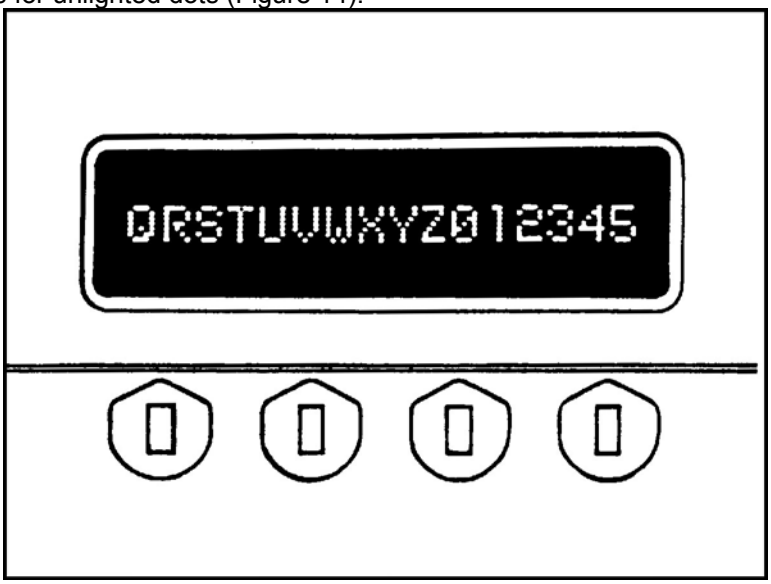



Figure 14. Second character display.

f. Press the SEQ switch again and the screen shows "6" through "" The four character blocks (Figure 15) and the SEQ and MSG (message) lights (Figure 16) should be flashing.

**Performance Steps**

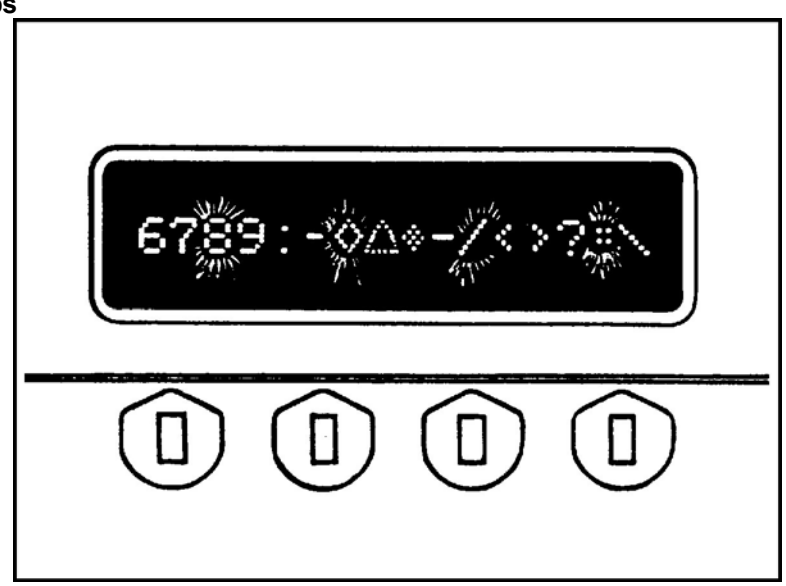


Figure 15. Third character display.

5. Conducts the modem self-test (MOD).
   a. Again, return to the test menu and press the REVIEW switch to bring up the test menu.
   b. Select the modem test by pressing the fourth DISPLAY switch (Figure 17).

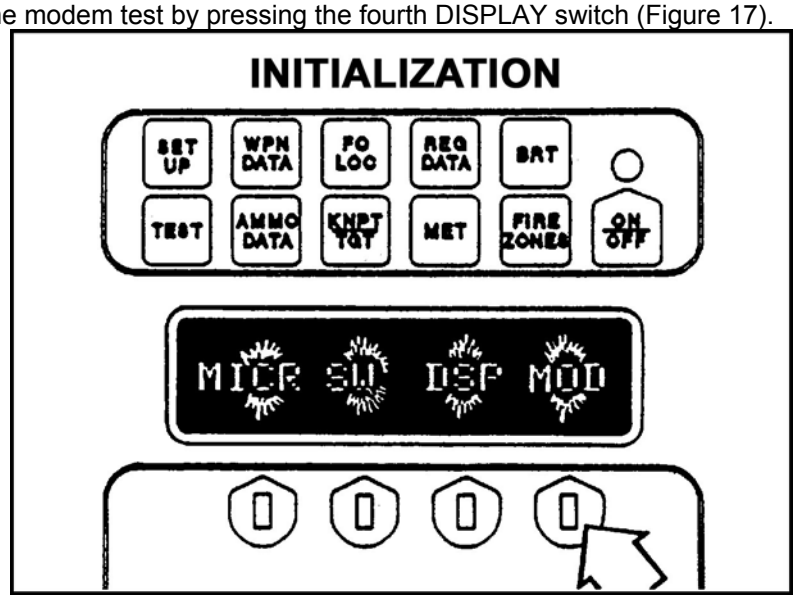



Figure 17. Fourth DISPLAY switch.

   c. The MBC's screen should now read TESTING MODEM (Figure 18). This test lasts about 20 seconds, and then the display should change to MODEM PASS.

**Performance Steps**

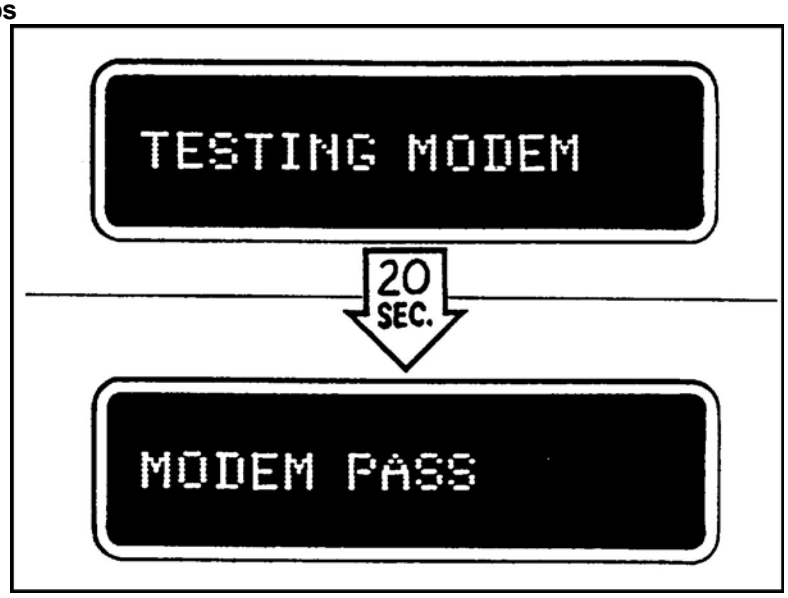



Figure 18. Modem test.

6. If the MBC passed all of the tests, it is ready for operation.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and materials given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to place the MBC into operation and conduct an MBC self-test.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Placed the MBC into operation. | ____ | ____ |
| 2. Checked BATT LOW light. | ____ | ____ |
| 3. Checked MBC revision number. | ____ | ____ |
| 4. Conducted microprocessor self-test. | ____ | ____ |
| 5. Conducted switch self-test. | ____ | ____ |
| 6. Conducted display self-test. | ____ | ____ |
| 7. Conducted modem self-test. | ____ | ____ |
| 8. Detected and reported any shortcomings or faults of the MBC. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1220-246-12&P |

**Prepare a Mortar Ballistic Computer with Initialization Data**

**071-082-0003**

**Conditions:** As a computer in a fire-direction center (FDC), given a mortar ballistic computer (MBC) and battery; a map, protractor, paper, and pencil; and the initialization data needed to accomplish the support mission.

**Standards:** Without error, programmed the mortar ballistic computer (MBC) using the given initialization data.

**Performance Steps**

NOTE: For minimum initialization, SETUP and WPN DATA are the two mandatory switches that must initialize before a standard GRID fire mission can be started. These switches are always manually initialized. Their data never changes as a result of other switch actions, although the computer can review and update these menus as needed. When AMMO DATA switch default values are suitable, the AMMO DATA switch is not required. The other switches--MET, FIRE ZONES, FO LOC, KNPT/TGT, and REG DATA--initialize as data becomes available.

1. Activate the MBC.
2. Perform a system self-test.
3. Check brightness (BRT).
4. Enter minimum initialization data:
   a. SETUP.
   b. WPN DATA.
   c. AMMO DATA.
5. Enter expanded initialization data:
   a. FIRE ZONES.
   b. FO LOC.
   c. KNPT/TGT.
   d. REG DATA.

**Evaluation Preparation:** SETUP: At the test site, provide all the equipment, materials, and information given in the task condition statement. Include all elements except MET in the initialization data.

NOTE: For this task, do not require the soldier to enter a MET message into the MBC.

BRIEF SOLDIER: Tell the soldier he will be required to activate the mortar ballistic computer (MBC) and enter the given initialization data.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Activated the MBC. | ____ | ____ |
| 2. Performed a system self-test. | ____ | ____ |
| 3. Checked brightness (BRT). | ____ | ____ |
| 4. Entered minimum initialization data:<br>a. SETUP.<br>b. WPN DATA.<br>c. AMMO DATA. | ____ | ____ |
| 5. Entered expanded initialization data:<br>a. FIRE ZONES. | ____ | ____ |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| b. FO LOC. | | |
| c. KNPT/TGT. | | |
| d. REG DATA. | | |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1220-246-12&P |

**Program Safety Data in a Mortar Ballistic Computer**
**071-082-0004**

**Conditions:** Given an initialized mortar ballistic computer (MBC), left- and right-limit azimuths in mils; the safety fan's maximum and minimum ranges in meters; paper; and a pencil.

**Standards:** Manually and correctly entered all safety fan data in the mortar ballistic computer (MBC).

**Performance Steps**

1. Press SFTY switch. NO OUTPUT DATA displays momentarily.
2. If active mission is stored, press SEQ until SAFETY DIAGRAM appears.
3. Enter A, B, or C.
4. SEQ - LLAZ (enter left limit azimuth).
5. SEQ - RLAZ (enter right limit azimuth).
6. SEQ - MAX RN (enter maximum range).
7. SEQ - MIN RN (enter minimum range).
8. SEQ - MIN:__ MAX__ CHG (enter minimum and maximum range changes). This is not necessary if you enter MIN and MAX ranges. This capability was included in the MBC as an additional control feature. However, the operator should understand that MIN and MAX changes can be confusing, especially when firing mixed ammunition. Although you can use this feature, you will normally bypass it when you know the minimum and maximum ranges.
9. SEQ - NXT FAN END (select NXT for additional fan or END to leave the menu).

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to program the safety data into a mortar ballistic computer (MBC).

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Pressed SAFTY switch. | ____ | ____ |
| 2. Sequenced (SEQ) until SAFETY DIAGRAM appeared. | ____ | ____ |
| 3. Entered left limit azimuth. | ____ | ____ |
| 4. Entered right limit azimuth. | ____ | ____ |
| 5. Entered maximum range. | ____ | ____ |
| 6. Entered minimum range. | ____ | ____ |
| 7. Selected NEXT for additional fan. | ____ | ____ |
| 8. Selected END to leave the menu. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any
performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 23-91
TM 9-1220-246-12&P

**Program No-Fire Data in a Mortar Ballistic Computer**

**071-082-0005**

**Conditions:** Given an initialized mortar ballistic computer (MBC), coordinates for minimum and maximum fire lines, three or more coordinates for a no-fire zone, paper, and a pencil.

**Standards:** Entered firing lines and no-fire zone data correctly into the mortar ballistic computer (MBC). If the entered sequence did not display, reported the MBC as nonoperational.

**Performance Steps**

1. Enter no-fire lines.
   a. Press FIRE ZONE switch.
   b. When LN ZN appears, select LN.
   c. When SEQ - LN:MIN CLR appears, confirm.
   d. When SEQ - E:__ N:__ appears, enter first minimum line grid.
   e. When SEQ - E:__ N:__ appears, enter second minimum line grid.
   f. When SEQ - LN MAX appears, confirm.
   g. When SEQ - E:__ N:__ appears, enter maximum line grid.
   h. SEQ - READY appears
2. Program a no-fire zone.
   a. Press FIRE ZONE switch.
   b. When ZN:_ NFI NXT CLR appears, enter zone number.
   c. When SEQ - NR PTS:_ appears, enter number of grids necessary.
   d. When SEQ - E:__ N:__ appears, enter grids.
   e. When SEQ - Step 4 repeats, continue until all grids are entered.
   f. SEQ - READY appears.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to program no-fire data into a mortar ballistic computer.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Entered the no-fire lines. | ____ | ____ |
| 2. Programmed the no-fire zone. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any
performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |
| | TM 9-1220-246-12&P |

**Compute Data for a Grid Mission Using a Mortar Ballistic Computer**

**071-082-0006**

**Conditions:** As a computer in a fire-direction center (FDC), given a call for fire; an initialized mortar ballistic computer (MBC); a blank DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Correctly and manually entered all data into the MBC, and then sequenced and viewed all fire-command data to within 1 mil for deflection and 1 mil for elevation.

**Performance Steps**

1. The setup data is in Figure 1 which is used throughout this task and recorded on the data sheet. The FO sends the following call for fire (Figure 2). Record this information on the computer's record.

**DATA SHEET**

For use of this form, see FM 23-91, the proponent agency is TRADOC

| SETUP | | WEAPON DATA | | | | FO DATA | | |
|---|---|---|---|---|---|---|---|---|
| TIME OUT | 60 | UNIT | B CO 1/29 | WPN | A1 | WPN | | FO / ALT / GRID |
| TGT PRFX | AB | | | DIR | 2700 | DIR | | P35 0420 013 739 |
| TGT NO | 0000 - 0300 | B1 min CAR | M252 | DIS | 35 | DIS | | |
| ALARM | ☐ ON ☒ OFF | ☐ YES ☒ NO | | | | | | |
| MIN E | 097 | BP | A2 | WPN | A3 | WPN | | |
| MIN N | 070 | E | 9845 | DIR | 5900 | DIR | | |
| GD | ☒ E ☐ W E04 | N | 7453 | DIS | 35 | DIS | | |
| LAT | ☒ + ☐ - +32 | ALT | 0240 | | | | | |
| LISTEN | ☐ ON ☒ OFF | AZ | 1280 | WPN | A4 | WPN | | |
| BIT RATE | 1200 | DEF | 2800 | DIR | 5900 | DIR | | |
| KEY TONE | 1.4 | ELE | | DIS | 70 | DIS | | |
| BLK | ☒ SNG ☐ DBL | | | | | | | |
| OWNER ID | A | | | | | | | |

**AMMUNITION DATA**

TEMPERATURE 75° TYPE ☒ HE ☒ WP ☒ ILL ☐ CS ☐ TNG

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LOT NUMBER | C0008 | N0010 | M0015 | | | | | | |
| WEIGHT / TYPE | HE M374A3 | WP M375A2 | ILL M301A3 | | | | | | |
| ON HAND | | | | | | | | | |
| RECEIVED | | | | | | | | | |

Figure 1. Setup data used for MBC tasks.

**COMPUTER'S RECORD**

For use of this form, see FM 23-91, the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P35 | AB0000 |

☐ ADJUST FIRE ☒ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

SHIFT FROM

GRID 019 758
OT DIRECTION
ALTITUDE

OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION RADAR SITE
METHOD OF CONTROL
METHOD OF ENGAGEMENT

**Performance Steps**

Figure 2. Call for fire.

2. Initiate the FDC order on the computer's record. Once the FDC order has been initiated, use the GRID switch to start the fire mission after the target location is identified by the grid coordinates. The MBC requires a five-digit easting and a five-digit northing.
   a. Press the GRID switch. FR GRID is displayed.
   b. Press the SEQ switch. The display asks for the FO's identification. If the FO's identification was entered during the initialization, then it should be entered here. However, if the FO's identification was not entered, sequence through to the next display.
   c. Press the SEQ switch. The mission and target number assigned by the computer are displayed.
   d. Press the SEQ switch. A direction is not needed to determine firing data for the initial fire command.
   e. Press the SEQ switch. Using numeric entry, enter the target coordinates. Enter easting 01900 and northing 75800.
   f. Press the SEQ switch. Using numeric entry, enter the target altitude when known. On a grid mission when the target altitude is unknown, the MBC uses the firing unit altitude. Therefore, if the target altitude is unknown, sequence through this display.

NOTE: Do not enter zeros or the computed firing data will be inaccurate.

   g. Press the SEQ switch. READY is displayed.

3. Press the WPN AMMO switch to enter the weapon and ammunition to be used for the active fire mission (Figure 3).

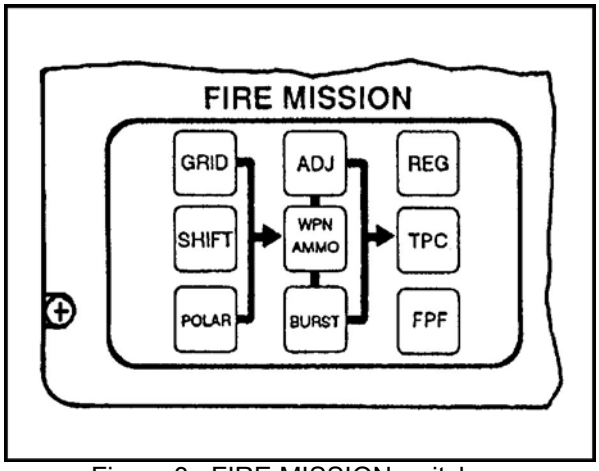



Figure 3. FIRE MISSION switches.

   a. Press the WPN AMMO switch.
   b. Press the SEQ switch. The FO's identification displays if it was entered into the grid menu (see paragraph 3b).
   c. Press the SEQ switch. The mission and target number are displayed.
   d. Press the SEQ switch. Using alphabetic and numeric characters, enter the section and adjusting piece. The call for fire indicates this is an FFE. However, an adjusting piece must be selected for the MBC to continue the mission. Enter A2.
   e. Press the SEQ switch. SH/FZ: is displayed. Using multiple choice entry, change the shell and fuse if needed. This display is used to select the shell and fuse combination to fire. The default shows: HE PD, since the FDC order calls for HE delay (Figure 4). The PD fuse and delay fuse are the same.

**Performance Steps**

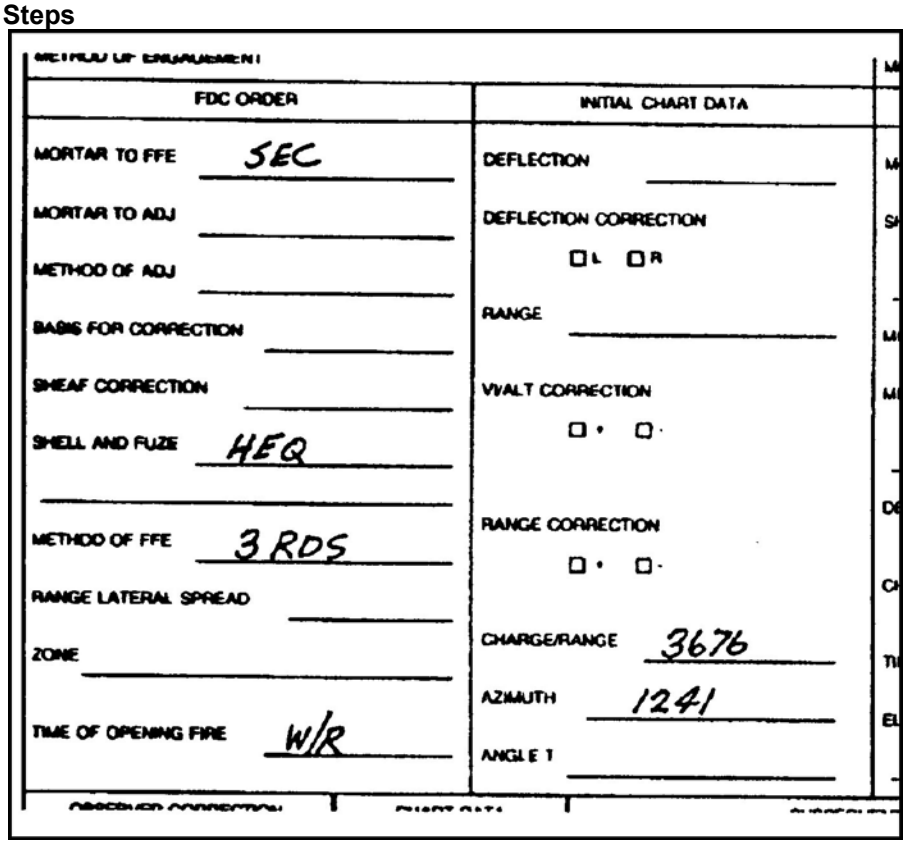



Figure 4. FDC order and initial chart data.

f. Press the SEQ switch. This display allows you to enter the charge manually. When the charge is not entered, the MBC selects the lowest charge when it computes the firing data.
g. Press the SEQ switch. READY is displayed.
h. Press the COMPUTE switch.

4. As you sequence through to acquire the firing information, enter the initial chart data as the information becomes available. When using the MBC to compute firing data, the FDC records only the range, azimuth, and angle "T" in the initial chart data on the computer's record (Figure 4).

NOTES:
1. The RANGE and AZIMUTH lines may be entered after the initial fire command is determined.
2. The ANGLE T line is left blank and is not needed for this mission since this is an FFE and there is no FO direction or adjustment given by the FO.

5. Use the TFC switch to enter or change sheaf information, method of engagement, and weapons to fire and to select registration or MET data. If there are no changes, the MBC defaults to a parallel sheaf and adjust its' fire. To adjust fire, use only one weapon (selected by the WPN AMMO switch). When entering FFE, include all unassigned weapons in a section for computation. The TFC switch is not needed when the defaults are acceptable.
   a. Press the TFC switch.
   b. Press the SEQ switch. FO ID number is displayed by the MBC.
   c. Press the SEQ switch. The mission and target number are displayed.
   d. Press the SEQ switch. Using multiple choice entry, select the type of sheaf: parallel, converge, or special. Use the default shown PRL.
   e. Press the SEQ switch. Using multiple choice entries, select the method of control. Change CON:AF to CON:FFE.
   f. Press the SEQ switch. Enter the section to fire and all unassigned weapons. When the method of fire control is FFE or DST, delete weapons by using the clear entry key.

**Performance Steps**

g. Press the SEQ switch. You can use registration corrections or MET with this display, providing registration data have been entered and computed. Use the default shown.
h. Press the SEQ switch. When a current MET has not been entered into the MBC, the FDC uses STD (standard) MET.
i. Press the SEQ switch. The display shows: PUSH COMPUTE.

NOTE: The MBC automatically goes to the fire data menu once computation is completed.

j. Push COMPUTE. The method of control used (FFE), type of MET used (STD), and registration point, when used, are displayed.
k. Press the SEQ switch. The weapon, deflection, and charge are displayed.
l. Press the SEQ switch. The weapon, fuze setting (when applicable), and elevation are displayed.
m. Press the SEQ switch. The weapon and time of flight are displayed.
n. Press the SEQ switch. The MBC displays the firing data for the remaining mortars. Sequence through the firing data until READY is displayed.

6. Complete the initial fire command, recording it on the computer's record (Figure 5). If the TFC switch was not needed for this mission, then enter the initial fire command block after entering and completing the WPN AMMO menu.

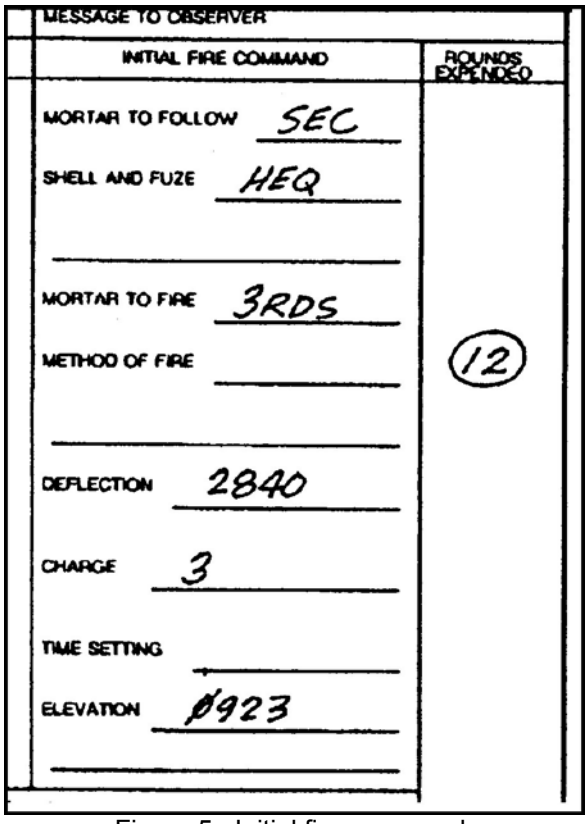



Figure 5. Initial fire command.

7. Once you determine the initial fire command, enter the remaining portion of the initial chart data. Find the range to the target and azimuth in the SAFETY DATA menu (Figure 6).

**Performance Steps**

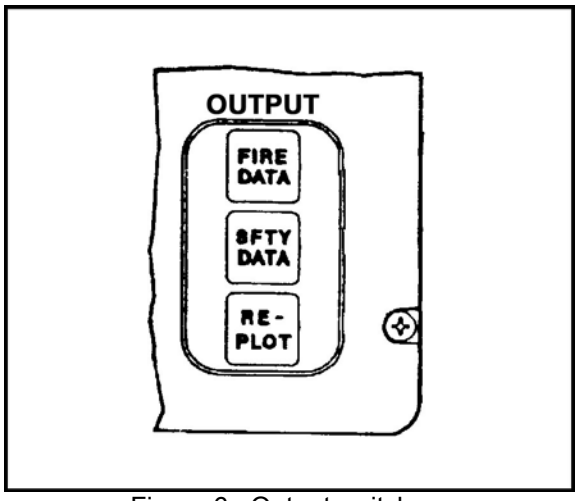



Figure 6. Output switches.

a. Press the SAFETY DATA switch. Range and azimuth from the adjusting mortar to the target are displayed. Record the azimuth and range from the adjusting mortar to the target on the computer's record.
b. Press the BACK switch. READY is displayed.

8. Use the FIRE DATA switch to review existing fire data. Store the last computed data until recomputation or end of mission is pressed. Data is identical to the COMPUTE switch output.

9. The FO sends, "End of mission, radar site destroyed."

10. Use the EOM switch to end the fire mission. You may assign a known point when storing the target.
    a. Press the EOM switch. Using multiple choice entry, select end of mission, EOM, or end of mission, RECORD, as target EOMRAT. If EOM is selected, all mission data and the target number are erased from the MBC's memory, and READY is displayed. Select EOMRAT.
    b. Select SURVEYED NO. The MBC stores the initial target grid and altitude if the target is surveyed, and the final hit grid and altitude if the target is not surveyed. Use the default SURVEYED NO.
    c. Press the SEQ switch. The target number is entered by the computer. Using numeric entry, assign a known point if needed. Enter 00.

NOTE: The last two digits of the target number are normally used as the KNPT NO.

    d. Press the SEQ switch. The MBC displays the target number saved.
    e. Press the SEQ switch. The MBC displays, READY.

11. Once the mission has been completed, record the firing data on the data sheet from the computer's record.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to prepare the mortar ballistic computer (MBC) for operation and to compute the given mission.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded the deflection, charge, and elevation for all mortars. | ____ | ____ |
| 3. Determined and recorded the range and azimuth to the target. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 4. Stored the target as a known point. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

**Compute Data for a Shift Mission Using a Mortar Ballistic Computer**

**071-082-0007**

**Conditions:** Given a ballistic computer operator in a fire-direction center [FDC]; a forward observer (FO); a call-for-fire mission; a mortar ballistic computer (MBC) initialized and ready for operation, including a saved target or known point; a blank DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Manually and correctly entered all data into the mortar ballistic computer (MBC), sequenced, and viewed all fire-command data to within 1 mil for deflection and 1 mil for elevation.

**Performance Steps**

1. The FO sends a call for fire (Figure 1); the computer records the call for fire on the computer's record.

COMPUTER'S RECORD

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B Co 1/29 INF | | | P35 | AB0001 |

| | | |
|---|---|---|
| [X] ADJUST FIRE [ ] FIRE FOR EFFECT<br>[ ] IMMEDIATE SUPPRESSION | SHIFT FROM AB0000 | POLAR<br>OT DIRECTION ____ ALTITUDE ____<br>DISTANCE ____ |
| GRID ____<br>OT DIRECTION ____<br>ALTITUDE ____ | OT DIRECTION 0980 ALTITUDE ____<br>[ ] LEFT / [X] RIGHT 400<br>[ ] ADD / [X] DROP 300<br>[ ] UP / [ ] DOWN ____ | [ ] UP / [ ] DOWN ____<br>VERTICAL ANGLE [ ] + / [ ] - ____ |
| TARGET DESCRIPTION PLATOON IN OPEN | | METHOD OF CONTROL |
| METHOD OF ENGAGEMENT | | MESSAGE TO OBSERVER ANGLE T: 1000 |

Figure 1. Call for fire.

2. Initiate the FDC order on the computer's record. To initialize the mission, press the SHIFT switch. The MBC displays, FR SHIFT (Figure 2).

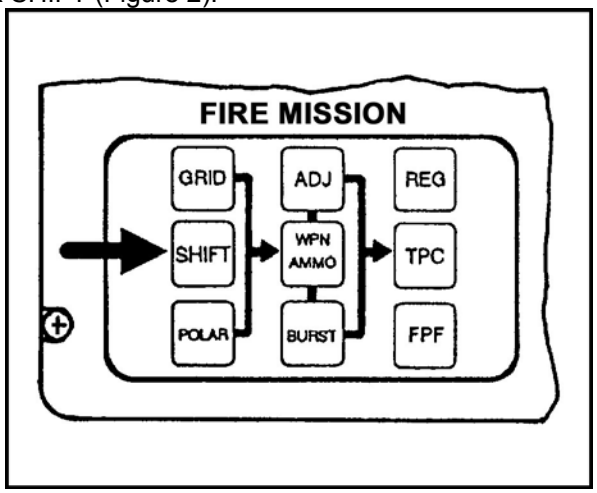



Figure 2. SHIFT switch.

   a. Press the SEQ switch. Enter the FO's identification into the MBC, if his position has been stored.
   b. Press the SEQ switch. Using multiple choice entries, select either target or known point to conduct a SHIFT FROM mission.
   c. Select KNPT. Enter the known point number, in this case enter 00.

**Performance Steps**

d. Press the SEQ switch. Enter the FO's direction numerically, in this case enter 0980.
e. Press the SEQ switch. The MBC displays the mission and target number.
f. Press the SEQ switch. Using the multiple choice entry, select the direction of the lateral shift and enter the amount in meters, in this case enter R 0400.
g. Press the SEQ switch. Using the multiple choice entry, select the direction of the range shift and enter the amount in meters, in this case enter 0300.
h. Press the SEQ switch. The MBC displays U D HGT. Enter a vertical shift (if the call for fire requires it).
i. Press the SEQ switch. The MBC displays READY. The call for fire has now been entered.

3. Use the WPN/AMMO menu to assign a section and adjusting piece to the mission. Enter A2 in the WPN/AMMO menu and sequence through the menu until READY is displayed.

NOTE: If you attempt to compute the mission without entering the WPN/AMMO menu, the MBC displays NO WPN DATA for a few seconds then it automatically opens the WPN/AMMO menu. Compute Data for a Grid Mission Using a Mortar Ballistic Computer, paragraphs 4a, b, and c.)

4. Press COMPUTE and record the firing data for the initial chart data and the initial fire command on the computer's record (Figure 3).

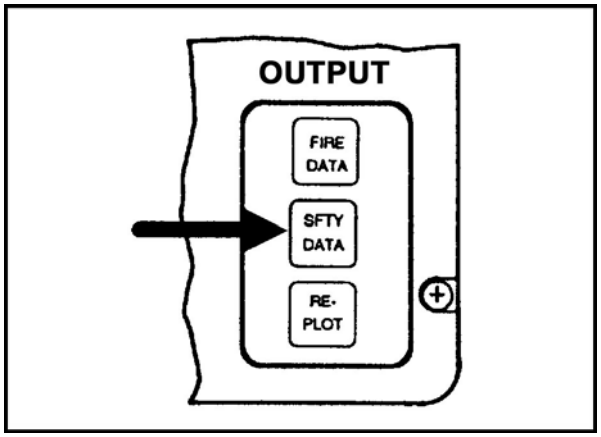
ANGLE T: 1000

| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | SEC | DEFLECTION | | MORTAR TO FOLLOW | SEC | |
| MORTAR TO ADJ | #2 | DEFLECTION CORRECTION | | SHELL AND FUZE | HEQ | |
| METHOD OF ADJ | 1 RD | ☐L ☐R | | | | |
| BASIS FOR CORRECTION | | RANGE | | MORTAR TO FIRE | #2 | |
| SHEAF CORRECTION | | VVALT CORRECTION | | METHOD OF FIRE | 1 RD IN ADJ | ① HE |
| SHELL AND FUZE | HEQ IN ADJ PROX IN FFE | ☐+ ☐- | | | 4 RDS PROX IN FFE | |
| METHOD OF FFE | 4 RDS | RANGE CORRECTION | | DEFLECTION | 2706 | |
| RANGE LATERAL SPREAD | | ☐+ ☐- | | CHARGE | 3 | |
| ZONE | | CHARGE/RANGE | 3518 | TIME SETTING | | |
| TIME OF OPENING FIRE | W/R | AZIMUTH | 1375 | ELEVATION | Ø989 | |
| | | ANGLE T | 1000 | | | |

OBSERVER CORRECTION | CHART DATA | SUBSEQUENT COMMANDS

Figure 3. FDC order, initial chart data, and initial fire command.

5. The FDC finds the range to the target and the azimuth to the target in the SAFETY DATA menu (Figure 4).



**Performance Steps**

Figure 4. SAFETY DATA switch.

a. Press the SAFETY DATA switch. The MBC displays the range and azimuth from the adjusting mortar to the target. Record this data on the computer's record.
b. Determine angle "T."
   (1) Press the XMIT switch. MTO CMD appears on the display. Press the DISPLAY switch under MTO. Sequence 11 times until ANGLE T: is displayed. Record the angle "T" to the nearest 10 mils on the computer's record.
   (2) To exit this menu, press the REVIEW switch once, then press the BACK switch until READY is displayed.

6. The forward observer sends the corrected information; "Left one hundred, drop 100" The computer records this information on the computer's record (Figure 5).

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| L100 | -100 | | | 3388 | | | 2722 | | | 1032 | ② HE |
| | + 50 | FFE | | 3435 | SEC | ARDS PROX | 2727 | | | 1031 | ⑯ PROX |
| | | | | | EOM | PLT | DISPERSED, EST | 6 CAS. | | | |
| | | | | | B.P. Ø/1785 | | 75354 | | | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 5. FO's correction.

7. Press the ADJ switch to enter the correction. The ADJUST switch allows two types of adjustments: ADJ, using input from one forward observer; MPI, using input from two forward observers. The computer selects ADJ.
   a. The display shows: ENT REV (enter or review the last entered corrections). Select ENT.
   b. The adjusting FO is displayed.
   c. Press the SEQ switch. The display shows the mission and target number.
   d. Press the SEQ switch. The display shows the availability of registration corrections and MET data. Use the default shown.
   e. Press the SEQ switch. The display shows the type of MET in use.
   f. Press the SEQ switch. The display shows the forward observer to target direction.
   g. Press the SEQ switch. Using the multiple choice entry, select the direction of the lateral shift, and enter the amount in meters. Enter L 0100.
   h. Press the SEQ switch. Using the multiple choice entry, select the direction of the range shift, and enter the amount in meters. Enter - 0100.
   i. Press the SEQ switch. The burst-height correction for the altitude may be entered. The default is in meters and may be changed to feet, using the multiple choice entry.
   j. Press the SEQ switch until the MBC displays READY.

8. Press COMPUTE to determine firing data.
   DEFLECTION --- 2722
   CHARGE ------- 3
   ELEVATION --- 1032

NOTE: The FDC must determine the range for each adjusting round and record it on the computer's record.

**Performance Steps**

9. The forward observer sends the correction, "Add 50, fire for effect." (See Figure 5).
10. The operator enters the correction, + 0050, and sequences to READY, using the ADJ menu step 7).
11. Press the TFC switch. This changes the method of control from ADJ to FFE (as in the previous grid mission). (This step may be omitted if the default values in the TFC menu are not required to be changed.)
12. The operator enters the WPN/AMMO menu by pressing the WPN/AMMO key. He sequences through until the SH/FZ display is shown. Then he changes the shell and fuze type that was used to adjust with the shell and fuze type that will be used for the FFE. (See the FDC order.) The computer selects VT and sequences through until READY is displayed.
13. Press COMPUTE to determine the firing data for each firing mortar.
14. The FO sends, "End of mission, platoon dispersed, estimated six casualties." Before ending the mission, press the SAFETY DATA switch and sequence until the bursting grid is displayed. Record this information on the computer's record and sequence until READY is displayed.
15. Use the EOM switch and save this target as KNPT 01, recording it on the data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to prepare the mortar ballistic computer (MBC) with the data provided.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Shifted from the prescribed target in the call for fire. | ____ | ____ |
| 3. Determined and recorded the deflection, charge, and elevation for all mortars. | ____ | ____ |
| 4. Determined and recorded the range, azimuth, and angle "T" for the initial round. | ____ | ____ |
| 5. Determined and recorded the burst-point grid for the last adjusted round. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if the soldier fails any performance measure. If he scores NO-GO, show the soldier what is wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for a Polar Mission Using a Mortar Ballistic Computer**

**071-082-0008**

**Conditions:** As a computer in a fire-direction center (FDC), given a call for fire, an initialized mortar ballistic computer (MBC), a blank DA Form 2399 (Computer's Record), a blank DA Form 2188-R (Data Sheet), and a pencil.

**Standards:** Manually and correctly entered all data into the mortar ballistic computer (MBC), and sequenced and viewed all fire-command data to within 1 mil for deflection and 1 mil for elevation.

**Performance Steps**

1. Record the FO's call for fire on the computer's record just as it was received, including the FO's call sign (Figure 1). Check the call for fire to determine if it contains enough information to fire the mission.

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

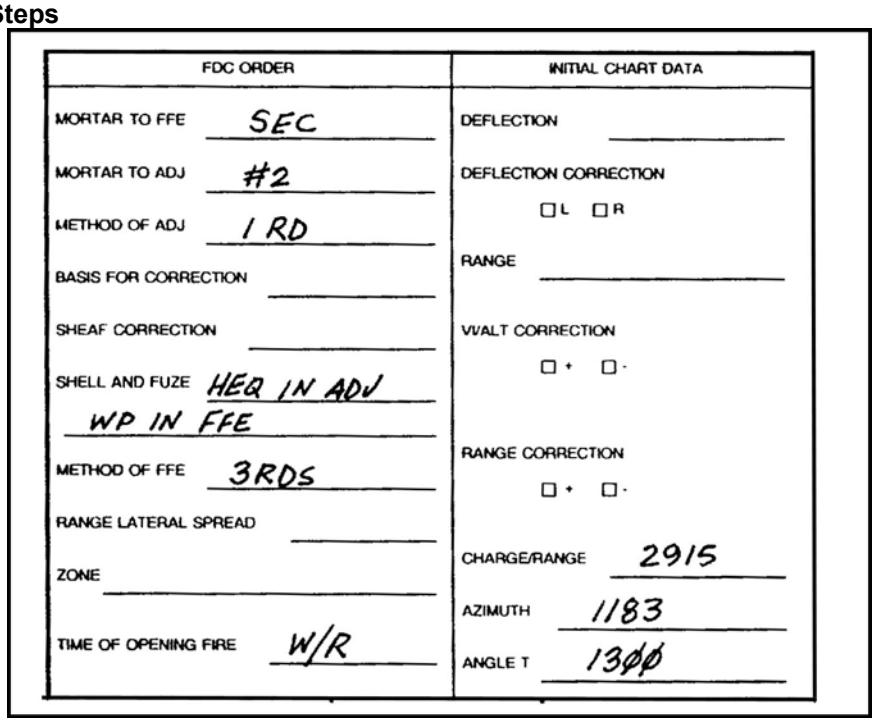
| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P35 | AB0002 |

| | | |
|---|---|---|
| ☒ ADJUST FIRE ☐ FIRE FOR EFFECT<br>☐ IMMEDIATE SUPPRESSION | SHIFT FROM | POLAR<br>DT DIRECTION 6300 ALTITUDE<br>DISTANCE 1800 |
| GRID<br>DT DIRECTION<br>ALTITUDE | DT DIRECTION ALTITUDE<br>☐ LEFT / ☐ RIGHT<br>☐ ADD / ☐ DROP<br>☐ UP / ☐ DOWN | ☐ UP / ☐ DOWN<br>VERTICAL ANGLE ☐ + / ☐ - |
| TARGET DESCRIPTION 2 POL TANKERS | | METHOD OF CONTROL |
| METHOD OF ENGAGEMENT | | MESSAGE TO OBSERVER ANGLE T 1300 |
| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND / ROUNDS |

Figure 1. FO's call for fire.

2. Initiate the FDC order on the computer's record. Once the FDC order has been initiated, press the POLAR switch, and then select LASER, if the forward observer is equipped with a laser target designator. The FO conducts this polar mission in the normal mode. Select NORMAL.
   a. The MBC displays FR POLAR.
   b. Press the SEQ switch. The FO sending the mission must be identified for the MBC. Enter P35.
   c. Press the SEQ switch. The MBC displays the mission and target number.
   d. Press the SEQ switch. Using the numeric keys, enter the FO's direction. Enter 6300.
   e. Press the SEQ switch. Using the numeric keys, enter the FO's range to the target. Enter 1800.
   f. Press the SEQ switch. Enter the FO's vertical correction, if any.
   g. Press the SEQ switch. The MBC displays, READY.
3. Use the WPN/AMMO switch, assign the mission to Alpha section's base piece, and sequence A2 to READY. Record the initial chart data on the computer's record (Figure 2).

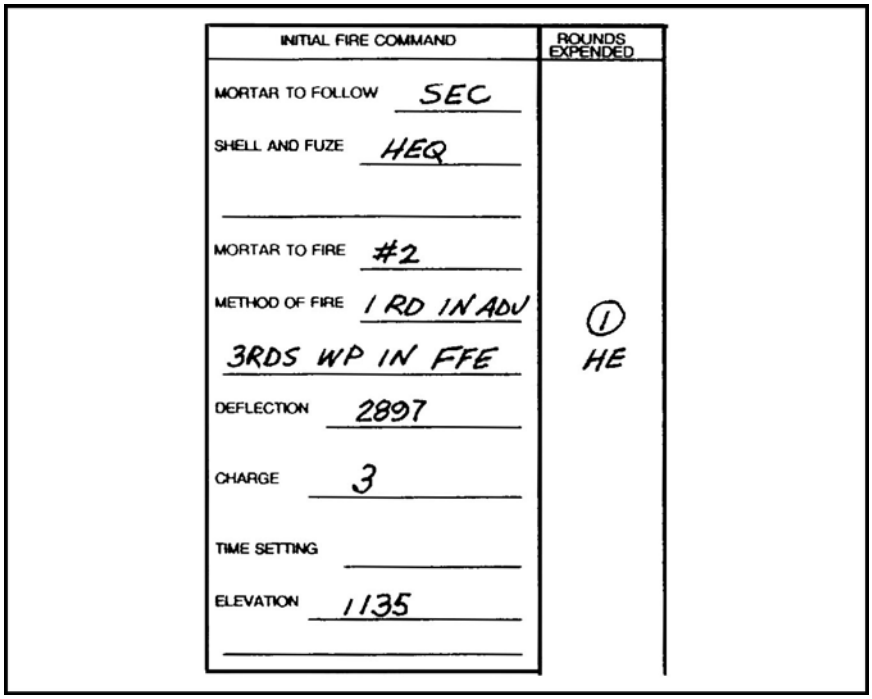
**Performance Steps**



| FDC ORDER | | INITIAL CHART DATA | |
|---|---|---|---|
| MORTAR TO FFE | SEC | DEFLECTION | |
| MORTAR TO ADJ | #2 | DEFLECTION CORRECTION | ☐L ☐R |
| METHOD OF ADJ | 1 RD | RANGE | |
| BASIS FOR CORRECTION | | | |
| SHEAF CORRECTION | | VVALT CORRECTION | ☐+ ☐- |
| SHELL AND FUZE | HEQ IN ADV WP IN FFE | | |
| METHOD OF FFE | 3RDS | RANGE CORRECTION | ☐+ ☐- |
| RANGE LATERAL SPREAD | | | |
| ZONE | | CHARGE/RANGE | 2915 |
| | | AZIMUTH | 1183 |
| TIME OF OPENING FIRE | W/R | ANGLE T | 13ØØ |

Figure 2. Initial chart data.

4. Press the COMPUTE switch and record the initial fire command data on the computer's record (Figure 3).



| INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|
| MORTAR TO FOLLOW | SEC | |
| SHELL AND FUZE | HEQ | |
| MORTAR TO FIRE | #2 | |
| METHOD OF FIRE | 1 RD IN ADV 3RDS WP IN FFE | (1) HE |
| DEFLECTION | 2897 | |
| CHARGE | 3 | |
| TIME SETTING | | |
| ELEVATION | 1135 | |

Figure 3. Initial fire command.

5. Once you determine the initial fire command, you can enter the remaining portion of the initial chart data. (The range to the target and azimuth are found in the SAFETY DATA menu. The angle "T" is found in the XMIT DATA menu.)

**Performance Steps**

a. Use the SAFETY DATA switch to display the range to the target. Record all firing data information on the computer's record (Figure 4).

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R200 | +100 | | | 3137 | | | 2909 | | | 1080 | ② HE |
| | -50 | FFE | | 3122 | SEC | 3 RDS WP | 2093 | 6 | | 0944 | ⑫ WP |
| | | | | | | | | | | | |
| | | | | EOM | 2 POL TANKERS BURNING | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | B.P. | 01319 75760 | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

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Figure 4. Observer's corrections.

b. Also record the range to the target and azimuth and determine the angle "T." Determine angle "T" to the nearest 1 mil, record to the nearest 10 mils, and send it to the FO to the nearest 100 mils. If angle "T" exceeds 500 mils, notify the FO.

c. To determine angle "T" with the FO's identification stored in the MBC, press the XMIT switch. The MBC displays, MTO CMD. Select DISPLAY switch under MTO and sequence 11 times. The MBC displays the angle "T." One option to exit the XMIT menu is to press the REVIEW switch, and then press the BACK switch twice. The MBC displays READY (Figure 2).

6. The FO sends the correction, "Right two hundred: add one hundred" (Figure 4). Enter the correction in the MBC, and compute the firing data using the ADJ menu, deflection 2909, elevation 1080.

7. The FO sends the correction, "Drop fifty, fire for effect" (Figure 4). Record this correction on the computer's record.

8. Enter the correction into the MBC, using the ADJ menu, and sequence until READY is displayed.

9. The FDC's order requires WP ammunition be used in the FFE. Use the WPN/AMMO switch to change the shell/fuze combination to WP.
   a. Press the WPN/AMMO switch; the display shows: WPN/AMMO.
   b. Press the SEQ switch; the display shows: FO: PW:35.
   c. Press the SEQ switch; the display shows: MSN: 1 TN:.
   d. Press the SEQ switch; the display shows: 81 WPN:AFD2.*
   e. Press the SEQ switch; the display shows: SH/FZ: HE PD. Press the DISPLAY switch, Number 3 (under the HE). The display shows: HE WP ILL TRN. The light over the SEQ switch is flashing, signaling that there are more choices available. Press the DISPLAY switch, Number 2 (under WP); the display shows: SH/FZ: WP PD.
   f. The display shows: CHG:. Press the SEQ switch; the display shows: READY.

10. Enter the TFC menu to change the method of control (CON) from AF to FFE. Sequence until PRESS COMPUTE is displayed. Press the COMPUTE switch and record the subsequent command on the computer's record (Figure 4).

NOTE: The TFC menu is not needed when the defaults are acceptable.

11. Use the SAFETY DATA switch and sequence to burst point 01319 75760. This is the 10-digit grid where the last round impacted. Record this information on the computer's record (Figure 4).

12. The FO calls back, "End of mission, two POL tankers burning." Using the EOM menu, end the

**Performance Steps**

mission and store the target as KNPT 02, recording it on the data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide all materials, equipment, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the items provided; to record the call for fire and input data into the mortar ballistic computer (MBC); and to record data for the heading, initial fire command, subsequent command, and rounds expended.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded deflection, charge, and elevation for each round fired. | ____ | ____ |
| 3. Determined and recorded range and azimuth to the target for initial round. | ____ | ____ |
| 4. Determined and recorded the angle "T" and told the FO if angle "T" was greater than 500 mils. | ____ | ____ |
| 5. Determined and recorded the burst-point grid on the computer's record. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any
performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

## Compute Data for a Mark-Center-of-Sector Mission Using a Mortar Ballistic Computer
## 071-082-0009

**Conditions:** As a forward observer (FO), given a call-for-fire, an initialized mortar ballistic computer (MBC), a blank DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Manually and correctly entered in the computer all data needed to start the grid mission; entered or changed the weapon, ammunition, and fire-command data, as sequenced and viewed; and identified the location of the center of sector.

**Performance Steps**

1. Enter grid mission data.
2. Enter weapon and ammunition data.
3. Compute data.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute data for a mark-center-of-sector mission using a mortar ballistic computer (MBC).

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Entered grid mission. | ____ | ____ |
| 2. Entered weapon and ammunition data. | ____ | ____ |
| 3. Computed data. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any
performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |
| | TM 9-1220-246-12&P |

**Compute Data for a Grid-Registration Mission Using a Mortar Ballistic Computer**

**071-082-0010**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC); a coordinated registration point; a blank DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Registered the section, adjusted the sheaf, and determined the firing corrections to within 1 mil for deflection and 1 mil for elevation.

**Performance Steps**

1. Enter the call for fire on the computer's record (Figure 1), using the GRID menu and assigning A2 as the adjusting piece in the WPN/AMMO menu.

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P35 | RPØØ |

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID ØI6Ø 743Ø
OT DIRECTION 14ØØ
ALTITUDE 33Ø

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION REGISTRATION POINT
METHOD OF CONTROL
METHOD OF ENGAGEMENT
MESSAGE TO OBSERVER ANGLE T: 1ØØØ

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE: SEC | DEFLECTION | MORTAR TO FOLLOW: SEC | |
| MORTAR TO ADJ: #2 | DEFLECTION CORRECTION ☐L ☐R | SHELL AND FUZE: HEQ | |
| METHOD OF ADJ: IRD | RANGE | MORTAR TO FIRE: #2 | |
| BASIS FOR CORRECTION | WALT CORRECTION ☐+ ☐- | METHOD OF FIRE: IRD | ① |
| SHEAF CORRECTION | | | |
| SHELL AND FUZE: HEQ | RANGE CORRECTION ☐+ ☐- | DEFLECTION: 2407 | |
| METHOD OF FFE | | CHARGE: 3 | |
| RANGE LATERAL SPREAD | CHARGE/RANGE: 3159 | TIME SETTING | |
| ZONE | AZIMUTH: 1675 | ELEVATION: 1Ø85 | |
| TIME OF OPENING FIRE: W/R | ANGLE T: 1ØØØ | | |

Figure 1. Call for fire, FDC order, initial chart data, and initial fire command.

2. The forward observer sends the correction, "Left 200, add 100." He continues to send corrections (Figure 2) until the round is within 25 meters of the registration point. At this time, he has completed the registration. Record these corrections on the computer's record.

**Performance Steps**

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| L200 | +100 | | | 3209 | | | 2477 | | | 1071 | ② |
| R100 | -50 | | | 3181 | | | 2442 | | | 1079 | ③ |
| | +25 | R/C | | 3206 | PREPARE | TO ADJUST SHEAF | | | | | |

Figure 2. FO's corrections.

3. Using the MBC, enter the REG menu when the FO gives the command, R/C (registration complete), and after the lateral or range correction (if any) has been computed. The REG menu determines the correction factors for the RP. Automatically process the RP as a surveyed grid mission, pressing the REG switch.
   a. If the FO's identification was entered with the call for fire, the MBC displays REG and the FO ID.
   b. The MBC displays the mission and target number.
   c. The MBC displays the FO DIR to the target.
   d. Press the SEQ switch. The MBC displays the RP grid. Notice that the grid displayed is the initial grid--not the grid to the adjusted point.
   e. Press the SEQ switch. The MBC displays the altitude to the RP.
   f. Press the SEQ switch. The MBC displays the weapon caliber and the weapon number of the adjusted piece.
   g. Press the SEQ switch. The MBC displays the charge.
   h. Press the SEQ switch.
   i. Press the COMPUTE switch to determine the firing corrections. The MBC displays the assigned RP number as RP 00.

NOTE: Each time you press the REG MENU switch, the MBC assigns a new RP number; therefore, you must press the REG MENU switch only once during each registration mission. You can review the REG data by using the initialization keys and pressing the REG DATA switch, entering the RP number, and sequencing forward. You do not update REG. Sequence forward until you see the RCF and DEFK, then sequence until READY is displayed.

   j. Press the SEQ switch. The MBC displays the type of MET used and the RCF, + 15.
   k. Press the SEQ switch. The MBC displays the type of MET used and the deflection correction, L 38.

4. Press the SEQ switch. The MBC displays READY. The MBC has determined the firing corrections but will not apply them to any subsequent data during this mission. However, the correction factors are automatically applied to all following missions within the transfer limits of the RP.

5. Iinitiate the adjustment of the sheaf. Tell the FO, "Prepare to adjust the sheaf." The FO responds, "Section right" (Figure 3). Record this data on the computer's record.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S/R | | | | | SEC | LRD S/R #2 DNF | 2444 | | | | |
| #1 L20 | | | | | #1 | DNF | 2450 | | | | |
| #3 R40 | | | | | #3 | DNF | 2432 | | | | |
| #4 | ADJ | EQM S/A | | | | | | | | | |
| | | | | | SEC | REFER | 2444 | R/A | A/P | | |
| | | | | | | | | | | | |
| | | | | | RCF | +15 | DEFK | L38 | | | |

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Figure 3. FO's correction and subsequent commands.

6. When you give the firing data to the mortars, the section will fire either a section left or right, but No. 2 mortar will not fire. Use the TFC menu to change CON:AF to CON:FFE. To determine the firing data, press COMPUTE. Changing CON:AF to CON:FFE and pressing COMPUTE in paragraph 7 is

**Performance Steps**

mandatory; you must do it before adjusting individual mortars. This gives the mortars the same deflection as the No. 2 mortar. The FO orders a section right fired without the No. 2 mortar. He calls back, "Number one mortar left twenty; number three mortar right forty; number four mortar adjusted. End of mission, sheaf adjusted."

NOTE: Ignore range corrections under 50 meters. Refire corrections of 50 meters or more. Corrections to be refired should always be transmitted first by the FO.

a. Use the adjust menu and sequence to ADJ: AUF; change AUF to SHEAF.
b. Sequence to WPN. Enter A1 and a correction of L 20.
c. Compute the correction.
d. Using the ADJ menu, sequence to CONT NXT and select NXT. If any adjustment requires refiring, compute that correction and that weapon refires. The FO again gives a spotting correction. Once all adjustments are made for a specific mortar, select NXT and enter the next weapon to be adjusted.
e. Enter A3 and a correction of R 40.
f. Compute the correction.
g. Using the FIRE DATA switch, sequence through the data and record the new data for the No. 1 and No. 3 mortars. Once the sheaf has been adjusted, the section must REFER and REALIGN the aiming post on No. 2 mortar's DEF 2444.

7. End the mission in the MBC using the EOM menu. Save the mission as KNPT 03, recording it on the data sheet.

8. Use the REG DATA menu to store information about the RP and to update the RP. Update the RP when a MET message is received or when reregistration is conducted.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to prepare the mortar ballistic computer (MBC) with the initial data given.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded deflection, charge, and elevation for each round fired. | ____ | ____ |
| 3. Determined and recorded range and azimuth to the registration point. | ____ | ____ |
| 4. Determined and recorded the angle "T." Told the FO if the angle "T" was greater than 500 mils. | ____ | ____ |
| 5. Determined and recorded the deflection and range correction factors. | ____ | ____ |
| 6. Ensured section referred and realigned the aiming post on No. 2 mortar's deflection. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any
performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for Sheaf Adjustment Using a Mortar Ballistic Computer**
**071-082-0014**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC); a call for fire with a target description and sheaf corrections for a converged sheaf in the FO's fire-for-effect; a completed DA Form 2399 (Computer's Record) for the registration mission; a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Computed the firing data for the initial and subsequent fire commands to within 1 mil for deflection and 1 mil for elevation, and converged the sheaf on the fire-for-effect (FFE).

**Performance Steps**
NOTE: The term "sheaf" denotes the lateral distribution of the bursts of two or more weapons fired together. The width of the sheaf is the lateral distance between the centers of the flank bursts. The front covered by any sheaf is the width of the sheaf, plus the effective width of one burst. A parallel sheaf is one in which the trajectories of all weapons are parallel (Figure 1).

1. Press the GRID switch and enter the FO's call for fire on the computer's record (Figure 2).

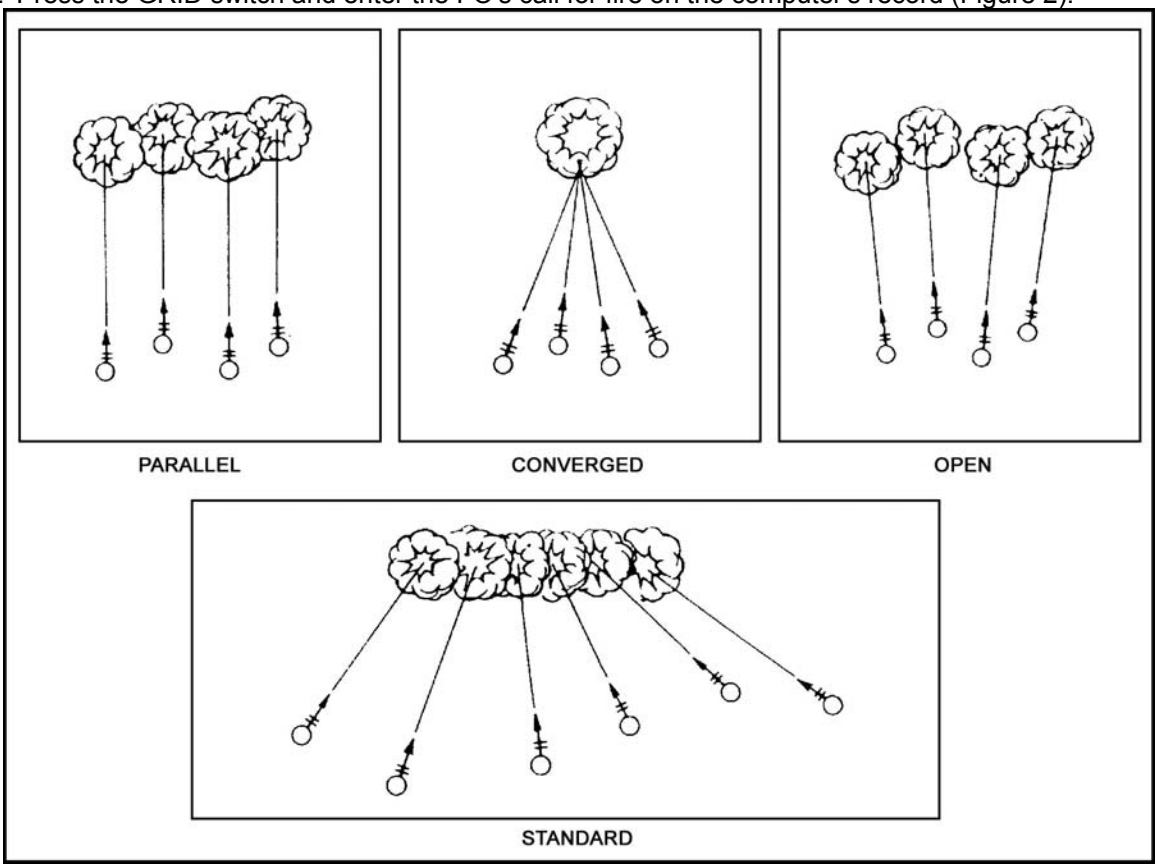

Figure 1. Types of sheaves

**Performance Steps**

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P35 | AB0004 |

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

SHIFT FROM

POLAR
OT DIRECTION ALTITUDE
DISTANCE

GRID 026 766
OT DIRECTION 0760
ALTITUDE

OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION ENEMY OP WITH COVER
METHOD OF ENGAGEMENT
METHOD OF CONTROL
MESSAGE TO OBSERVER ANGLE T 0700

FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED

Figure 2. FO's call for fire.

2. Use the WPN/AMMO menu and assign the mission to the section and adjusting piece, A2. Then determine the firing data, and record the initial fire command (Figure 3) on the computer's record.

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE SEC | DEFLECTION | MORTAR TO FOLLOW SEC | |
| MORTAR TO ADJ #2 | DEFLECTION CORRECTION ☐L ☐R | SHELL AND FUZE HEQ | |
| METHOD OF ADJ 1 RD | RANGE | MORTAR TO FIRE #2 | |
| BASIS FOR CORRECTION | WALT CORRECTION ☐+ ☐- | METHOD OF FIRE 1 RD IN ADJ | (1) |
| SHEAF CORRECTION CONV #2 | | HED IN FFE | |
| SHELL AND FUZE HEQ IN ADJ HED IN FFE | RANGE CORRECTION ☐+ ☐- | DEFLECTION 2952 | |
| METHOD OF FFE 3 RDS | | CHARGE 4 | |
| RANGE LATERAL SPREAD | CHARGE/RANGE 4638 | TIME SETTING | |
| ZONE | AZIMUTH 1129 | ELEVATION 0926 | |
| TIME OF OPENING FIRE W/R | ANGLE T 0700 | | |

OBSERVER CORRECTION | CHART DATA | SUBSEQUENT COMMANDS

Figure 3. FDC's order and initial fire command.

3. Using the adjust menu, enter the FO's correction on the computer's record and determine the subsequent command.
   a. The forward observer sends the correction, "Add 50, fire for effect."
   b. Use the adjust menu and enter the FO's correction (Figure 4).

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| | +50 | FFE | | 4685 | SEC | 3RDS HED | 1) 2963 | | | 0967 | |
| | | | | | | | 2) 2956 | | | 0967 | |
| | | | | | | | 3) 2948 | | | 0967 | |
| | | | | | | | 4) 2941 | | | 0966 | (13) |
| | | | | | EOM | OP DESTROYED | | | | | |
| | | | | | B.P. 02634 76637 | | | | | | |

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Figure 4. FO's correction.

**Performance Steps**

4. Before you can determine the firing data, the sheaf must be changed to converge (Figure 1). To do this, use the TFC menu.
   a. Press the TFC switch. The MBC displays TFC and the FO ID if it was entered with the call for fire.
   b. Press the SEQ switch. The MBC displays the mission and target number.
   c. Press the SEQ switch. The MBC displays the type of sheaf to use in the FFE. The default is PRL. Using multiple choice entry, change the display to CVG.
   d. Press the SEQ switch. The MBC displays the method of control. The MBC defaults to AF. Using multiple choice entry, change the method of control to FFE.
   e. Press the SEQ switch. The MBC displays the mortars available (not active on other missions) in the section. Weapons may be deleted or added by using the CLEAR ENTRY switch and or DISPLAY switch three.
   f. Press the SEQ switch. The MBC indicates if REG and or MET applies. If a registration point or MET applies, this display may be used to deactivate the MET or REG corrections. Use the default shown, YES.
   g. Press the SEQ switch. The MBC displays which RP correction, if any, is applied to the target. This is the basis for correction.
   h. Press the SEQ switch. The MBC displays, PUSH COMPUTE. When the COMPUTE switch has been pressed and the firing data determined the MBC goes directly to the FIRE DATA menu and records the subsequent command data.
   i. Press the SAFETY DATA switch. Record the range for the final adjusted round and the burst-point grid on the computer's record.
5. The forward observer sends the following surveillance, "End of mission, observation post destroyed." Using the EOM menu, end the mission and record the target as KNPT 04 on the data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and materials given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the provided equipment and information and determine the data needed to correct the sheaf.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded deflection, charge, and elevation for each round fired. | ____ | ____ |
| 3. Determined and recorded range and azimuth for the initial round. | ____ | ____ |
| 4. Determined and recorded angle "T;" told the FO if angle "T" is greater than 500 mils. | ____ | ____ |
| 5. Entered the TFC menu and changed the sheaf to converge. | ____ | ____ |
| 6. Determined and recorded burst-point grid for the final adjusted round. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for a Traversing Mission Using a Mortar Ballistic Computer**
**071-082-0015**

**Conditions:** As a computer in a fire-direction center (FDC), given a call for fire for a wide target; an initialized mortar ballistic computer (MBC); a completed DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Manually and correctly entered all data into the mortar ballistic computer (MBC), and sequenced and viewed all computed data; set all firing data to within 1 mil for deflection and 1 mil for elevation. After the last adjusting round, determined the burst-point grid for the center mass of the target area.

**Performance Steps**
NOTE: Traversing fire is used by mortars when the target is wider than can be engaged by a standard or open sheaf. Wide targets are engaged by using a distributed fire for effect (FFE). This means that the mortar will be manipulated for deflection between rounds until the number of rounds given in the fire command has been fired.
a. Upon receiving the call for fire and recording it on the computer's record (Figure 1), the FDC chief determines that traversing fire must be used to cover the target area. He then completes the FDC order, using 4 rounds for every 100 meters of target width (or 1 round for each 30 meters). With the information in the call for fire, the FDC chief determines that the adjusting mortar (No. 2) must be adjusted to center mass of the target.
b. To effectively engage a target using traversing fire (Figure 2), he must ensure that the attitude of the target does is not different more than 100 mils from the attitude of the mortar section.

1. Using the information in the call for fire, FDC order (Figure 3), and observer corrections (Figure 4), enter the data into the MBC to adjust the No. 2 mortar onto the center mass of the target. Then, record data on the computer's record. Figure 4 shows all of the FO's adjustments that are recorded on the computer's record.

**COMPUTER'S RECORD**
For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| BCo 1/29 INF | | | P35 | AB ØØØ5 |

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID Ø15 767
OT DIRECTION Ø2ØØ
ALTITUDE

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / [ ] RIGHT
[ ] ADD / ☐ DROP
☐ UP / [ ] DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION COMPANY IN OPEN 4ØØ X 5Ø ATT: 276Ø
METHOD OF ENGAGEMENT
METHOD OF CONTROL
MESSAGE TO OBSERVER ADJUST FIRE

Figure 1. Call for fire.

**Performance Steps**

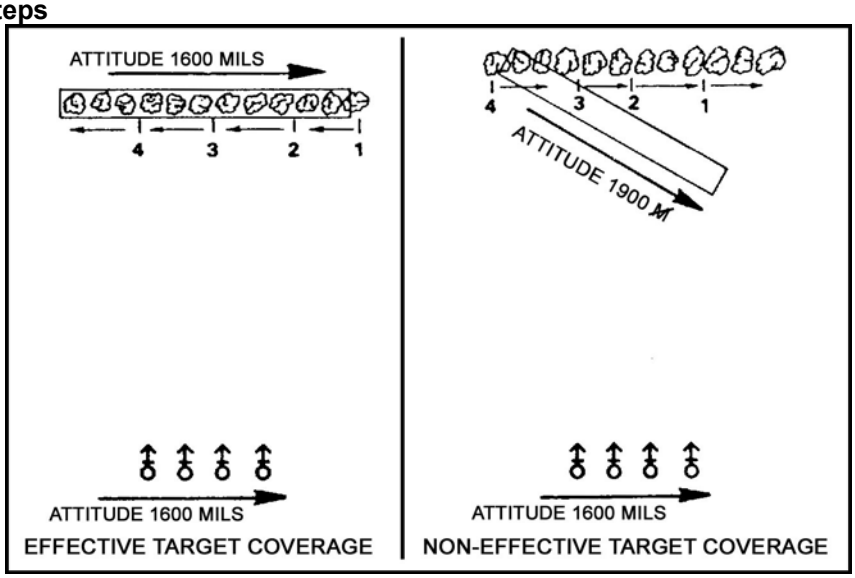


Figure 2. Traversing fire.

MESSAGE TO OBSERVER: ANGLE T: 0900

| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | SEC | DEFLECTION | | MORTAR TO FOLLOW | SEC | |
| MORTAR TO ADJ | #2 | DEFLECTION CORRECTION | ☐L ☐R | SHELL AND FUZE | HEQ | |
| METHOD OF ADJ | 1RD | RANGE | | MORTAR TO FIRE | #2 | ① HE |
| BASIS FOR CORRECTION | | WALT CORRECTION | ☐+ ☐- | METHOD OF FIRE | 1RD IN ADJ 4RDS PROX IN FFE | |
| SHEAF CORRECTION | OPEN | RANGE CORRECTION | ☐+ ☐- | DEFLECTION | 3110 | |
| SHELL AND FUZE | HEQ IN ADJ PROX IN FFE | CHARGE/RANGE | 3743 | CHARGE | 3 | |
| METHOD OF FFE | 4RDS | AZIMUTH | 0970 | TIME SETTING | | |
| RANGE LATERAL SPREAD | | ANGLE T | 0900 | ELEVATION | 0885 | |
| ZONE | | | | | | |
| TIME OF OPENING FIRE | W/R | | | | | |

Figure 3. FDC order and initial fire command.

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| L 300 | +200 | | | 3699 | | | 3209 | | | 0911 | ② HE |
| R 700 | -100 | | | 3685 | | | 3170 | | | 0918 | ③ HE |
| | -50 | FFE | | 3646 | PREPARE TO TRAVERSE RIGHT | | | | | | |
| | | | | | SEC | 4RDS PROX | TRAVERSE RIGHT | | 1/2 TURN | | |
| | | | | | | | 3143 | | | 0964 | |
| | | | | | | | 3161 | | | 0958 | |
| | | | | | | | 3179 | | | 0951 | |
| | | | | | | | 3196 | | | 0942 | ⑯ PROX |
| | | | | | EOM | EST | 30% CAS | | | | |
| | | | | | B.P. 01312 | | 76789 | AZ: 0919 | | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 4. FO's corrections.

a. After the adjustment is complete--

**Performance Steps**

(1) Divide the target into segments.
(2) Determine the mil width of one segment.
(3) Determine the number of turns required to cover one segment.
(4) Determine the number of turns between rounds.

b. Enter the last FO correction before starting adjustments.
c. Compute the firing data to the center mass of the target area, and record the azimuth, 0919, and burst point, 01312 76789, on the last adjusting round.
   (1) Divide the segment width by 2 to determine the amount of modification (100/2 = 50). Use the gun-target azimuth chart (Figure 5) to determine if the modification carries a positive or a negative sign.

**GUN-TARGET AZIMUTH 4901-1499**

TRAVERSE LEFT (+)
TRAVERSE RIGHT (–)

**GUN-TARGET AZIMUTH 1500-1700**

ATTITUDE < 1600
TRAVERSE LEFT (–)
TRAVERSE RIGHT (+)

ATTITUDE > 1600
TRAVERSE LEFT (+)
TRAVERSE RIGHT (–)

**GUN-TARGET AZIMUTH 1701-4699**

TRAVERSE LEFT (–)
TRAVERSE RIGHT (+)

**GUN-TARGET AZIMUTH 4700-4900**

ATTITUDE < 1600
TRAVERSE LEFT (+)
TRAVERSE RIGHT (–)

ATTITUDE > 1600
TRAVERSE LEFT (–)
TRAVERSE RIGHT (+)

Figure 5. Gun-azimuth chart.

   (2) The azimuth for the center mass of the target was 0919. This azimuth is between gun-target azimuth, 4901-1499. The modification in this example carries a minus sign, - 50, because it requires traversing to the right.

2. When the FDC computes the last correction and selects a special sheaf, the MBC divides the total width of the target into four equal segments (depending on the number of mortars stored in the setup menu). Then it assigns each mortar a segment and determines the firing data to the center of each segment. On this mission, the FDC chief decides to traverse right in the FFE (Figure 4). You need the firing data of the LEFT EDGE for each mortar segment. Find the correct starting point for each mortar by entering a correction after the center mass firing data has been determined.
   a. Determine the segment width each mortar has to cover by dividing the width of the target by the number of mortars in the FFE: 400/4 = 100.
   b. Once the segment widths for each mortar is determined, calculate the number of rounds it will take for each mortar to cover this area. Each mortar must cover 100 meters; therefore, using the rule, 4 rounds for each 100 meters, each mortar fires 4 rounds. (See method of fire in Figure 3.)

3. Attitudes cannot exceed 3200 mils. The difference between mortar attitude and target attitude must

**Performance Steps**

not exceed 100 mils. Using the ADJ menu, change the DIR: to the attitude 2760. Sequence until the MBC displays, + - RN:, and enter the modification, - 0050. Then sequence until the MBC displays READY.

NOTE: Remember to change the fuze at the WPN/AMMO menu for the FFE, as directed on the FDC order.

a. Use the TFC menu and change SHF to special (adj point center). Enter a WID 400 (target width in call for fire) and ATT 2760. Change CON to FFE and compute the firing data.
b. Determine the mil width for one segment by comparing No. 1 mortar's deflection to No. 2 mortar's deflection, and subtract the smaller from the larger. This gives the mil width for each segment. Number 1 mortar's deflection is 3143; number 2 mortar's deflection is 3161 (Figure 4).
   EXAMPLE:
   3161 - 3143 = 18 mils
c. Determine the number of turns required to cover one segment.
   EXAMPLE: Divide the number of mils (18) by 10 (1 turn of the traversing handwheel equals about 10 mils): 18/10 = 1.8 turns (round off to the nearest 1/2 turn) = 2 turns.
d. Determine the number of turns between rounds.
   EXAMPLE: First, determine the intervals by subtracting 1 from the number of rounds for one segment (100 meters = 4 rounds): 4 - 1 (always) = 3 intervals.
e. Divide the number of turns (2) by the intervals (3).
   EXAMPLE: 2 divided by 3 = 2/3 = 0.6, rounded to the nearest 1/2 turn = 0.5 or 1/2 turn between rounds.

4. Upon completion of the adjustment phase of the mission, the FDC gives the section command, PREPARE TO TRAVERSE RIGHT (LEFT). Traverse the mortar all the way in the opposite direction of that given, back off two turns, and wait for further instructions from the FDC.
5. After the FFE, the FO sends, "End of mission, estimated thirty percent casualties."
6. Place the adjusting mortar back to the center mass data before ending the mission. Use the TFC menu and change the sheaf back to PRL, pressing SEQ and changing FFE to AF. Use the ADJ menu and reverse the modification, + 50, sequencing to READY, and pressing COMPUTE. Select the SAFETY DATA switch; the burst-point grid should be the same as the one you recorded for center mass. End the mission and record the target, KNPT 05. Then, update the data sheet using the burst-point grid.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and materials given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the material and information given and to compute the final firing data for a traverse mission.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded deflection, charge, and elevation for each round fired. | ____ | ____ |
| 3. Determined and recorded angle "T" and told the FO if the angle T was greater than 500 mils. | ____ | ____ |
| 4. Divided the target into segments and determined the mil width for one segment. | ____ | ____ |
| 5. Determined the number of turns it took to cover one segment. | ____ | ____ |
| 6. Determined the number of turns between rounds. | ____ | ____ |
| 7. Determined the azimuth and burst-point grid to the center mass of the target on | ____ | ____ |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| the last adjusting round. | | |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for a Searching Mission Using a Mortar Ballistic Computer**
**071-082-0016**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC); a call for fire for a deep target; a completed DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Computed the firing data to within 1 mil for deflection and 1 mil for elevation. Determined the number of turns to the nearest half-turn, and then determined the number of rounds required. After the last adjusting round, determined the burst-point grid for the center mass of the target area.

**Performance Steps**

NOTE 1. Searching fire is used by mortars (60-mm, 81-mm, and 120-mm) when the target is wider or deeper than can be engaged by a parallel sheaf. Wide or deep targets are engaged by using a distributed fire for effect (FFE). This means that the mortar must be manipulated for elevation between rounds until the number of rounds given in the fire command has been fired.

NOTE 2. Effective engagement using searching fire (Figure 1) requires that the attitude of the target differ no more than 100 mils from the azimuth of the gun-target line.

1. Enter the FO's call for fire (Figure 2), initiate the mission using the shift menu, and assign the mission to A2 in the WPN/AMMO menu, recording it on the computer's record.

COMPUTER'S RECORD
For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P35 | AB0006 |

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID
OT DIRECTION
ALTITUDE

SHIFT FROM AB 0004
OT DIRECTION 0420 ALTITUDE
☒ LEFT / ☐ RIGHT 200
☒ ADD / ☐ DROP 300
☐ UP / ☐ DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION COMPANY ASSEMBLY AREA 100 X 300 ATT: 1000
METHOD OF ENGAGEMENT HEQ IN FFE
METHOD OF CONTROL
MESSAGE TO OBSERVER ANGLE T: 700

Figure 2. Call for fire.

2. Enter your searching fire FDC order and initial fire command on the computer's record (Figure 3).

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE SEC | DEFLECTION | MORTAR TO FOLLOW SEC | ① |
| MORTAR TO ADJ #2 | DEFLECTION CORRECTION ☐L ☐R | SHELL AND FUZE HEQ | |
| METHOD OF ADJ IRD | RANGE | MORTAR TO FIRE #2 | |
| BASIS FOR CORRECTION | VV/ALT CORRECTION ☐+ ☐- | METHOD OF FIRE IRD IN ADV | |
| SHEAF CORRECTION | | 12 RDS IN FFE | |
| SHELL AND FUZE HEQ | RANGE CORRECTION ☐+ ☐- | DEFLECTION 3029 | |
| METHOD OF FFE 12 RDS | CHARGE/RANGE 4801 | CHARGE 4 | |
| RANGE LATERAL SPREAD | AZIMUTH 1051 | TIME SETTING | |
| ZONE | ANGLE T 0700 | ELEVATION 0843 | |
| TIME OF OPENING FIRE W/R | | | |

**Performance Steps**

Figure 3. FDC order and initial fire command.

NOTE: The number of rounds to fire (method of FFE) is based on the rule: 4 rounds for each 100 meters or 1 round for each 30 meters of target depth.

3. In firing a search mission, the adjustment phase of the mission is the same as a regular adjust mission. Using the base mortar (No. 2) as the adjusting mortar, the forward observer adjusts the round until it is center mass of the target (Figure 4), if needed. He must remember to change the shell and fuze on the last adjustment. Upon completion of the adjustment phase of the mission, determine the burst-point grid for the last adjusting round, and record it on the computer's record.
   a. Enter the ADJ menu, remove the FO's direction, and enter the attitude of the target. Take half of the target area, and enter it as a range correction to reach the far edge.

      EXAMPLE: If the target area is 300 meters, half of this area is 150 meters. Enter a range correction of + 0150. This places the round on the far edge. Record the elevation and charge for the far edge, enter the ADJ menu, and then enter a range correction of - 0300. This places the round on the near edge. Record the elevation and charge for the near edge--both charges must be the same. If not, enter the WPN/AMMO menu and sequence until CHG: is displayed. Enter the charge recorded for the far edge, sequence until READY displays, and press COMPUTE. Record the new charge and elevation for the near edge.
   b. To determine the mil length of the target, the FDC subtracts the elevation to hit the far edge of the target from the elevation for the near edge of the target.
   c. Each turn of the elevation crank is about 10 mils. Dividing the mil length of the target by 10 gives you the total turns needed to cover the target.
   d. To compute the number of turns between each round, you must know how many rounds will be fired by each mortar (see the FDC order--method of FFE). To determine the turns between rounds, divide the total turns by the intervals between rounds (interval is always one less than the number of rounds).

NOTE: Round off turns to the nearest half turn.

4. Before the mission can be ended, you must enter a correction to adjust the mortars back to the center mass of the target. Enter a correction of + 150 at the ADJ menu, sequence until READY displays, and press COMPUTE. Enter the SAFETY DATA menu and sequence through until the burst-point grid is displayed. To end the mission, use the EOM menu and save the target as KNPT 06, recording it on the data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and materials given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the materials and information given, and to compute the final firing data for a search mission.

| **Performance Measures**<br>NOTE: Not to be sequence scored. | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded deflection, charge, and elevation for each round fired. | ____ | ____ |
| 3. Determined and recorded angle "T" and told the FO if angle T was greater than 500 mils. | ____ | ____ |
| 4. Changed the FO's direction in the ADJ menu and entered the attitude of the target. | ____ | ____ |
| 5. Determined the mil length of the target. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 6. Determined the total number of turns to cover the target area. | ____ | ____ |
| 7. Determined the number of rounds to cover the target area. | ____ | ____ |
| 8. Determined the number of turns between rounds. | ____ | ____ |
| 9. Determined azimuth and burst-point grid to center mass of target on the last adjusting round. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

**Compute Data for an Illumination Mission Using a Mortar Ballistic Computer**
**071-082-0018**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC); an illumination call for fire; a completed DA Form 2399 (Computer's Record); and a pencil.

**Standards:** Manually and correctly entered all data into the mortar ballistic computer (MBC), computed data to place illumination over the target area, to include determining firing data to within 1 mil for deflection, 1 mil for elevation, and time setting to the nearest tenth of a second.

**Performance Steps**
NOTE 1: Purpose of illumination. Battlefield illumination provides friendly forces with light to assist them in ground operations at night. The light provided by the mortar illumination round also allows the FO to detect targets of opportunity or enemy activity in the area. The indiscriminate use of illumination can give away friendly operations as well as reveal enemy operations. Therefore, the FDC, as well as the FO, must exercise caution when using illumination.

NOTE 2: Amount of illumination. The amount of illumination required for a specific mission depends on the observer-target (O-T) distance, conditions of visibility, and the size and shape of the area to be illuminated.

1. The FO may request any of the following patterns of illumination rounds. Therefore, you must be able to compute the data to provide the pattern requested.
    a. One-gun illumination. Most illumination missions are fired by one mortar. This leaves the remaining mortars available to fire high explosive (HE) rounds, should a target be detected. Normally, the flank or upwind mortar should be used.
    b. Two-gun illumination. This pattern is used when more light is needed than one round can provide. Two different mortars (normally, the flank mortars) each fire one round. The rounds are set to burst at the same time.
    c. Two-gun illumination, range spread. This pattern is used when the area to be illuminated has greater depth than width. When this pattern is called for, you must enter the data into the MBC. One mortar fires 250 meters (500 meters for 107-mm and 120-mm mortars) beyond the target location (given by the FO) on the gun-target (G-T) line. The other mortar fires rounds 250 meters (500 meters for 107-mm and 120-mm mortars) below the target location on the G-T line. With the 81-mm mortar, this causes the rounds to burst 500 meters apart. With the 107-mm and 120-mm mortars, the rounds will burst 500 meters beyond and 500 meters below the target location, causing the rounds to burst 1,000 meters apart.
    d. Two-gun illumination, lateral spread. This pattern is used when the area to be illuminated has greater width than depth. When this pattern is called for, you must enter data into the MBC for one mortar to fire rounds 250 meters (500 meters for 107- and 120-mm mortars) to the left of the target location (given by the FO).Enter data for the other mortar to fire rounds 250 meters (500 meters for 107- and 120-mm mortars) to the right of the target. This causes rounds to burst 500 meters (1,000 meters for 107- and 120-mm mortars) apart. Normally, the flank mortars are used for this type of coverage.
    e. Three-gun illumination, range-lateral spread. If the target area is extremely large or if visibility is limited, the FO may call for range-lateral spread. This procedure combines two methods (range spread and lateral spread). This results in a large diamond-shaped pattern of bursts. If the flank mortars are used for lateral spread and the center mortar for range spread, the danger of rounds crossing in flight is removed.

2. When you receive a call for fire (Figure 1), record this information on the computer's record. The basic procedure for computing illumination is the same as for HE. Due to the large area illuminated by the illumination round, angle "T" is neither computed nor used for illumination adjustment.
    a. Enter the data into the MBC to fire an illumination round over the target area to aid the FO in determining whether there is enemy activity in his area.
    b. Upon the completion of the FDC order, you will know which mortar will be firing the illumination

**Performance Steps**

and which mortar will be firing HE, should it be called for (Figure 2), so you will record it on the computer's record.

| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | #4 | DEFLECTION | | MORTAR TO FOLLOW | #4 | |
| MORTAR TO ADJ | | DEFLECTION CORRECTION | | SHELL AND FUZE | ILLUM | |
| METHOD OF ADJ | IRD | ☐L ☐R | | | | |
| BASIS FOR CORRECTION | RP00 | RANGE | | MORTAR TO FIRE | | |
| SHEAF CORRECTION | | WALT CORRECTION | | METHOD OF FIRE | IRD | |
| SHELL AND FUZE | ILLUM | ☐+ ☐- | | | | 1 |
| | | RANGE CORRECTION | | DEFLECTION | 2604 | |
| METHOD OF FFE | | ☐+ ☐- | | CHARGE | 7 | |
| RANGE LATERAL SPREAD | | CHARGE/RANGE | 2528 | TIME SETTING | 27.3 | |
| ZONE | | AZIMUTH | 1477 | ELEVATION | 1016 | |
| TIME OF OPENING FIRE | W/R | ANGLE T | | | | |
| OBSERVER CORRECTION | | CHART DATA | | SUBSEQUENT COMMANDS | | |

Figure 2. FDC order and initial fire command.

c. Due to the size of the area illuminated by the flare, you will seldom make range and deviation corrections of less than 200 meters. You will make height-of-burst corrections in multiples of 50 meters.

3. The FO sends the correction, "Right four hundred; add two hundred; down one hundred." Enter the corrected information, "Right four hundred; add two hundred; down one hundred," into the MBC. The "down one hundred" is not a range correction, but a height correction. The FO wants the round lower for accurate surveillance and identification of the target.

4. The FO sends the next correction, "Drop two hundred, up fifty."

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R400 | +200 | D 100 | | 2975 | | | 2605 | 8 | 29.0 | 0968 | 2 |
| | -200 | U 50 | | | | | 2542 | | 29.3 | 0995 | 3 |
| | | U 50 | | | | | | | 28.4 | 0978 | 4 |
| | | | | | EOM | NO TARGET OBSERVED | | | | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 3. Forward observer's correction.

5. The FO's next correction is "Down five zero" (Figure 3). After recording the correction on the computer's record, you must determine the correction only for the height of the round.

6. The FO then calls back with his next transmission, "End of mission, no target observed." Press the EOM switch and select EOM. There is no need for the computer to save this data since the round did not impact on the ground; therefore, the burst-point grid will be inaccurate.

**Performance Steps**

7. At this time, the mission is complete. Maintain the computer's record if noise was again heard in the same area. You would not, however, record the illumination data on the data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute the data needed to fire an illumination mission.

| **Performance Measures**<br>NOTE: Not to be scored in sequence. | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded deflection, charge, elevation, and time setting for each round fired. | ____ | ____ |
| 3. Determined and recorded the range to the target. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for a Coordinated Illumination Mission Using a Mortar Ballistic Computer**
**071-082-0019**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC); a call for fire; two blank DA Forms 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); a pencil; an illumination mission and a coordinated illumination mission with three forward observer (FO) corrections each.

**Standards:** Entered all data manually and correctly into the mortar ballistic computer (MBC), sequenced data, and viewed all fire-command data. Computed illumination mission data for the illumination adjustment mission. Computed illumination and HE mission data for the adjustment and fire-for-effect (FFE) of high-explosive (HE) ammunition on the target. Determined all firing data to within 1 mil for deflection, 1 mil for elevation, and the time setting to the nearest tenth of a second.

**Performance Steps**

1. When a target is suspected but due to reduced visibility cannot be seen by the FO, the FO must call the FDC to have the target area illuminated. At this point, the FO adjusts the illumination over the target area and identifies the target. He must initiate a call for fire requesting illumination for the target area in the normal manner (Figure 1). The computer must enter the call for fire in the GRID menu. He selects SH/FZ ILL and, using the WPN/AMMO menu, records the data on the computer's record.

**COMPUTER'S RECORD**
For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P35 | |

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID ØØ4 758
OT DIRECTION Ø56Ø
ALTITUDE

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION SUSPECTED VEHICLE NOISE
METHOD OF ENGAGEMENT ILLUMINATION
METHOD OF CONTROL
MESSAGE TO OBSERVER

FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS

Figure 1. Call for fire (illumination).

2. Figure 2 (computer's record) shows the FDC order and the subsequent commands for the illumination mission.

**Performance Steps**

| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | #4 | DEFLECTION | | MORTAR TO FOLLOW | #4 | |
| MORTAR TO ADJ | | DEFLECTION CORRECTION ☐L ☐R | | SHELL AND FUZE | ILLUM | |
| METHOD OF ADJ | IRD | RANGE | | | | |
| BASIS FOR CORRECTION | | WALT CORRECTION ☐+ ☐- | | MORTAR TO FIRE | | |
| SHEAF CORRECTION | | | | METHOD OF FIRE | IRD | |
| SHELL AND FUZE | ILLUM | RANGE CORRECTION ☐+ ☐- | | DEFLECTION | 3038 | 1 |
| METHOD OF FFE | | | | CHARGE | 7 | |
| RANGE LATERAL SPREAD | | CHARGE/RANGE | 2322 | TIME SETTING | 29.2 | |
| ZONE | | AZIMUTH | 1043 | ELEVATION | 1105 | |
| TIME OF OPENING FIRE | W/R | ANGLE T | | | | |

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R400 | +200 | 0100 | | 2695 | | | 2937 | | 26.8 | 0954 | 2 |
| | -200 | U50 | | 2528 | | | 2894 | | 28.1 | 1032 | 3 |
| | | U50 | PREPARE TO MARK | | | | | | 27.3 | 1016 | 4 |
| | | | | ILL ADJ, TARGET OBSERVED | | | | | | | |
| | | | | | | MARK TIME: 50 SEC | | | | | |

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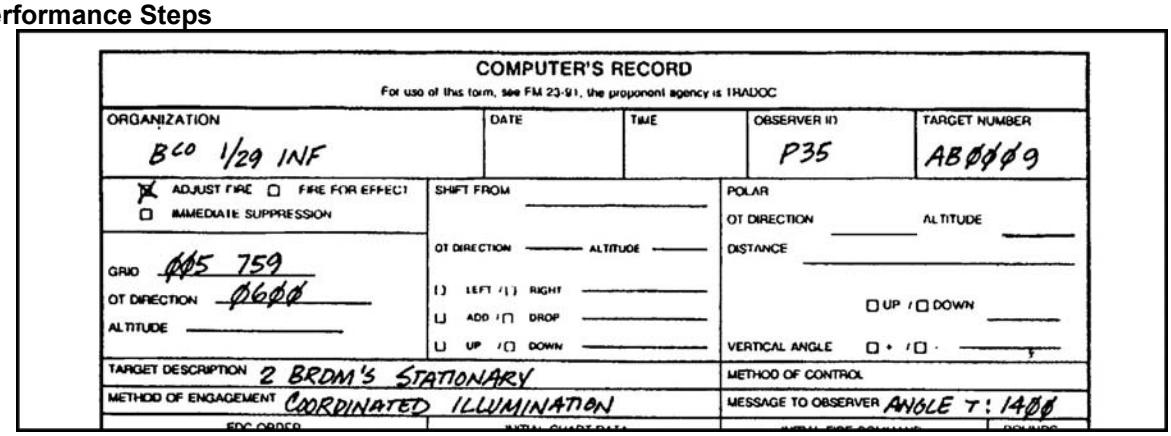
Figure 2. FDC order and subsequent commands.

3. In the mark method (the most used), the FO may tell the FDC that he will be giving the illumination mark on the next round of illumination, or the FDC may tell the FO to give it on the next illumination round. Either way, the FO and FDC must know when it will be given.
   a. When illumination has been adjusted to provide the best light on the target, the FO gives the command, MARK ILLUMINATION.
   b. The computer times the flight of the round from the time it was fired until the command, MARK. During the coordinated illumination mission, he subtracts the HE time of flight from the MARK time for each HE round(s) fired. The remainder is the number of seconds the HE is fired after the illumination round(s) (Figures 2 and 3). The computer records this number on the computer's record.

**Performance Steps**



COMPUTER'S RECORD

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P35 | AB0009 |

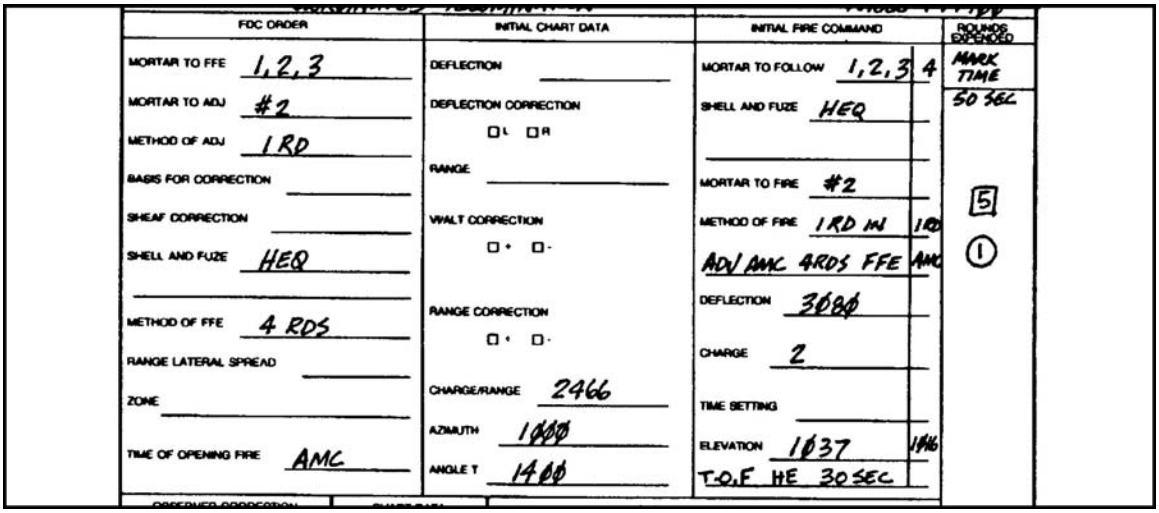
| | | |
|---|---|---|
| ☒ ADJUST FIRE ☐ FIRE FOR EFFECT ☐ IMMEDIATE SUPPRESSION | SHIFT FROM | POLAR |
| | OT DIRECTION ALTITUDE | OT DIRECTION ALTITUDE |
| GRID 005 759 | | DISTANCE |
| OT DIRECTION 0600 | ☐ LEFT / ☐ RIGHT | ☐ UP / ☐ DOWN |
| ALTITUDE | ☐ ADD / ☐ DROP | |
| | ☐ UP / ☐ DOWN | VERTICAL ANGLE ☐ + / ☐ - |
| TARGET DESCRIPTION 2 BRDM'S STATIONARY | | METHOD OF CONTROL |
| METHOD OF ENGAGEMENT COORDINATED ILLUMINATION | | MESSAGE TO OBSERVER ANGLE T: 1400 |

Figure 3. Call for fire (coordinated illumination).

4. Now that the illumination has been adjusted over the target area, the computer receives a call for fire for coordinated illumination. He determines the data to take the target under fire (Figure 3).

NOTE: The illumination mission (mission No. 1) will not be terminated (EOM). Should there be any illumination adjustments to be made based on the FO's observations during the coordinated mission (mission No. 2), the computer can still retrieve that mission by pressing the MSN switch and then toggling to mission No. 1 (as in a simultaneous mission).

a. In firing a coordinated mission, use a new computer's record to record the coordinated illumination mission (Figure 3). Record the mark time recorded in the rounds expended (RDS EXP) column on the computer's record (Figure 4). Also record in that column that an illumination round and HE round have been fired. Take the data used to fire the first illumination round from the computer's record that was used to adjust the illumination mission (Figure 2). Determine the time to fire the HE round(s) by subtracting the TOF of the HE round from the MARK time of the illumination round. The difference is the time (seconds) that the HE is fired after the illumination round is fired. Perform this procedure for every round (HE) that is fired in the coordinated illumination mission.



| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE 1,2,3 | DEFLECTION | MORTAR TO FOLLOW 1,2,3 4 | MARK TIME |
| MORTAR TO ADJ #2 | DEFLECTION CORRECTION ☐L ☐R | SHELL AND FUZE HEQ | 50 SEC |
| METHOD OF ADJ 1 RD | RANGE | MORTAR TO FIRE #2 | 5 |
| BASIS FOR CORRECTION | VMALT CORRECTION ☐+ ☐- | METHOD OF FIRE 1 RD WI | 1 |
| SHEAF CORRECTION | | ADJ AMC 4 RDS FFE | AMC |
| SHELL AND FUZE HEQ | RANGE CORRECTION ☐+ ☐- | DEFLECTION 3080 | |
| METHOD OF FFE 4 RDS | | CHARGE 2 | |
| RANGE LATERAL SPREAD | CHARGE/RANGE 2466 | TIME SETTING | |
| ZONE | AZIMUTH 1000 | ELEVATION 1037 | 146 |
| TIME OF OPENING FIRE AMC | ANGLE T 1400 | T.O.F HE 30 SEC | |

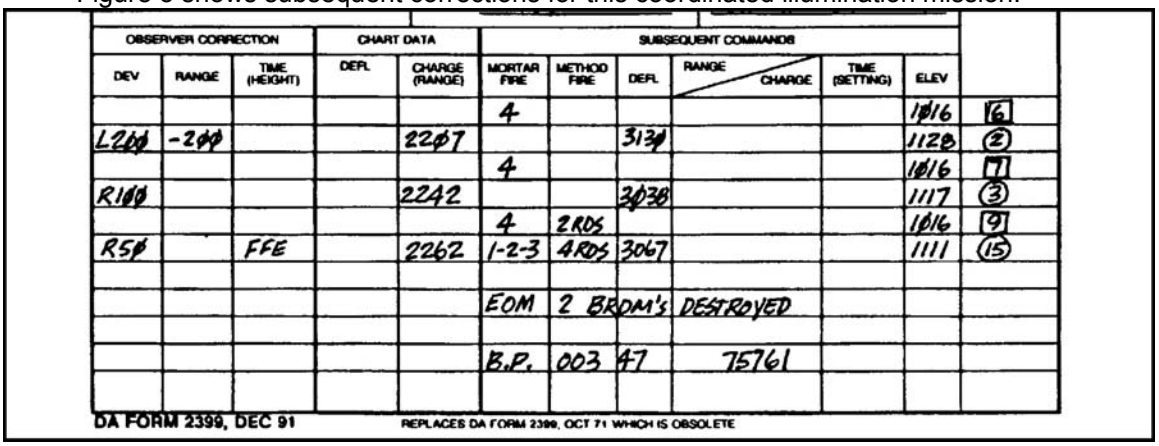
Figure 4. FDC order and initial fire command.

NOTE: In the rounds expended column, the illumination rounds total continues from the illumination adjustment mission (mission No. 1).

b. If the FO decides to adjust the illumination and the HE concurrently when sending corrections, he precedes illumination corrections with the word ILLUMINATION and HE corrections with the letters HE--for example, ILLUMINATION, UP FIVE ZERO; HE, RIGHT FIVE ZERO, ADD FIVE ZERO. The computer records these corrections on separate lines on the computer's record.

**Performance Steps**

Figure 5 shows subsequent corrections for this coordinated illumination mission.



| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| | | | | | 4 | | | | | 1016 | 6 |
| L200 | -200 | | | 2207 | | | 3134 | | | 1128 | 2 |
| | | | | | 4 | | | | | 1016 | 7 |
| R100 | | | | 2242 | | | 3038 | | | 1117 | 3 |
| | | | | | 4 | 2 RDS | | | | 1016 | 9 |
| R50 | | FFE | | 2262 | 1-2-3 | 4 RDS | 3067 | | | 1111 | 15 |
| | | | | | | | | | | | |
| | | | | | EOM | 2 BROM's | | DESTROYED | | | |
| | | | | | | | | | | | |
| | | | | | B.P. | 003 | 47 | 75761 | | | |
| | | | | | | | | | | | |

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Figure 5. Corrections for coordinated illumination mission.

NOTE: In this example, there are no corrections for the illumination round. There are two methods normally used to adjust illumination and HE.

1. Coordinated illumination using the illumination mark method. In this method, the computer controls the firing of both the illumination and HE.
2. Coordinated illumination by shell at the FO's command. In this method, the FO controls the firing of each round. The FO sends the corrections, and the computer computes the data and sends it to the mortars. The mortars then report when they are UP. The FDC notifies the FO, and the FO gives the command to fire each round.

c. When the FO is certain that he can hit the target with the next round, he may call for any one of the following:
   (1) "Continuous illumination, fire for effect."
   (2) If he has another correction for the HE, he can request, "Continuous illumination, HE drop twenty-five, fire for effect." By requesting continuous illumination, the FO is telling the FDC that he wants the target illuminated during adjustment, fire for effect, and illuminated afterward to allow him to make his target surveillance. This is the least desirable method because of the amount of illumination ammunition needed.

d. The FO makes only HE corrections and lets the FDC determine how many illumination rounds to fire under the method of fire.

5. Upon completion of the mission, the computer saves the HE data (mission No. 2) as a target or known point and records it on the data sheet. The illumination data (mission No. 1) are not required to be saved as a known point or target.

NOTE: The computer must determine and record the burst-point grid for the final HE round.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute the data to fire a coordinated illumination mission.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Not to be sequence scored. | | |
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded deflection, charge, and elevation for each round fired. | ____ | ____ |
| 3. Determined and recorded the range and azimuth to the target for the initial round. | ____ | ____ |
| 4. Determined and recorded the angle "T" and told the FO if the angle "T" was | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| greater than 500 mils. | | |
| 5. Determined and recorded the number of seconds between the illumination round and the HE round. | ____ | ____ |
| 6. Determined and recorded the burst-point grid for the last HE round on the computer's record. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

**Compute Data for Simultaneous Missions Using a Mortar Ballistic Computer**
**071-082-0020**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC); a simultaneous call for fires; two blank DA Forms 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

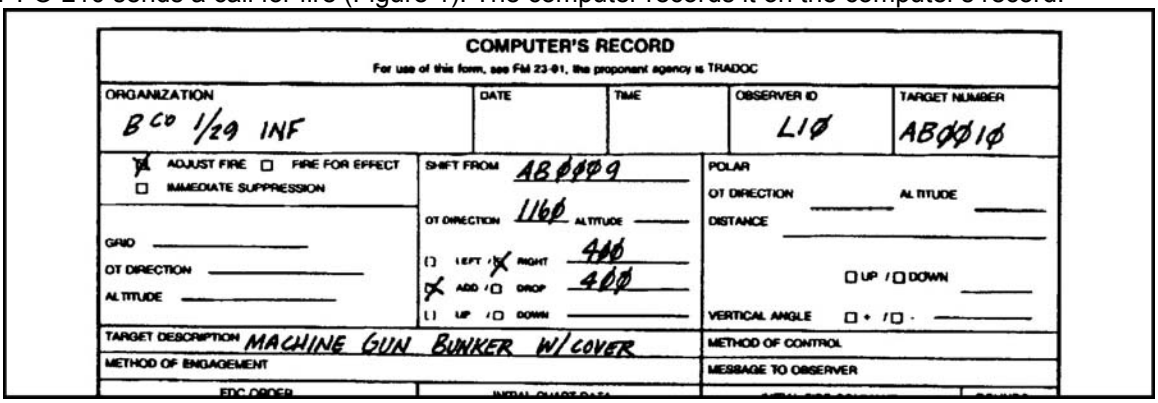
**Standards:** Manually and correctly entered all data into the mortar ballistic computer (MBC), and sequenced and viewed all fire-command data. Determined all firing data to within 1 mil for deflection and 1 mil for elevation.

**Performance Steps**

1. The computer uses the MSN switch to start the review of the current mission or to switch to another mission when more than one is active. When two or more are being computed from the same location, the chief computer must check to ensure the correct deflection is sent to the mortar(s) that support each mission. Both computers must compute data for both missions at the same time.

NOTE: L10 and H42 are FOs that has not been entered into the setup menu. When initiating the mission(s), the computer must sequence by the display that asks to input a FO. The missions can be identified by the mission number depending upon the order the missions were received.

2. FO L10 sends a call for fire (Figure 1). The computer records it on the computer's record.


COMPUTER'S RECORD
For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | L10 | AB0010 |

☒ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

SHIFT FROM AB0009
OT DIRECTION 1160 ALTITUDE
☐ LEFT / ☒ RIGHT 400
☒ ADD / ☐ DROP 400
☐ UP / ☐ DOWN

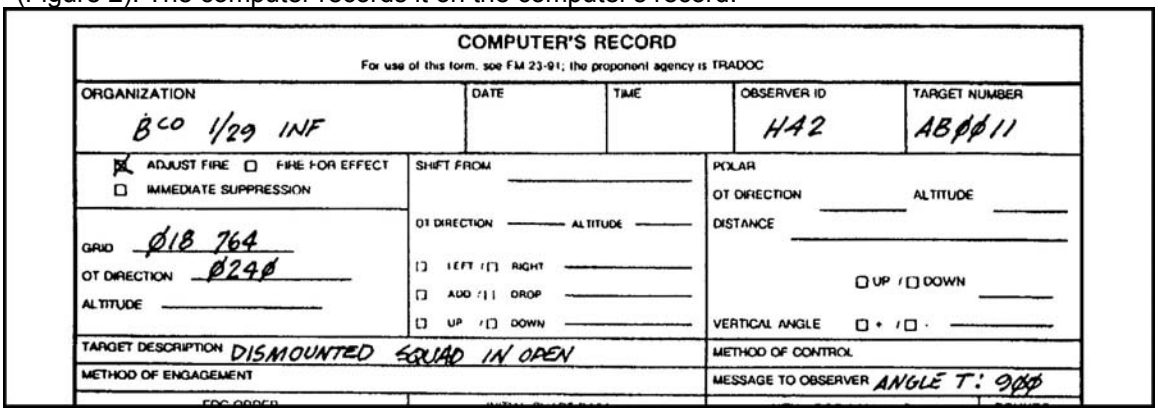
GRID
OT DIRECTION
ALTITUDE

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION MACHINE GUN BUNKER W/COVER
METHOD OF ENGAGEMENT
METHOD OF CONTROL
MESSAGE TO OBSERVER
FDC ORDER
INITIAL QUADRANT DATA

Figure 1. FO L10's call for fire (mission No. 1).

3. Immediately after the computer receives the fire request from FO L10, FO H42 sends a call for fire (Figure 2). The computer records it on the computer's record.


COMPUTER'S RECORD
For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | H42 | AB0011 |

☒ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

GRID 018 764
OT DIRECTION 0240
ALTITUDE

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION DISMOUNTED SQUAD IN OPEN
METHOD OF ENGAGEMENT
METHOD OF CONTROL
MESSAGE TO OBSERVER ANGLE T: 900
FDC ORDER
INITIAL QUADRANT DATA

Figure 2. FO H42's call for fire (mission No. 2).

4. The computer prepares the FDC order and initial firing data for FO L10's mission and records it on

**Performance Steps**

the computer's record (Figure 3). He initiates the mission by pressing one of the FIRE MISSION switches. For FO L10's call for fire, the computer should press the SHIFT MISSION switch.

| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | 3-4 | DEFLECTION | | MORTAR TO FOLLOW | 3-4 | |
| MORTAR TO ADJ | #3 | DEFLECTION CORRECTION | | SHELL AND FUZE | HEQ | |
| METHOD OF ADJ | IRD | ☐L ☐R | | | | |
| BASIS FOR CORRECTION | | RANGE | | MORTAR TO FIRE | #3 | |
| SHEAF CORRECTION | | WALT CORRECTION | | METHOD OF FIRE | IRD IN ADV | ① |
| SHELL AND FUZE | HEQ IN ADV | ☐+ ☐- | | | 3RDS PROX IN FFE | HE |
| | PROX IN FFE | | | DEFLECTION | 2990 | |
| METHOD OF FFE | 3RDS | RANGE CORRECTION | | CHARGE | 4 | |
| RANGE LATERAL SPREAD | | ☐+ ☐- | | | | |
| ZONE | | CHARGE/RANGE | 3836 | TIME SETTING | | |
| | | AZIMUTH | 1091 | ELEVATION | 1125 | |
| TIME OF OPENING FIRE | W/R | ANGLE T | 850 | | | |
| OBSERVER CORRECTION | | CHART DATA | | SUBSEQUENT COMMANDS | | |

Figure 3. FO L10's FDC order and initial fire command.

5. While waiting for FO L10's correction for the first initial round fired for L10's mission, the computer processes the FDC order. He determines the initial fire command for FO H42's mission (Figure 4) by initiating a second mission. He does this by pressing (for the second time) one of the FIRE MISSION switches. For FO H42's call for fire, the computer should press the GRID MISSION switch. He records this data on the computer's record.

| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | 1-2 | DEFLECTION | | MORTAR TO FOLLOW | 1-2 | |
| MORTAR TO ADJ | #2 | DEFLECTION CORRECTION | | SHELL AND FUZE | HEQ | |
| METHOD OF ADJ | IRD | ☐L ☐R | | | | |
| BASIS FOR CORRECTION | | RANGE | | MORTAR TO FIRE | #2 | |
| SHEAF CORRECTION | CONV. #2 | WALT CORRECTION | | METHOD OF FIRE | IRD IN ADV | |
| SHELL AND FUZE | HEQ IN ADV | ☐+ ☐- | | | 3RDS HE D IN FFE | |
| | HE D IN FFE | | | DEFLECTION | 2891 | ① |
| METHOD OF FFE | 3RDS | RANGE CORRECTION | | CHARGE | 2 | |
| RANGE LATERAL SPREAD | | ☐+ ☐- | | | | |
| ZONE | | CHARGE/RANGE | 2639 | TIME SETTING | | |
| | | AZIMUTH | 1190 | ELEVATION | 0954 | |
| TIME OF OPENING FIRE | W/R | ANGLE T | 30 | | | |
| OBSERVER CORRECTION | | CHART DATA | | SUBSEQUENT COMMANDS | | |

Figure 4. FO H42's FDC order and initial fire command.

6. FO L10 sends the correction, "Left two hundred, add two hundred" (Figure 5). The computer enters the correction on the computer's record.

**Performance Steps**

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| L100 | -300 | | | 3564 | | | 2945 | 3 | | 0972 | ② HE |
| | +50 | FFE | | 3596 | 3-4 | 3RDS PROX | 2956 | | | 0977 | ⑥ PROX |
| | | | | | EOM | TROOPS DISPERSED | | | | | |
| | | | | | B.P. | 01645 | 76181 | | | | |

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Figure 5. FO L10's correction.

7. Before entering the correction, the computer must return to MSN No. 1, which is L10's mission. Using the MSN switch, the computer changes to mission No. 1, enters the correction by using the ADJ menu, and determines the subsequent firing data.
   a. Press the MSN switch. The MBC displays the status of the three mission storage blocks. The number on the far right of the display is the MSN number the MBC is currently working with. Each mission block is identified by a mission number and a three-letter abbreviation for its status. The possible abbreviations are--
      (1) UNA--unassigned (no active mission).
      (2) GRD--active grid mission.
      (3) SHF--active shift mission.
      (4) PLR--active polar mission.
   b. To change the MSN number to another mission, press the DISPLAY switch under the mission block desired.
   c. Press DISPLAY switch 1. The number on the right side of the display changes to the mission number selected.
   d. To review the mission, sequence through the display. To enter an adjustment for mission No. 1, press the ADJ switch while at the MSN No. 1 menu.
8. FO H42 sends the correction, "Left one hundred, drop three hundred" (Figure 6).

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| L200 | +200 | | | 2841 | | | 2964 | 3 | | 1167 | ② |
| L50 | -25 | FFE | | 2818 | 1-2 | 3RDS HE | 2995 | | | 1171 | |
| | | | | | | | 2983 | | | 1171 | ⑧ |
| | | | | | EOM | BUNKER | DESTROYED | | | | |
| | | | | | B.P. | 00932 | 75865 | | | | |

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Figure 6. FO H42's correction.

9. Before entering the correction, the computer must return to MSN No. 2, which is H42's mission.

**Performance Steps**

Using the MSN switch, he changes to mission No. 2 and enters the correction by using the ADJ menu and by determining the subsequent firing data.

10. FO L10 sends the correction, "Left fifty, drop twenty five, fire for effect" (Figure 5). The computer enters the correction on the computer's record.
11. Using the MSN switch, the computer changes to mission No. 1, entering the correction and computing the firing data.
12. FO H42 sends a correction, "Add fifty, fire for effect" (Figure 6). The computer enters the correction on the computer's record.
13. Using the MSN switch, the computer changes to mission No. 2. He enters the correction, uses the WPN/AMMO menu, and selects PROX (VT) as the fuze, computing the firing data.
14. FO L10 sends his surveillance, "End of mission, bunker destroyed." The computer determines and records the burst point and end of mission. He uses the EOM menu and saves the target as KNPT 08, recording it on the data sheet.
15. FO H42 sends his surveillance, "End of mission, troops dispersed." The computer determines and records the burst point and end of mission, using the EOM menu and saving the target as KNPT 09.

**Evaluation Preparation:** SETUP: At the test site, provide all materials, equipment, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier that he will be tested on computing a simultaneous fire mission using the MBC.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded deflection, charge, and elevation for each round fired. | ____ | ____ |
| 3. Determined and recorded range and azimuth to the target for the initial round. | ____ | ____ |
| 4. Determined and recorded the angle "T" and told the FO if the angle "T" was greater than 500 mils. | ____ | ____ |
| 5. Correctly applied the FO corrections for the prescribed mission. | ____ | ____ |
| 6. Determined and recorded the burst-point grid for the final round of each mission on the computer's record. | ____ | ____ |
| 7. Updated the data sheet. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for a Split-Section Mission Using a Mortar Ballistic Computer**
**071-082-0021**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC); a split mortar section, calls for fire, a blank DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Entered all data manually and correctly into the mortar ballistic computer (MBC), and sequenced and viewed all fire-command data.

**Performance Steps**

1. Enter GRID, POLAR, or SHIFT data to start mission for section A.
2. Enter or change WPN AMMO data for section A.
3. Sequence and view computed fire command data for initial round for section A.
4. Enter, view, and transmit firing information to FO for section A.

-----ROUND FIRED-----

5. Enter GRID, POLAR, or SHIFT data to start mission for section B.
6. Enter WPN AMMO data for section B.
7. Sequence and view computed fire command data for initial round for section B.
8. Enter, view, and transmit firing information to FO for section B.

-----ROUND FIRED-----

9. Sequence and view fire mission data for section A.
10. Enter adjustments to initial round for section A.
11. Sequence and view computed fire command data for second round for section A.

-----ROUND FIRED-----

12. Sequence and view fire mission data for section B
13. Enter adjustments to initial round for section B.
14. Sequence and view computed fire command data for second round for section B.

-----ROUND FIRED-----

NOTE: Steps 9 through 14 are repeated until adjustment is attained.

15. Sequence and view fire mission data for section A.
16. Enter technical fire control data for section A.
17. Sequence and view computed fire command data for final adjustment for section A

-----FFE FIRED-----

18. Sequence and view fire mission data for section B.
19. Enter technical fire control data for section B
20. Sequence and view computed fire command data for final adjustment for section B.

-----FFE FIRED-----

21. Sequence and view fire mission data for section A.

**Performance Steps**

22. End the mission, save the target, and record target for section A.
23. Sequence and view fire mission data for section B.
24. End the mission, save the target, and record target for section B.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute data for a split-section mission using a mortar ballistic computer (MBC).

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Entered grid, polar, or shift data to start mission for section A. | ____ | ____ |
| 2. Entered or changed WPN ammo data for section A. | ____ | ____ |
| 3. Sequenced and viewed computed fire command data for initial round for section A | ____ | ____ |
| 4. Entered, viewed, and transmitted firing information to FO for section A. | ____ | ____ |
| 5. Entered grid, polar, or shift data to start mission for section B. | ____ | ____ |
| 6. Entered WPN ammo data for section B. | ____ | ____ |
| 7. Sequenced and viewed computed fire command data for initial round for section B. | ____ | ____ |
| 8. Entered, viewed, and transmitted firing information to FO for section B. | ____ | ____ |
| 9. Sequenced and viewed fire mission data for section A. | ____ | ____ |
| 10. Entered adjustments to initial round for section A. | ____ | ____ |
| 11. Sequenced and viewed computed fire command data for second round for section A. | ____ | ____ |
| 12. Sequenced and viewed fire mission data for section B. | ____ | ____ |
| 13. Entered adjustments to initial round for section B. | ____ | ____ |
| 14. Sequenced and viewed computed fire command data for second round for section B. | ____ | ____ |
| 15. Sequenced and viewed fire mission data for section A. | ____ | ____ |
| 16. Entered technical fire control data for section A. | ____ | ____ |
| 17. Sequenced and viewed computed fire command data for final adjustment for section A. | ____ | ____ |
| 18. Sequenced and viewed fire mission data for section B. | ____ | ____ |
| 19. Entered technical fire control data for section B. | ____ | ____ |
| 20. Sequenced and viewed computed fire command data for final adjustments for section B. | ____ | ____ |
| 21. Sequenced and viewed fire mission data for section A. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 22. Ended the mission, saved the target, and recorded target for section A. | ____ | ____ |
| 23. Sequenced and viewed fire mission data for section B. | ____ | ____ |
| 24. Ended the mission, saved the target, and recorded target for section B. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**
FM 23-91
TM 9-1220-246-12&P

**Compute Data for a Final Protective Fire Using a Mortar Ballistic Computer**

**071-082-0022**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC); a call for fire; a blank DA Form 2399 (Computer's Record); a pencil; and corrections to adjust each mortar onto the final protective fire (FPF).

**Standards:** Entered all data manually and correctly into the mortar ballistic computer (MBC), sequenced and viewed fire-command data so that all data were within 1 mil for deflection and 1 mil for elevation, and so that no round impacted more than 50 meters short of the final protective fire (FPF) during the adjustment.

**Performance Steps**

1. The FPF is the highest priority mission fired by mortars. When the call to fire the FPF comes in, the section is ordered to check fire on any mission being conducted. This is done to bring the mortars onto the FPF data and to fire until given a cease fire or until all ammunition is exhausted. Therefore, care must be taken in planning, adjusting, and calling for the FPF to be fired.

NOTES:
1. The FPF is fired as a final effort to stop the enemy from overrunning the supported unit. When the enemy is beyond 200 meters, the commander cannot accurately determine that the position will be overrun; therefore, firing all mortar ammunition would be unwise.
2. Should there be dead space or a likely avenue of approach beyond 200 meters that the commander wants covered, this should be computed instead as a priority target.
3. During daylight, the mortars (when not firing) are laid on the priority target data.
4. During darkness or limited visibility, mortars (when not firing) are laid on the FPF data.

2. Since FPF is adjusted close to friendly forces (no more than 200 meters in front), the FO uses the creeping method of adjustment.

3. During the adjustment, the fire direction center (FDC) fires fuze delay on all adjusting rounds to reduce the danger to friendly forces.

4. Upon receiving the call for fire to adjust an FPF (Figure 1), the computer calculates firing data based on the call for fire and FDC order. He then records the data on the computer's record (Figure 2).

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P35 | FPF |

| | | |
|---|---|---|
| [X] ADJUST FIRE [ ] FIRE FOR EFFECT<br>[ ] IMMEDIATE SUPPRESSION | SHIFT FROM | POLAR<br>OT DIRECTION ALTITUDE<br>DISTANCE |
| GRID R/L 0035 7465<br>OT DIRECTION 0300<br>ALTITUDE | OT DIRECTION ALTITUDE<br>[ ] LEFT / [ ] RIGHT<br>[ ] ADD / [ ] DROP<br>[ ] UP / [ ] DOWN | [ ] UP / [ ] DOWN<br>VERTICAL ANGLE [ ] + / [ ] - |
| TARGET DESCRIPTION FPF ATT: 2000 L140 | | METHOD OF CONTROL S/R |
| METHOD OF ENGAGEMENT D/C | | MESSAGE TO OBSERVER 1200 |
| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND ROUNDS |

Figure 1. Call for fire.

**Performance Steps**

| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | SEC | DEFLECTION | | MORTAR TO FOLLOW | SEC | |
| MORTAR TO ADJ | #1 | DEFLECTION CORRECTION | ☐L ☐R | SHELL AND FUZE | HE D | |
| METHOD OF ADJ | IRD | RANGE | | | | |
| BASIS FOR CORRECTION | | | | MORTAR TO FIRE | | |
| SHEAF CORRECTION | L140 | WALT CORRECTION | ☐+ ☐- | METHOD OF FIRE | IRD S/R | |
| SHELL AND FUZE | HE D IN ADJ | | | | AMC | |
| | HE Q IN FFE | | | DEFLECTION | 1) 2) 3) 2548 2559 2549 4) 2540 | ④ |
| METHOD OF FFE | 20 RDS | RANGE CORRECTION | ☐+ ☐- | | | |
| RANGE LATERAL SPREAD | | | | CHARGE | 2 | |
| ZONE | | CHARGE/RANGE | 1874 | TIME SETTING | | |
| | | AZIMUTH | 1513 | | | |
| TIME OF OPENING FIRE | AMC | ANGLE T | 1210 | ELEVATION | 1220 1224 1228 1232 | |

Figure 2. FDC order and initial fire command.

NOTES:
1. The FO always sends the FPF location in code, unless both parties have secure radio capabilities.
2. The FDC never adds a safety buffer to the location sent by the FO.
3. The FO requests a S/R (section right), or S/L (section left) as the method of control.
4. If the FO fails to state in the call for fire that the grid he is sending is the left limit or the right limit of the FPF, the FDC must request he do so. If the FO sends a right limit grid, then the FPF direction and width extends toward the LEFT (L 140); if he sends a left limit, then the direction extends toward the RIGHT (R 140).

NOTE: The angle "T" must be computed manually for an FPF mission.

a. Upon receiving the initial fire command, the entire section fires one round (HE) with delay fuze).
b. The FO observes the impact of the rounds and determines which mortar's round impacted closest to the FPF line or to friendly forces. This mortar is referred to as the danger gun (Figure 3).

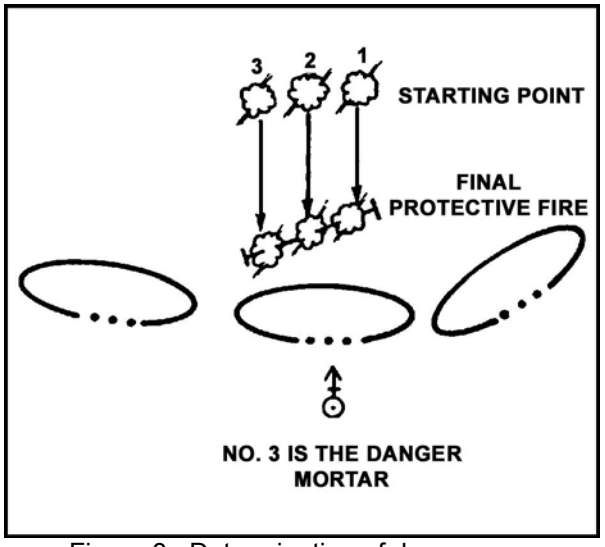



Figure 3. Determination of danger gun.

NOTE: The normal time interval between rounds fired by a platoon (right) (left) is 5 seconds. If the FO wants a different interval, he must specify it.

c. The FO adjusts the danger gun onto the FPF line using creeping fire.

**Performance Steps**

d. The procedure for computing the data is basically the same for an FPF as for any other mission, except that the computer must keep in mind that it is a danger-close mission. The computer must recheck the data and ensure that the commands given to the mortars are understood.
e. The computer continues the adjustment procedure for each mortar until rounds from each mortar impact in the proper position on the FPF.

NOTE: When conducting an FPF mission with the MBC, use only the FPF switch, SEQ switch, BACK switch, ALPHA NUMERIC switches, DISPLAY switches, and the COMPUTE switch. Using any other key could lock up the MBC.

5. To compute FPF data, the computer performs the following:
   a. Press the FPF switch. Using multiple choice entry, select INIT to initialize the FPF. Using numeric entry, enter the line number. Using alphanumeric characters, enter section and weapon number. Enter line numbers 1 and A1 (since the FO requested a S/R).

NOTE: An FPF is referred to by the MBC as a "line." The MBC can store three FPF lines in its memory banks.

   b. Press the SEQ switch. Select the shell/fuze combination for the mission. The default is HE PD.
   c. Press the SEQ switch. Enter the FO direction and 0300.
   d. Press the SEQ switch. Enter the FPF right limit and 00461 74604 (since A1 is the adjusting mortar).

NOTE: If firing a section right, enter a right limit FPF grid. If firing a section left, enter a left limit grid for the FPF.

6. If the computer conducts a registration after firing the FPF and determines firing corrections, the MBC applies those corrections to update the FPF data.
   a. Press the SEQ switch. Enter the FPF altitude, if given.
   b. Press the SEQ switch. Select the direction of the FPF line and the width of the FPF. The size of the FPF depends on the weapon type (Figure 4) and the tactical situation. Enter L 140 (81-mm width, 240 meters).

| SIZE (MILLIMETERS) | TYPE OF MORTAR | NUMBER OF MORTARS | APPROXIMATE WIDTH (METERS) | APPROXIMATE DEPTH (METERS) |
|---|---|---|---|---|
| 120 | M285 | 6 | 480 | 60 |
| | M285 | 3 | 300 | 60 |
| 107 | M30 | 6 | 320 | 40 |
| | | 4 | 240 | 40 |
| | | 3 | 200 | 40 |
| 81 | M29 | 4 | 210 | 40 |
| | | 3 | 175 | 40 |
| 81 | M252 | 4 | 240 | 50 |
| | | 3 | 200 | 50 |
| 60 | M224 | 2 | 120 | 30 |

Figure 4. Size of FPF and weapon type.

NOTES:
1. The direction of the FPF should be LEFT if the right flank mortar (No. 1) is adjusting or if firing a section RIGHT, and RIGHT if the left flank mortar is adjusting or if firing a section LEFT.
2. The approximate widths on Figure 4 are based on an open sheaf. Battlefield situations may dictate otherwise.

   c. Press the SEQ switch. Enter attitude, 2000 mils.

**Performance Steps**

d. Press the SEQ switch. Press the COMPUTE switch to determine firing data.
e. Sequence through the FIRE DATA menu, and record the data for each mortar (Figure 2). Once sequence is passed, No. 4 mortar's data, ADJ * will be displayed. Select DISPLAY switch No. 4 and Enter 1 (danger gun).
f. Press the SEQ switch. The MBC displays the direction to the target.
g. Press the SEQ switch. Enter the FO's correction for No. 1 mortar (danger gun). Enter R 50, sequence then enter Drop 100 (Figure 5). Record data on the computer's record.

| | OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| #1 | R50 | -100 | | | 1887 | #1 | IRD | 2507 | 2 | | 1216 | (5) |
| | | +25 | #1 ADJ REPORT #2 | | 1894 | #1 | DNF | 2520 | 2 | | 1215 | |
| | | | | | | #2 | IRD | 2511 | 2 | | 1219 | (6) |
| #2 | L100 | -50 | | | 1767 | #2 | IRD | 2502 | 2 | | 1245 | (7) |
| | | -25 | #2 ADJ REPORT #3 | | 1760 | #2 | DNF | 2488 | 2 | | 1247 | |
| | | | | | | #3 | IRD | 2478 | 2 | | 1251 | (8) |
| #3 | R25 | | #3 ADJ REPORT #4 | | 1768 | #3 | DNF | 2473 | 2 | | 1245 | |
| | | | | | | #4 | IRD | 2463 | 2 | | 1249 | (9) |
| #4 | L25 | | #4 ADJ FPF ADJ | | 1729 | #4 | DNF | 2467 | 2 | | 1254 | |
| | | | | | | EOM | FPF | ADJ | | | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 5. Firing data for each mortar.

h. Sequence through until PUSH COMPUTE is displayed. Press COMPUTE to determine the firing data for No. 1 mortar; sequence past data for other mortars. ADJ * will be displayed. Select the DISPLAY switch No. 4, enter weapon number to adjust, and enter the FO's next correction. Repeat these steps until all mortars are adjusted and the MBC displays ADJ COMPLETE. The computer must finish adjusting one mortar at a time before entering adjustments for other mortars otherwise the MBC calculates that mortar as adjusted.

NOTE: To determine the range and azimuth for each round, select the FPF switch. The display should show INIT ADJ DTA CLR, and the indicator light should be flashing above the SEQ switch. Press the SEQ switch; SFTY is displayed. Select DISPLAY switch No. 1; SFTY FPF LINE: is displayed. Enter No. 1 and SEQ once and record the range and azimuth.

i. The FPF data for the section may be reviewed at any time by using the FPF menu switch.
   (1) Press the FPF switch. Then select "DTA" for data.
   (2) Press the SEQ switch. Enter the FPF line number for the sections FPF and enter 1.
   (3) Sequence through the displays to review each mortar's data.

**Evaluation Preparation:** SETUP: At the test site, provide all materials, equipment, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier that he will be tested on the ability to correctly compute final protective fire (FPF) using the mortar ballistic computer (MBC).

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Not to be scored in sequence. | | |
| 1. Correctly entered all data in the MBC without error. | ____ | ____ |
| 2. Determined and recorded deflection, charge, and elevation for each round fired. | ____ | ____ |
| 3. Determined and recorded the range and azimuth to the FPF location. | ____ | ____ |
| 4. Determined and recorded angle "T" and told the FO if angle T was greater than | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 500 mils. | | |
| 5. Reviewed FPF data once the mortars were adjusted. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

**Compute Data for a Quick-Smoke Mission Using a Mortar Ballistic Computer**
**071-082-0023**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC), a call for fire, a smoke chart, three corrections for the high-explosive adjustment phase; a blank DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Entered all data manually and correctly into the mortar ballistic computer (MBC), and sequenced and viewed all fire-command data to within 1 mil for deflection and 1 mil for elevation. Determined the exact number of white phosphorus (WP) rounds needed for a quick-smoke mission to screen the target area and the time interval between rounds.

**Performance Steps**
NOTES:
1. Quick-smoke is a screening smoke mission used to place a curtain of smoke between enemy observers and friendly units to mask friendly maneuvers, or to deceive and confuse the enemy as to the nature of friendly operations. Authority to fire smoke missions rests with the highest commander whose troops will be affected.
2. Quick-smoke missions are normally planned missions, because WP rounds are a small part of the basic load. Therefore, more WP ammunition must be requested to fire the mission. The computer determines the number of rounds the mission requires based on the worst conditions likely to exist at the time the mission is fired.

1. The computer computes a quick-smoke mission the same as a normal HE adjust fire mission, except when required to place a curtain of smoke between enemy observers and friendly units (Figure 1).

**Performance Steps**

| RELATIVE HUMIDITY (PERCENT) | TEMPERATURE GRADIENT | WIND SPEED, KNOTS 2 | 4 | 9 | 13 | 18 | 22 | 26 |
|---|---|---|---|---|---|---|---|---|
| 30 | LAPSE | 13 | 13 | 11 | 11 | 13 | | |
| | NEUTRAL | 9 | 9 | 7 | 7 | 9 | 9 | 11 |
| | INVERSION | 6 | 6 | 4 | | | | |
| 60 | LAPSE | 9 | 9 | 7 | 9 | 9 | | |
| | NEUTRAL | 6 | 6 | 4 | 4 | 6 | 7 | 9 |
| | INVERSION | 3 | 3 | 3 | | | | |
| 90 | LAPSE | 7 | 7 | 6 | 6 | 7 | | |
| | NEUTRAL | 4 | 4 | 3 | 3 | 4 | 6 | 6 |
| | INVERSION | 3 | 3 | 3 | | | | |

- FOR QUARTERING WINDS—MULTIPLY TABLE VALUES BY 2.
- FOR TAILWINDS—MULTIPLY TABLE VALUES BY 2.
- FOR HEADWINDS—MULTIPLY TABLE VALUES BY 2.5.
- FOR SHELL IMPACT ON LAND—USE TABLE QUANTITIES SHOWN.
- FOR WATER IMPACTS—MULITPLY TABLE VALUES BY 1.4.
- FOR CURTAINS GREATER OR LESS THAN 500 METERS IN WIDTH—SCALE THE TABLE VALUES UP OR DOWN PROPORTIONALLY.
- FOR ESTABLISHING A SMOKE CURTAIN—EMPLOY VOLLEY FIRE USING TWICE THE TABLE VALUE (BUT NOT LESS THAN 10 ROUNDS).

A. SMOKE CURTAIN. NUMBER OF WP ROUNDS PER MINUTE TO MAINTAIN A SMOKE CURTAIN ON A 500-METER FRONT IN FLANK WINDS (AS SHOWN IN THE CHART ABOVE).

B. OBSCURING SMOKE EFFECT. THE NUMBER OF ROUNDS PER MINUTE REQUIRED TO MAINTAIN AN OBSCURING SMOKE EFFECT ON A 100-METER FRONT (OBTAINED BY DOUBLING THE VALUES SHOWN IN THE CHART ABOVE).

Figure 1. Smoke chart.

a. The upwind flank mortar is the adjusting mortar for the mission.
b. The last adjusting round is a WP round (adjustment phase).
c. Before the FDC order can be determined, the number of WP rounds for the method of FFE must be computed.
d. The needed weather information can be obtained from S2, the FO, a MET, or by estimation. Once the weather information is obtained, use the smoke chart to determine the number of rounds required for each minute.

2. The computer computes the required rounds.
   a. For a mortar platoon to fire a quick-smoke mission, WP must be ordered and stockpiled before the mission.
   b. When determining the number of rounds required for the mission, the computer must know the length of time that the screen is to be maintained. This information should be passed to the FDC by either the commander calling for the mission, by the platoon leader, or by the fire support officer (FSO).
   c. The quick-smoke mission is fired in three phases.
      (1) Adjustment phase: One round of WP is fired as the last adjusting round.
      (2) Establishment phase: This is twice the number of rounds required to maintain for one minute, but never less than 12 rounds.
      (3) Maintenance phase: This is the determined number of rounds for one minute times the

**Performance Steps**

duration of the mission.
EXAMPLE: weather conditions--
- o 30 percent relative humidity.
- o Lapse condition.
- o 2-knot wind speed.

With these weather conditions present, the smoke chart (Figure 1) indicates that 13 rounds are required for each minute for a 500-meter front.

d. The formula for a quick-smoke mission follows:
ADJUSTMENT PHASE: Always use 1 round of WP to confirm the adjustment of the HE round.
ESTABLISHMENT PHASE: 4/5 meters front X 13 from smoke card/1 minute = 52/5 = 10.4 Always round up.
10.4 (number of rounds for 1 minute) = 11; 11 X 2 = 22 (number of rounds to establish).
Number of rounds for FDC ORDER: 22 rounds to establish, divided by the number of mortars, 4 = 5.5
Since 5.5 rounds cannot be fired, increase the number of rounds to establish until it can be divided evenly by the number of mortars.
24/4 = 6 rounds for the FFE in the FDC ORDER
MAINTENANCE PHASE: 11 rounds for 1 minute X the duration (10 minutes) = 110 rounds to maintain. 11 rounds (for 1 minute) divided into 60 seconds = 5.4 (always round time down) = 5 seconds between rounds in the maintenance phase.
Adjustment phase: 1 WP
Establishment phase: 24 WP
Maintenance phase: 110 WP
Total rounds: 135 WP

NOTE: The time used during the establishment phase is not considered part of the maintenance phase of the mission.

3. The FO sends a call for fire (Figure 2). The computer records the call for fire on the computer's record.

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P35 | AB0012 |

☒ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID 015 755
DT DIRECTION 0700
ALTITUDE

SHIFT FROM
DT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
DT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

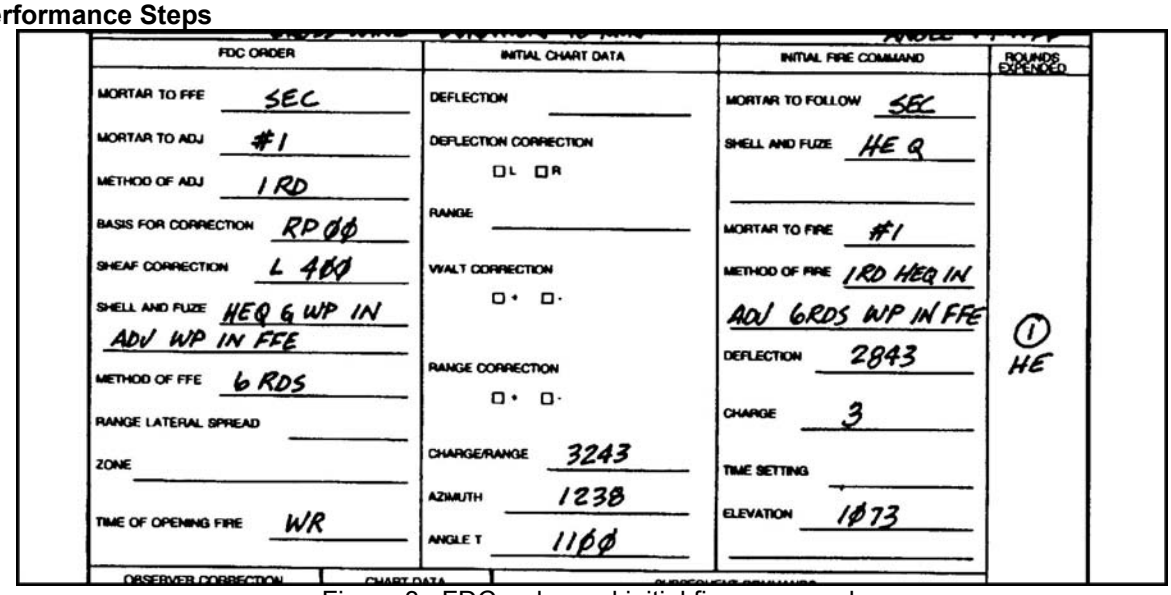
TARGET DESCRIPTION SCREEN WOOD LINE 400 MTRS ATT. 1700
METHOD OF ENGAGEMENT CROSS WIND DURATION 10 MIN
METHOD OF CONTROL
MESSAGE TO OBSERVER ANGLE T: 1100

FDC ORDER

Figure 2. Call for fire.

4. The computer computes the call for fire by entering the FDC order and the initial fire command (Figure 3) on the computer's record.

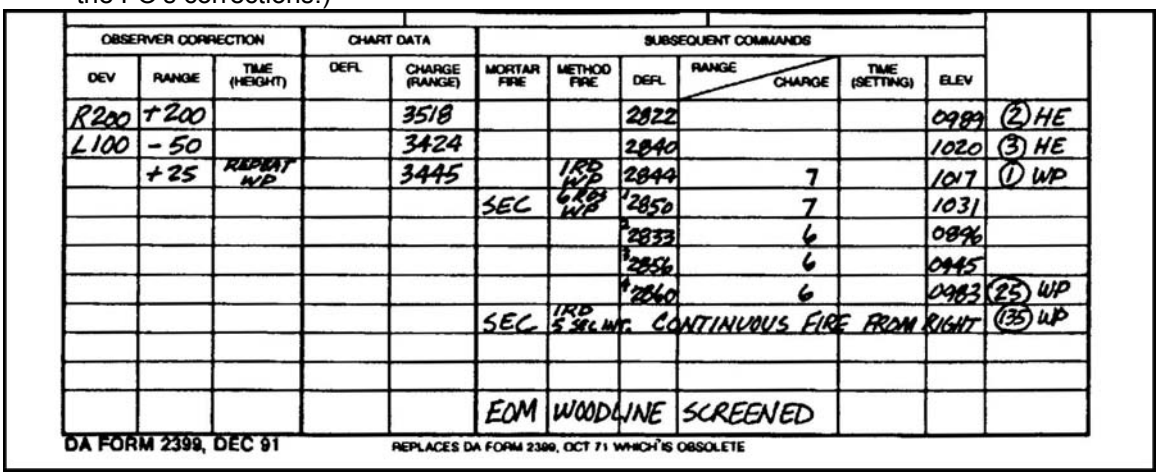
**Performance Steps**



| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | SEC | DEFLECTION | | MORTAR TO FOLLOW | SEC | |
| MORTAR TO ADJ | #1 | DEFLECTION CORRECTION | | SHELL AND FUZE | HE Q | |
| METHOD OF ADJ | 1 RD | ☐L ☐R | | | | |
| BASIS FOR CORRECTION | RP ØØ | RANGE | | MORTAR TO FIRE | #1 | |
| SHEAF CORRECTION | L 4ØØ | WALT CORRECTION | | METHOD OF FIRE | 1RD HEQ IN | |
| SHELL AND FUZE | HEQ & WP IN | ☐+ ☐- | | ADJ 6RDS WP IN FFE | | ① |
| | ADJ WP IN FFE | | | DEFLECTION | 2843 | HE |
| METHOD OF FFE | 6 RDS | RANGE CORRECTION | | | | |
| RANGE LATERAL SPREAD | | ☐+ ☐- | | CHARGE | 3 | |
| ZONE | | CHARGE/RANGE | 3243 | TIME SETTING | | |
| | | AZIMUTH | 1238 | | | |
| TIME OF OPENING FIRE | WR | ANGLE T | 11ØØ | ELEVATION | 1Ø73 | |
| OBSERVER CORRECTION | | CHART DATA | | SUBSEQUENT COMMANDS | | |

Figure 3. FDC order and initial fire command.

a. Enter the fire request using the grid menu. Assign the upwind mortar, A1, as the adjusting mortar in the WPN/AMMO menu, and determine the firing data. Use the ADJ menu to enter the corrections sent by the FO until he calls back, "Repeat WP." Use the WPN/AMMO menu to change the shell type to WP and compute the firing data. (See Figure 4, [computer's record] for the FO's corrections.)



| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R200 | +200 | | | 3518 | | | 2822 | | | 0989 | ② HE |
| L100 | - 50 | | | 3424 | | | 2840 | | | 1020 | ③ HE |
| | +25 | REPEAT WP | | 3445 | | 1RD WP | 2844 | 7 | | 1017 | ① WP |
| | | | | | SEC | 6RDS WP | 2850 | 7 | | 1031 | |
| | | | | | | | 2833 | 6 | | 0896 | |
| | | | | | | | 2856 | 6 | | 0945 | |
| | | | | | | | 2860 | 6 | | 0983 | (25) WP |
| | | | | | SEC | 1RD 5.56 WP | CONTINUOUS FIRE FROM RIGHT | | | | (135) WP |
| | | | | | EOM | WOODLINE | SCREENED | | | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 4. FO's corrections.

b. Use the TFC menu to enter a special sheaf. Since the flank mortar will be used, select FLANK and enter the width of the target, L 400. The upwind mortar is A1 and the area is 400 meters long; enter the attitude of the target, 1700. Select FFE and PUSH COMPUTE to receive the firing data for the mortars.

5. Control of the FFE.
   a. When the FO calls for the FFE, the establishment phase is fired as rapidly as safety permits.
   b. The first round of the maintenance phase is fired almost immediately after the establishment phase. Volley fire is then continued at the time interval determined for the maintenance phase.
   c. The commander who ordered the screening mission controls the end of mission; however, he may order the screen to be maintained beyond the scheduled termination time.
   d. Once the end of mission is given, the computer presses the EOM switch and saves it as a known point, recording it on the data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the material and information given to compute data for a quick-smoke mission.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Determined and recorded deflection, charge, and elevation for each round fired. | ____ | ____ |
| 2. Correctly entered all data in the MBC without error. | ____ | ____ |
| 3. Determined the number of WP rounds for the FDC order (ADJ/EST phase). | ____ | ____ |
| 4. Determined the total number of WP rounds for the mission. | ____ | ____ |
| 5. Determined the number of seconds between WP rounds (maintenance phase). | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for an Immediate-Suppression or Smoke Mission Using a Mortar Ballistic Computer**
**071-082-0024**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC), an immediate suppression or smoke call-for-fire, a blank DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); and a pencil.

**Standards:** Entered or corrected all data in the mortar ballistic computer (MBC) (if data was present from previous missions) to accurately reflect information provided by either the forward observer (FO), the firing section, the chief computer, peer computers, the unit chain of command, the fire-support team (FIST), or supporting artillery.

**Performance Steps**
NOTE: The difference between "immediate" and normal missions is that the first rounds are fired for effect. The missions are entered in the normal fashion, with one exception: FFE is selected in the first menu of the COMPUTE sequence. As a result, fire data for all guns will be furnished at the end of the sequence.

1. Enter data to start mission.
2. Enter or change weapons/ammunition data.
3. Enter technical fire-control data, including FFE mode.
4. Compute and view computed fire command data.
5. End the mission, and save (if needed) and record the target

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute data for an immediate suppression or smoke mission using a mortar ballistic computer (MBC).

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Entered data to start mission. | ____ | ____ |
| 2. Entered or changed weapons/ammunition data. | ____ | ____ |
| 3. Entered technical fire control data, including FFE mode. | ____ | ____ |
| 4. Computed and viewed computed fire command data. | ____ | ____ |
| 5. Ended the mission, and saved and recorded the target. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |
| | TM 9-1220-246-12&P |

**Enter a Meteorological Message Using a Mortar Ballistic Computer**

**071-082-0025**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC), a blank DA Form 3677-R, computer MET Message; and pencil.

**Standards:** Correctly wrote all MET message data on the blank DA Form 3677-R and entered it into the mortar ballistic computer (MBC) without error.

**Performance Steps**

1. The M23 MBC does not use the same ballistic MET data that FDC personnel use when using the M16 plotting board. Instead, the computerized MET is used. When no MET is available, the MBC uses the STANDARD MET that is stored within the mortar ballistic computer. The MET menu has two files--NEW and CURRENT. When a new MET message is received, it is entered into the MBC using the NEW file in the MET menu. Only after the UPDATE option is selected does the NEW MET become the CURRENT MET and apply to firing data.
   a. To place fire on a target without adjustment, a mortar unit must know the exact location of the target and compensate for all nonstandard conditions.
   b. The computer MET message (Figure 1) has two parts: the introduction, which identifies and describes the MET station; and the body, which contains MET data. MET messages can normally be obtained from the division artillery MET station every four hours.

| GROUP 1 | | GROUP 2 |
|---|---|---|
| METCM1 | | 344985 |
| GROUP 3 | | GROUP 4 |
| 071010 | | 049982 |
| | INTRODUCTION | |
| 00320006 | | 29570982 |
| 01280014 | | 29650971 |
| 02304013 | | 29070938 |
| 03347014 | | 28430885 |
| 04390008 | | 28020834 |
| 05504007 | | 28080783 |
| 06452016 | | 27860744 |
| 07477013 | | 27400699 |
| 08525013 | | 27080651 |
| | BODY | |

Figure 1. Computer MET message introduction and body.

2. The computer records the MET message on DA Form 3677-R. He broadcasts the MET message in six-character blocks as shown in Figure 1. The first four six-character groups comprise the introduction, and go on the top line of the form. The rest of the message goes in the body, each line of which consists of two eight-character groups. Figure 2 shows an example of a completed DA Form 3677-R.

**Performance Steps**

**COMPUTER MET MESSAGE**

For use of this form, see FM 6-15; the proponent agency is TRADOC.

| IDENTIFICATION | OCTANT | LOCATION $L_aL_aL_a$ or xxx | LOCATION $L_oL_oL_o$ or xxx | DATE | TIME (GMT) | DURATION (HOURS) | STATION HEIGHT (10's M) | MDP PRESSURE MB |
|---|---|---|---|---|---|---|---|---|
| METCM | Q | | | YY | $G_QG_QG_Q$ | G | hhh | $P_dP_dP_d$ |
| METCM | 1 | 344 | 985 | 07 | 101 | 0 | 049 | 982 |

| ZONE HEIGHTS METERS | LINE NUMBER | ZONE VALUES: WIND DIRECTION (10s M) | WIND SPEED (KNOTS) | TEMPERATURE (1/10°K) | PRESSURE (MILLIBARS) |
|---|---|---|---|---|---|
| | ZZ | ddd | FFF | TTTT | PPPP |
| SURFACE | 00 | 320 | 006 | 2957 | 0982 |
| 200 | 01 | 280 | 014 | 2965 | 0971 |
| 500 | 02 | 304 | 013 | 2907 | 0938 |
| 1000 | 03 | 347 | 014 | 2843 | 0885 |
| 1500 | 04 | 390 | 008 | 2802 | 0834 |
| 2000 | 05 | 504 | 007 | 2808 | 0783 |
| 2500 | 06 | 452 | 016 | 2786 | 0744 |
| 3000 | 07 | 477 | 013 | 2740 | 0699 |
| 3500 | 08 | 525 | 013 | 2708 | 0651 |
| 4000 | 09 | | | | |
| 4500 | 10 | | | | |
| 5000 | 11 | | | | |
| 6000 | 12 | | | | |
| 7000 | 13 | | | | |
| 8000 | 14 | | | | |
| 9000 | 15 | | | | |
| 10000 | 16 | | | | |
| 11000 | 17 | | | | |
| 12000 | 18 | | | | |
| 13000 | 19 | | | | |
| 14000 | 20 | | | | |
| 15000 | 21 | | | | |
| 16000 | 22 | | | | |
| 17000 | 23 | | | | |
| 18000 | 24 | | | | |
| 19000 | 25 | | | | |
| 20000 | 26 | | | | |

| FROM TC | DATE AND TIME (GMT) | DATE AND TIME (LST) |
|---|---|---|
| MESSAGE NUMBER | RECORDER | CHECKED |

DA FORM 3677-R, MAY 92 PREVIOUS EDITION OF THIS FORM MAY BE USED UNTIL EXHAUSTED.

Figure 2. Example of a completed MET message.

3. At the end of the transmission of a MET message, the computer checks to see that his copy is complete. The format of the message enables him to ask for a repetition of only the part he has missed, as in, "Say again introduction," or "Say again line zero four." When his copy is complete, the computer reads back the entire message to check it for errors. If he has recorded line 05 incorrectly, the transmitting station would notice the error and report, "Wrong, line zero five: 052618 998962."

4. The following information provides the fire direction center (FDC) and the computer with the procedures for computing the MET message:
   a. Press the MET switch. MET NEW CURRENT is displayed. Using multiple choice entry, select NEW.
   b. Press the SEQ switch. Enter the quadrant number, then enter 1 (Figure 2).
   c. Press the SEQ switch. Enter the latitude and longitude (344 and 985, see Figure 2).
   d. Press the SEQ switch. Enter the day of month and time of the MET message in GMT ( 07 and 101, see Figure 2).

**Performance Steps**

e. Press the SEQ switch. Enter the station altitude and atmospheric pressure (049 and 982, see Figure 2).
f. Press the SEQ switch. Enter line 00 wind direction and speed (320 and 006, see Figure 2).
g. Press the SEQ switch. Enter line 00 temperature and air pressure (2957 and 0982, see Figure 2).
h. Press the SEQ switch. Continue to enter the rest of the MET message through line 08. After line 08, UPDATE MET* will be displayed. Using the multiple choice entry, select the flashing asterisk (*) to update the standard MET stored in the MBC, placing the NEW MET in the CURRENT MET FILE while retaining a copy in the NEW file.
i. If while checking the MET in the current MET file an error is discovered in the data, select the MET switch at the initialization keys. MET: NEW CURRENT is displayed. Select NEW. Sequence through the message until the line number where the error was detected is displayed; correct the error. Sequence through until UPDATE MET is displayed, and press DISPLAY switch number three under UPDATE MET*.

**Evaluation Preparation:** SETUP: At the test site, provide those items shown in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use a blank DA Form 3677-R to record the MET message. Tell him that you will read the MET message to him just as he would hear it over the radio. Tell the soldier that after writing the message, he must enter it into the mortar ballistic computer (MBC).

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Recorded the MET message without error. | ____ | ____ |
| 2. Entered all data in the MBC without error. | ____ | ____ |
| 3. Updated MET after entering the entire message. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |
| | FM 6-15 |

**Determine a Location by Resection, Intersection, or Traverse Using a Mortar Ballistic Computer**
**071-082-0026**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC) and one of the following located within the initialized area:

1. One unknown point and two known points; the direction from the two known points to the single unknown point; and either the vertical angle from one of the two known points to the single unknown point or from the single unknown point to one of the two known points.

2. One known point, one unknown point, the direction from the known point to the unknown point, and the vertical angle from the known point to the unknown point.

**Standards:** Determined the actual location of the unknown point.

**Performance Steps**
NOTE 1: If the MBC fails to display the options described in the steps, perform a system self-test. Report any malfunction or repeated failure to function to your supervisor.

1. Determine the method of location to be used.
    a. Use resection if you know the azimuths from the unknown point to the known points.
    b. Use intersection if you know the azimuths from the known points to the unknown point.
    c. Use traversing if you know the distance and direction from the known point to the unknown point.

2. Perform a resection.
    a. Press the SURV switch.
    b. Select RES from the menu.
    c. Enter first KNPT/TGT number and azimuth.

NOTE 2: The MBC requires the vertical angle from only one known point, so enter the known point from which you know the vertical angle.

    d. Press the SEQ switch.
    e. Enter vertical angle (up/down).
    f. Press the SEQ switch.
    g. Enter second KNPT/TGT number and azimuth.
    h. Press the SEQ switch.
    i. Select and press the COMPUTE switch.
    j. Read the coordinates for the unknown point.
    k. Press the SEQ switch.

NOTE 3: The unknown point altitude will be valid only if you entered the angle in steps 2(e).

    l. Read the computed altitude of the unknown point.
    m. Press the SEQ switch.
    n. Store BP FO KNPT information as required.
    o. Assign TGT number and store data.

NOTE 4: Once data is stored, the MBC displays READY.

3. Perform an intersection.
    a. Press the SURV switch.
    b. Select INT from the menu.
    c. Select FOs or KNPTs from the menu.
    d. Enter first FO/KNPT number and azimuth to the known point.
    e. Press the SEQ switch.
    f. Enter the vertical angle (up/down).
    g. Enter the second FO/KNPT number and azimuth to the known point.
    h. Press the SEQ switch.
    i. Select/press the COMPUTE switch.

**Performance Steps**

j. Read the coordinates of the unknown point.
k. Press the SEQ switch.

NOTE 5: The unknown point altitude will only be valid if you entered the angle in step 3(f).

l. Read the computed altitude of the unknown point.
m. Press the SEQ switch.
n. Assign a TGT number/store DATA.

NOTE 6: When the TGT/DATA is entered, the display will indicate READY.

4. Perform a traverse.
   a. Press the SURV switch.
   b. Select/press the TRV switch.
   c. Enter KNPT/TGT number and azimuth to the unknown point.
   d. Press the SEQ switch.
   e. Enter the horizontal or slant distance.
   f. Press the SEQ switch.
   g. Enter the vertical angle (up/down).
   h. Press the SEQ switch.
   i. Press the COMPUTE switch.
   j. Read the coordinates of the unknown point.
   k. Press the SEQ switch.

NOTE 7: The unknown point altitude will only be valid if you entered the angle in step 4(g).

   l. Read the altitude of the unknown point.
   m. Press the SEQ switch.
   n. Assign TGT number/store data or continue with another traverse mission.
   o. Press the SEQ switch for a READY display.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to determine a location by resection, intersection, or traverse using a mortar ballistic computer (MBC).

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed a resection. | ____ | ____ |
| 2. Performed an intersection. | ____ | ____ |
| 3. Performed a traverse. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |
| | TM 9-1220-246-12&P |

**Operate a Mortar Ballistic Computer Using a Digital Message Device**

**071-082-0027**

**Conditions:** As a computer in a fire-direction center (FDC), given an initialized mortar ballistic computer (MBC) interfaced with a digital message device (DMD); signal operation instructions (SOI); a blank DA Form 2399 (Computer's Record); a blank DA Form 2188-R (Data Sheet); a pencil; and the requirement to conduct fire missions.

**Standards:** Transmitted requested information to the forward observer (FO) using the DMD. Received, integrated, and recorded the FO's DMD messages into the computer.

**Performance Steps**

NOTE 1: Perform the following steps as dictated by the situation--see the appropriate CUES and NOTES.

1. Initiate a self-test on the MBC-DMD system.
   a. TEST switch (press).
   b. XMIT TEST appears (select XMIT).
   c. ROUTE__ __XMIT appears (enter route #, select XMIT).
   d. XMITTING appears (wait for message).
   e. ACK or NO RESP ENTRY appears (respond using [1] or [2]).
      (1) ACK indicates the system is functional--the element is complete.
      (2) NO RESP ENTRY indicates the system is nonfunctional. Try to more times. If unsuccessful, troubleshoot the system. If the system cannot be repaired, report it.

2. Transmit a messager to the FO using the DMD (MBC sequence):
   a. XMIT switch (press).
   b. MTO CMD appears (select XMIT).
   c. Seq - ADJ WPN:XX appears (confirm).
   d. Seq - NR VOL:__ appears (enter number of volleys).
   e. Seq - NR UNITS appears (use CLEAR ENTRY switch and enter number of units to FFE).
   f. Seq - PR ERR:XX appears (record).
   g. Seq - ADJ SF:XXX adj shell/fuze appears (confirm).
   h. Seq - 1ST SF:XXX 1st FFE round shell/fuze appears (confirm).
   i. Seq - SUBS SF:XXX subsequent round shell/fuze appears (confirm).
   j. Seq - MOE: XX appears (confirm).
   k. Seq - CON: XX appears (confirm).
   l. Seq - TOF: XXX appears (record).
   m. Seq - ANG T:XXXX appears (record).
   n. Seq - FO MSN:X appears (record).
   o. Seq - FO:X/XX ROUTE:X appears (confirm).
   p. Seq - [XX] *XMIT appears (enter COMSEC code from SOI and select *XMIT when ready to transmit).
   q. XMITTING appears (wait).
   r. ACK or NO RSP RETRY 1 appears (respond as described in step 1e).

3. Send a shot/splash message.
   a. XMIT switch (press).
   b. MTO CMD appears (select CMD).
   c. MSN:X TN:XXXX appears (confirm).
   d. Seq - FI INFO:SHOT appears (accept default).

NOTE 2: Other choices are available at the FI INFO:SHOT display: SPLASH, DESIG, FIRE, CKFR, ALL, and READY.

   e. Seq - DIGITAL MANUAL appears (select DIGITAL; MANUAL is selected for voice transmission).
   f. Seq - FO:X/XX ROUTE:X appears (confirm).
   g. Seq - [XX]D SHOT appears (enter COMSEC code for shot).

**Performance Steps**

h. Seq - [XX]D SPLASH appears (enter COMSEC code for splash).
i. Seq - *XMIT appears (press when round is fired).
j. XMITTING appears (monitor).
k. SPLASH appears (monitor).
l. XMITTING reappears (monitor).
m. ACK or NO RSP RETRY 1 appears (respond as described in step 1e).

4. Receive a DMD transmitted fire request.
   a. MSG indicator flashes (press MSG switch).
   b. FR GRID (or POLAR, SHIFT) appears (record).
   c. Seq - [XX] FO:X/00appears (record).
   d. Seq - MSN:X TN:XXXXXX appears (record).
   e. Seq - DIR:XXXX appears--FO direction (record).
   f. Seq - E:XXXXX N:XXXXX appears (record).
   g. Seq - ALT:XXXX appears (record).

NOTE 3: If the situation dictates, proceed to WPN/AMMO, TFC, and COMPUTE without viewing the remainder of the steps in this sequence. See NOTE 4, if steps 4h through 4o are to be bypassed.

   h. Seq - TYPE:XXXXXX type target appears (record).
   i. Seq - DOP:XXXX degree of protection appears (record).
   j. Seq - RAD:XXXX radius of target appears (record).
   k. Seq - STR:XXXX strength of target appears (record).
   l. Seq - SH/FZ:XXX VOL:_ appears (record/enter VOL if known).
   m. Seq - CON:XX appears (record).
   n. Seq - PRI:XXXX PZ_ appears (record).
   o. Seq - READY appears (proceed to WPN/AMMO entry as with a normal GRID, POLAR, or SHIFT mission).

NOTE 4: Continue entering mission data using WPN/AMMO, TFC, and COMPUTE sections of a GRID, SHIFT, or POLAR Mission, based on the type of mission being fired. For procedure outlines, see the applicable task referenced in step 4o.

5. Receive a subsequent adjustment message.
   a. MSG switch (press).
   b. SUBQ ADJUST appears (prepare to record).
   c. Seq - [XX]D FO:X/XXappears (record).
   d. Seq - MSN:X TN:XXXXXX appears (record).
   e. Seq - DIR:XXXX appears (record).
   f. Seq - DEV:XXXXX appears (record).
   g. Seq - RN:(+-)XXXX appears (record).
   h. Seq - HGT:XXXX appears (record).
   i. Seq - OBSN:XX appears (record).
   j. Seq - SH/FZ:XXX appears (record).
   k. Seq - CON:XX appears (record).
   l. Seq - ADJUST CLEAR END appears (select ; ADJUST enters corrections, CLEAR deletes the message, and END retains the message without processing the data.)
   m. READY appears

NOTE 5: Continue to compute the adjustment using the COMPUTE switch.

6. Receive additional messages via MBC using DMD:.
   a. Fire request using grid coordinates.
   b. Fire request using shift from a known point.
   c. Fire request using polar coordinates.
   d. FO location data.
   e. Subsequent adjustment to fire request.
   f. Precision adjustment.
   g. Fire request using laser data.
   h. Subsequent adjustment to laser fire request.

**Performance Steps**

i. End of mission data and surveillance data.
j. Request for final protective fire.
k. Quick fire request on a known point.
l. Quick fire request on a known target
m. FO request to assign known point number.
n. FO command message.
o. High burst mean point of impact.
p. Front line trace data.
q. Radar registration data.
r. Free text messages.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to operate a mortar ballistic computer (MBC) using a digital message device.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Initiated a self-test on the MBC-DMD system. | ____ | ____ |
| 2. Transmitted a message to the forward observer using the DMD. | ____ | ____ |
| 3. Sent a shot/splash message. | ____ | ____ |
| 4. Received a DMD transmitted-fire request. | ____ | ____ |
| 5. Received a subsequent adjustment message. | ____ | ____ |
| 6. Received additional messages. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**
FM 23-91
TM 9-1220-246-12&P

**Maintain a Mortar Ballistic Computer**

**071-082-0028**

**Conditions:** As a computer in a fire-direction center (FDC), given a mortar ballistic computer (MBC) complete with carrying case, cables, accessories, and cleaning supplies, including clean water, mild soap, soft cloth, and stiff bristle brush.

**Standards:** Cleaned and inspected the mortar ballistic computer (MBC); corrected any faults within own ability; and reported all others.

**Performance Steps**

1. The section leader enforces safety measures.

DANGER: DO NOT BURN, CHARGE, OR MUTILATE USED BATTERIES. EXPLOSION OR TOXIC FUMES COULD RESULT.

WARNING: Do not start vehicle when MBC is turned on. Equipment damage could result.

   a. Used batteries must be disposed of IAW unit SOP.
   b. When the MBC is hooked up to an external vehicular battery or power source, ensure that the MBC is turned OFF before starting the vehicle's engine.

2. The computer inspects the MBC before operation.
   a. Inspect the MBC for completeness. All cables and accessories should be present that are required to support the unit's mission (Figure 1).

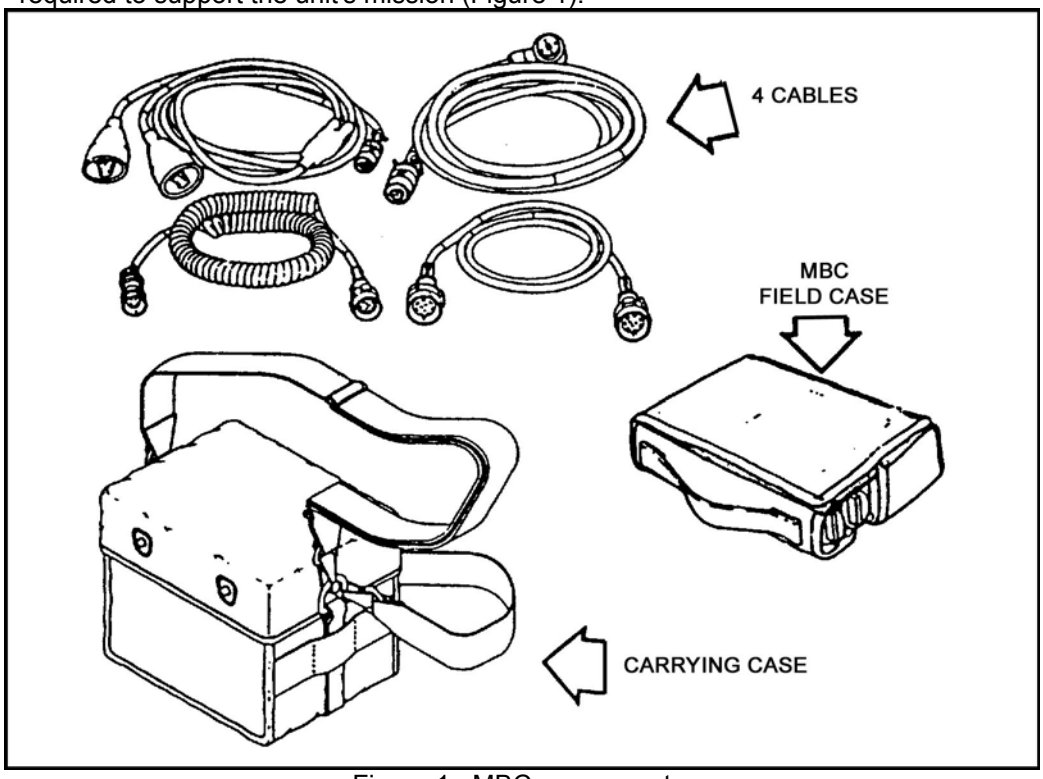



Figure 1. MBC components.

   b. Check the surface of MBC for dust, dirt, oil, grease, or moisture. The display, keyboard, and other exterior surfaces should be clean and dry.
   c. Check latches to make sure they function properly.

WARNING: Never use sharp objects, such as a pencil, to press the keys. This could permanently damage the MBC.

   d. Check the keyboard to ensure surface is free of punctures or cracks. Avoid cutting the

**Performance Steps**

keyboard surface by using a blunt object to press the keys.

NOTE: If the keyboard surface is punctured, the MBC is no longer waterproof.

e. Check the internal battery for swelling and leakage.

NOTE: If the MBC is not to be used for more than 30 days, remove the battery.

f. Check the cables for damaged insulation or bent connectors. Make sure all cables are in good condition.

g. Check the MBC field case and carrying case to ensure they are free of torn fabric and straps. The field case must provide adequate protection.

h. Inspect the bottom of the MBC. Make sure the rubber caps over the connector are serviceable (Figure 2).

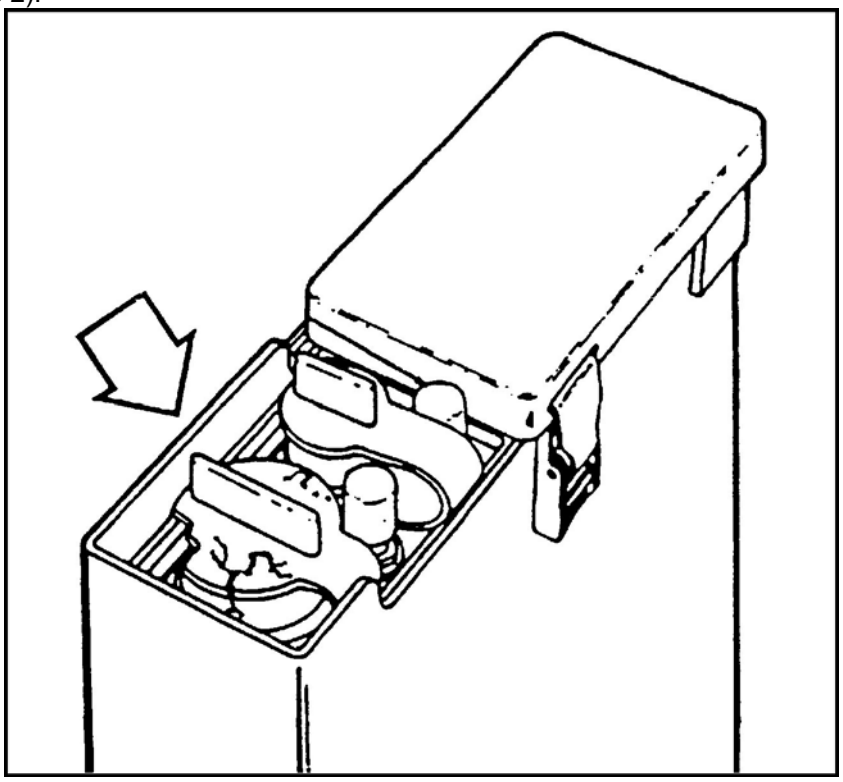


Figure 2. Unserviceable cable connector rubber caps.

i. Check the battery compartment cover, the cover's rubber gasket and plastic spacer, battery straps, battery compartment, and battery connectors (Figures 3 and 4).

**Performance Steps**

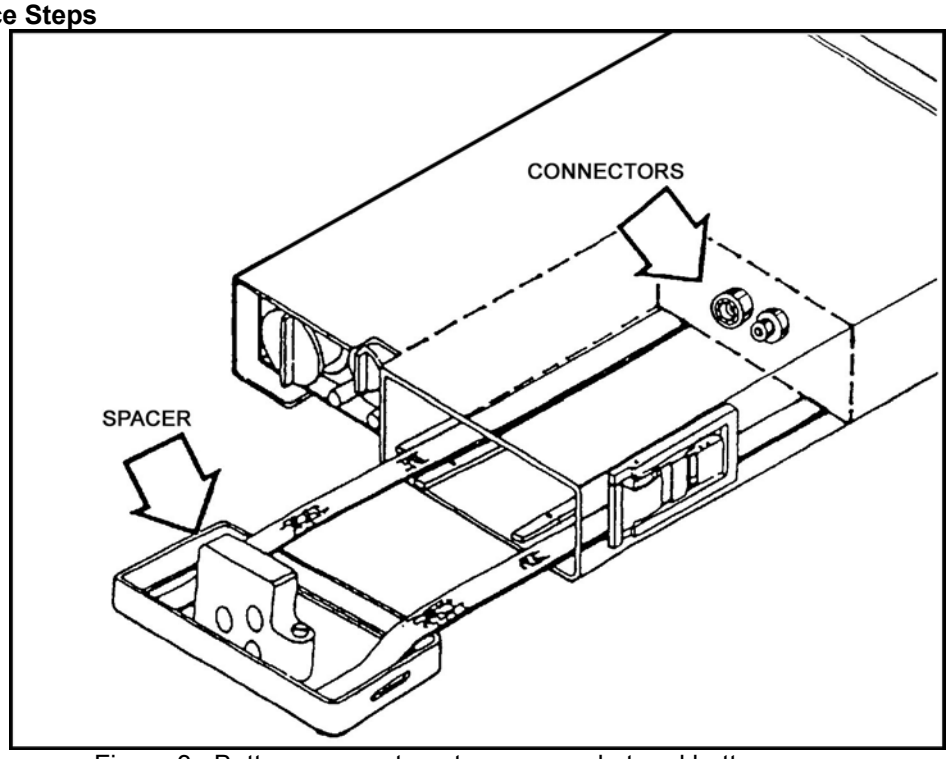



Figure 3. Battery compartment covers gasket and battery snaps.

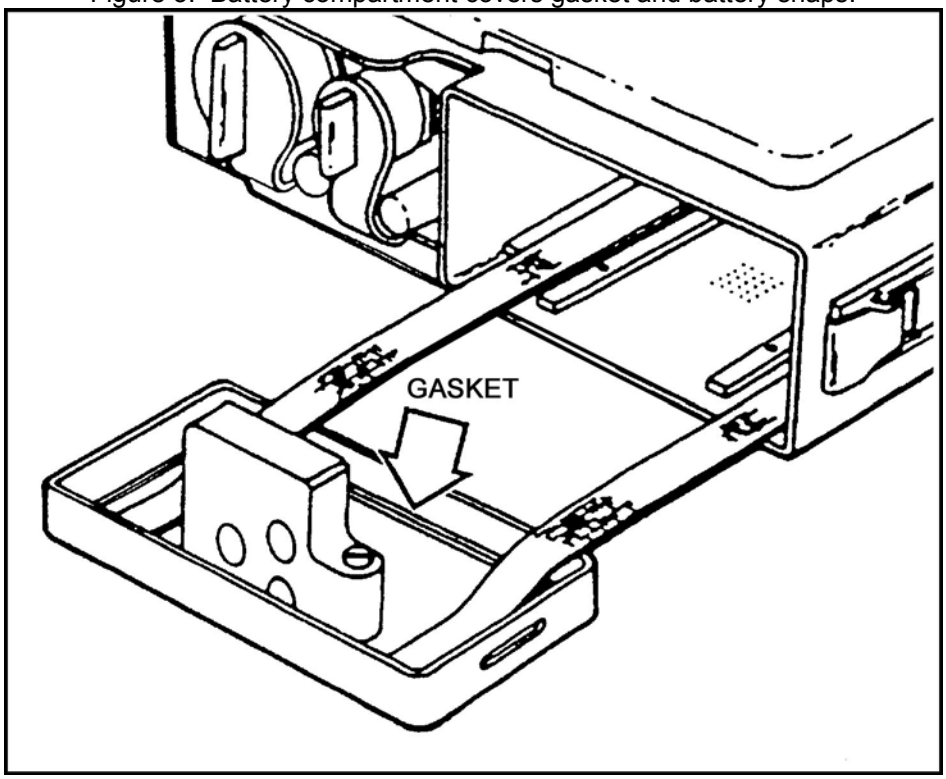



Figure 4. Battery connectors and plastic spacer.

j. Run the MBC self-test. This is the last check before operating the MBC.

3. The computer inspects the MBC during operation.
   a. Continue to check the keyboard surface for cuts or punctures.

**Performance Steps**

b. Periodically check the internal battery to make sure it remains serviceable; that is, free from cracks or leaks.
c. Continue to check the battery compartment cover and latch so that no breakage or warping occurs during use.
d. When operating over a long period, run a self-test periodically.

4. The computer inspects the MBC after operation.
   a. Check the MBC for completeness. Account for all items on hand before operation.
   b. Check and inspect the same things as in the preoperational inspection.

5. The computer cleans the MBC.
   a. Remove any dust or loose dirt on the outside case surface, the display, and the keyboard with a clean, soft, nonabrasive dry cloth.
   b. Remove grease, fungus, and ground-in dirt from the outside case surface, the display, and the keyboard with a damp cloth and mild soap; wipe dry.
   c. Remove dust and dirt from all cable connectors and latches with a stiff bristle brush.
   d. To clean chemical battery leaks from the battery compartment, cover, and straps, use a damp cloth and mild soap. For dried deposits, use the stiff bristle brush. NEVER use a wire brush on the MBC.
   e. The field case, carrying case and case straps should be allowed to dry. Then brush and scrape off dried mud and dirt with a stiff bristle brush. Remove grease or excessive dirt with water and mild soap.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and materials given in the task condition statement.

BRIEF SOLDIER: Tell the soldier that he is to perform a preoperational inspection of the mortar ballistic computer (MBC), report any broken or faulty items, and clean the MBC.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Performed a preoperational inspection.<br>a. Checked for completeness.<br>b. Checked for dust, dirt, grease, or moisture on case, display, and keyboard.<br>c. Checked latches.<br>d. Checked keyboard for cuts or punctures.<br>e. Checked internal battery.<br>f. Checked all cables.<br>g. Checked rubber connector caps.<br>h. Checked battery compartment, cover, gasket, battery straps, and battery connectors.<br>i. Checked field case and carrying case. | ____ | ____ |
| 2. Conducted a self-test. | ____ | ____ |
| 3. Cleaned the MBC. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1220-246-12&P |

Subject Area 38: WEAPONS: HG/MINES/DEMOLITIONS

**Clear Misfires**

**052-193-2030**

**Conditions:** Given electric and/or nonelectric blasting cap(s), detonating cord, time fuze, fuze igniter, TNT, a demolition set, hand tools, and a misfired charge.

**Standards:** Cleared misfires, ensured that you --

Waited the required amount of time prior to move downrange to investigate the misfire.

Investigated the misfired system and determined the cause of the misfire.

Avoided injury to personnel.

**Performance Steps**

1. Wait the required time and watch for the following signs before moving downrange to investigate the misfired charge.
    a. Wait 30 minutes prior to moving downrange to investigate the misfire, with one exception. If the misfired charge is electrically primed, above ground, and it is not dual primed, it can be investigated immediately.
    b. If smoke or fire can be seen coming from the charge location, wait until the smoke or fire stops before moving downrange.

2. Investigate to determine the cause and corrective action to take.

WARNING Do not move either the blasting cap or the misfired cap.

    a. Electrical firing system.
        (1) At the firing point, check the blasting machine for operability, check connections between the firing wire and the blasting machine for adequate contact, and check the firing wire for breaks.

Note: If the blasting machine is inoperable or the connections are inadequate, immediately correct the problem and try to fire again.

        (2) Downrange, check the firing wire for breaks and shorts, check connections between the cap lead wire and the firing wire for adequate contact, and check the location of the electrical blasting cap to determine if the priming is inadequate.

Note: If the electric cap detonated but did not initiate the charge, priming was inadequate.

    b. Nonelectrical firing system. Check the location of the blasting cap to determine if the priming was inadequate.

Note: If the blasting cap detonated but did not initiate the charge, priming was inadequate.

    c. Systems with detonating cord. Locate the primed end of the detonating cord to determine if the blasting cap detonated but failed to initiate the cord, or if the fault is in the initiating assembly.

3. Clear misfired charges.
    a. Tamped charges.
        (1) Misfired charges that have no more than 1 foot of tamping. Attempt to explode the misfired charge by detonating a new 2-pound charge placed directly on top of the tamping.
        (2) Misfired charges that have more than 1 foot of tamping. Carefully remove the tamping by means of wooden or nonmetallic tools within 1 foot either above or beside the charge. Detonate a new 2-pound charge placed on the tamping.

Note: Avoid accidentally digging into the misfired charge by constantly checking the depth of the tamping during digging. Tamping may be blown out by means of a stream of compressed air or water, if available.

    b. Untamped charges. Detonate a 1-pound charge placed next to the misfired charge.
    c. Correct equipment faults found in electrical detonating assemblies by replacing equipment

**Performance Steps**

and/or repairing breaks and insulating shorts.

d. Attach new detonating assemblies to detonating cord main lines and/or branch lines at least 6 inches from the cut end of the cord.

Note: If the detonating cord continually fails to fire, the detonating cord is defective and the charge must be fired again.

**Evaluation Preparation:** SETUP: Provide the soldier with the items listed in the task condition statement. Use inert training equipment when performing this task.

BRIEF SOLDIER: Tell the soldier to clear the misfire without causing injury to personnel.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Wait the required time before moving downrange to investigate the misfired charge.<br>c. Without leaving the firing point, immediately investigates as much of an electrical firing assembly as possible. | ____ | ____ |
| 2. Investigate to determine the cause and corrective action to take. | ____ | ____ |
| 2. Investigates to determine the cause and corrective action to take. | ____ | ____ |

CAUTION: Do not move either the blasting cap or the misfired cap.

a. Electrical firing system.

(1) At the firing point, checks the blasting machine for operability, checks connections between firing wire and blasting machine for adequate contact, and checks firing wire for breaks.

NOTE: If the blasting machine is inoperable or the connections inadequate, immediately correct the problem, and try to fire again.

(2) Down range, checks the firing wire for breaks and shorts, checks connections between the cap lead wire for adequate contact, and checks the location of the electrical blasting cap to determine if the priming is inadequate.

NOTE: If the electric cap detonated but did not initiate the charge, priming was inadequate.

b. Nonelectrical firing systems.

(1) Checks all igniters and the time fuze to determine if one did not burn.

(2) Checks location of the blasting cap to determine if the priming was inadequate.

NOTE: If the blasting cap detonated but did not initiate the charge, priming was inadequate.

c. Systems with detonating cord. Locates the primed end of the detonating cord to determine if the blasting cap detonated but failed to initiate the cord, or if the fault is in the initiating assembly.

d. Checks for misfires after multiple charges have been detonated to ensure all charges detonated.

| | | |
|---|---|---|
| 3. Clear misfired charges. | ____ | ____ |
| 3. Clears misfired charges. | ____ | ____ |

a. Tamped charges.

(1) Misfired charges that have no more than 1 foot of tamping. Attempts to explode them by detonating a new 2-pound charge placed directly on top of the tamping.

(2) Misfired charges that have more than 1 foot of tamping. Carefully removes the tamping by means of wooden nonmetallic tools within 1 foot of the charge. Detonates a new 2-pound charge placed on the

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|

tamping.

NOTE: Avoid accidentally digging into the misfired charge. Constantly check the depth of the tamping during digging. Tamping may be blown out by means of a stream of compressed air or water, if available.

b. Untamped charges. Detonates a 1-pound charge placed next to each misfired charge.
c. Corrects equipment faults found in electrical detonating assemblies by replacing equipment and/or repairing breaks and insulating shorts.
d. Attaches new detonating assemblies to detonating cord main lines and/or branch lines at least 6 inches from the cut end of the cord.

NOTE: If detonating cord continually fails to fire, the detonating cord is defective and the charges must be primed again.

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier scores NO-GO, show him what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 5-250 |

Subject Area 49: WEAPONS: MK19 MACHINE GUN

**Correct Malfunctions of an MK 19 Machine Gun**
**071-030-0008**

**Conditions:** Given a loaded MK 19 machine gun mounted on an M3 tripod or vehicle, linked 40-mm grenade ammunition, a caliber .50 cleaning rod, a bore obstruction device (BOD), an assistant gunner, rifle bore cleaner (RBC), lubricating oils (LSA and either LSAT or LAW), grease (GMD), cleaning solvent (PD680), wiping rags, cloth (abrasive crocus), cleaning rod assembly, small-arms cleaning brushes, and one of the following situations: the weapon has failed to fire; the weapon is firing sluggishly; or the weapon has uncontrolled fire (continues to fire after the trigger is released).

**Standards:** Took immediate action on an MK 19 machine gun that had failed to fire without identifying the cause of the malfunction. If immediate action was unsuccessful, performed remedial action to identify the cause of the malfunction. Took immediate action to secure a runaway MK 19 machine gun and took remedial action to eliminate the malfunction. Took corrective action for an MK 19 machine gun that was firing sluggishly.

**Performance Steps**

1. Apply immediate action when the weapon fails to fire (during peacetime and during training).

NOTE: Clear all nonessential personnel away from the gun position.

DANGER:
1. If anything unusual occurs during firing (including short recoil, out of battery, excess smoke, flash, loud or muffled report, malfunction, or stoppage) immediately inspect the weapon. Clear the weapon. Check the barrel for obstruction. Check the feeder, bolt face, and receiver for damage or unusual debris. DO NOT try to clear an obstructed bore. To get assistance, follow the instructions in the local or unit SOP. Continued firing may cause death or injury.
2. DO NOT relink or fire ammunition that has been cycled through the weapon.

WARNING:
1. Clear all nonessential personnel away from the gun position.
2. If, when you fire a round, you--
- Hear a muffled sound;
- See excess smoke coming out of the chamber area;
- See excess debris, gas, or both coming from below the gun;

DO NOT perform immediate action.
DO notify your supervisor.

a. Keep the weapon pointed at the target.
b. Pull the bolt to the rear to charge the weapon and have the assistant gunner catch the live round as it is ejected.
c. If the weapon will not charge, stop immediate action and apply remedial action to clear a jammed bolt (Step 2b).
d. Push the charging handles forward and up.
e. Place the safety switch in the safe (S) position.
f. Check for bore obstruction.
(1) Make sure the safety switch is on safe (S).

WARNING:
1. DO NOT let the bolt go forward--this could cause a round to fire accidentally.
2. DO NOT insert your hands into the receiver with the bolt locked to the rear on sear. If you do so, you could suffer a severe injury.
3. DO make sure the safe/fire switch is in the safe (S) position.

(2) Lower the charging handles, maintain your grip, and apply back pressure to the bolt.
(3) Have the assistant gunner open the top cover and check the bolt face for a live round.

**Performance Steps**

(4) If a live round, spent case, or debris is present--
( a) Have the assistant gunner remove the catch bag and be prepared to catch any live ammunition that falls from the bottom of the weapon.
( b) Charge the bolt completely until the bolt clicks (locks) to the rear. Return the handles to the forward position, handles down.
( c) If a round is still present, have the assistant gunner clear it from the bolt face by inserting a cleaning rod through the slot in the charger handle assembly and catching the round.
( d) Have the assistant gunner place the bore obstruction device (BOD) into the chamber end of the barrel (weighted end first).
( e) Snake the BOD into the barrel.
( f) If the cable stops feeding, pull it back and push it forward again.
( g) If you cannot push the cable forward any farther, the bore is obstructed. STOP. Notify your supervisor at once.

WARNING: If you find that the bore of the weapon is obstructed, notify your supervisor and follow your unit SOP. Never try to remove an obstructing round from the bore. Only trained and qualified personnel should do so. DO NOT transport a weapon with a projectile lodged in the bore.

(5) If you are able to insert the BOD cable through the barrel so that you see the weighted end of the cable protruding from the flash suppressor, then the barrel is clear.
(6) Move the safety switch to the fire (F) position and try to fire.
(7) If the weapon does not fire, put the safety switch on safe (S) and wait 10 seconds.
(8) Pull the bolt to the rear. Have the assistant gunner catch the live round as it ejects.
(9) Notify your supervisor.

2. Apply immediate action during combat.
   a. Press the charger handle locks, and rotate the charger handles down.
   b. Pull the charger handles to the rear until the bolt sears.
   c. Push the charger handles forward and rotate them up.
   d. Relay the gun and fire.
   e. If the gun fails to fire, apply remedial action.

WARNING: Do not use combat misfire procedures during peacetime or training. Serious injury can result if you do not observe precautions.

NOTE: Both charger handles must be forward and up for firing. If either handle is down, the gun will not fire.

3. Apply remedial action to correct malfunctions.
   a. Correct sluggish operation of an MK 19 machine gun.
      (1) Clean weapon and perform operator-level maintenance.
      (2) Check recoil springs for weakness and bent guide rods.
      (3) If you find defects that are not correctable, notify your supervisor.

WARNING: Be sure bolt is forward before removing back plate pin assembly. Otherwise, serious injury could result!

   b. Clear a jammed bolt (weapon will not charge).

DANGER: Perform these procedures in sequence. Otherwise, the bolt could spring forward suddenly and fire a round, causing injury or death.

NOTE: Clear all nonessential personnel away from the gun position.

(1) Place the safety switch on the safe (S) position.
(2) Press the charger handle locks, and rotate the charger handles down.
(3) Pull the charger handles to the rear as far as possible. Maintain rearward pressure on them, and have the assistant gunner lift the top cover.

DANGER: Do not allow the bolt to slam forward while you are opening the top cover.
If the bolt were to slam forward while you are opening the top cover, the weapon could fire a live round, causing injury or death.

**Performance Steps**

(4) Pull the charger handles to the rear until the bolt clicks (locks); make sure the bolt stays to the rear when you release the charger handles.
(5) Insert the cleaning rod section through the slot in the side of the receiver. Prepare to catch the ejected round.
(6) Raise the cleaning rod to force the live round down. Catch the live round as it ejects.
(7) Remove the ammunition belt from feeder.
(8) Reposition the ammunition belt in the feeder.
(9) Place the safety switch on fire (F) position.
(10) Ride the bolt forward by grasping one charging handle and depressing the trigger.
(11) Make sure the feed slide assembly is to the left.
(12) Make sure the secondary drive lever is engaged with the feed slide pin. If not, engage the forked end with the feed slide pin.
(13) Close the top cover gently.
(14) Charge the weapon and try to fire.
(15) If the bolt jams again, repeat (1) through (7). Then place the safety switch on the safe (S) position, and notify your supervisor.

c. Apply corrective action for uncontrolled fire (runaway gun).

WARNING: Never try to twist the belt with your hands. This could result in serious injury to personnel.

(1) Keep the gun pointed on target.
(2) Lower one charging handle to make the gun stop firing.
(3) Place the safety switch on safe (S) position.
(4) Clear the weapon and report its condition to your supervisor.

**Evaluation Preparation:** SETUP: Provide soldier with the equipment and personnel listed in condition.

BRIEF SOLDIER: Tell the soldier to take corrective action for each situation listed in standards, one situation at a time. If it is unclear what actions the soldier is performing, have the soldier describe the action.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Applied immediate action when the weapon failed to fire.<br>a. Peacetime and training.<br>b. Combat only. | ____ | ____ |
| 2. Applied remedial action to correct malfunction.<br>a. Corrected the sluggish operation of an MK 19 machine gun.<br>b. Cleared a jammed bolt (weapon would not charge).<br>c. Applied corrective action for uncontrolled fire (runaway gun). | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-27<br>TM 9-1010-230-10 |

Subject Area 50: WEAPONS: MORTAR FDC GENERAL

**Use Mortar Firing Tables**

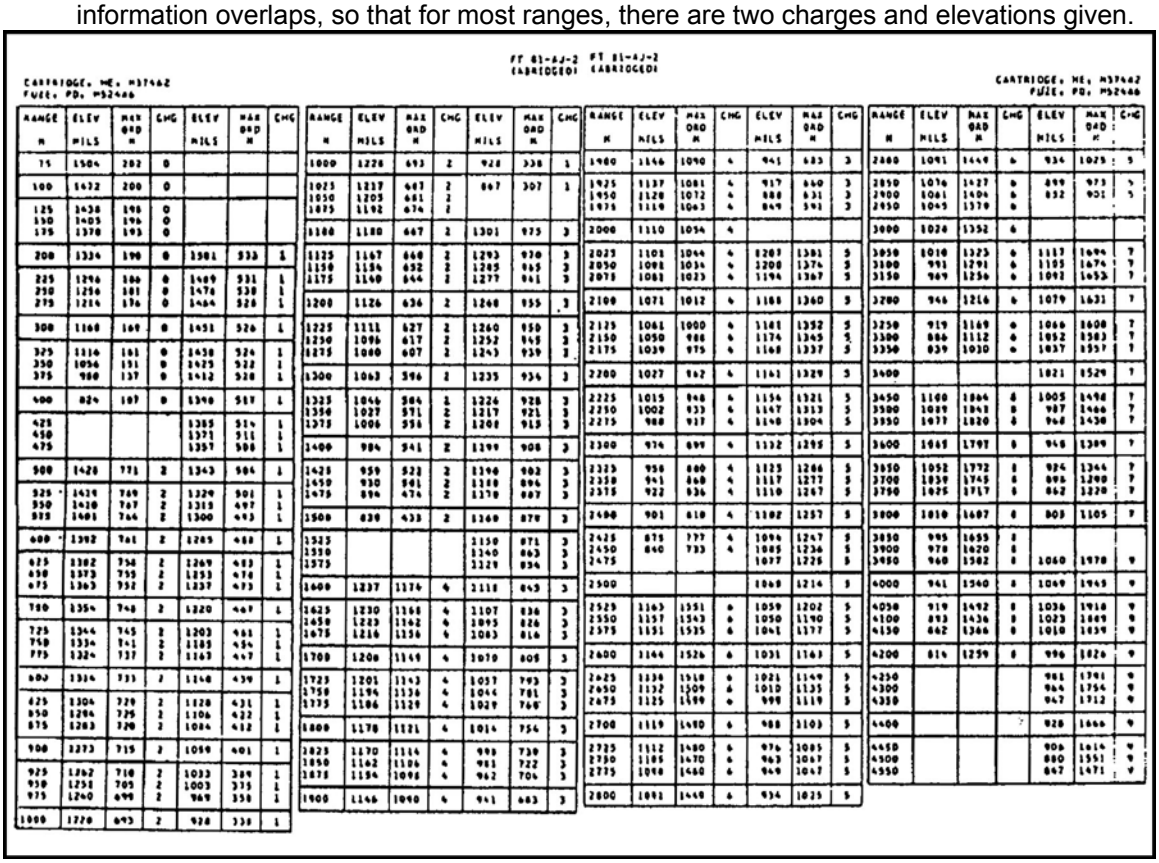
**071-321-4011**

**Conditions:** As a computer in a fire-direction center (FDC) or a squad leader, given a firing table (abridged or unabridged) for the type of mortar and ammunition used; a blank DA Form 2399 (Computer's Record); a pencil; ammunition; and the range to the target.

**Standards:** Within one minute, determined and provided the data required for a given range for the 60-, 81-, and 120-mm mortars, and, if possible for the 4.2-inch mortar, including the charge, elevation (with or without extension for the 4.2-inch mortar), and time of flight.

**Performance Steps**

1. The firing tables for mortars are printed in two forms--abridged and unabridged. The abridged firing table is printed on a waxed card and packed in ammunition boxes. It contains the minimum information needed to fire a round.
   a. The abridged firing table has columns for range, charge, and elevation (Figure 1). The information overlaps, so that for most ranges, there are two charges and elevations given.



FT 81-AJ-2 ABRIDGED

CARTRIDGE, HE, M374A2
FUZE, PD, M52A4

| RANGE M | ELEV MILS | MAX ORD M | CHG |
|---|---|---|---|
| 75 | 1584 | 282 | 0 |
| 100 | 1572 | 280 | 0 |
| 125 | 1438 | 198 | 0 |
| 150 | 1405 | 196 | 0 |
| 175 | 1370 | 193 | 0 |
| 200 | 1334 | 190 | 0 |
| 225 | 1296 | 186 | 0 |
| 250 | 1256 | 181 | 0 |
| 275 | 1214 | 176 | 0 |
| 300 | 1168 | 169 | 0 |
| 325 | 1116 | 161 | 0 |
| 350 | 1056 | 151 | 0 |
| 375 | 980 | 137 | 0 |
| 400 | 824 | 107 | 0 |
| 425 | | | |
| 450 | | | |
| 475 | | | |
| 500 | 1428 | 771 | 2 |
| 525 | 1419 | 769 | 2 |
| 550 | 1410 | 767 | 2 |
| 575 | 1401 | 764 | 2 |
| 600 | 1392 | 761 | 2 |
| 625 | 1382 | 758 | 2 |
| 650 | 1373 | 755 | 2 |
| 675 | 1363 | 752 | 2 |
| 700 | 1354 | 748 | 2 |
| 725 | 1344 | 745 | 2 |
| 750 | 1334 | 741 | 2 |
| 775 | 1324 | 737 | 2 |
| 800 | 1314 | 733 | 2 |
| 825 | 1304 | 729 | 2 |
| 850 | 1294 | 725 | 2 |
| 875 | 1283 | 720 | 2 |
| 900 | 1273 | 715 | 2 |
| 925 | 1262 | 710 | 2 |
| 950 | 1251 | 705 | 2 |
| 975 | 1240 | 699 | 2 |
| 1000 | 1228 | 693 | 2 |

| RANGE M | ELEV MILS | MAX ORD M | CHG |
|---|---|---|---|
| 1000 | 1228 | 693 | 2 |
| 1025 | 1217 | 687 | 2 |
| 1050 | 1205 | 681 | 2 |
| 1075 | 1192 | 674 | 2 |
| 1100 | 1180 | 667 | 2 |
| 1125 | 1167 | 660 | 2 |
| 1150 | 1154 | 652 | 2 |
| 1175 | 1140 | 644 | 2 |
| 1200 | 1126 | 636 | 2 |
| 1225 | 1111 | 627 | 2 |
| 1250 | 1096 | 617 | 2 |
| 1275 | 1080 | 607 | 2 |
| 1300 | 1063 | 596 | 2 |
| 1325 | 1046 | 584 | 2 |
| 1350 | 1027 | 571 | 2 |
| 1375 | 1006 | 556 | 2 |
| 1400 | 984 | 541 | 2 |
| 1425 | 959 | 523 | 2 |
| 1450 | 930 | 501 | 2 |
| 1475 | 894 | 474 | 2 |
| 1500 | 839 | 433 | 2 |
| 1525 | | | |
| 1550 | | | |
| 1575 | | | |
| 1600 | 1237 | 1174 | 4 |
| 1625 | 1230 | 1168 | 4 |
| 1650 | 1223 | 1162 | 4 |
| 1675 | 1216 | 1156 | 4 |
| 1700 | 1208 | 1149 | 4 |
| 1725 | 1201 | 1143 | 4 |
| 1750 | 1194 | 1136 | 4 |
| 1775 | 1186 | 1129 | 4 |
| 1800 | 1178 | 1121 | 4 |
| 1825 | 1170 | 1114 | 4 |
| 1850 | 1162 | 1106 | 4 |
| 1875 | 1154 | 1098 | 4 |
| 1900 | 1146 | 1090 | 4 |

| RANGE M | ELEV MILS | MAX ORD M | CHG |
|---|---|---|---|
| 1900 | 1228 | 693 | 2 |
| 1925 | 1237 | 687 | 2 |
| 1950 | 1228 | 681 | 2 |
| 1975 | 1219 | 674 | 2 |
| 2000 | 1210 | 667 | 2 |
| 2025 | 1201 | 660 | 2 |
| 2050 | 1191 | 652 | 2 |
| 2075 | 1181 | 644 | 2 |
| 2100 | 1171 | 636 | 2 |
| 2125 | 1161 | 627 | 2 |
| 2150 | 1150 | 617 | 2 |
| 2175 | 1139 | 607 | 2 |
| 2200 | 1127 | 596 | 2 |
| 2225 | 1115 | 584 | 2 |
| 2250 | 1102 | 571 | 2 |
| 2275 | 1088 | 557 | 2 |
| 2300 | 1074 | 541 | 2 |
| 2325 | 1058 | 523 | 2 |
| 2350 | 1041 | 501 | 2 |
| 2375 | 1022 | 474 | 2 |
| 2400 | 981 | 410 | 2 |
| 2425 | 875 | 777 | 4 |
| 2450 | 840 | 733 | 4 |
| 2475 | | | |
| 2500 | | | |
| 2525 | 1163 | 1351 | 6 |
| 2550 | 1157 | 1343 | 6 |
| 2575 | 1151 | 1335 | 6 |
| 2600 | 1144 | 1326 | 6 |
| 2625 | 1138 | 1318 | 6 |
| 2650 | 1132 | 1309 | 6 |
| 2675 | 1125 | 1299 | 6 |
| 2700 | 1119 | 1290 | 6 |
| 2725 | 1112 | 1280 | 6 |
| 2750 | 1105 | 1270 | 6 |
| 2775 | 1098 | 1260 | 6 |
| 2800 | 1091 | 1249 | 6 |

| RANGE M | ELEV MILS | MAX ORD M | CHG |
|---|---|---|---|
| 1900 | 1228 | 693 | 2 |
| 1925 | 1137 | 1081 | 4 |
| 1950 | 1128 | 1072 | 4 |
| 1975 | 1119 | 1063 | 4 |
| 2000 | 1110 | 1054 | 4 |
| 2025 | 1101 | 1044 | 4 |
| 2050 | 1091 | 1034 | 4 |
| 2075 | 1081 | 1023 | 4 |
| 2100 | 1071 | 1012 | 4 |
| 2125 | 1061 | 1000 | 4 |
| 2150 | 1050 | 988 | 4 |
| 2175 | 1039 | 975 | 4 |
| 2200 | 1027 | 962 | 4 |
| 2225 | 1015 | 948 | 4 |
| 2250 | 1002 | 933 | 4 |
| 2275 | 988 | 917 | 4 |
| 2300 | 974 | 899 | 4 |
| 2325 | 958 | 880 | 4 |
| 2350 | 941 | 860 | 4 |
| 2375 | 922 | 836 | 4 |
| 2400 | 901 | 810 | 4 |
| 2425 | 875 | 777 | 4 |
| 2450 | 840 | 733 | 4 |
| 2475 | | | |
| 2500 | | | |
| 2525 | 1163 | 1351 | 6 |
| 2550 | 1157 | 1343 | 6 |
| 2575 | 1151 | 1335 | 6 |
| 2600 | 1144 | 1326 | 6 |
| 2625 | 1138 | 1318 | 6 |
| 2650 | 1132 | 1309 | 6 |
| 2675 | 1125 | 1299 | 6 |
| 2700 | 1119 | 1290 | 6 |
| 2725 | 1112 | 1280 | 6 |
| 2750 | 1105 | 1270 | 6 |
| 2775 | 1098 | 1260 | 6 |
| 2800 | 1091 | 1249 | 6 |

FT 81-AJ-2 ABRIDGED

CARTRIDGE, HE, M374A2
FUZE, PD, M52A4

| RANGE M | ELEV MILS | MAX ORD M | CHG |
|---|---|---|---|
| 1900 | 1228 | 693 | 2 |
| 1925 | 1237 | 687 | 2 |
| 1950 | 1228 | 681 | 2 |
| 1975 | 1219 | 674 | 2 |
| 2000 | 1210 | 667 | 2 |
| 2025 | 1201 | 660 | 2 |
| 2050 | 1191 | 652 | 2 |
| 2075 | 1181 | 644 | 2 |
| 2100 | 1171 | 636 | 2 |
| 2125 | 1161 | 627 | 2 |
| 2150 | 1150 | 617 | 2 |
| 2175 | 1139 | 607 | 2 |
| 2200 | 1127 | 596 | 2 |
| 2225 | 1115 | 584 | 2 |
| 2250 | 1102 | 571 | 2 |
| 2275 | 1088 | 557 | 2 |
| 2300 | 1074 | 541 | 2 |
| 2325 | 1058 | 523 | 2 |
| 2350 | 1041 | 501 | 2 |
| 2375 | 1022 | 474 | 2 |
| 2400 | 981 | 410 | 2 |
| 2425 | 875 | 777 | 4 |
| 2450 | 840 | 733 | 4 |
| 2475 | | | |
| 2500 | | | |
| 2525 | 1163 | 1351 | 6 |
| 2550 | 1157 | 1343 | 6 |
| 2575 | 1151 | 1335 | 6 |
| 2600 | 1144 | 1326 | 6 |
| 2625 | 1138 | 1318 | 6 |
| 2650 | 1132 | 1309 | 6 |
| 2675 | 1125 | 1299 | 6 |
| 2700 | 1119 | 1290 | 6 |
| 2725 | 1112 | 1280 | 6 |
| 2750 | 1105 | 1270 | 6 |
| 2775 | 1098 | 1260 | 6 |
| 2800 | 1091 | 1249 | 6 |

CARTRIDGE, HE, M374A2
FUZE, PD, M52A4

| RANGE M | ELEV MILS | MAX ORD M | CHG |
|---|---|---|---|
| 2800 | 1091 | 1249 | 6 |
| 2850 | 1076 | 1427 | 6 |
| 2900 | 1061 | 1404 | 6 |
| 2950 | 1045 | 1379 | 6 |
| 3000 | 1028 | 1352 | 6 |
| 3050 | 1010 | 1325 | 6 |
| 3100 | 991 | 1291 | 6 |
| 3150 | 969 | 1256 | 6 |
| 3200 | 946 | 1216 | 6 |
| 3250 | 919 | 1169 | 6 |
| 3300 | 886 | 1112 | 6 |
| 3350 | 839 | 1030 | 6 |
| 3400 | | | |
| 3450 | 1160 | 1864 | 8 |
| 3500 | 1089 | 1843 | 8 |
| 3550 | 1077 | 1820 | 8 |
| 3600 | 1065 | 1797 | 8 |
| 3650 | 1052 | 1772 | 8 |
| 3700 | 1039 | 1745 | 8 |
| 3750 | 1025 | 1717 | 8 |
| 3800 | 1010 | 1687 | 8 |
| 3850 | 995 | 1655 | 8 |
| 3900 | 978 | 1620 | 8 |
| 3950 | 960 | 1582 | 8 |
| 4000 | 941 | 1540 | 8 |
| 4050 | 919 | 1492 | 8 |
| 4100 | 893 | 1436 | 8 |
| 4150 | 862 | 1366 | 8 |
| 4200 | 814 | 1259 | 8 |
| 4250 | | | |
| 4300 | | | |
| 4350 | | | |
| 4400 | | | |
| 4450 | | | |
| 4500 | | | |
| 4550 | | | |

| RANGE M | ELEV MILS | MAX ORD M | CHG |
|---|---|---|---|
| 2800 | 1091 | 1249 | 6 |
| 2850 | 1076 | 1427 | 6 |
| 2900 | 1061 | 1404 | 6 |
| 2950 | 1045 | 1379 | 6 |
| 3000 | 1028 | 1352 | 6 |
| 3050 | 1010 | 1325 | 6 |
| 3100 | 991 | 1291 | 6 |
| 3150 | 969 | 1256 | 6 |
| 3200 | 946 | 1216 | 6 |
| 3250 | 919 | 1169 | 6 |
| 3300 | 886 | 1112 | 6 |
| 3350 | 839 | 1030 | 6 |
| 3400 | | | |
| 3450 | 1160 | 1864 | 8 |
| 3500 | 1089 | 1843 | 8 |
| 3550 | 1077 | 1820 | 8 |
| 3600 | 1065 | 1797 | 8 |
| 3650 | 1052 | 1772 | 8 |
| 3700 | 1039 | 1745 | 8 |
| 3750 | 1025 | 1717 | 8 |
| 3800 | 1010 | 1687 | 8 |
| 3850 | 995 | 1655 | 8 |
| 3900 | 978 | 1620 | 8 |
| 3950 | 960 | 1582 | 8 |
| 4000 | 941 | 1540 | 8 |
| 4050 | 919 | 1492 | 8 |
| 4100 | 893 | 1436 | 8 |
| 4150 | 862 | 1366 | 8 |
| 4200 | 814 | 1259 | 8 |
| 4250 | | | |
| 4300 | | | |
| 4350 | | | |
| 4400 | | | |
| 4450 | | | |
| 4500 | | | |
| 4550 | | | |

Figure 1. Abridged firing table for 81-mm HE and WP.

   b. The abridged firing table for the 81-mm illumination (FT 81-AL-1) round has columns for range, charge, elevation, and fuze setting (Figure 2). The information also overlaps, giving a choice of two charges for most ranges. One fault with this firing table is that it gives no times or elevation corrections for height-of-burst corrections (up or down) given by the forward observer.

**Performance Steps**

CARTRIDGE, ILLUMINATING, M301A3
FUZE, TIME, M84A1

FT 81-AL-1
(ABRIDGED)

| RANGE M | ELEV MILS | FS | CHG | ELEV MILS | FS | CHG |
|---|---|---|---|---|---|---|
| 250 | 1501 | 20.6 | 3 | | | |
| 300 | 1481 | 20.6 | 3 | | | |
| 350 | 1460 | 20.6 | 3 | 1501 | 26.1 | 4 |
| 400 | 1439 | 20.4 | 3 | 1486 | 26.0 | 4 |
| 450 | 1418 | 20.2 | 3 | 1471 | 25.9 | 4 |
| 500 | 1396 | 20.1 | 3 | 1457 | 25.8 | 4 |
| 550 | 1374 | 20.0 | 3 | 1442 | 25.8 | 4 |
| 600 | 1351 | 19.8 | 3 | 1427 | 25.7 | 4 |
| 650 | 1327 | 19.6 | 3 | 1411 | 25.6 | 4 |
| 700 | 1302 | 19.4 | 3 | 1396 | 25.4 | 4 |
| 750 | 1276 | 19.1 | 3 | 1380 | 25.3 | 4 |
| 800 | | | | 1363 | 25.2 | 4 |
| 850 | 1404 | 30.7 | 5 | 1347 | 25.0 | 4 |
| 900 | 1382 | 30.5 | 5 | 1330 | 24.8 | 4 |
| 950 | 1379 | 30.4 | 5 | 1312 | 24.6 | 4 |
| 1000 | 1366 | 30.2 | 5 | 1294 | 24.4 | 4 |
| 1050 | 1353 | 30.1 | 5 | 1276 | 24.2 | 4 |
| 1100 | 1340 | 29.9 | 5 | 1257 | 24.0 | 4 |
| 1150 | 1326 | 29.7 | 5 | 1237 | 23.7 | 4 |
| 1200 | 1313 | 29.5 | 5 | 1216 | 23.4 | 4 |
| 1250 | 1299 | 29.3 | 5 | 1194 | 23.1 | 4 |
| 1300 | 1284 | 29.1 | 5 | 1170 | 22.8 | 4 |
| 1350 | 1269 | 28.9 | 5 | 1145 | 22.4 | 4 |
| 1400 | 1254 | 28.6 | 5 | 1118 | 21.9 | 4 |
| 1450 | 1239 | 28.4 | 5 | 1087 | 21.4 | 4 |
| 1500 | 1222 | 28.1 | 5 | 1051 | 20.7 | |
| 1550 | 1206 | 27.8 | 5 | | | |
| 1600 | 1188 | 27.5 | 5 | 1274 | 33.9 | 6 |
| 1650 | 1170 | 27.1 | 5 | 1261 | 33.6 | 6 |
| 1700 | 1151 | 26.7 | 5 | 1248 | 33.4 | 6 |

FT 81-AL-1
(ABRIDGED)

CARTRIDGE, ILLUMINATING, M301A3
FUZE, TIME, M84A1

| RANGE M | ELEV MILS | FS | CHG | ELEV MILS | FS | CHG |
|---|---|---|---|---|---|---|
| 1700 | 1151 | 26.7 | 5 | 1248 | 33.4 | 6 |
| 1750 | 1130 | 26.3 | 5 | 1235 | 33.1 | 6 |
| 1800 | 1108 | 25.9 | 5 | 1222 | 32.8 | 6 |
| 1850 | 1085 | 25.4 | 5 | 1208 | 32.5 | 6 |
| 1900 | 1059 | 24.8 | 5 | 1194 | 32.1 | 6 |
| 1950 | 1029 | 24.2 | 5 | 1179 | 31.8 | 6 |
| 2000 | 993 | 23.3 | 5 | | | |
| 2050 | | | | | | |
| 2100 | 1221 | 37.9 | 7 | 1131 | 30.6 | 6 |
| 2150 | 1209 | 37.6 | 7 | 1113 | 30.1 | 6 |
| 2200 | 1197 | 37.2 | 7 | 1084 | 29.6 | 6 |
| 2250 | 1186 | 36.9 | 7 | 1074 | 29.1 | 6 |
| 2300 | 1172 | 36.5 | 7 | 1062 | 28.5 | 6 |
| 2350 | 1158 | 36.1 | 7 | 1028 | 27.9 | 6 |
| 2400 | 1145 | 35.7 | 7 | 1000 | 27.1 | 6 |
| 2450 | 1130 | 35.2 | 7 | 987 | 26.1 | 6 |
| 2500 | 1116 | 34.7 | 7 | 922 | 24.9 | 6 |
| 2550 | 1100 | 34.2 | 7 | | | |
| 2600 | 1083 | 33.7 | 7 | 1168 | 41.0 | 8 |
| 2650 | 1066 | 33.1 | 7 | 1156 | 40.6 | 8 |
| 2700 | 1047 | 32.6 | 7 | 1144 | 40.1 | 8 |
| 2750 | 1026 | 31.8 | 7 | 1131 | 39.6 | 8 |
| 2800 | 1003 | 31.0 | 7 | 1118 | 39.1 | 8 |
| 2850 | 978 | 30.1 | 7 | 1104 | 38.6 | 8 |
| 2900 | 947 | 29.0 | 7 | 1090 | 38.1 | 8 |
| 2950 | 906 | 27.6 | 7 | 1075 | 37.5 | 8 |
| 3000 | | | | 1059 | 36.8 | 8 |
| 3050 | | | | 1042 | 36.2 | 8 |
| 3100 | | | | 1024 | 35.5 | 8 |
| 3150 | | | | 1004 | 34.7 | 8 |
| 3200 | | | | 982 | 33.8 | 8 |
| 3250 | | | | 957 | 32.7 | 8 |
| 3300 | | | | 927 | 31.5 | 8 |
| 3350 | | | | 884 | 29.8 | 8 |

Figure 2. Abridged firing table for 81-mm illumination.

2. To use the abridged firing table, the computer/squad leader--
   a. Reads down the range column to the desired range.
   b. Reads across the card to locate the two charges given for that range.
   c. Picks the lower of the two charges.
   d. Selects the elevation that goes with the charge selected (the elevation is always to the left).

NOTE: The charge selected is always the lowest charge possible to reach the target. The one exception to this rule is firing without an FDC and using the ladder method of adjustment, or when determining the mil length of a deep target to use searching fire.

EXAMPLE, see Figure 1:
Range 1,925 meters Charge 3, elevation 943
Range 2,525 meters Charge 4, elevation 802

3. The unabridged firing tables are normally used only in the FDC by the computer and contain the following tables:
   a. Table A--wind components (used only with the MET message).
   b. Table B--temperature and density corrections (used only with the MET message).
   c. Table C--propellant temperature (used only with the MET message).
   d. Table D--basic data and correction factors.
   e. Table E--supplementary data.

NOTE: Tables A, B, and C are used only in computing a MET message.

4. Tables D and E are the firing tables most often used by the computer. The most often used columns are shown in Table 1.

**Performance Steps**

| FIRING TABLES | TABLE | COLUMN | |
|---|---|---|---|
| FT 4.2-K-2 | D | 1 | RANGE |
| | D | 2 | CHARGE |
| | D | 7 | TIME OF FLIGHT |
| | E | 10 | MAXIMUM ORDNANCE |
| FT 4.2-H-2 | D | 1 | RANGE |
| | D | 2 | CHARGE |
| | D | 7 | TIME OF FLIGHT |
| | E | 10 | MAXIMUM ORDNANCE |
| FT81-AI-3 | D | 1 | RANGE |
| | D | 2 | ELEVATION |
| | D | 6 | TIME OF FLIGHT |
| | E | 8 | MAXIMUM ORDNANCE |
| FT 60-P-1 | D | 1 | RANGE |
| | D | 2 | ELEVATION |
| | D | 4 | TIME OF FLIGHT |
| | E | 5 | MAXIMUM ORDNANCE |

Table 1. Commonly used columns.

NOTE: No complete firing table is available for the 120-mm mortar.

5. Under the new doctrine of firing the mortars at the lowest elevation (4.2-inch mortar) or lowest charge (81-mm/60-mm/120-mm mortar), the computer can modify the firing tables to help determine which elevation or charge to use.
   a. FT 4.2-K-2. On the index of each elevation, print in the minimum and maximum ranges each elevation will fire as shown in Figure 3. As shown, the 4.2-inch mortar will fire from 910 meters to 6,840 meters at 0800-mil elevation. This means that the 4.2-inch mortar should always fire at 0800-mil elevation, unless the rounds will not clear a terrain feature between the mortars and the target or unless the target is closer than 910 meters.

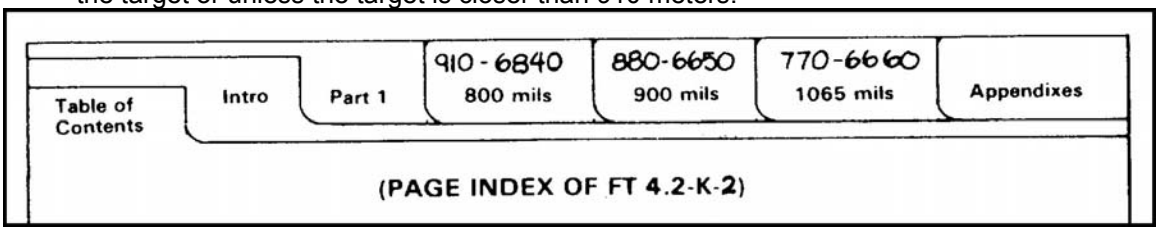



Figure 3. Page index of FT 4.2-K-2.

   b. FT 4.2-H-2. Print in the minimum and maximum ranges each elevation will fire with and without extension on page II, as shown in Figure 4. Again, use 0800-mil elevation with or without extension, unless terrain or target position precludes its use. To be more exact in keeping the maximum ordinance as low as possible, use 0800-mil elevation without extension when firing at ranges between 1,080 meters and 3,800 meters. From 3,830 meters to 5,650 meters, use 0800-mil elevation with extension. A 0900-mil elevation should never be used. The maximum ordinance for 0900-mil elevation is never lower than 0800-mil elevation with or without extension. A 1065-mil elevation should only be used when ranges are between 920 meters and 1,080 meters.

**Performance Steps**

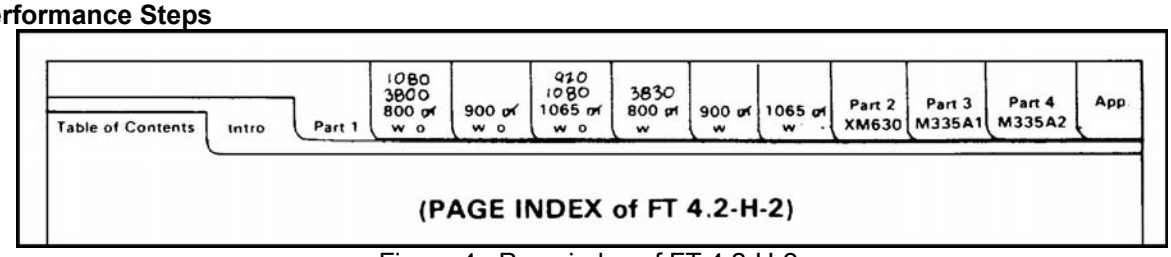
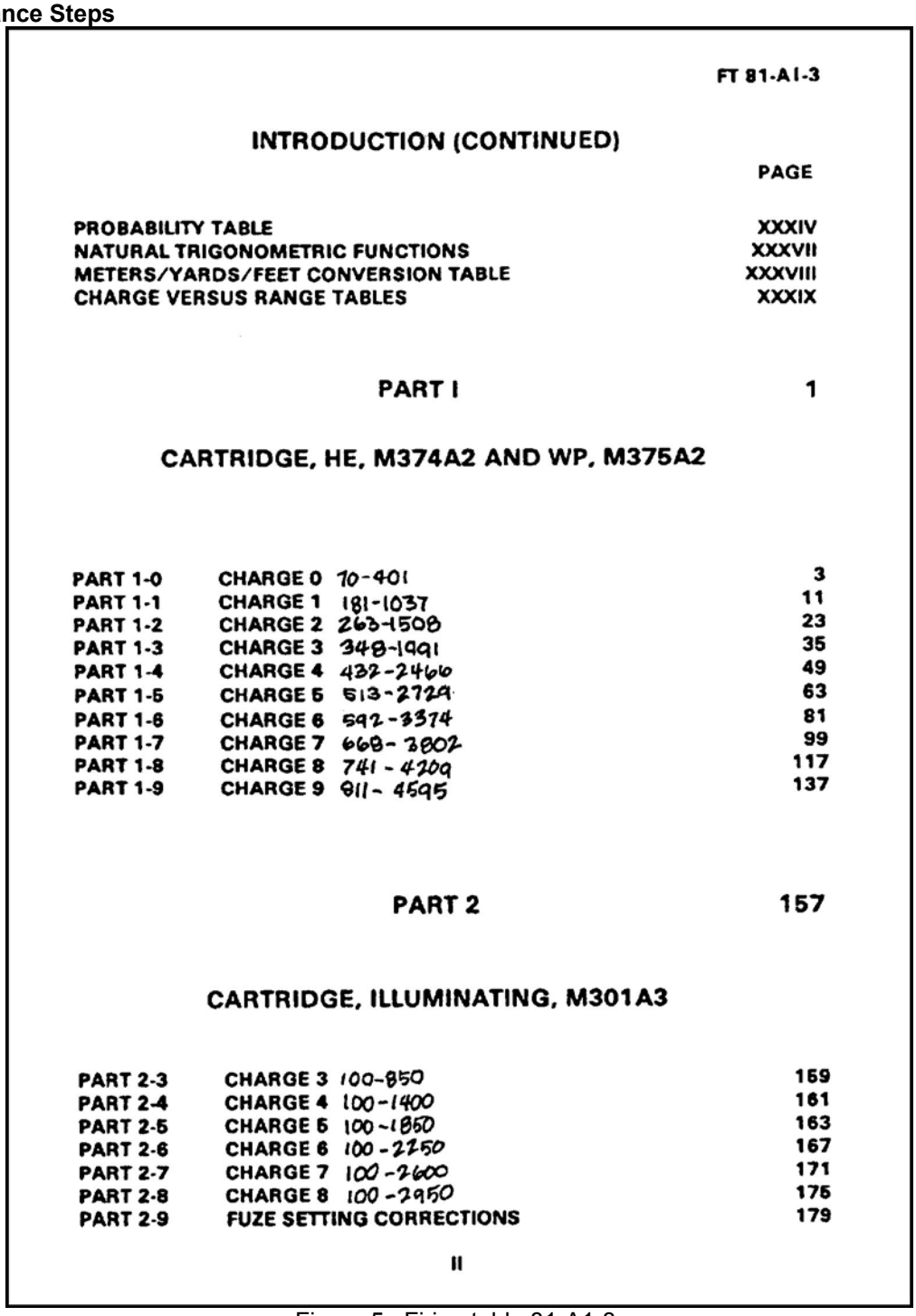



Figure 4. Page index of FT 4.2-H-2.

c. FT 81-AI-3. Print in the minimum and maximum ranges each charge will fire on page II as shown in Figure 5. By looking at the ranges shown, the computer can tell the lowest charge that can be used.

**Performance Steps**



FT 81-A1-3

INTRODUCTION (CONTINUED)



II

Figure 5. Firing table 81-A1-3.

d. FT 60-P-1. Print in the minimum and maximum ranges each charge will fire on the table of contents as shown in Figure 6. By looking at the ranges shown, the computer can tell the lowest charge that can be used.

**Performance Steps**

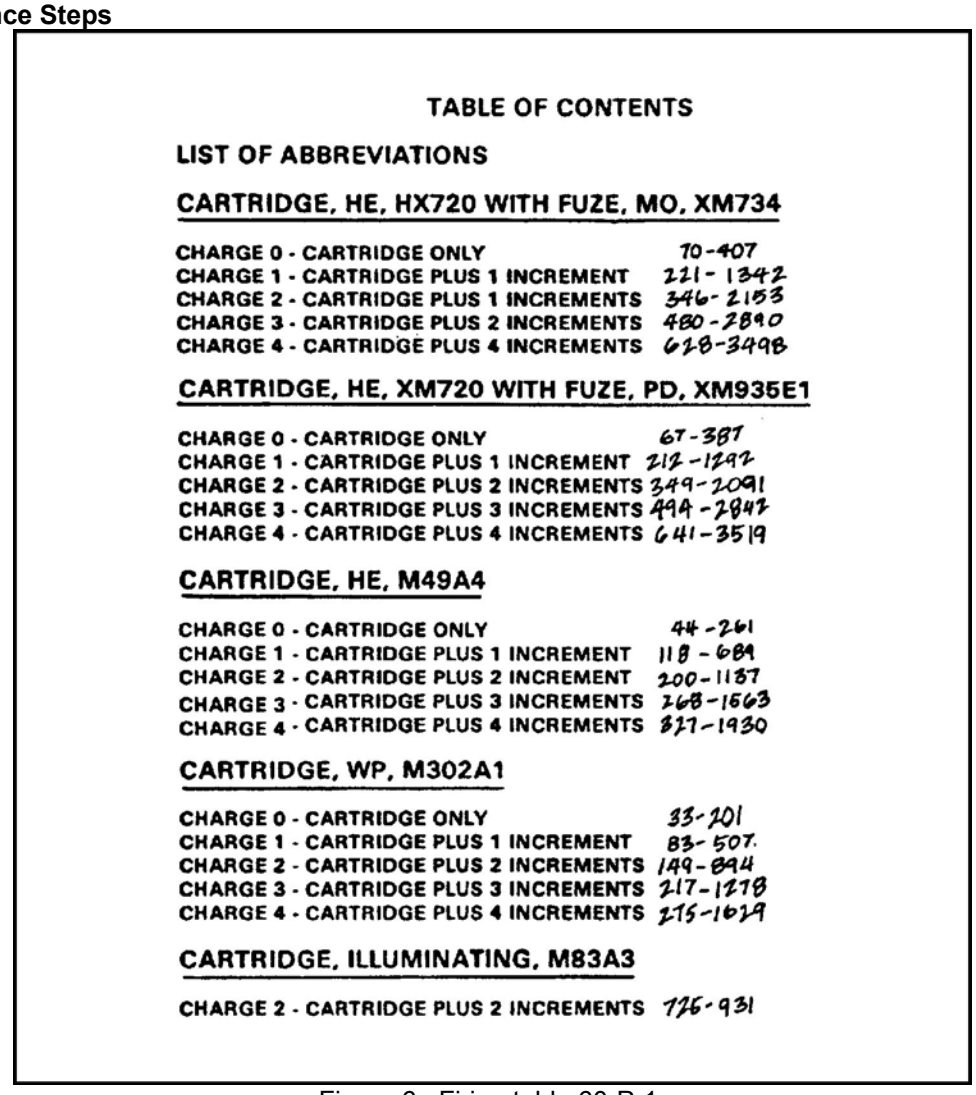


TABLE OF CONTENTS

LIST OF ABBREVIATIONS

CARTRIDGE, HE, HX720 WITH FUZE, MO, XM734

CHARGE 0 - CARTRIDGE ONLY 70-407
CHARGE 1 - CARTRIDGE PLUS 1 INCREMENT 221-1342
CHARGE 2 - CARTRIDGE PLUS 1 INCREMENTS 346-2153
CHARGE 3 - CARTRIDGE PLUS 2 INCREMENTS 480-2890
CHARGE 4 - CARTRIDGE PLUS 4 INCREMENTS 628-3498

CARTRIDGE, HE, XM720 WITH FUZE, PD, XM935E1

CHARGE 0 - CARTRIDGE ONLY 67-387
CHARGE 1 - CARTRIDGE PLUS 1 INCREMENT 212-1292
CHARGE 2 - CARTRIDGE PLUS 2 INCREMENTS 349-2091
CHARGE 3 - CARTRIDGE PLUS 3 INCREMENTS 494-2847
CHARGE 4 - CARTRIDGE PLUS 4 INCREMENTS 641-3519

CARTRIDGE, HE, M49A4

CHARGE 0 - CARTRIDGE ONLY 44-261
CHARGE 1 - CARTRIDGE PLUS 1 INCREMENT 118-689
CHARGE 2 - CARTRIDGE PLUS 2 INCREMENT 200-1137
CHARGE 3 - CARTRIDGE PLUS 3 INCREMENTS 268-1563
CHARGE 4 - CARTRIDGE PLUS 4 INCREMENTS 327-1930

CARTRIDGE, WP, M302A1

CHARGE 0 - CARTRIDGE ONLY 33-201
CHARGE 1 - CARTRIDGE PLUS 1 INCREMENT 83-507
CHARGE 2 - CARTRIDGE PLUS 2 INCREMENTS 149-894
CHARGE 3 - CARTRIDGE PLUS 3 INCREMENTS 217-1278
CHARGE 4 - CARTRIDGE PLUS 4 INCREMENTS 275-1629

CARTRIDGE, ILLUMINATING, M83A3

CHARGE 2 - CARTRIDGE PLUS 2 INCREMENTS 726-931

Figure 6. Firing table 60-P-1.

**Evaluation Preparation:** SETUP: At the test site, provide all materials and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to give information from the firing table as instructed.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. On an abridged firing table: found and gave correct data, when requested. | ____ | ____ |
| 2. On an unabridged firing table:<br>a. Gave brief explanation of Tables A, B, and C of firing table, when required.<br>b. Found and gave correct data in Tables D and E, when requested. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
| --- | --- |
| | FM 23-91 |

## Record Information on Firing Records

## 071-076-0002

**Conditions:** Given a firing table; a plotting board or mortar ballistic computer; a call for fire; the forward observer's (FO's) corrections; sufficient information to complete the fire-direction center (FDC) order; an ammunition count; a mortar platoon or section SOP; one each blank DA Forms 2399 (Computer's Record) and 2188-R (Data Sheet); and a pencil.

**Standards:** Recorded and computed the mission. Correctly completed all required blocks and spaces on the computer's record. At the end of the mission, recorded the information and data needed for each type of mortar and ammunition fired. Completed the data sheet.

**Performance Steps**

1. DA Form 2399, Computer's Record (Figure 1), is a work sheet used to record the FO's corrections, firing data, and commands to the mortars during a fire mission. He uses the computer's record for each mission received and fired by the FDC. The blocks and spaces on a computer's record and the data to be recorded are explained below. All information or data recorded on a computer's record are based on the call for fire, FDC order, or unit SOP.
   a. ORGANIZATION. Unit that is firing the mission.
   b. DATE. Date the mission is fired.
   c. TIME. Time the mission was received (the call for fire recorded).
   d. OBSERVER ID. Forward observer's call sign.
   e. TARGET NUMBER. Number assigned to the mission.
   f. WARNING ORDER. Type of warning order used for the mission (adjust fire, FFE, immediate suppression).
   g. TARGET LOCATION. Method used to locate target (grid, shift from, polar).
   h. TARGET DESCRIPTION. Details of target (type, size, number, protection).
   i. METHOD OF ENGAGEMENT. Types of adjustment and ammunition (when used).
   j. METHOD OF CONTROL. The adjustment gun (when named by the FO) and time of delivery (when used).
   k. MESSAGE TO OBSERVER. Space used to record any message sent to the forward observer (when used).
   l. FDC ORDER. This includes the following:
      (1) MORTAR TO FFE (mortar to fire for effect)--Mortar(s) that will be used during the FFE phase of the mission.
      (2) MORTAR TO ADJ (mortar to adjust)--Mortar(s) that will be used during the adjustment phase of the mission. Leave blank if the mortar to adjust is the same as the mortar to fire for effect.
      (3) METHOD OF ADJ (method of adjustment)--Number of rounds used by the adjusting mortar(s) for each correction during the adjustment phase of the mission.
      (4) BASIS FOR CORRECTION--Point (usually the registration point) from which the correction factors to be applied are determined (surveyed chart only).
      (5) SHEAF CORRECTION--Type of sheaf, other than parallel sheaf, that will be used during the FFE.
      (6) SHELL AND FUSE--Shell and fuze combination that will be used for the mission. The first line is used for the ammunition that will be fired in the adjustment phase. The second line is used for the ammunition that will be fired in the FFE if it changes from the adjustment round type. If different types of ammunition will be used during the mission, the different rounds are listed--for example:
         SHELL AND FUSE: HEQ in Adj, HEQ/WP in FFE.
      (7) METHOD OF FFE (method of fire for effect)--Number and type rounds for each mortar in the FFE phase of the mission--for example:
         METHOD OF FFE: 2 rounds HEQ, 2 round WP.
      (8) RANGE LATERAL SPREAD--This is used with illumination and one of the following:

**Performance Steps**

( a) Range Spread: 60-mm mortar, 250 meters between rounds; 81-mm mortar, 500 meters between rounds; and 4.2-inch and 120-mm mortars, 1,000 meters between rounds.
( b) Lateral Spread: 60-mm mortar, 250 meters between rounds; 81-mm mortar, 500 meters between rounds; and 4.2 inch and 120-mm mortars, 1,000 meters between rounds.
( c) Range/Lateral Spread: A combination of range spread and lateral spread.

(9) ZONE--This is used only with the 4.2-inch mortar. The zone will normally cover 100 or 200 meters. A platoon-size target would require a 100-meter zone, while a company-size target would require a 200-meter zone. Should the target require it, the 4.2-inch mortar can fire a larger zone. Zone missions fired by 60-, 81-, and 120-mm mortars are fired using searching fire.
(10) TIME OF OPENING FIRE--The fire control for the mission.
W/R = When ready.
AMC = At my command (either the FO or FDC).
The chief computer/section sergeant usually completes the FDC order. This area describes how the FDC will engage the target.

m. INITIAL CHART DATA. This includes the following:
(1) DEFLECTION--Initial deflection from the mortar position to the target being engaged.
(2) DEFLECTION CORRECTION--Deflection correction used for the mission.
(3) RANGE--Initial range from the mortar position to the target being engaged.
(4) VI/ALT CORRECTION--Vertical interval/altitude difference used for the mission.
(5) RANGE CORRECTION--Range correction factor used for the mission.
(6) CHARGE/RANGE--Charge and corrected range used for the mission.
(7) AZIMUTH--The direction from the gun position to the target.
(8) ANGLE T--Mil difference between the G-T line and the O-T line. (Recorded to the nearest 10 mils and transmitted to the nearest 100 mils.)

n. INITIAL FIRE COMMAND. This is the first command that is sent to the mortar section for a mission. To complete the initial fire command, the computer must use the initial chart data, plus any corrections, and the information in the FDC order.
(1) MORTAR TO FOLLOW (mortars to follow or FFE)--The mortar(s) to follow all commands or the mortar(s) that will be used in the FFE.
(2) SHELL AND FUSE--The shell and fuse combination used during the mission. If it is an adjustment mission, that is the round used during the adjustment.
(3) MORTAR TO FIRE--The number of mortar(s) being used during the adjustment phase.
(4) METHOD OF FIRE--The number of rounds being used for adjustment and in the FFE, and the type, if mixed. Any control by the FDC would be placed here--for example:
( a) One round HEQ in adjustment; two rounds HEQ/two rounds WP in FFE, AMC. Announcing the number of rounds in the FFE gives the ammunition bearer time to prepare those rounds such as in the event of an immediate-suppression mission.
( b) Three rounds HEQ.
(5) DEFLECTION--The command deflection to fire the first round.
(6) CHARGE--The command charge needed to fire the first round.
(7) TIME SETTING--The time setting needed on mechanical-time fuzes (normally, illumination) to obtain the desired effects over the target area.
(8) ELEVATION--The elevation used for engaging the target (800, 900, and 1065 for the 4.2-inch mortar; for 60-, 81-, and 120-mm mortars, it is the elevation obtained from the FTs for the range to be fired). The elevation is also the command to fire in the absence of any type of fire control.

o. ROUNDS EXPENDED. A cumulative count of the number of rounds fired for the initial fire command.

p. OBSERVER CORRECTION. This includes the following:
(1) DEV (deviation)--The LEFT/RIGHT, in meters, sent in by the observer--for example:
DEV: L200 = The observer wants a "left 200 meters" correction.
(2) RANGE--The ADD/DROP, in meters, sent in by the observer--for example:

**Performance Steps**

RANGE: "Add 200" is recorded as "+200," while "Drop 200" is recorded as "-200."

(3) TIME (HEIGHT)--The height correction the observer wants, usually used with illumination. For corrections in height, the observer will send UP/DOWN: "UP 200" or "DOWN 200."

q. CHART DATA. Chart data are obtained from the M16/M19 plotting boards for the observer's requested corrections. This section is used only when firing corrections are to be applied to the chart data to obtain firing data. (Disregard this portion of the computer's record when using the MBC.)

(1) DEFL (deflection)--The deflection read from the plotting equipment before any corrections are applied.

(2) CHARGE (RANGE)--Chart charge (or range) is read from the plotting equipment before any corrections are applied. If a range is recorded, the charge corresponding to it may be written either in the lower part of the CHG box or in parentheses in the adjoining unused MORT FIRE box.

r. SUBSEQUENT COMMANDS. The command data are sent to the mortar(s) to fire the next round(s). Those commands, DEFL/CHG/ELEV, contain chart data and all firing corrections to apply. In the subsequent fire command, the only commands that are announced are any changes from the initial fire command or the previous subsequent fire command. The elevation is always given regardless of any changes.

(1) MORTAR TO FIRE--Self-explanatory.

(2) METHOD OF FIRE--The number of rounds and type of fire.

(3) DEFL (deflection)--The command deflection(s) to fire the round(s).

(4) RANGE/CHARGE--On the 4.2-inch mortar, the command charge to fire the rounds; on the 60-, 81-, and 120-mm mortars, the command range used for this round(s) and the charge, if different. The range is recorded and used to determine the charge that is given to the 60-, 81-, and 120-mm mortars (range is not given to mortars).

(5) TIME (SETTING)--The time setting needed for the mechanical-time fuze.

(6) ELEV (elevation)--The elevation used for this round(s); also, the command to fire in the absence of any fire control.

**Performance Steps**

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 IN | | 1401 | A59 | BD 0504 |

☑ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID
OT DIRECTION
ALTITUDE

SHIFT FROM RPI
OT DIRECTION 0720 ALTITUDE
☐ LEFT / ☑ RIGHT 300
☑ ADD / ☐ DROP 700
☐ UP / ☑ DOWN 120

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION PLT IN OPEN
METHOD OF ENGAGEMENT
METHOD OF CONTROL
MESSAGE TO OBSERVER

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE: SEC | DEFLECTION: 0548 | MORTAR TO FOLLOW: SEC | |
| MORTAR TO ADJ: #2 | DEFLECTION CORRECTION: ☐ L ☑ R 18 | SHELL AND FUZE: HEQ | |
| METHOD OF ADJ: 1 RD | RANGE: 3275 | MORTAR TO FIRE: #2 | |
| BASIS FOR CORRECTION: RPI | WALT CORRECTION: ☐ + ☑ - 50 | METHOD OF FIRE: 1RD | |
| SHEAF CORRECTION | | 3 RDS PROX IN FFE | (1) HE |
| SHELL AND FUZE: HEQ IN ADJ / PROX IN FFE | RANGE CORRECTION: ☐ + ☑ - 25 | DEFLECTION: 0530 | |
| METHOD OF FFE: 3 RDS | CHARGE/RANGE: 6/3150 | CHARGE: 6 | |
| RANGE LATERAL SPREAD | AZIMUTH: 0640 | TIME SETTING | |
| ZONE | ANGLE T: 80 | ELEVATION: 0969 | |
| TIME OF OPENING FIRE: W/R | | | |

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| L200 | -200 | FFE | 0580 | 3325 | SEC | 3 RDS PROX | 0542 | 3200 | | 0946 | (2) PROX |
| | | | | | | EOM | EST | 30% | CAS- | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 1. Example of completed DA Form 2399, Computer's Record.

2. Data Sheet. DA Form 2188-R, Data Sheet (Figure 2), is used by the computer to record data that pertains to the mortar section or platoon and the firing data for each target engaged that may be of future value. The entries on this form are explained as follows:

**Performance Steps**

a. SETUP. FDC uses this block to record the initialization data used by the firing element.
   (1) TIME OUT--Amount of time selected between switch function.
   (2) TGT PRFX--Target prefix used by the firing element.
   (3) TGT NO--Target numbering block.
   (4) ALARM--Alarm on-off function for messages.
   (5) MIN E/MIN N--Minimum easting and northing coordinates from the map sheet.
   (6) GD--East or west grid declination.
   (7) LAT--Latitude from the map sheet.
   (8) LISTEN--Mode that allows message transmission and reception.
   (9) BIT RATE--Message transmission rates for DMD-supported missions.
   (10) KEY TONE--Length of time required for a communications device.
   (11) BLK--Transmit block mode for DMD-supported missions.
   (12) OWNER ID--Owner identification.

b. WEAPON DATA. FDC uses this block to record the weapon initialization data used by the firing element.
   (1) UNIT--Unit mortar element is assigned.
   (2) __-mm CAR--Weapon type and indicates either mounted or dismounted.
   (3) BP--Base piece number.
   (4) E--Base piece easting map coordinate.
   (5) N--Base piece northing map coordinate.
   (6) ALT--Altitude in meters of the base piece.
   (7) AZ--mils of the base piece direction of fire.
   (8) DEF--Referred deflection used by the firing element.
   (9) ELE--107-mm requires a selected elevation.
   (10) WPN/DIR/DIS--Weapon number, direction, and distance from the base piece. FDC continues completing information until all weapons have been recorded for firing section.

c. FO DATA. FDC uses this block to record the forward observer's locations.
   (1) FO--Call sign of the forward observer.
   (2) ALT--Altitude at the forward observer's location.
   (3) GRID--Grid coordinates of the forward observer's location.

d. AMMUNITION DATA. FDC uses this section to monitor the rounds. This information should be updated after each mission.
   (1) TEMPERATURE--Current temperature.
   (2) TYPE--Appropriate types of ammunition issued.
   (3) LOT NUMBER--Listing of different lot numbers of the rounds and fuzes on hand.
   (4) WEIGHT--Weight difference between types of projectiles.
   (5) ON HAND--The number, by lot, that the firing element has on the firing position.
   (6) RECEIVED--Number and type of rounds received.
   (7) TOTAL--The combination of rounds on hand and those received.
   (8) ROUNDS EXPENDED--The number of rounds expended for missions.
   (9) ROUNDS REMAINING--The number of rounds remaining.

e. TARGET DATA. FDC uses this section to record previously fired targets.
   (1) TARGET ID--This includes the following:
      ( a) TGT NO (target number)--Alphanumeric identifier assigned to a target.
      ( b) GRID--Six-digit or eight-digit coordinates of a target.
      ( c) ALT--Altitude of the target.
   (2) CHART DATA--This includes the following:
      ( a) DEFL (deflection)--Chart (M16/M19) or initial (MBC) deflection to the target.
      ( b) RG/CHG (range/charge)--Chart (M16) or initial (MBC) range and charge for the mortars needed for a target.
   (3) FIRING CORRECTIONS--For the 4.2-inch mortar, column (1) is used to record the total deflection correction used during the mission. Columns (3) and (4) are used on the modified and surveyed charts only. This section includes the following:
      ( a) DEFL CORR (deflection correction)--Direction (left/right) and number of mils to apply to the chart deflection to engage the target.

**Performance Steps**

( b) RANGE CORR (range correction)--Number and type (+/-) of meters to apply to the chart range to engage the target.
( c) ALT (altitude)/VI (vertical interval)--Altitude of the target and VI difference, UP (+) or DOWN (-) in meters, between the target and the mortar altitudes.
( d) ALT CORR (altitude correction)--For all mortars, this is the number and direction (UP/DOWN) of meters used for altitude corrections that are applied. For 4.2-inch mortars, charge correction is listed that is needed for the VI. For the 60-, 81-, and 120-mm only, corrections for deflection and range are used on the modified and surveyed charts.

(4) FIRING DATA--This is the base gun command data for the targets. This information contains all corrections (when used) plus chart data to get the firing data (command data) to the center mass of the target.
( a) DEFL (deflection)--Command deflection to hit the center mass of the target.
( b) RG/CHG (range/charge)--The command range and charge to hit the target.
( c) FUZE TIME SETTING (fuze time setting)--Fuze/time setting on mechanical fuzes recorded to the nearest 0.1 second.
( d) ELEV (elevation)--Elevation used to fire the round: for 4.2-inch mortars, 800, 900, or 1065; for 60-, 81-, and 120-mm mortars, the elevation from the firing tables for the command range.

(5) INTELLIGENCE--This includes the following:
( a) TIME FIRED--The time the call for fire was received.
( b) TGT DES (target description)--What the target was (from the call for fire on the computer's record).
( c) MET OF ENG (method of engagement)--How the target was engaged (number of mortars, number and type of rounds fired in the FFE).
( d) SUR (surveillance)--What happened to the target.

(6) ROUNDS--Rounds expended for mission and amount remaining for future missions.

**Performance Steps**

**DATA SHEET**

For use of this form, see FM 23-91; the proponent agency is TRADOC

**SETUP**

| | |
|---|---|
| TIME OUT | 60 |
| TGT PRFX | CA |
| TGT NO | 0300 - 0400 |
| ALARM | ☐ ON ☑ OFF |
| MIN E | 02 |
| MIN N | 73 |
| GD ☑ E ☐ W | 02 |
| LAT ☑ + ☐ - | 32 |
| LISTEN | ☐ ON ☑ OFF |
| BIT RATE | 1200 |
| KEY TONE | 1-4 |
| BLK | ☑ SNG ☐ DBL |
| OWNER ID | B |

**WEAPON DATA**

| | |
|---|---|
| UNIT | B 1/29 IN |
| BL mm CAR | |
| ☐ YES ☐ NO | |
| BP | B2 |
| E | 0360 |
| N | 7490 |
| ALT | 460 |
| AZ | 3136 |
| DEF | 2800 |
| ELE | |

| | WPN | DIR | DIS |
|---|---|---|---|
| | B1 | 4800 | 35 |
| | B3 | 1600 | 35 |
| | B4 | 1600 | 70 |

**FO DATA**

| FO | ALT | GRID |
|---|---|---|
| A59 | 500 | 0283 7417 |

**AMMUNITION DATA**

TEMPERATURE 70°

TYPE ☐ HE ☑ WP ☑ ILL ☐ CS ☐ TNG

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LOT NUMBER | HE C008 | WP B008 | ILL A008 | | | | | | |
| WEIGHT | 20 | 30 | | | | | | | |
| ON HAND | 200 | 100 | 50 | | | | | | |
| RECEIVED | 100 | 50 | 25 | | | | | | |
| TOTAL | 300 | 150 | 75 | | | | | | |
| ROUNDS EXPENDED | 7 | | | | | | | | |
| ROUNDS REMAINING | 293 | | | | | | | | |

**TARGET DATA**

| TARGET ID | | | CHART DATA | | FIRING CORRECTIONS | | | | FIRING DATA | | | | INTELLIGENCE | | | | ROUNDS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TGT NO | GRID | ALT | DEFL | RG / CHG | DEFL CORR | RANGE CORR | ALT VI | ALT CORR | DEFL | RG / CHG | FUZE TIME SETTING | ELEV | TIME FIRED | TGT DES | MET OF ENG | SUR | EXP | REM |
| RP1 | 0881 7158 | 540 | | | | | 540 +70 | | 2817 | 8 | | 0963 | | RP1 | # 2 1 RD | | 7 HE | 293 |

DA FORM 2188-R, DEC 91 REPLACES DA FORM 2188-R, MAR 77 WHICH IS OBSOLETE

Figure 2. Example of completed DA Form 2188-R, Data Sheet.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to complete the computer's record based on information given or data determined, and to transfer the correct information and data to the data sheet.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Recorded unit and date in the heading. | ____ | ____ |
| 2. Recorded firing corrections, if determined. | ____ | ____ |
| 3. Correctly recorded the call for fire. | ____ | ____ |
| 4. Completed the FDC order. | ____ | ____ |
| 5. Determined and recorded initial firing data. | ____ | ____ |
| 6. Recorded the FO's corrections, then computed and recorded subsequent data. | ____ | ____ |
| 7. Recorded all rounds expended. | ____ | ____ |
| 8. Recorded target surveillance. | ____ | ____ |
| 9. Recorded and updated the ammunition record. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly..

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

**Record Data Using Meteorological Data Sheet**
**071-076-0003**

**Conditions:** Given DA Form 3675-R (Ballistic Message) and meteorological (MET) message.

**Standards:** Recorded meteorological (MET) message on DA Form 3675-R without error.

**Performance Steps**
NOTE 1: To place fire on a target without adjustment, a mortar unit must know the exact location of the target, and compensate for all nonstandard conditions. Re-registration is the most accurate method for determining and maintaining current firing corrections, but it is not always practical. The ballistic MET message allows determination of the corrections necessary in the conditions that affect the flight of rounds between registrations. Those conditions include changes in powder temperature, air temperature and density, and speed and direction of the wind, assuming that all other factors remain constant until the section displaces.

NOTE 2: The performance steps provide fire direction center (FDC) computers with the rules and procedures for computation of the MET message. The firing tables for the type ammunition being fired provide the MET information required. Plus (+) signs have been omitted from the firing tables; numbers without signs are considered positive.

NOTE 3: . By themselves, corrections computed from the MET message are inadequate. To be of value to the FDC, a MET message must be received within four hours of a registration. The registration corrects for all nonstandard conditions. A MET received and computed concurrently with the registration tells the FDC how much of the total registration correction is due to weather. By comparing the corrections from a later MET message, the FDC can modify the registration corrections to account for changes in weather. The use of MET corrections, therefore, eliminates the need for re-registration.

NOTE 4: The ballistic MET message (Figure 1) has two parts: the introduction, which identifies and describes the MET station; and the body, which contains MET data. MET messages can normally be obtained from the division artillery MET station every four hours. Since MET information is normally broadcast on AM radios, it comes

1. Format of the MET message. The MET message is broadcast in six-character blocks as shown in Figure 2. The first 4 six-character groups are known as the introduction, and are recorded on the top line of the recording form. The rest of the message is the body (2 six-character groups compose each line of the body).

**Performance Steps**

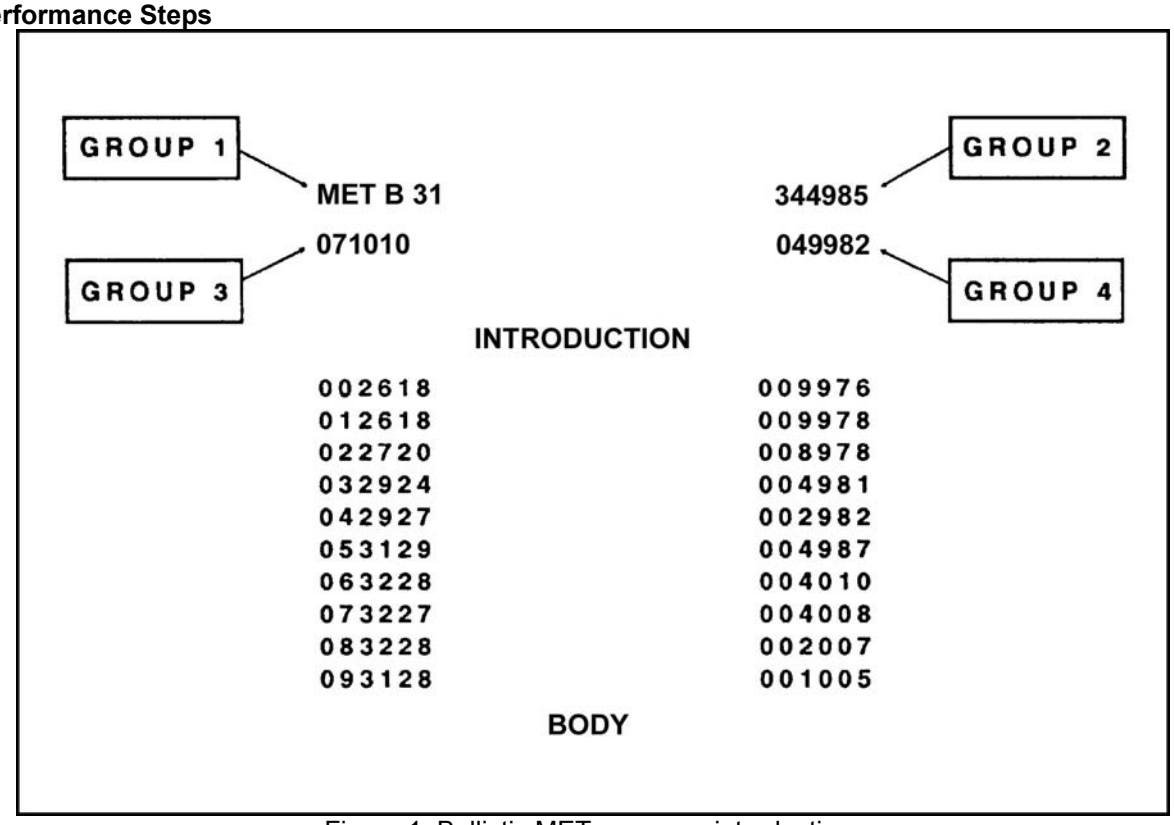



Figure 1. Ballistic MET message introduction.

2. Recording the MET message (DA Form 3675-R).
   a. METB 31 (Group 1). MET - Indicates that the transmission is a MET message. The "B" indicates that it is a ballistic MET message; the "3" indicates that the message is for surface-to-surface fire, and the "1" indicates the octant of the globe in which the MET message applies.

**Performance Steps**

**BALLISTIC MESSAGE**
For use of this form, see FM 6-15; the proponent agency is TRADOC.

| IDENTIFICATION | TYPE MSG | OCTANT | LOCATION $L_aL_aL_a$ or xxx | LOCATION $L_oL_oL_o$ or xxx | DATE YY | TIME (GMT) $G_oG_oG_o$ | DURATION (HOURS) G | STATION HEIGHT (10s M) hhh | MDP PRESSURE % OF STD PPP |
|---|---|---|---|---|---|---|---|---|---|
| METB | K | Q | xxx | xxx | YY | $G_oG_oG_o$ | G | hhh | PPP |
| METB | 3 | 1 | 34H | 985 | 07 | 101 | ø | ø49 | 982 |

| ZONE HEIGHT (METERS) | LINE NUMBER ZZ | BALLISTIC WINDS DIRECTION (100s MILS) dd | BALLISTIC WINDS SPEED (KNOTS) FF | BALLISTIC AIR TEMPERATURE (% OF STD) TTT | BALLISTIC AIR DENSITY (% OF STD) ΔΔΔ |
|---|---|---|---|---|---|
| SURFACE | 00 | 26 | 18 | 009 | 976 |
| 200 | 01 | 26 | 18 | 009 | 978 |
| 500 | 02 | 27 | 20 | 008 | 978 |
| 1000 | 03 | 29 | 24 | 004 | 981 |
| 1500 | 04 | 29 | 27 | 002 | 982 |
| 2000 | 05 | 31 | 29 | 004 | 987 |
| 3000 | 06 | 32 | 28 | 004 | 010 |
| 4000 | 07 | 32 | 27 | 004 | 008 |
| 5000 | 08 | 32 | 28 | 002 | 007 |
| 6000 | 09 | 31 | 28 | 001 | 005 |
| 8000 | 10 | | | | |
| 10000 | 11 | | | | |
| 12000 | 12 | | | | |
| 14000 | 13 | | | | |
| 16000 | 14 | | | | |
| 18000 | 15 | | | | |

REMARKS

| DELIVERED TO: RECEIVED FROM: | TIME (GMT) | TIME (LST) |
|---|---|---|
| | | |

| MESSAGE NUMBER | DATE |
|---|---|
| | |
| RECORDER | CHECKED |
| | |

DA FORM 3675-R, MAY 92 PREVIOUS EDITION OF THIS FORM MAY BE USED UNTIL EXHAUSTED.

Figure 2. Example of completed ballistic MET message.

b. 344985 (Group 2). The "344" indicates the latitude of the center of the area of applicability expressed to the nearest tenth of a degree, and the "985" indicates the longitude of the center

**Performance Steps**

of the area of applicability expressed to the nearest tenth of a degree. When the longitude is 100 or greater (possible in octant 1, 2, or 7), omit the initial digit.

c. 071010 (Group 3). The "07" indicates the day of the month the period of validity of the message begins: "07" equals the seventh day of the month; the "101" indicates, to the nearest tenth of an hour in Greenwich mean time, the hour the period of validity begins; and "0" indicates the duration of the period of validity in hours. For US forces, the MET data are presumed valid until a later message is provided.

d. 049982 (Group 4). The "049" indicates the altitude of the MET station (also referred to as the meteorological datum plane [MDP]), recorded in tens of meters. To avoid confusion, the altitude should be written on the recording form exactly as it is received; "049" written on the sheet means 49 times 10 or 490 meters. The "982" indicates atmospheric pressure at the MET station. This value is not used to determine MET corrections for mortars, but it is recorded to avoid confusion.

3. Body. The atmosphere is divided into height zones parallel to the MDP (Figure 3). MET conditions are determined for each height zone and recorded in two six-digit groups. The data for each zone are numbered, beginning at "00" for the zone containing the MET station, and recorded on the line bearing the corresponding number.

**Performance Steps**

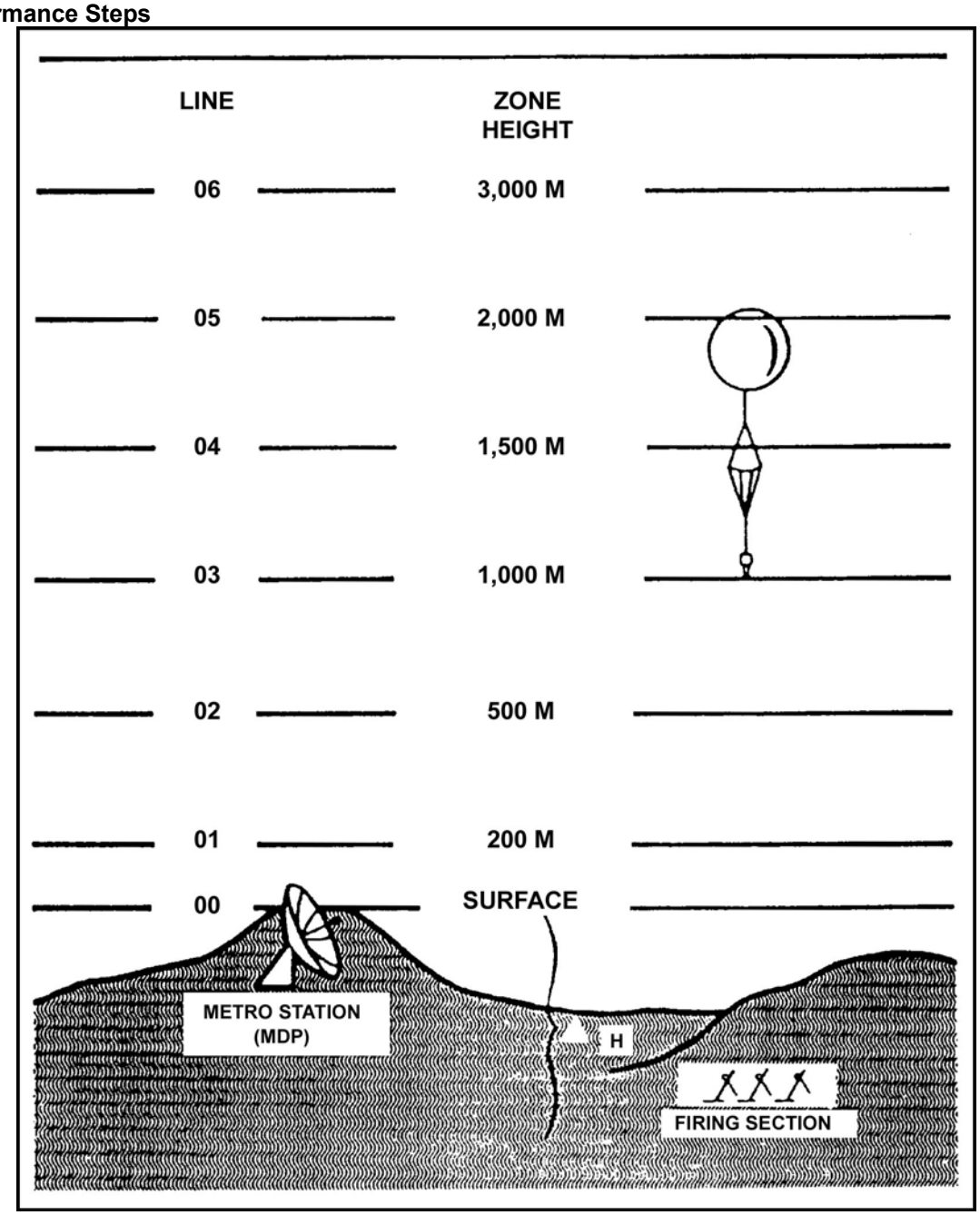



Figure 3. Height zones.

a. 032924. The "03" indicates the line number. Each line number corresponds to a specific type of data. Line numbers run from 00 (surface conditions) up to 15 (18,000 meters). However, with present ammunition only lines 00 through 06 are used, since mortar projectiles never exceed the zone height recorded on line 06. The entire MET message is recorded to reduce the chance of omitting significant data. The "29" indicates the direction from which the ballistic wind is blowing. It is a grid azimuth expressed in hundreds of mils--for example, 29 = 2900 mils; and the "24" indicates the speed of the ballistic wind expressed to the nearest whole knot, for example, 24 equals 24 knots.
b. 004981. The "004" indicates the ballistic air temperature expressed to the nearest 0.1 percent of standard. When the value is equal to or greater than 100, the initial digit, "1," has been

**Performance Steps**

omitted in transmission. The computer recording the message may add the 1 for clarity if he desires. In this example, 004 = 100.4 percent. The "981" indicates the ballistic air density expressed to the nearest 0.1 percent of standard. As with temperature, the initial "1" is omitted in transmission when the value equals or exceeds 100.0. In this example, 981 equals 98.1 percent.

4. Corrections and omissions. At the end of the transmission of a MET message, the recorder checks to see that his copy is complete. The format of the message enables the recorder to ask for a repetition of only the part he has missed, as in, "Say again introduction," or "Say again line zero four." When his copy is complete, the recorder reads back the entire message to check it for errors. If line 05 has been recorded incorrectly, the transmitting station catches the error and reports, "Wrong, line zero five: 052618 998962."

**Evaluation Preparation:** SETUP: At the test site, provide those items shown in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use a blank DA Form 3675-R to record the meteorological (MET) message, to read the MET message as he would over the radio, and, if he misses a portion of the message, to follow the proper procedure to ask for permission to repeat that portion.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Recorded the MET message without error. | ____ | ____ |
| 2. Used proper procedure when asking for a portion of the message to be given again. | ____ | ____ |

NOTE: Performance measure No. 2 will not be scored if the message is recorded correctly the first time it is given.

**Evaluation Guidance:** For test purposes, the soldier need only give and record two lines of the body of the MET message. Score performance measure 2 only if the message is recorded correctly the first time it is given. Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |
| | FM 6-15 |
| | FT 4.2-H-2 |
| | FT 4.2-K-2 |
| | FT 60-P-1 |
| | FT 81-AI-3 |

## Compute Meterological Firing Corrections
## 071-076-0004

**Conditions:** Given a blank DA Form 2601-1 (MET Data Correction Sheet for Mortars), completed DA Form 3675-R (Ballistic Message), a firing table, an overprinted DA Form 2601-1 as shown in Figure 1, the weight of the projectile (4.2-inch only), the powder temperature, the MET corrections from a previous MET message; and pencils and paper.

**Standards:** Computed MET data corrections to apply to the nearest mil for deflection and the nearest meter for range.

**Performance Steps**

1. Compute MET corrections.
    a. To place effective fire on a target without adjustment, a mortar unit must know the exact location of the target and compensate for all nonstandard conditions. The re-registration is the most accurate method for determining and maintaining firing corrections, but it is not always practical. The ballistic MET message provides a means of determining the corrections necessary for changes in many of the conditions that affect the flight of rounds during the periods between registrations. Those conditions include changes in powder temperature, air temperature and air density, and the speed and direction of the wind.
    b. By themselves, corrections computed from the MET message are not adequate firing corrections. To be of value to the FDC, a valid MET message must be received concurrently with a registration (within four hours). The registration corrects for all nonstandard conditions. A MET message received and computed concurrently with the registration tells the FDC how much of the total registration correction is due to weather. By comparing the corrections from a later MET message, the FDC can modify the registration corrections to account for changes in weather. The use of MET corrections, therefore, eliminates the need for re-registration.
    c. The performance steps provide fire direction center (FDC) computers with the rules and procedures for computation of the MET message. The firing tables for the type of ammunition being fired provide the MET information required. Plus (+) signs have been omitted from the firing tables; numbers without signs are considered positive.

NOTE: The tables used in this task are from the 81-mm mortar firing table (FT 81-AI-3). However, the procedures used in this task apply to all mortars.

2. Completion of DA Form 2601-1 (Figure 1).

**Performance Steps**

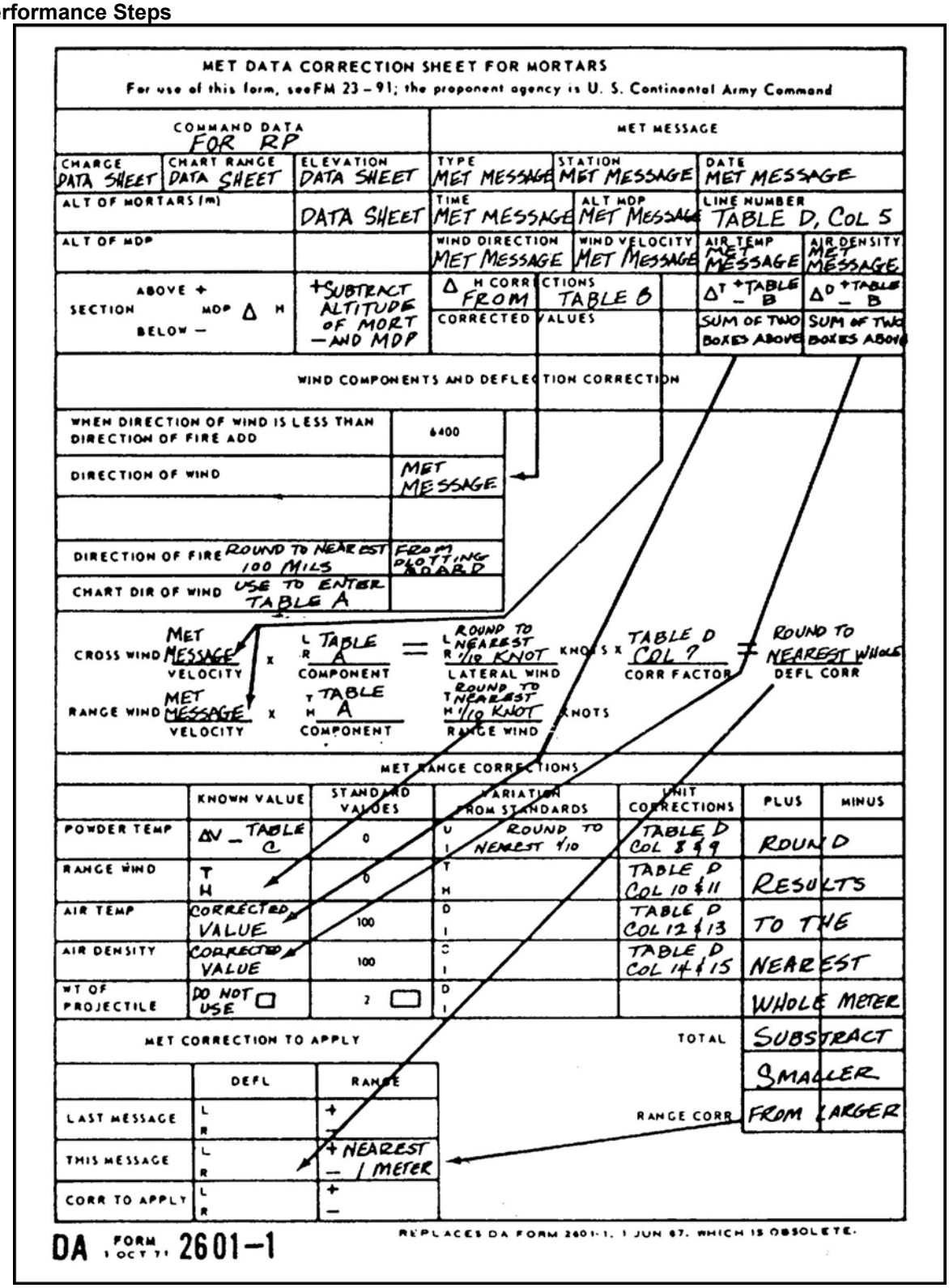



Figure 1. Overprinted MET data correction sheet for mortars.

NOTE: The DA Form 2601-1 in Figure 1 has been overprinted with information on where to find required data, and how to determine and compute MET data.

**Performance Steps**

a. Known data. Known data are those available to the FDC before the receipt of a MET message. They are collected by the computers and recorded in the proper spaces on the MET data correction sheet. Known data includes--
   (1) Charge. This is the most current charge on the data sheet for the registration point (RP). This charge determines which line of the firing tables is consulted to determine the correction factors to be used, and which line of the MET message to use. The line number to use for the MET message can also be recorded before the MET message is received. To do so, enter the firing tables in the following ways:
      ( a) For the 4.2-inch mortar, at the elevation used during the registration: go to column 2 and find the command charge, then go to column 6. The number at that charge in column 6 is the line number.
      ( b) For the 60-mm, 81-mm, or 120-mm mortar, at the command charge, go to column 1 (range) and find the command range, then go to column 5. The number at that range in column 5 is the line number.
      ( c) Once the MET message has been received and recorded, the introduction and the information from the line number being used is then recorded on DA Form 2601-1.
   (2) Chart range. This is for applying MET corrections. The range used becomes the command range. This is the range that was used to hit the RP.
   (3) Elevation. The elevation is used to determine the adjusted charge; corrections are taken from the same section of the firing tables.
   (4) Direction of fire. This is for use with the MET data and is measured to the plotted location of the RP, and then rounded to the nearest 100 mils. It is measured using a surveyed chart. It may also be read from the mounting information at the top of the data sheet.
   (5) Altitude. The altitude of the firing section is read from the data sheet, rounded to the nearest 10 meters, and recorded in the proper box.
   (6) Powder temperature. The temperature of the ammunition propellant at the section is measured to the nearest degree Fahrenheit. If the propellant temperature cannot be determined, air temperature can be substituted.
   (7) Weight of projectile (4.2-inch mortar). This is the weight of the ammunition used during the registration mission. The weight is expressed in squares, and two squares (2 squares) has been set as the standard. If the section has different types of ammunition, the same weight projectile should be used during the registration.

NOTE: The new 4.2-inch ammunition does not use squares of weight.

b. Computation. Once the known data have been recorded on the MET data correction sheet, the transmission of the MET message is awaited. The computation of the MET corrections is quicker and more accurate if the computer has organized his thoughts and data before the message is received. Figure 1 shows a MET data correction sheet that indicates the sources, movements, and precision of the data recorded on the sheet. The following is a guide for organizing MET computations:
   (1) Record any known, previously unrecorded data in the proper spaces before receipt of the MET message.
   (2) Enter the proper subsection of the firing tables at the charge and command range (Table D); read across to find which line of the MET message to use.
   (3) After the MET message is received and recorded on DA Form 3675-R, extract the information contained in the introduction of the message in the line of the body determined above. Record this information in the proper spaces of the MET data correction sheet.
   (4) Compute corrected values for air temperature and density, determine the chart direction of the wind and corresponding wind components, and compute the deflection correction.
   (5) Compute the MET range correction.
   (6) Round the corrections for deflection and range to the nearest mil and meter, respectively, and record them in THIS MESSAGE box at the bottom to determine the correction to apply.

c. Example. The following known data are used to compute corrections:
   Adjusted range --- 2,600;

**Performance Steps**

Charge --- 6;
Elevation --- 1,144;
Direction of fire --- 1,400;
Section altitude --- 210;
Ammunition --- M374A2;
Propellant temperature --- 53 degrees Fahrenheit.

d. Procedures for use of DA Form 2601-1. To compute MET corrections--
   (1) Known data. Record all known data in the spaces provided.
   (2) Determination of line number (Figure 5). Enter the firing tables at the section for the elevation or charge and search down column 1 until the adjusted range (2,600) is found. Read across to column 5 to determine the line number of the MET message to use (in this case, 4).
   (3) MET values. Record the data from the introduction and the appropriate line (04) of the MET message in the proper spaces on DA Form 2601-1 (Figure 2). For brevity, the location of the MET station should remain as it appears in the MET message. All other data should be changed from 030 to 300; wind direction, from 25 to 2500. Values for the altitude of the MET station wind direction, and wind speed are used in other sections of the sheet, and should be recorded now in these other sections.
   (4) Temperature and density corrections. Determine DELTA H and corrected values for air temperature and density. DELTA H is the difference in altitude between the mortar section and the meteorological datum plane (MDP). The sign is plus (+) if the section is above the MDP and minus (-) if it is below:
   Altitude of the MDP --- 300,
   - Altitude of mortars --- 210,
   DELTA H --- -90 (Section below MDP)

NOTE: The DELTA H must always be converted to hundreds to enter Table B (Figure 3).
EXAMPLE: DELTA H = 150 = 1.50;
1. = hundreds (left-hand column of table);
.50 = tenths (across top of Table B)
In the task, DELTA H is -90. This is converted to -0.90 to enter Table B.
The DELTA H corrections modify the values of air temperature and density determined at the MET station to what they would be at the mortar section. The value for DELTA H is used to locate the appropriate corrections in Table B (Figure 3). Corrections for air temperature (DELTA T) and air density (DELTA D) are arranged in four double rows in the table. The numbers 0, +10-, through +90- across the top represent DELTA H in tens of meters. Where the proper hundreds row crosses the proper tens column, the corrections are found. The numerical sign of the corrections are found where the 0 row crosses the +90- column. The sign of DELTA H is minus, making the corrections plus: DELTA T is +0.2 and DELTA D is +0.9. Enter these in the spaces provided on the form, and determine the corrected values for temperature and density (Figure 2).

   (5) Wind components. The wind direction should already have been entered in the proper space, and also the direction of fire. (If the direction of fire is larger than the direction of the wind, add 6400 to the latter (4300 is larger than 2900; 2900 + 6400 = 9300). Subtract the direction of fire; the result is the chart direction of the wind (9300 - 4300 = 5000). In this message, the direction of fire is less than the direction of the wind (2500 - 1400 = 1100). Enter Table A (Figure 4) and find the chart direction of the wind. Read across that row to find the crosswind and range wind components (RIGHT.88 and HEAD.47). Copy them in the proper spaces (Figure 2). Multiply the components by the wind speed to get lateral wind and range wind. The crosswind (16 x .88 = R14.1) is multiplied by the correction factor corresponding to the adjusted range (2,600) taken from Table D (basic data), column 7 (1.4, Figure 5) to get the deflection correction (R14.1 x 1.4 = R19.1, which rounds to R20). The result is moved to the bottom and placed in THIS MESSAGE (Figure 2) for deflection correction.

**Performance Steps**

**MET DATA CORRECTION SHEET FOR MORTARS**

For use of this form, see FM 23 – 91; the proponent agency is U. S. Continental Army Command

| COMMAND DATA | | | MET MESSAGE | | | |
|---|---|---|---|---|---|---|
| CHARGE 6 | CHART RANGE 2600 | ELEVATION 1144 | TYPE 3 | STATION 625602 | DATE 07 | |
| ALT OF MORTARS (m) | | 210 | TIME 0806 | ALT MDP 300 | LINE NUMBER 4 | |
| ALT OF MDP | | 300 | WIND DIRECTION 2500 | WIND VELOCITY 16 | AIR TEMP 99.6 | AIR DENSITY 95.3 |
| SECTION ABOVE + / BELOW – MDP Δ H | | + / – 90 | Δ H CORRECTIONS | | ΔT ± .2 | Δρ ± .9 |
| | | | CORRECTED VALUES | | 99.8 | 96.2 |

**WIND COMPONENTS AND DEFLECTION CORRECTION**

| | |
|---|---|
| WHEN DIRECTION OF WIND IS LESS THAN DIRECTION OF FIRE ADD | 6400 |
| DIRECTION OF WIND | 2500 |
| | |
| DIRECTION OF FIRE | -1400 |
| CHART DIR OF WIND | 1100 |

CROSS WIND 16 (VELOCITY) × (L)(R) .88 (COMPONENT) = (L)(R) 14.1 (LATERAL WIND) KNOTS × 1.4 (CORR FACTOR) = R20 (DEFL CORR)

RANGE WIND 16 (VELOCITY) × (I)(H) .47 (COMPONENT) (I)(H) 7.5 (RANGE WIND) KNOTS

**MET RANGE CORRECTIONS**

| | KNOWN VALUE | STANDARD VALUES | VARIATION FROM STANDARDS | UNIT CORRECTIONS | PLUS | MINUS |
|---|---|---|---|---|---|---|
| POWDER TEMP | ΔV – .9 | 0 | (V)(I) .9 | 19.9 | 18 | |
| RANGE WIND | (I)(H) 7.5 | 0 | (T)(H) 7.5 | 5.5 | 41 | |
| AIR TEMP | 99.8 | 100 | (D)(I) .2 | .1 | — | — |
| AIR DENSITY | 96.2 | 100 | (C)(I) 3.8 | -6.9 | | 26 |
| WT OF PROJECTILE | ☐ | 2 ☐ | (D)(I) | | | |
| MET CORRECTION TO APPLY | | | | TOTAL | 59 | 26 |
| | | | | | 26 | |
| | | | | RANGE CORR | 33 | |

| | DEFL | RANGE |
|---|---|---|
| LAST MESSAGE | L / R | + / – |
| THIS MESSAGE | (L)(R) 20 | (+)(–) 33 |
| CORR TO APPLY | L / R | + / – |

DA FORM (OCT 71) 2601-1 REPLACES DA FORM 2601-1, 1 JUN 67, WHICH IS OBSOLETE.

Figure 2. Example of completed MET data correction sheet for mortars.

**Performance Steps**

CHARGE 6

TABLE B

FT-81-AI-3

TEMPERATURE AND DENSITY CORRECTIONS

CTG. HE. M374A2
FUZE. PD. M567

CORRECTIONS TO TEMPERATURE (DT) AND DENSITY (DD), IN PERCENT, TO COMPENSATE FOR THE DIFFERENCE IN ALTITUDE, IN METERS, BETWEEN THE BATTERY AND THE MDP

| DH | | 0 | ·10· | ·20· | ·30· | ·40· | ·50· | ·60· | ·70· | ·80· | ·90· |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | DT | -0.0 | 0.0 | 0.0 | ·0.1· | ·0.1· | ·0.1· | ·0.1· | ·0.2· | ·0.2· | ·0.2· |
| | DD | 0.0 | ·0.1· | ·0.2· | ·0.3· | ·0.4· | ·0.5· | ·0.6· | ·0.7· | ·0.8· | ·0.9· |
| ·100· | DT | ·0.2· | ·0.2· | ·0.2· | ·0.3· | ·0.3· | ·0.3· | ·0.3· | ·0.4· | ·0.4· | ·0.4· |
| | DD | ·1.0· | ·1.1· | ·1.2· | ·1.3· | ·1.4· | ·1.5· | ·1.6· | ·1.7· | ·1.8 | ·1.9· |
| ·200· | DT | ·0.5· | ·0.5· | ·0.5· | ·0.6· | ·0.6· | ·0.6· | ·0.6· | ·0.7· | ·0.7· | ·0.7· |
| | DD | ·2.0· | ·2.1· | ·2.2· | ·2.3· | ·2.4· | ·2.5· | ·2.6· | ·2.7· | ·2.8· | ·2.9· |
| ·300· | DT | ·0.7· | ·0.7· | ·0.7· | ·0.8· | ·0.8· | ·0.8· | ·0.8· | ·0.9· | ·0.9· | ·0.9· |
| | DD | ·3.0· | ·3.1· | ·3.2· | 3.3· | ·3.4· | ·3.5· | ·3.6· | ·3.7· | ·3.8· | ·3.9· |

NOTES
1 DH IS BATTERY HEIGHT ABOVE OR BELOW THE MDP
2 IF ABOVE THE MDP, USE THE SIGN BEFORE THE NUMBER
3 IF BELOW THE MDP, USE THE SIGN AFTER THE NUMBER

Figure 3. Temperature and density corrections table.

**Performance Steps**

TABLE A

FT 81-A1-3

WIND COMPONENTS

CHARGE 6

CTG, HE, M374A2
FUZE, PD, M567

COMPONENTS OF A ONE KNOT WIND

| CHART DIRECTION OF WIND | CROSS WIND | RANGE WIND |
|---|---|---|
| MIL | KNOT | KNOT |
| 0 | 0 | H1.00 |
| 100 | R.10 | H.99 |
| 200 | R.20 | H.98 |
| 300 | R.29 | H.96 |
| 400 | R.38 | H.92 |
| 500 | R.47 | H.88 |
| 600 | R.56 | H.83 |
| 700 | R.63 | H.77 |
| 800 | R.71 | H.71 |
| 900 | R.77 | H.63 |
| 1000 | R.83 | H.56 |
| → 1100 | R.88 | H.47 |
| 1200 | R.92 | H.38 |
| 1300 | R.96 | H.29 |
| 1400 | R.98 | H.20 |
| 1500 | R.99 | H.10 |
| 1600 | R1.00 | 0 |
| 1700 | R.99 | T.10 |
| 1800 | R.98 | T.20 |
| 1900 | R.96 | T.29 |
| 2000 | R.92 | T.38 |
| 2100 | R.88 | T.47 |
| 2200 | R.83 | T.56 |
| 2300 | R.77 | T.63 |
| 2400 | R.71 | T.71 |
| 2500 | R.63 | T.77 |
| 2600 | R.56 | T.83 |
| 2700 | R.47 | T.88 |
| 2800 | R.38 | T.92 |
| 2900 | R.29 | T.96 |
| 3000 | R.20 | T.98 |
| 3100 | R.10 | T.99 |
| 3200 | 0 | T1.00 |

| CHART DIRECTION OF WIND | CROSS WIND | RANGE WIND |
|---|---|---|
| MIL | KNOT | KNOT |
| 3200 | 0 | T1.00 |
| 3300 | L.10 | T.99 |
| 3400 | L.20 | T.98 |
| 3500 | L.29 | T.96 |
| 3600 | L.38 | T.92 |
| 3700 | L.47 | T.88 |
| 3800 | L.56 | T.83 |
| 3900 | L.63 | T.77 |
| 4000 | L.71 | T.71 |
| 4100 | L.77 | T.63 |
| 4200 | L.83 | T.56 |
| 4300 | L.88 | T.47 |
| 4400 | L.92 | T.38 |
| 4500 | L.96 | T.29 |
| 4600 | L.98 | T.20 |
| 4700 | L.99 | T.10 |
| 4800 | L1.00 | 0 |
| 4900 | L.99 | H.10 |
| 5000 | L.98 | H.20 |
| 5100 | L.96 | H.29 |
| 5200 | L.92 | H.38 |
| 5300 | L.88 | H.47 |
| 5400 | L.83 | H.56 |
| 5500 | L.77 | H.63 |
| 5600 | L.71 | H.71 |
| 5700 | L.63 | H.77 |
| 5800 | L.56 | H.83 |
| 5900 | L.47 | H.88 |
| 6000 | L.38 | H.92 |
| 6100 | L.29 | H.96 |
| 6200 | L.20 | H.98 |
| 6300 | L.10 | H.99 |
| 6400 | 0 | H1.00 |

Figure 4. Wind components table.

**Performance Steps**

FT 81-AI-3 TABLE D CHARGE 6

CTG, HE, M374A2 BASIC DATA

FUZE, PD, M567

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| RANGE | ELEV | D ELEV PER 100 M DR | APPROX NO. OF TURNS PER 100 M DR | LINE NO. | TIME OF FLIGHT | AZIMUTH CORRECTION CW OF 1 KNOT |
| M | MIL | MIL | NO. | NO. | SEC | MIL |
| 2200 | 1235 | 21 | 2 | 4 | 36.7 | 1.7 |
| 2225 | 1229 | 21 | 2 | 4 | 36.7 | 1.7 |
| 2250 | 1224 | 21 | 2 | 4 | 36.6 | 1.7 |
| 2275 | 1219 | 21 | 2 | 4 | 36.5 | 1.6 |
| 2300 | 1214 | 22 | 2 | 4 | 36.4 | 1.6 |
| 2325 | 1208 | 22 | 2 | 4 | 36.4 | 1.6 |
| 2350 | 1203 | 22 | 2 | 4 | 36.3 | 1.6 |
| 2375 | 1197 | 22 | 2 | 4 | 36.2 | 1.6 |
| 2400 | 1192 | 22 | 2 | 4 | 36.1 | 1.6 |
| 2425 | 1186 | 23 | 2 | 4 | 36.0 | 1.5 |
| 2450 | 1180 | 23 | 2 | 4 | 35.9 | 1.5 |
| 2475 | 1174 | 23 | 2 | 4 | 35.9 | 1.5 |
| 2500 | 1169 | 24 | 2 | 4 | 35.8 | 1.5 |
| 2525 | 1163 | 24 | 2 | 4 | 35.7 | 1.5 |
| 2550 | 1157 | 24 | 2 | 4 | 35.6 | 1.5 |
| 2575 | 1151 | 25 | 2 | 4 | 35.5 | 1.4 |
| → 2600 | 1144 | 25 | 2 | 4 | 35.4 | 1.4 |
| 2625 | 1138 | 25 | 3 | 4 | 35.3 | 1.4 |
| 2650 | 1132 | 26 | 3 | 4 | 35.2 | 1.4 |
| 2675 | 1125 | 26 | 3 | 4 | 35.1 | 1.4 |
| 2700 | 1119 | 27 | 3 | 4 | 35.0 | 1.4 |
| 2725 | 1112 | 27 | 3 | 4 | 34.8 | 1.3 |
| 2750 | 1105 | 28 | 3 | 4 | 34.7 | 1.3 |
| 2775 | 1098 | 28 | 3 | 4 | 34.6 | 1.3 |
| 2800 | 1091 | 29 | 3 | 4 | 34.5 | 1.3 |
| 2825 | 1084 | 29 | 3 | 4 | 34.4 | 1.3 |
| 2850 | 1076 | 30 | 3 | 4 | 34.2 | 1.3 |
| 2875 | 1069 | 31 | 3 | 4 | 34.1 | 1.2 |
| 2900 | 1061 | 31 | 3 | 4 | 33.9 | 1.2 |
| 2925 | 1053 | 32 | 3 | 4 | 33.8 | 1.2 |
| 2950 | 1045 | 33 | 3 | 4 | 33.6 | 1.2 |
| 2975 | 1037 | 34 | 3 | 4 | 33.5 | 1.2 |
| 3000 | 1028 | 35 | 4 | 4 | 33.3 | 1.2 |

Figure 5. Basic data table.

(6) Range correction. All known values should already be written in the proper spaces except DELTA V, which are found as follows. The computer enters Table C (Figure 6) and finds

**Performance Steps**

the temperature closest to that recorded for the propellant (it may be Fahrenheit or Celsius). Variation in velocity appears in the center column on the same line as the temperature. The computer now determines the amount by which these known values vary from the standard values upon which the firing tables are based. The variations from standard must be multiplied by correction factors from Table D (Figure 7) to convert them to range correction in meters. Enter Table D on the line corresponding to the adjusted range and find the correction factors for each variation from standard. Enter the factor with its sign on the MET sheet. Multiply the variation from standard by the correction factor, and place the result (rounded to the nearest whole meter) in the column with the same sign as the correction factor. When all of the corrections have been multiplied, add the two columns and determine the MET correction (+33 in the example). Determine the result to the nearest meter and write it in the range box for THIS MESSAGE.

**Performance Steps**

FT 81-AI-3 TABLE C CHARGE 6

CTG, HE, M374A2
FUZE, PD, M567

PROPELLANT TEMPERATURE

VARIATIONS IN MUZZLE VELOCITY
DUE TO PROPELLANT TEMPERATURE

| TEMPERATURE OF PROPELLANT | VARIATION IN VELOCITY | TEMPERATURE OF PROPELLANT |
|---|---|---|
| DEGREES F | M S | DEGREES C |
| -40 | -7 6 | -40.0 |
| -35 | -7 2 | -37 2 |
| -30 | -6 8 | -34 4 |
| -25 | -6 4 | -31 7 |
| -20 | -6 0 | -28 9 |
| -15 | -5 6 | 26 1 |
| -10 | -5 2 | 23 3 |
| -5 | -4 9 | -20 6 |
| 0 | -4 5 | -17 8 |
| 5 | -4 1 | 15 0 |
| 10 | -3 8 | 12 2 |
| 15 | -3 4 | -9 4 |
| 20 | -3 1 | -6 7 |
| 25 | -2 7 | -3 9 |
| 30 | -2 4 | 1 1 |
| 35 | -2 1 | 1 7 |
| 40 | -1 8 | 4 4 |
| 45 | -1 5 | 7 2 |
| 50 | -1 2 | 10 0 |
| → 55 | (-0.9) | 12 8 |
| 60 | -0 6 | 15 6 |
| 65 | -0.3 | 18.3 |
| 70 | 0.0 | 21.1 |
| 75 | 0.3 | 23 9 |
| 80 | 0.5 | 26.7 |
| 85 | 0.8 | 29.4 |
| 90 | 1.1 | 32.2 |
| 95 | 1.3 | 35.0 |
| 100 | 1.5 | 37.8 |
| 105 | 1.8 | 40 6 |
| 110 | 2.0 | 43.3 |
| 115 | 2.2 | 46.1 |
| 120 | 2.4 | 48 9 |
| 125 | 2.6 | 51.7 |
| 130 | 2.8 | 54.4 |

Figure 6. Propellant temperature.

**Performance Steps**

FT 81-AI-3 TABLE D CHARGE 6

CTG, HE, M374A2 CORRECTION FACTORS

FUZE, PD, M567

| 1 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|
| RANGE | RANGE CORRECTIONS FOR | | | | | | | |
| | MUZZLE VELOCITY 1 M/S | | RANGE WIND 1 KNOT | | AIR TEMP 1 PCT | | AIR DENSITY 1 PCT | |
| | DEC | INC | HEAD | TAIL | DEC | INC | INC | DEC |
| M | M | M | M | M | M | M | M | M |
| 2200 | 16.9 | -14.7 | 5.3 | -4.3 | 0.1 | 0.0 | -5.8 | 5.7 |
| 2225 | 17.1 | -14.9 | 5.4 | -4.3 | 0.1 | 0.0 | -5.8 | 5.8 |
| 2250 | 17.2 | -15.0 | 5.4 | -4.3 | 0.1 | 0.0 | -5.9 | 5.9 |
| 2275 | 17.4 | -15.2 | 5.4 | -4.3 | 0.1 | 0.0 | -6.0 | 5.9 |
| 2300 | 17.6 | -15.4 | 5.4 | -4.3 | 0.1 | 0.0 | -6.0 | 6.0 |
| 2325 | 17.8 | -15.5 | 5.4 | -4.4 | 0.1 | 0.0 | -6.1 | 6.1 |
| 2350 | 18.0 | -15.7 | 5.4 | -4.4 | 0.1 | 0.0 | -6.2 | 6.1 |
| 2375 | 18.2 | -15.9 | 5.4 | -4.4 | 0.1 | 0.0 | -6.2 | 6.2 |
| 2400 | 18.4 | -16.0 | 5.5 | -4.4 | 0.1 | 0.0 | -6.3 | 6.3 |
| 2425 | 18.6 | -16.2 | 5.5 | -4.4 | 0.1 | 0.0 | -6.4 | 6.3 |
| 2450 | 18.7 | -16.4 | 5.5 | -4.5 | 0.1 | 0.0 | -6.4 | 6.4 |
| 2475 | 18.9 | -16.5 | 5.5 | -4.5 | 0.1 | 0.0 | -6.5 | 6.5 |
| 2500 | 19.1 | -16.7 | 5.5 | -4.5 | 0.1 | 0.0 | -6.6 | 6.6 |
| 2525 | 19.3 | -16.8 | 5.5 | -4.5 | 0.1 | 0.0 | -6.6 | 6.6 |
| 2550 | 19.5 | -17.0 | 5.5 | -4.5 | 0.1 | 0.0 | -6.7 | 6.7 |
| 2575 | 19.7 | -17.2 | 5.5 | -4.5 | 0.1 | 0.0 | -6.8 | 6.8 |
| → 2600 | 19.9 | -17.3 | 5.5 | -4.6 | 0.1 | 0.0 | -6.9 | 6.8 |
| 2625 | 20.1 | -17.5 | 5.5 | -4.6 | 0.1 | 0.0 | -6.9 | 6.9 |
| 2650 | 20.2 | -17.7 | 5.6 | -4.6 | 0.1 | 0.0 | -7.0 | 7.0 |
| 2675 | 20.4 | -17.8 | 5.6 | -4.6 | 0.1 | 0.0 | -7.1 | 7.0 |
| 2700 | 20.6 | -18.0 | 5.6 | -4.6 | 0.1 | 0.0 | -7.1 | 7.1 |
| 2725 | 20.8 | -18.1 | 5.6 | -4.6 | 0.1 | 0.0 | -7.2 | 7.2 |
| 2750 | 21.0 | -18.3 | 5.6 | -4.7 | 0.1 | 0.0 | -7.3 | 7.2 |
| 2775 | 21.2 | -18.5 | 5.6 | -4.7 | 0.1 | 0.0 | -7.3 | 7.3 |
| 2800 | 21.4 | -18.6 | 5.6 | -4.7 | 0.1 | 0.0 | -7.4 | 7.3 |
| 2825 | 21.6 | -18.8 | 5.6 | -4.7 | 0.1 | 0.0 | -7.5 | 7.4 |
| 2850 | 21.8 | -19.0 | 5.6 | -4.7 | 0.1 | 0.0 | -7.5 | 7.5 |
| 2875 | 22.0 | -19.1 | 5.5 | -4.7 | 0.1 | 0.0 | -7.6 | 7.5 |
| 2900 | 22.1 | -19.3 | 5.5 | -4.8 | 0.1 | 0.0 | -7.7 | 7.6 |
| 2925 | 22.3 | -19.5 | 5.5 | -4.8 | 0.1 | 0.0 | -7.7 | 7.7 |
| 2950 | 22.5 | -19.6 | 5.5 | -4.8 | 0.1 | 0.0 | -7.8 | 7.7 |
| 2975 | 22.7 | -19.8 | 5.5 | -4.8 | 0.1 | 0.0 | -7.9 | 7.8 |
| 3000 | 22.9 | -19.9 | 5.5 | -4.8 | 0.1 | 0.0 | -7.9 | 7.8 |

Figure 7. Correction factors table.

(7) MET correction. This is the contribution of MET factors at the time the MET was computed in the amount recorded by THIS MESSAGE, here R20, +33. The change in the deflection

**Performance Steps**

correction is expressed as the direction and number of mils change from the concurrent MET (R20) to the first subsequent MET (R8). The horizontal scale of Figure 8 illustrates a convenient method for determining the difference, in this case, LEFT 12. The range change is the difference between the range correction for the concurrent MET (+33) and that for the subsequent MET (+66). The vertical scale of Figure 8 shows how to determine the range correction; here, +33. The completed MET CORR TO APPLY section would look like Table 1.

The method of determining the correction to apply (L12, +33) to the data from the registration is recorded on the data sheet. If several hours later another MET is received and calculated (call this the second subsequent MET), the corrections to apply would be calculated by finding the changes in deflection and range corrections between the first subsequent MET (which is now in the LAST MESSAGE box) and the second subsequent MET, using exactly the same method as before.

**Performance Steps**

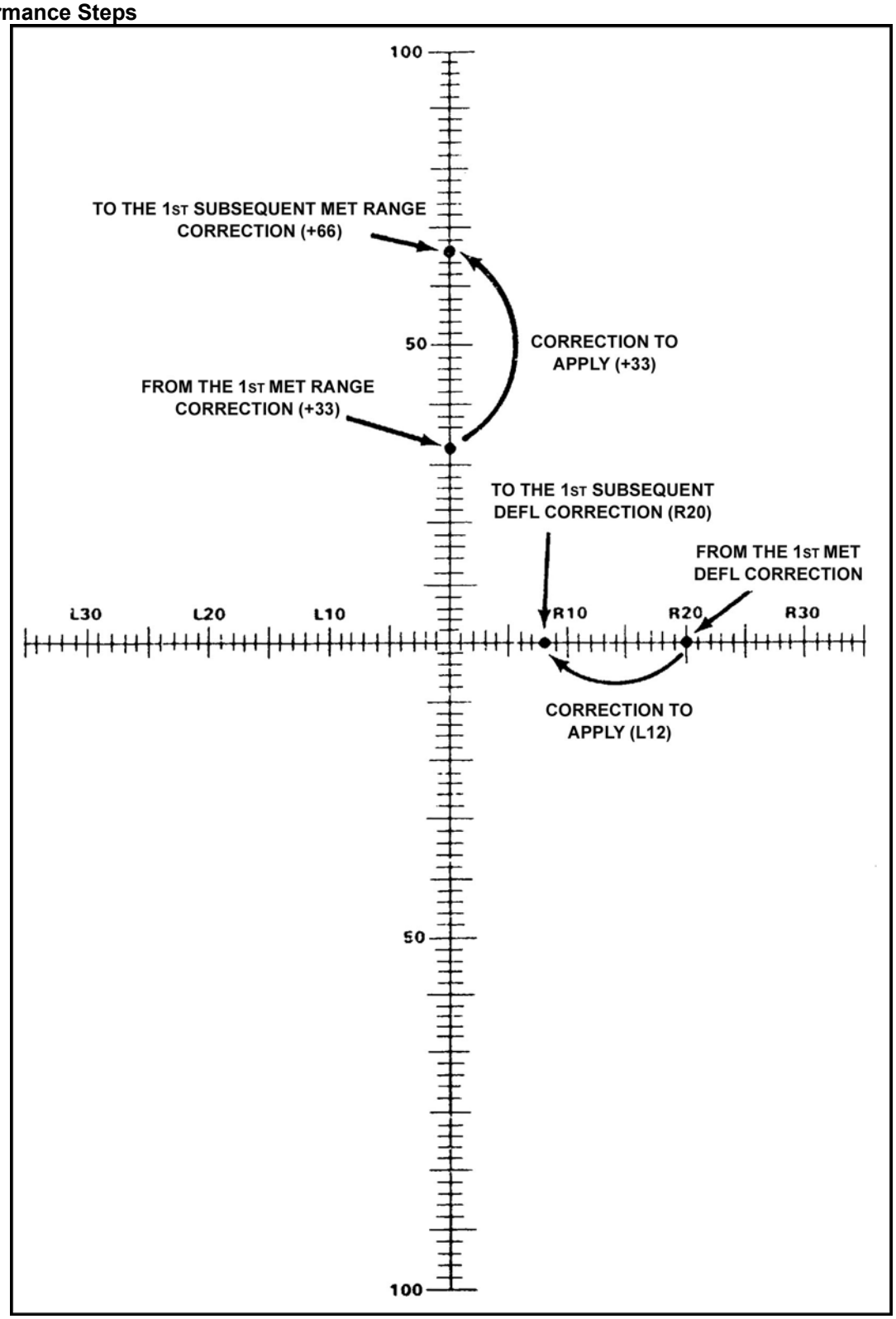



Figure 8. MET cross.

**Performance Steps**

| | DEFLECTION | RANGE |
|---|---|---|
| | L | + |
| LAST MESSAGE | 20 | 33 |
| | R | - |
| | L | + |
| THIS MESSAGE | 8 | 66 |
| | R | - |
| | L | + |
| CORR TO APPLY | 12 | 33 |
| | R | - |

Table 1. Example of completed MET CORR TO APPLY section.

3. Determination and application of MET firing corrections.
   a. Deflection correction. The deflection correction recorded on the data sheet from the registration was R23. The correction determined from the MET messages was L12. To determine the new deflection correction, add the two figures as follows: Deflection correction equals R(-)23; MET range correction equals L(+)12; and new deflection correction equals R(-)11.
   b. Range correction factor. To determine the new range correction factor (RCF), use the correction taken from the data sheet and the MET correction, and add these two figures as follows:
   (RP range correction +100) + (MET range correction + 33) = (New range correction +133).
   From the new range correction, the new RCF is determined as follows:
   (Range correction = +133), (Chart range (in thousands) = 2.4), 133/2.4 = 1,330/24 = 55.4 = +55 RCF
   These new corrections are now recorded on the data sheet and used to fire new targets.
   c. Firing data. After the new firing corrections have been determined and as time permits, it is possible to update firing data for all plotted and previously fired targets. The procedures for updating target information are exactly the same as the re-registration corrections.

**Evaluation Preparation:** SETUP: At the test site, provide all materials and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute and determine which MET corrections to apply based on the current and previous MET messages.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Determined the MET corrections based on the MET message without error. | ____ | ____ |
| 2. Compared the MET corrections from both MET messages; determined the MET corrections to apply to the registration correction when determining new firing corrections. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO, if he passes all performance measures within 20 minutes. Score him NO-GO if he fails any performance measure or misses the deadline. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
| --- | --- |
| | FM 23-91 |
| | FT 81-AI-3 |

## Apply No-Fire Data to a Plotting Board

**071-076-0008**

**Conditions:** Given a plotting board or firing chart prepared for or during an operation (surveyed chart); a fire-direction center (FDC) kit for the type mortar being fired; and no-fire restrictions such as overlays, grids, and notes that accurately prescribe location, times and other fire restrictions.

**Standards:** Applied no-fire data that gave the fire-direction center (FDC) accurate information that, when properly used, kept the designated area free of mortar fire during the prescribed period of time.

**Performance Steps**

NOTE: In the following steps, the term "chart" is used in lieu of "plotting board/firing chart"--as in surveyed, observed, or modified observed chart.

1. Superimpose boundaries onto the chart.
   a. Construct lines on the chart that graphically portray the limits of the restricted area(s).
2. Enter applicable information. The restricted areas identify or label with sufficient information to make them easily identified, and all related firing limitations understood.
3. Determine firing data to avoid impact in restricted areas. Any fire request that could impact in a restricted area is denied in a message to observer and reported to the chain of command.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to apply the no-fire data to a plotting board.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Superimposed boundaries onto the plotting board/firing chart. | ____ | ____ |
| 2. Entered information. | ____ | ____ |
| 3. Determined firing data and avoided impact within restricted areas. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Angle T**

**071-076-0010**

**Conditions:** As a computer in a fire-direction center (FDC), given the observer-target (O-T) direction, the gun-target (G-T) direction (direction of fire), No. 2 pencils, paper, and the following information for each of three problems:

1. One O-T azimuth between 0 and 1600 mils, and one G-T azimuth between 4800 and 0 mils.

2. One O-T azimuth between 0 and 1600 mils, and one G-T azimuth between 1600 and 3200 mils.

3. One O-T azimuth between 3200 and 4800 mils, and one G-T azimuth between 4800 and 0 mils.

**Standards:** 1. Determined angle T to the nearest mil.

2. Recorded angle T to the nearest 10 mils.

3. In the message to observer (MTO), notified the forward observer (FO) when angle T exceeded 500 mils or on the request of the FO.

**Performance Steps**

1. Angle T is the difference in mils (angle) between the O-T direction and gun-target (G-T) direction (Figure 1).

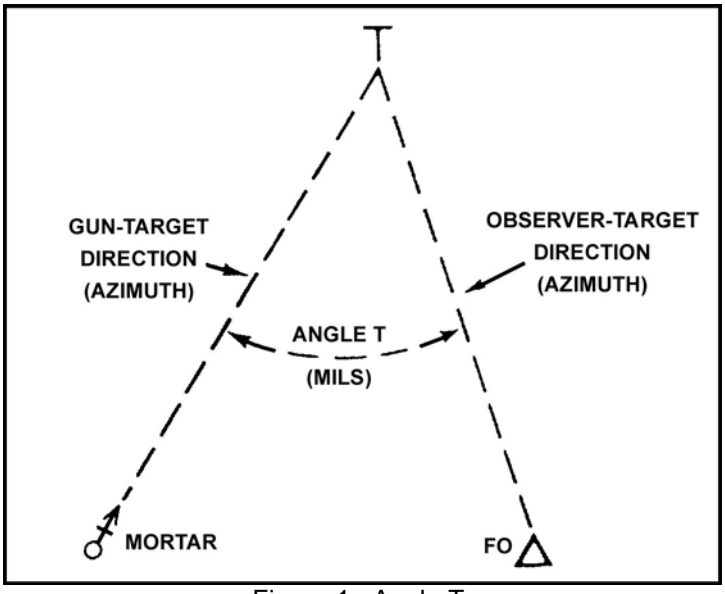



Figure 1. Angle T.

2. Angle T becomes significant when it reaches 500 mils. At that point, range changes, with respect to the G-T line, begin to appear as deviation changes to the FO. It is an uncorrectable ballistic characteristic of mortars that range probable error (the statistical uncertainty as to exactly where along the G-T line the round will impact) is fairly large. A round could easily land 25 meters over or short of a target when firing the same data. Deviation probable error is small by comparison. When angle T is over 500 mils, range probable errors begin to appear as deviations to the FO. Therefore, the FDC informs the FO when angle T is between 500 and 2700 mils (Figure 2).

**Performance Steps**

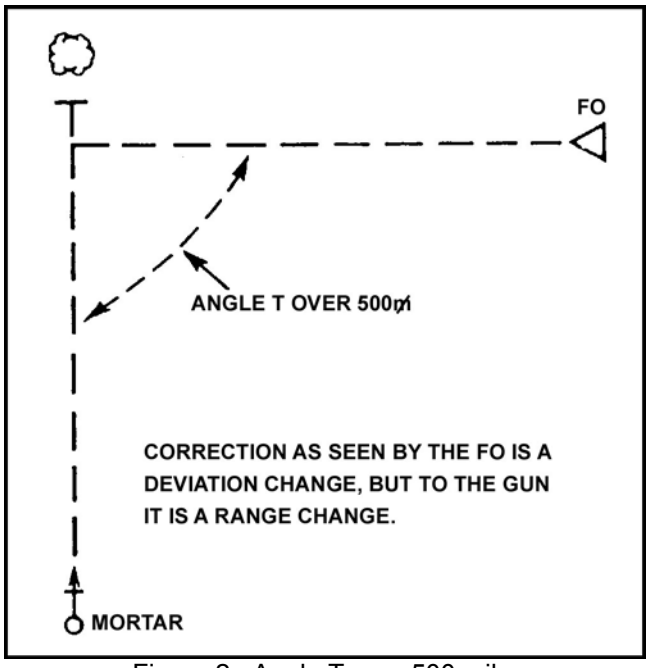



Figure 2. Angle T over 500 mils.

3. When this happens, the FO then uses a different method to determine the deviation (left, right) correction. When the FO has been told that angle T is over 500 mils, his initial action is to continue to use his O-T factor to make his deviation corrections. However, if he observes that he is getting much more of a correction than he asked for, he should consider cutting his corrections proportionately and continuing the mission.

4. To compute angle T, the FDC must have the O-T direction (taken from the call for fire), and the G-T direction (taken from the plotting board).
   EXAMPLE A: 4100 mils (O-T direction) minus 3500 mils (G-T direction) = 600 mils (Angle T).
   The angle T is between 500 and 2700 mils, so the FO is notified, "Angle T is over five hundred."
   EXAMPLE B: 6000 mils (O-T direction) minus 0100 mils (G-T direction) = 5900 mils.
   Result is greater than 3200, so subtract from 6400.
   6400 mils minus 5900 mils = 500 mils (Actual angle T).
   The angle T does not exceed 500 mils. The FO is not notified. Angle T is significant only when it is between 500 and 2700 mils (Figure 3).

**Performance Steps**

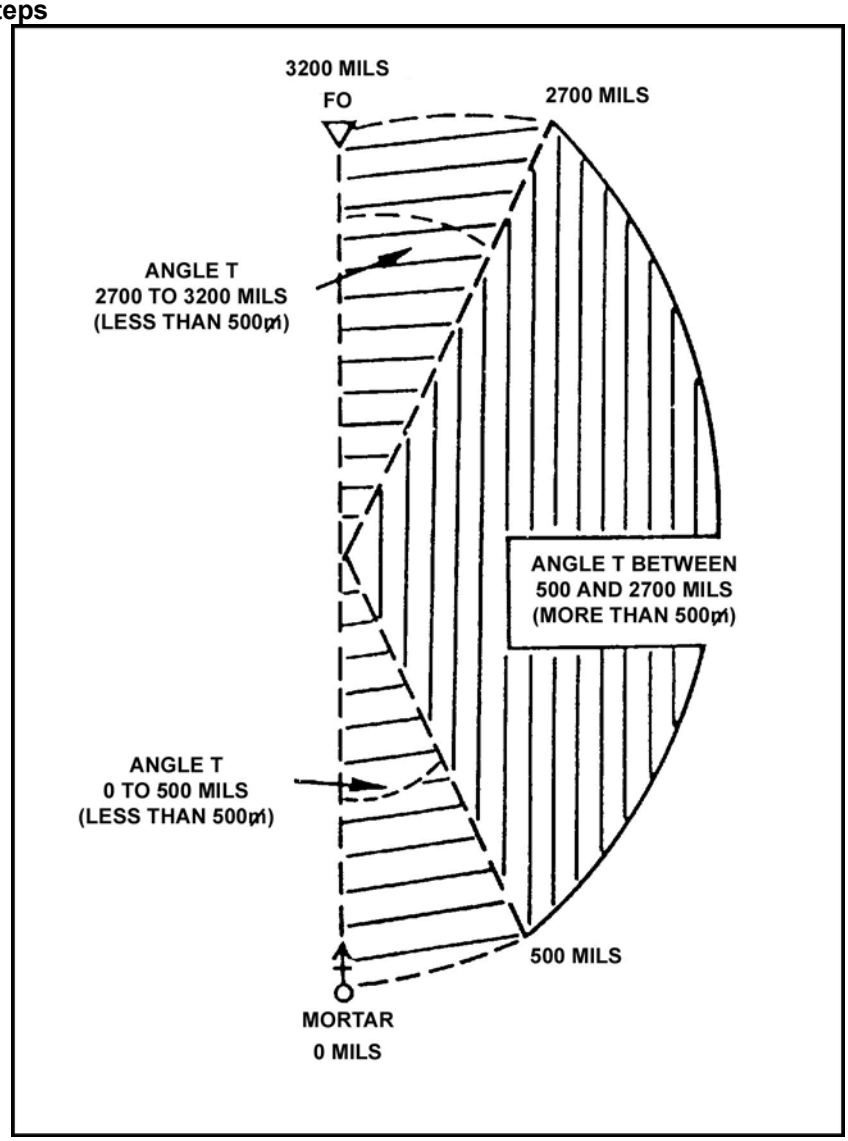



Figure 3. Angle T between 500 and 2700 mils.

5. Although the angle T is of no use to the FDC, it is of great importance to the FO. Angle T must be determined to the nearest mil and recorded on the computer's record to the nearest 10 mils. If the FO requests the angle T, it is given to the nearest 100 mils.

**Evaluation Preparation:** SETUP: At the test site, provide the equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to determine the angle T for each of the three problems. The soldier may place the data on the plotting board and determine the angle T, or he may use paper and pencil. Then, tell him to answer all questions about angle T. Answers follow in parentheses.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Determined the correct angle T for problem one (to 1 mil). | ____ | ____ |
| 2. Determined the correct angle T for problem two (to 1 mil). | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 3. Determined the correct angle T for problem three (to 1 mil). | ____ | ____ |
| 4. To what number of mils is angle T recorded on the computer's record? (nearest 10 mils) | ____ | ____ |
| 5. When is the FO informed about angle T? (when over 500 mils) | ____ | ____ |
| 6. Of what use is the angle T to the FDC? (none) | ____ | ____ |
| 7. When would the FDC inform the FO of the actual angle T when it is less than 500 mils? (only when the FO requested angle T) | ____ | ____ |
| 8. If the FO requested angle T, to what number of mils is it given? (nearest 100 mils) | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO, if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

Subject Area 51: WEAPONS: MORTAR FDC PLOTTING BOARD

**Prepare a Plotting Board for Operation Using the Below Pivot-Point Method**
**071-078-0002**

**Conditions:** As a computer in a fire-direction center (FDC), given an Ml6 plotting board; a call for fire for 60- and 81-mm mortars; a 1:50,000 map; a coordinate scale; a mil protractor; an ammunition count; firing tables; DA Form 2399 (Computer's Record); an overlay of the company's area of responsibility, including mortar position, targets, and reference points (RPs); referred deflection; and a No. 2 pencil.

**Standards:** 1. Determined direction of fire to within 10 mils, with a tolerance of 10 mils.

2. Determined mounting azimuth without error.

3. Superimposed referred deflection that corresponds to the mounting azimuth.

4. Plotted all known locations of mortars, targets, and RPs without error.

5. Completed computing the mission.

**Performance Steps**
NOTE: Information recorded in the margin of the computer's record is for training or may be used until the data sheet is set up.

1. The computer prepares observed chart (below pivot point).
    a. Determine data to set up the plotting board.
        (1) Using the overlay, plot the mortar position and RP on the map.
        (2) Using a mil protractor, determine the grid azimuth from the mortar position to the RP. Record this azimuth (direction of fire) in the top margin of the computer's record.

NOTE: Information recorded in the margin of the computer's record is for training or may be used until the data sheet is set up.

        (3) To determine the mounting azimuth, round off the direction of fire to the nearest 50 mils.
        EXAMPLE:
        Direction of Fire 2315 --- Mounting Azimuth 2300
        Direction of Fire 2425 --- Mounting Azimuth 2450
        Direction of Fire 2435 --- Mounting Azimuth 2450
        (4) Record the mounting azimuth in the top margin of the computer's record.
        (5) To set up the deflection scale on the plotting board, rotate the disk until the mounting azimuth is at the index mark. Directly below the mounting azimuth, write in the referred deflection (normally 2800) using the first two digits (28). Continue right or left of 28, using the LARS (left add, right subtract) rule, 400 to 500 mils (Figure 1).

**Performance Steps**

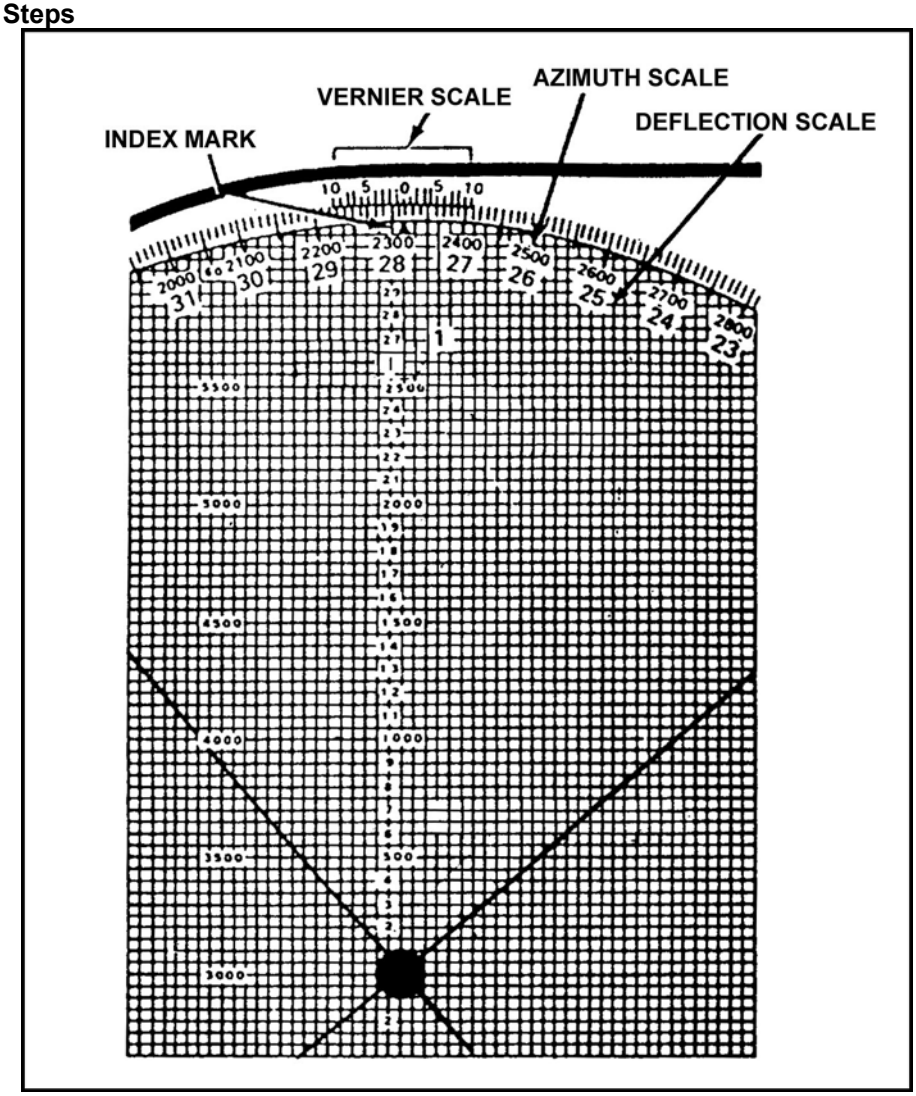



Figure 1. Placement of deflection scale on disk.

(6) To determine the chart deflection to fire the first round, index the grid azimuth (direction of fire) and read the deflection that corresponds to the grid azimuth. Record the deflection in the CHART DATA/DEFL block of the computer's record.

b. Determine deflection. To determine the deflection for the first round, keep the direction of fire indexed and read the deflection as follows (Figure 2):

**Performance Steps**

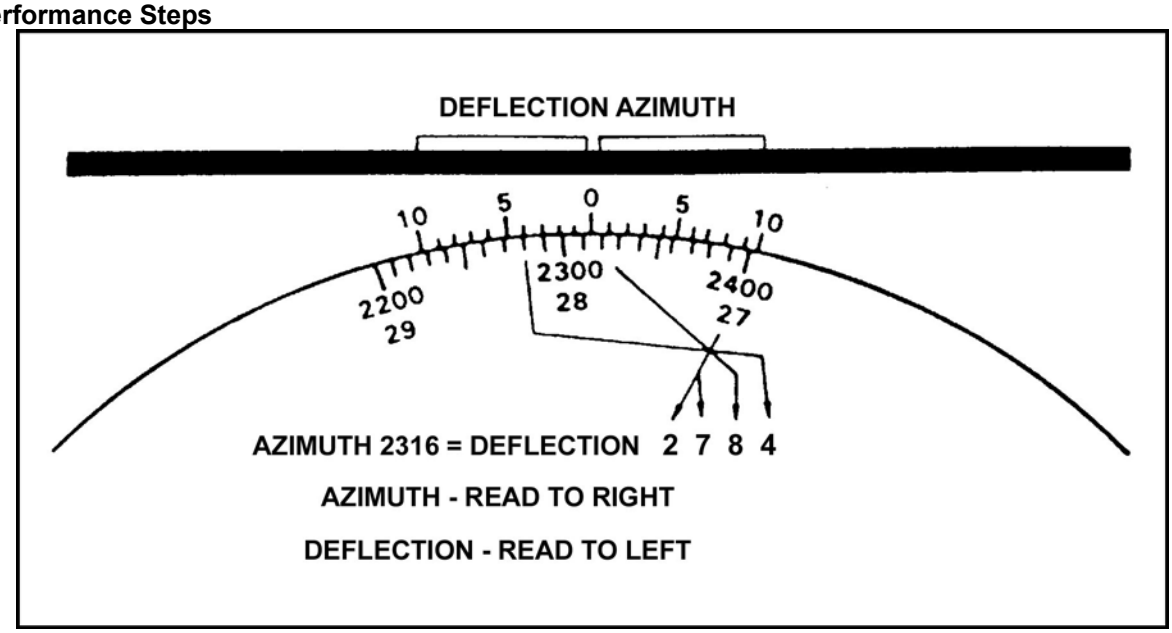



Figure 2. Deflection determination.

(1) The first two digits are read from the deflection scale that the computer placed on the plotting board. Since deflections increase to the left, look for the first number to the right of the index mark. In this example, it is 27.
(2) The third digit is read from the 10-mil mark between deflection numbers 27 and 28. The index mark is between the eighth and ninth 10-mil mark, which makes the third digit "8."
(3) The fourth digit is read at the Vernier scale. For deflections, use the left half of the scale. Count the 1-mil marks, starting at the 0, to the left until one of the 1-mil marks of the Vernier scale and one of the 10-mil marks on the azimuth disk are aligned. In this case, the fourth 1-mil mark is aligned, making the fourth digit 4.

c. Determine range. The next step is to determine the range from the mortar position to the RP. Using the edge of the computer's record, place it along the line from the mortar to the reference point on the map. Then place a tick mark at the mortar and one at the reference point. Using the range scale of the map, determine the range in meters. Record this in the CHART DATA/CHG (RG) block of the computer's record.
d. Plot the mortar and target. To complete setting up the plotting board, plot the mortar and reference point. Keeping the chart deflection indexed, move 500 meters to the right or left of the pivot point and down 2,000 meters (Figure 1). Make a small plot and enclose it with the mortar symbol (Figure 3). To plot the RP (range 2,150 meters), count the large and small squares, go straight up the board to the range, make a small plot, circle it, and number it (Figure 3).

**Performance Steps**

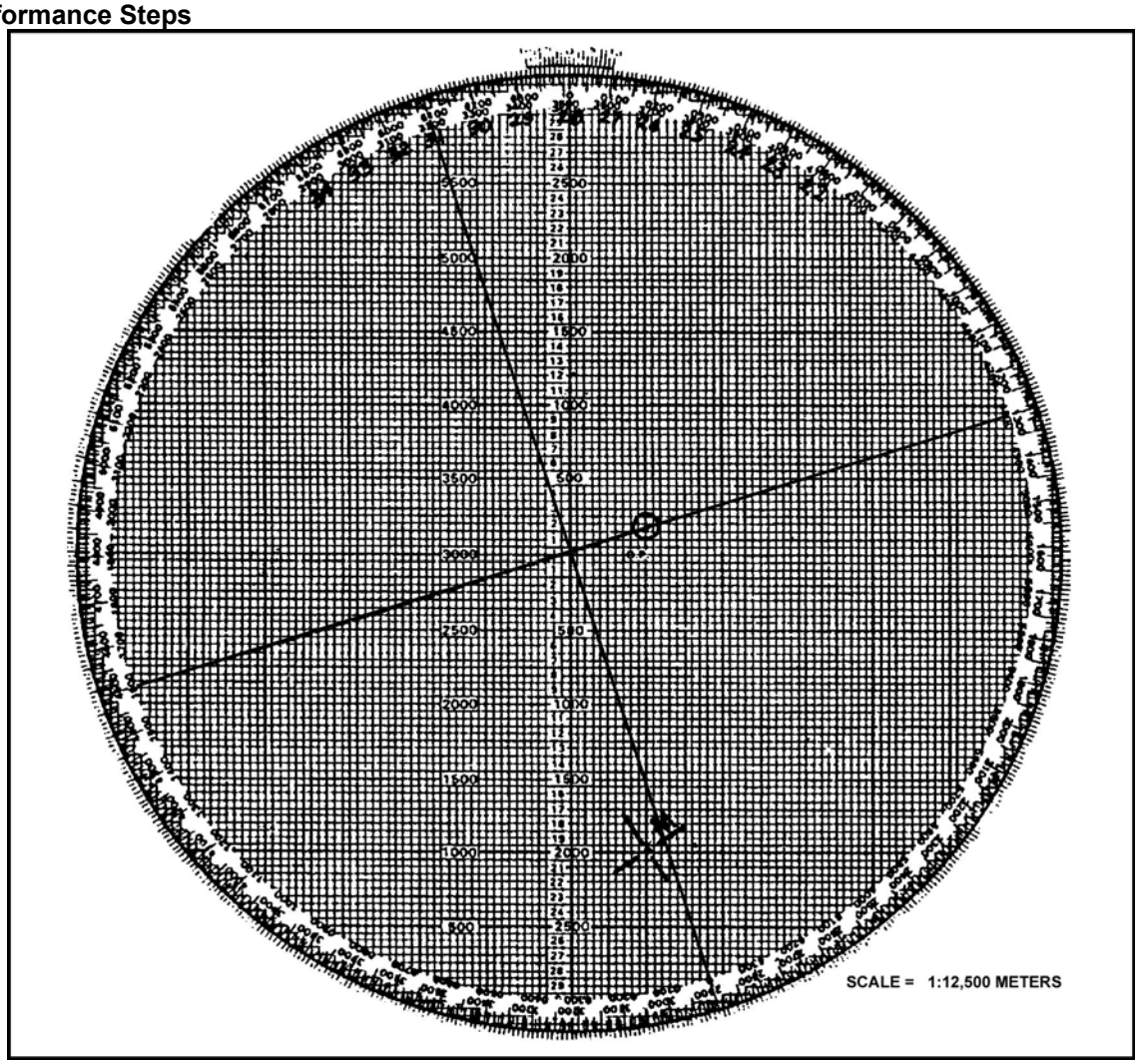



Figure 3. Mortar and target aligned.

2. The computer plots FO's correction. Receive and record the FO's correction (OBSERVER CORR) (Figure 1). Compute new data for the FO's correction as follows:
   a. Index the FO's direction (taken from the call for fire) at the index mark on the plotting board. (Place a small triangle [DELTA] below the FO's direction.)
   b. Plot the FO's correction from the last round fired (L3O, DROP 100). From round No. 1, go to the left 30 meters, or the equivalent of three-fifths of one small square, and down 100 meters, or the equivalent of two small squares. Make a small plot, circle it, and label it "2."

3. The computer determines new firing data.
   a. To determine the new deflection, range, charge, and elevation--
      (1) Rotate the disk until the No. 2 plot is aligned with the mortar plot. (The mortar and No. 2 plot must be an equal distance from the same vertical line and on the same side of the same vertical line.)
      (2) Keeping the plots aligned, read the deflection for plot No. 2 (Figure 1) and record on the computer's record.
      (3) Using the tick marks on the edge of the computer's record, determine the range for the mortar and No. 2 plot using the alternate range scale. Using the firing table, select and record elevation (Figure 1).
      (4) Place a "2" in the RDS EXP column.

**Performance Steps**

b. Repeat step 3a for all corrections sent by the FO until the mission is completed.

c. The FO sends, "Add (drop) 25, fire for effect, end of mission." The computer plots this correction and determines the data, erasing all but the last plot from the board. The last plot marks the TGT and is given a target number (Figure 4).

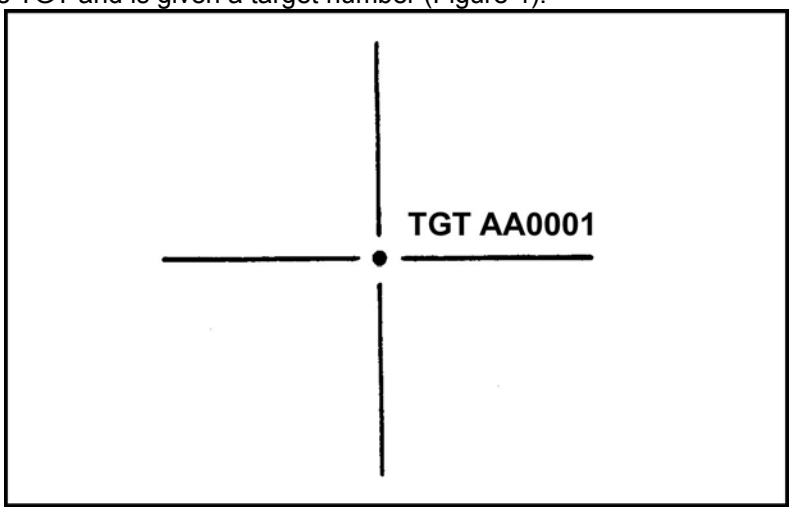



Figure 4. Last plot, target number AA0001.

d. Keep track of the number of rounds fired. Do this by recording the rounds fired in the RDS EXP column, and circle them as they are fired.

4. Upon receiving the end of mission for this or any mission, the computer must update the ammunition record at the bottom of the data sheet (DA Form 2188-R). To keep the ammunition count correct, the FDC obtains an ammunition count from all squad leaders. This is recorded on the computer's record. At the end of the mission, the computer subtracts the number of rounds fired from the total rounds on hand and rounds received. The remaining count is then carried forward to the computer's record for the next mission.

**Evaluation Preparation:** SETUP: At the test site, provide all material and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to set up the plotting board using the information given and to compute the mission.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Properly positioned an overlay on the map. | ____ | ____ |
| 2. Correctly plotted the mortar position and RP on the map, and determined the direction of fire to within 1 mil with a 5-mil tolerance. | ____ | ____ |
| 3. Determined the mounting azimuth. | ____ | ____ |
| 4. Superimposed the deflection scale. | ____ | ____ |
| 5. Plotted the mortar position and target. | ____ | ____ |
| 6. Computed the deflection for each FO correction to within 1 mil with a 10-mil tolerance. | ____ | ____ |
| 7. Computed the range for each FO correction to within 25 meters with a 25-meter tolerance. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 8. Determined the correct charge (lowest charge) and elevation for each range determined. | ____ | ____ |
| 9. Completed the initial fire command and computed data for all corrections. | ____ | ____ |
| 10. Correctly recorded rounds expended. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

**Compute Re-Registration Corrections Using a Plotting Board**

**071-078-0003**

**Conditions:** Given a firing table; an M16 plotting board; a call for fire; DA Forms 2399 (Computer's Record) and 2188-R (Data Sheet) completed for the registration mission; a complete fire direction center (FDC) order to reregister the weapon, to determine new corrections to apply to new targets, and to update DA Form 2188-R (Data Sheet); three forward observer (FO) corrections for the reregistration mission; and a No. 2 pencil.

**Standards:** Determined firing data from reregistration, applied the following corrections, and correctly updated the DA Form 2188-R (Data Sheet):

1. Deflection to the nearest mil with a 10-mil tolerance.

2. Range to the nearest 25 meters with a 25-meter tolerance.

3. Deflection correction to within 1 mil with a 10-mil tolerance.

4. Range correction factor (RCF) to within 1 meter.

**Performance Steps**

NOTE: The information provided in this task applies to both the 60-mm and 81-mm mortars.

1. The corrections determined from the initial registration are usually valid for only a few hours. Changing weather, further settling of the baseplate, changes in ammunition temperature, and other factors tend to invalidate them. Therefore, every three to five hours, or after any noticeable weather change, firing corrections should be verified and updated. One way of doing this is by reregistration in which the same registration point is re-fired to determine how much firing corrections have changed.

2. The reregistration is performed in the same manner as the registration mission. During the reregistration, however, all firing corrections determined from the registration mission must be applied to the chart data to fire each round. In the example, information was determined for or from the registration mission.
   EXAMPLE:
   Chart range ---------- 3,050
   Chart deflection ---------- 2790
   Altitude correction (vertical interval) -----  -25
   Deflection correction ----------  L1
   Range difference ---------- +150
   Range correction factor ----------  +48
   All of the firing corrections determined from the registration mission, except for the VI correction, were in the data fired and were determined only after the mission was completed.

3. During the registration mission, the chart data determined for the registration point (RP) were the initial chart range (3,050 meters) and the initial chart deflection (2790 mils). The data that were used to hit the RP were the final command range (3,200 meters) and the final command deflection (2801 mils). That means that the final data fired contained the firing corrections although the firing corrections were not known at that time.

4. To fire the reregistration, the computer must take the initial chart range and initial chart deflection and add the corrections back into them to determine the data to fire the first round (Figure 1).
   EXAMPLE:
   (Initial Chart Range + VI Correction + Range Correction = Firing Data) OR
   (3,050 M + (-25) + (48 x 3.1) = +125 = 3,175 M) AND
   (Initial Chart Deflection + Deflection Correction = Firing Data) OR

**Performance Steps**

(2790 mils + L11 = 2801 mils).

The corrections of +125 meters for range and L11 for deflection must be added to the chart data determined for each adjusting round fired during the reregistration mission.

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B CO 1/29 INF | | | P88 | RP1 |

☒ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID
OT DIRECTION 3800
ALTITUDE

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION RP1
METHOD OF ENGAGEMENT
METHOD OF CONTROL
MESSAGE TO OBSERVER PREPARE TO RE REG RP1

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE #2 | DEFLECTION 2790 | MORTAR TO FOLLOW #2 | |
| MORTAR TO ADJ | DEFLECTION CORRECTION ☒ L ☐ R | SHELL AND FUZE HE Q | |
| METHOD OF ADJ 1 RD | RANGE 3050 | MORTAR TO FIRE 1 RD | |
| BASIS FOR CORRECTION RP1 | WALT CORRECTION ☐ + ☒ - 50 | METHOD OF FIRE | |
| SHEAF CORRECTION | | DEFLECTION 2801 | ① |
| SHELL AND FUZE HE Q | RANGE CORRECTION ☐ + ☒ - 25 | CHARGE 6 | |
| METHOD OF FFE | CHARGE/RANGE 6 | TIME SETTING | |
| RANGE LATERAL SPREAD | AZIMUTH 3660 | ELEVATION 0958 | |
| ZONE | ANGLE T 140 | | |
| TIME OF OPENING FIRE W/R | | | |

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R50 | -100 | | 2783 | 2950 | | | 2794 | 3075 | | 1001 | ② |
| | +25 | | 2777 | 2975 | | | 2788 | 3100 | | 0991 | ③ |
| | EOM | R/C | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | NOTE: | CHART | DEFL | 2790 | | | ADV | CMD RNG 3125 | | | |
| | | | DEFL | 2788 | | | INT | CHT RNG 3050 | | | |
| | | | | R2 DEFL | CORR | | | +24.1 +75 RNG CORR | | | |
| | | | | | | | | 3.1 \| 75.30 = 24 RCS | | | |
| | | | | | | | | 3100 + 25 = | 3125 | | |
| | | | | | | CMD | RNG | W/O VI CORR = ADV | CMD | RNG | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 1. Example of completed computer's record.

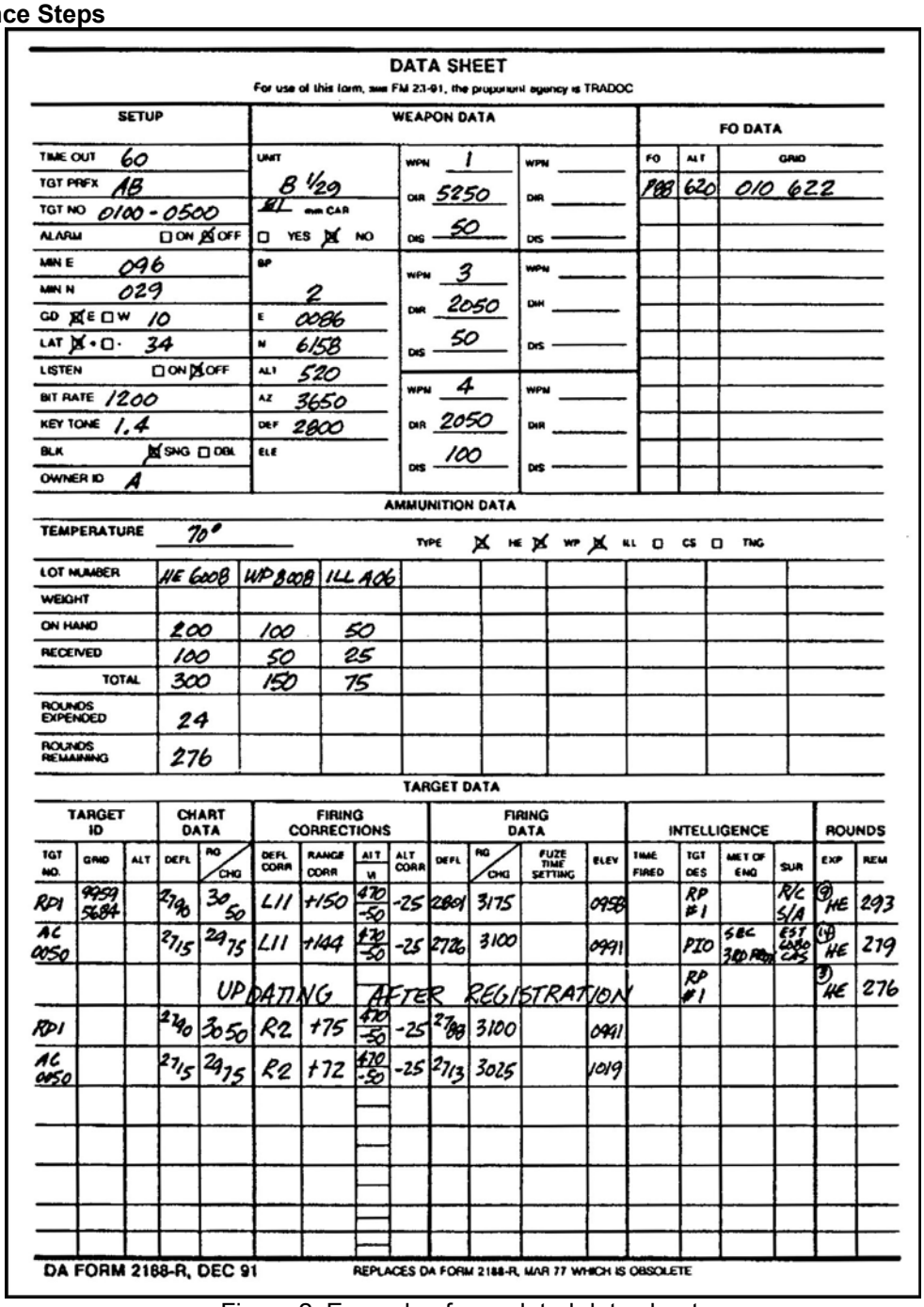
**Performance Steps**

5. The observer's corrections are plotted, and data are computed and sent to the section. When the observer splits a 50-meter range bracket, he announces, "End of mission, reregistration complete," with his correction. The computer computes the final firing data, but does not send them to the section; instead he sends, "End of mission," to the section.

NOTE: The computer may adjust the sheaf again if he has reason to suspect it, but this is usually not done.

6. Firing corrections must again be determined for both range and deflection.
    a. To determine the new RCF to be applied to new targets and to update firing data for previously fired targets on the data sheet, the computer must use data from both the initial registration and reregistration as follows:
        (1) RP Adjusted Range --- 3,100 meters (range fired) + Altitude Corrections ---+-25 (reverse sign to strip out) = 3,125 meters (altitude stripped out).
        (2) The range fired during reregistration to hit the RP is 3,125 meters, minus any altitude correction used.
    b. To determine range difference: RP reregistration-adjusted range --- 3,125 meters - (RP initial registration chart range --- 3,050 meters) = (Range difference --- +75 meters). Adjusted range is greater than chart range; the sign is a plus (+).
    c. To determine the new RCF, divide the range difference (+75) by the chart range to the RP expressed in thousands. In this case, 3,050 become 3.1, and 75 divided by 3.1 = 24.2 = + 24 (new RCF).
    d. To determine the new deflection correction, determine the difference between the reregistration-adjusted deflection and the initial registration chart deflection. If the reregistration-adjusted deflection is larger than the initial registration chart deflection, the deflection correction is a plus (+); if it is smaller, the deflection correction is a minus (-), for example, on initial registration, the RP chart deflection was 2790 mils. Several hours later, reregistration was conducted, and the RP was hit with an adjusted deflection of 2788 mils. The deflection correction is determined as follows: 2790 - 2788 = R2. Since the reregistration-adjusted deflection is smaller than the initial registration chart deflection, the deflection correction is a minus (R2). This R2 is applied to all deflections regardless of range to other targets.
    e. To determine the data to hit new targets and to update firing data for previously fired targets, apply the RCF and deflection correction to data used to hit the target. (Figure 2). For example, Target AC0050 was fired earlier with a chart range of 2,975 meters, a chart deflection of 2715 mils, and an altitude correction of -25. To determine the new data, round chart range (2,975 meters) to nearest hundred (3,000) expressed in thousands of meters (3.0) multiplied by the new RCF (+24) (3.0 x 24 = +72); 2,975 + (+72) + (-25) = 3,025 meters (round to nearest 25 meters for 81-mm mortar). Add chart deflection 2715 mils to the new deflection correction R2; 2715 + R2 = 2713 mils.

**Performance Steps**



DATA SHEET

For use of this form, see FM 23-91, the proponent agency is TRADOC

| SETUP | | WEAPON DATA | | | | FO DATA | | |
|---|---|---|---|---|---|---|---|---|
| TIME OUT | 60 | UNIT | B 1/29 | WPN 1 | WPN | FO | ALT | GRID |
| TGT PRFX | AB | | M1 mm CAR | DIR 5250 | DIR | P88 | 620 | 010 622 |
| TGT NO | 0100 - 0500 | | ☐ YES ☒ NO | DIS 50 | DIS | | | |
| ALARM | ☐ ON ☒ OFF | BP | | WPN 3 | WPN | | | |
| MIN E | 096 | | 2 | DIR 2050 | DIR | | | |
| MIN N | 029 | E | 0086 | DIS 50 | DIS | | | |
| GD ☒ E ☐ W | 10 | N | 6158 | WPN 4 | WPN | | | |
| LAT ☒ ● ☐ · | 34 | ALT | 520 | DIR 2050 | DIR | | | |
| LISTEN | ☐ ON ☒ OFF | AZ | 3650 | DIS 100 | DIS | | | |
| BIT RATE | 1200 | DEF | 2800 | | | | | |
| KEY TONE | 1.4 | ELE | | | | | | |
| BLK | ☒ SNG ☐ DBL | | | | | | | |
| OWNER ID | A | | | | | | | |

AMMUNITION DATA

TEMPERATURE 70° TYPE ☒ HE ☒ WP ☒ ILL ☐ CS ☐ TNG

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| LOT NUMBER | HE 600B | WP 800B | ILL A06 | | | | | | | |
| WEIGHT | | | | | | | | | | |
| ON HAND | 200 | 100 | 50 | | | | | | | |
| RECEIVED | 100 | 50 | 25 | | | | | | | |
| TOTAL | 300 | 150 | 75 | | | | | | | |
| ROUNDS EXPENDED | 24 | | | | | | | | | |
| ROUNDS REMAINING | 276 | | | | | | | | | |

TARGET DATA

| TARGET ID | | | CHART DATA | | FIRING CORRECTIONS | | | | FIRING DATA | | | | INTELLIGENCE | | | | ROUNDS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TGT NO. | GRID | ALT | DEFL | RG / CHG | DEFL CORR | RANGE CORR | ALT VI | ALT CORR | DEFL | RG / CHG | FUZE TIME SETTING | ELEV | TIME FIRED | TGT DES | MET OF ENG | SUR | EXP | REM |
| RP1 | 9959 5684 | | 27 90 | 30 50 | L11 | +150 | 470 -50 | -25 | 2801 | 3175 | | 0958 | | RP #1 | | R/C S/A | ③ HE | 293 |
| AC 0050 | | | 27 15 | 29 75 | L11 | +144 | 470 -50 | -25 | 2726 | 3100 | | 0991 | | PIO | SEC 300 RDS | EST LOAD CAS | ⑭ HE | 279 |
| | | | | UPDATING AFTER REGISTRATION | | | | | | | | | | RP #1 | | | ③ HE | 276 |
| RP1 | | | 27 90 | 30 50 | R2 | +75 | 470 -50 | -25 | 2788 | 3100 | | 0991 | | | | | | |
| AC 0050 | | | 27 15 | 29 75 | R2 | +72 | 470 -50 | -25 | 2713 | 3025 | | 1019 | | | | | | |

DA FORM 2188-R, DEC 91 REPLACES DA FORM 2188-R, MAR 77 WHICH IS OBSOLETE

Figure 2. Example of completed data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide the equipment and materials given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the data given for the reregistration and the computer's record and data sheet for the registration mission to compute the data for reregistration, to determine the new deflection correction and RCF, to record reregistration data on the data sheet, and to update the data for any previously fired targets.

[SME: What is "RCF"? "repair cycle float" [AR 310 50]; "remain on company frequency" [FAA Handbook 7340.1]; or "remote communications facility," [user defined]).

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Not to be sequence scored. | | |
| 1. Correctly recorded the call for fire on the computer's record. | ____ | ____ |
| 2. Completed the heading of the computer's record without error. | ____ | ____ |
| 3. Completed the initial fire command using the final adjusted deflection, charge, and elevation for the registration mission. | ____ | ____ |
| 4. Correctly recorded the FO's subsequent corrections. | ____ | ____ |
| 5. Computed data for all subsequent fire commands using the firing corrections determined from the registration mission. | ____ | ____ |
| 6. Computed the new deflection correction without error. | ____ | ____ |
| 7. Computed the new RCF without error. | ____ | ____ |
| 8. Recorded the re-registration on the data sheet without error. | ____ | ____ |
| 9. Updated the data on the data sheet for all previously fired targets without error. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for a Polar Mission Using a Plotting Board**
**071-078-0004**

**Conditions:** As a computer in a fire-direction center (FDC), given--

An M16 or M19 plotting board prepared for the operation as a modified observed chart to include a plotted coordinate system, deflection scale, a 60- or 81-mm mortar, reference point (RP) and forward observer (FO) positions; firing tables; DA Form 2399 (Computer's Record), with heading and fire direction center (FDC) order completed; forward observer's call for fire using the polar method of target location; one subsequent correction; and a No. 2 pencil.

**Standards:** 1. Determined deflections to the nearest mil with a 10-mil tolerance.

2. Determined range to the nearest 25 meters with a 25-meter tolerance.

3. Converted range to the correct charge and elevation.

**Performance Steps**
NOTE: The information provided in this task applies to both the 60- and 81-mm mortars (M16 and M19 plotting boards).

1. The computer records the call-for-fire on the computer's record just as it is received. This must include the FO's call sign (Figure 1). Check the call-for-fire to determine if it contains enough information to fire the mission to include direction and distance (from FO to target) and target description.

COMPUTER'S RECORD
For use of this form, see FM 23-91; the proponent agency is TRADOC.

| ORG | DATE | TIME | TGT NO. |
|---|---|---|---|
| B CO 1/66 | 25 JULY | 0930 | |

| VI | CHG/RG CORR | CHART DEFL | CHART RG |
|---|---|---|---|
| | | | |

| DEFL CORR | ANGLE T | CHG |
|---|---|---|
| | | |

| CALL—FOR—FIRE | FDC ORDER | INITIAL FIRE COMMAND | RDS EXP |
|---|---|---|---|
| FIA25<br>ADJUST FIRE<br>POLAR<br>DIRECTION 1290<br>DISTANCE 900<br>6 MAN PATROL<br>IN OPEN | MORT TO FFE<br>MORT TO ADJ<br>METH OF ADJ<br>BASIS FOR CORR<br>SHEAF CORR<br>SHELL & FUZE<br>METHOD OF FFE<br>RG/LATERAL SPREAD<br>ZONE<br>TIME OF OPENING FIRE | MORT TO FOLLOW<br>SHELL & FUZE<br>MORT TO FIRE<br>METHOD OF FIRE<br>DEFLECTION<br>CHARGE<br>TIME SETTING<br>ELEVATION | |

Figure 1. Example of completed call for fire.

NOTE: Before computing a polar mission, the FDC must know or request the FO's position and plot it on the plotting board. The FO must send the grid coordinates of his position in code.

2. The computer plots the target location as follows:
   a. Index the FO's direction given in the call-for-fire (Figure 2).

**Performance Steps**

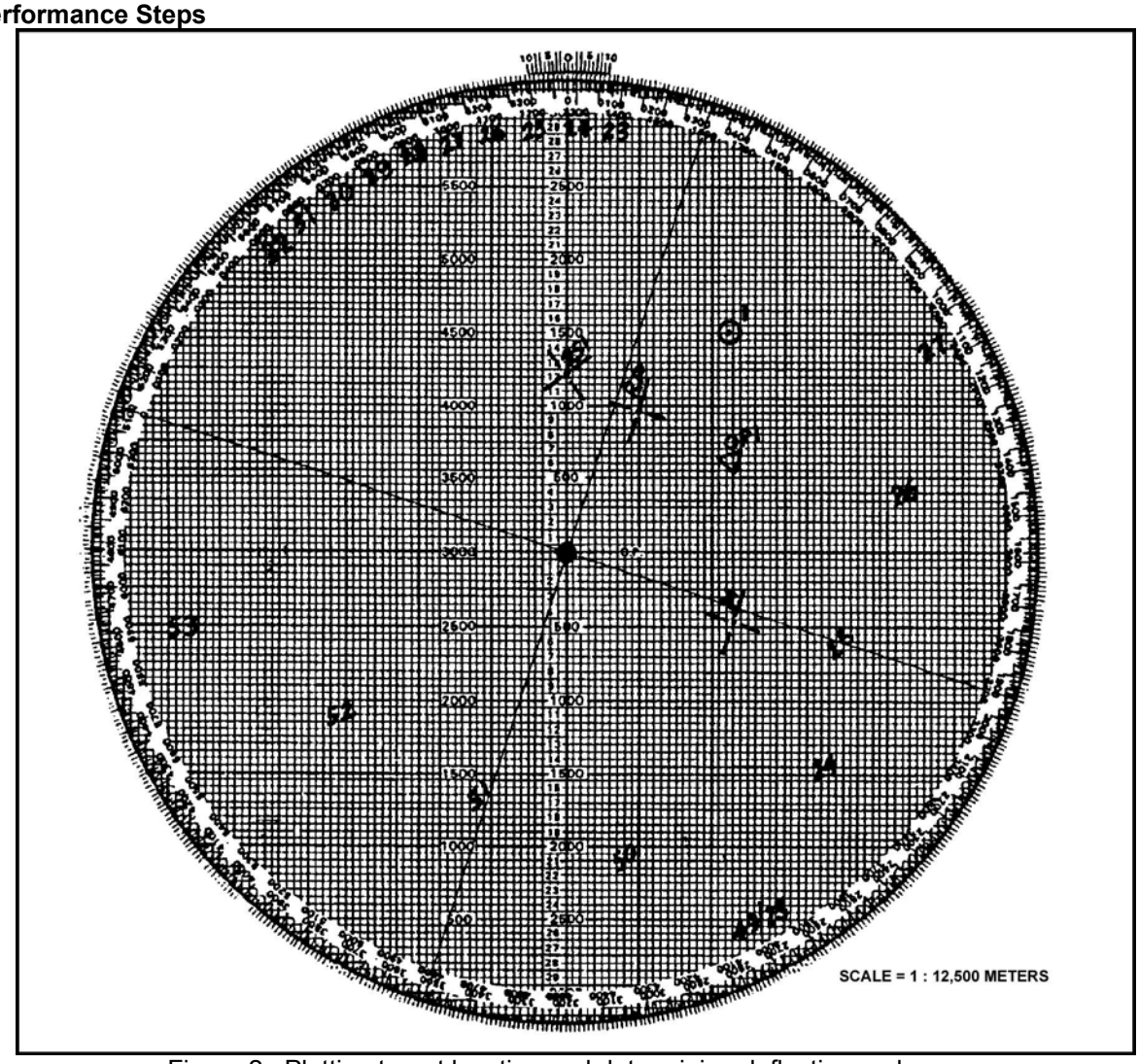



Figure 2. Plotting target location and determining deflection and range.

b. Plot the distance given in the call-for-fire using the edge of the computer's record. Place the corner of the computer's record on the line of the alternate range scale of the zero line of the alternate range scale of the plotting board; make a tick mark at the distance (range) given in the call-for-fire--for example, 900 meters (Figure 2). Move the computer's record to the FO's plotted position with the corner placed on the FO's plot. After making sure the edge of the computer's record is parallel to the line on the gridded base, make a plot on the disk at the tick mark on the computer's record. Circle the plot, and label it "1."

3. The computer determines the deflection and range.
   a. Rotate the disk until the target plot is aligned with the mortar plot, which must always be toward the bottom of the plotting board (Figure 2).
   b. Read the deflection at the index mark and record it on the computer's record.
   c. Place the edge of the computer's record on the mortar plot, making a tick mark at the target plot. Then, using the alternate range scale, determine the range from the mortar to the target and record it on the computer's record.
   d. Using the firing table, determine and record the correct charge and elevation for the range determined.

4. The computer has enough data to complete the initial fire command. After giving the command to

**Performance Steps**

the mortars, he places a "1" in the rounds expended (RDS EXP) column of the computer's record, and circles it after the round is fired.

5. Upon receiving the FO's correction (Figure 3), the computer indexes the FO's direction and makes the correction from the No. 1 plot (Figure 4). He makes corrections, as they are received, from the preceding plot.

MESSAGE TO OBSERVER

| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | SEC | DEFLECTION | 2370 | MORTAR TO FOLLOW | SEC | |
| MORTAR TO ADJ | #2 | DEFLECTION CORRECTION | ☐L ☐R | SHELL AND FUZE | HEQ | |
| METHOD OF ADJ | IRD | | | | | |
| BASIS FOR CORRECTION | — | RANGE | 1975 | MORTAR TO FIRE | #2 | |
| SHEAF CORRECTION | — | VV/ALT CORRECTION | ☐+ ☐- | METHOD OF FIRE | IRD HE | |
| SHELL AND FUZE | HE IN ADJ PROX IN FFE | | | | 3RDS PROX IN FFE | |
| METHOD OF FFE | 3RDS | RANGE CORRECTION | ☐+ ☐- | DEFLECTION | 2370 | |
| RANGE LATERAL SPREAD | | | | CHARGE | 3 | ① HEQ |
| ZONE | | CHARGE/RANGE | 3 | TIME SETTING | | |
| | | AZIMUTH | | | | |
| TIME OF OPENING FIRE | W/R | ANGLE T | 1140 | ELEVATION | 849 | |

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV |
| R50 | 100 | | FFE | | SEC | 3 RDS PROX | 2400 | 3 | | 962 |
| | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 3. Example of FO's corrections on computer's record.

**Performance Steps**

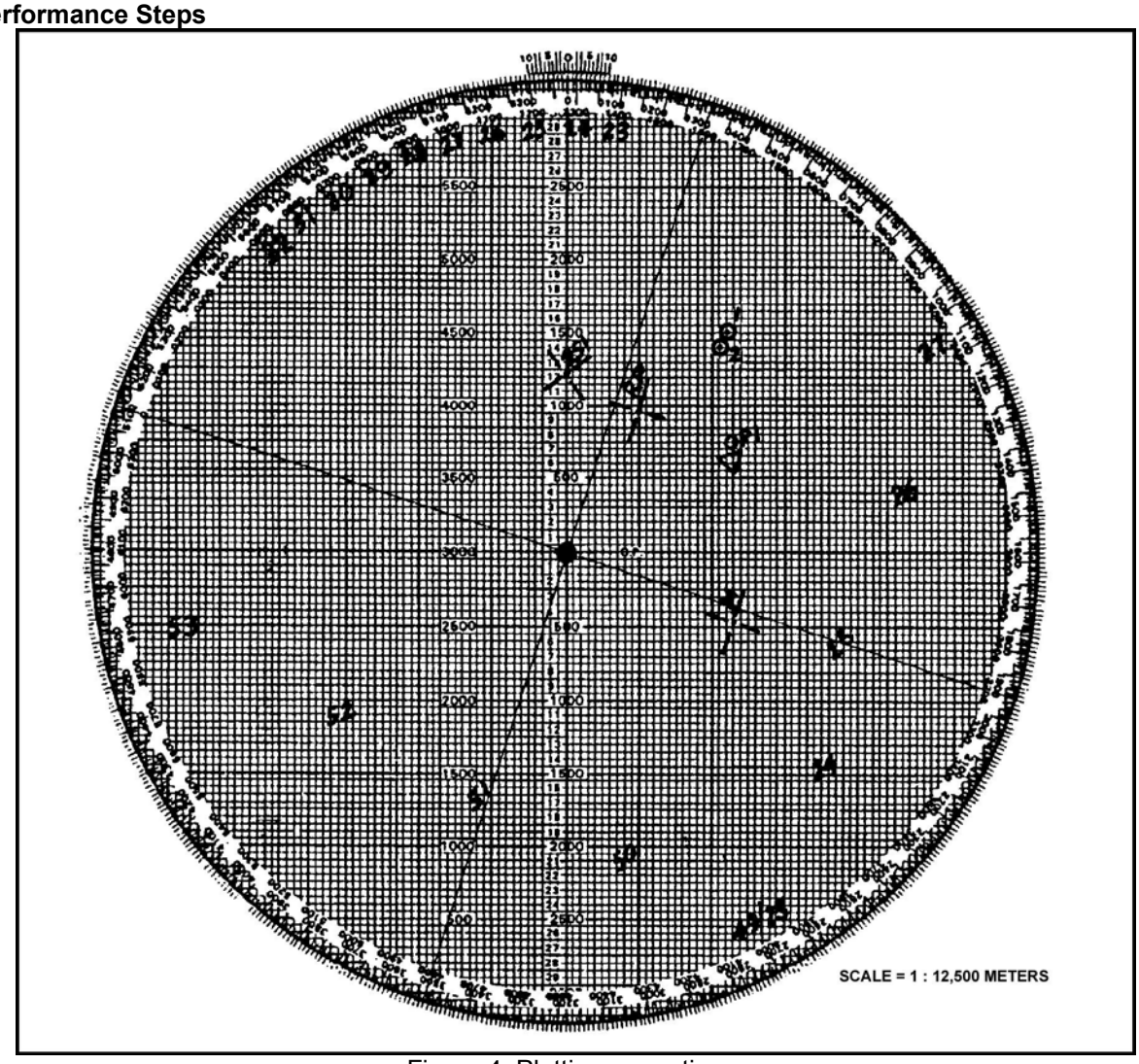



Figure 4. Plotting corrections.

6. The computer continues the procedure until the mission is completed.

**Evaluation Preparation:** SETUP: At the test site, provide all materials, equipment, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to record the call-for-fire, then to compute and record the data (heading, initial fire command, subsequent command, and rounds expended).

| **Performance Measures**<br>NOTE: Not to be sequence scored. | **GO** | **NO GO** |
|---|---|---|
| 1. Recorded the call for fire without error. | ____ | ____ |
| 2. Indexed the direction given in the call for fire without error. | ____ | ____ |
| 3. Plotted the target at the correct range using the correct FO position. | ____ | ____ |
| 4. Properly aligned the target plot with the mortar plot. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 5. Determined the deflection to within 1 mil with a 10-mil tolerance. | ____ | ____ |
| 6. Determined the range to within 25 meters with a 25-meter tolerance. | ____ | ____ |
| 7. Determined the correct charge (lowest charge) and elevation for range determined. | ____ | ____ |
| 8. Properly recorded all information on computer's record. | ____ | ____ |
| 9. Correctly recorded rounds expended. | ____ | ____ |
| 10. Recorded and computed the data for the FO correction using the criteria in performance measures 5 through 9. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

## Compute Data for a Final Protective Fire Using a Plotting Board

**071-078-0005**

**Conditions:** As a computer in a fire-direction center (FDC), given a firing table; a plotting board set up as a modified observed chart with a mortar position and reference point plotted; a call for fire and forward observer (FO) corrections to adjust each mortar onto the final protective fire (FPF); signal operation instructions (SOI) extract with KTC 1400* (numerical cipher/authentication system); DA Form 2399 (Computer's Record); and a No. 2 pencil.

**Standards:** Computed data to establish the final protective fire (FPF), to include deflection to within 1 mil with a 10-mil tolerance and range to within 25 meters with a 25-meter tolerance for each mortar. No round will impact more than 50 meters short of the FPF during adjustment.

**Performance Steps**

NOTE: The information in this task applies to the 4.2-inch, 60-mm, 81-mm, and 120-mm mortars. For the 60-mm, follow the instructions for the No. 1 and 2 mortars only.

1. The FPF is the highest priority mission fired by mortars. When the call to fire the FPF comes in, the section is ordered to check fire on any mission being conducted, to bring the mortars onto the FPF data, and to fire until given a cease fire or until all ammunition is exhausted. Therefore, care must be taken in planning, adjusting, and calling for the FPF to be fired.

NOTES:
1. The FPF is fired as a final effort to stop the enemy from overrunning the unit being supported. When the enemy is beyond 200 meters, an accurate determination cannot be made by the commander that the position will be overrun; therefore, firing all mortar ammunition would be unwise.
2. Should there be dead space or a likely avenue of approach beyond 200 meters that the commander wants covered, this should be plotted as a priority target.
3. During the hours of daylight, the mortars (when not firing) are laid on the priority target data.
4. During the hours of darkness or limited visibility, mortars (when not firing) are laid on the FPF data.

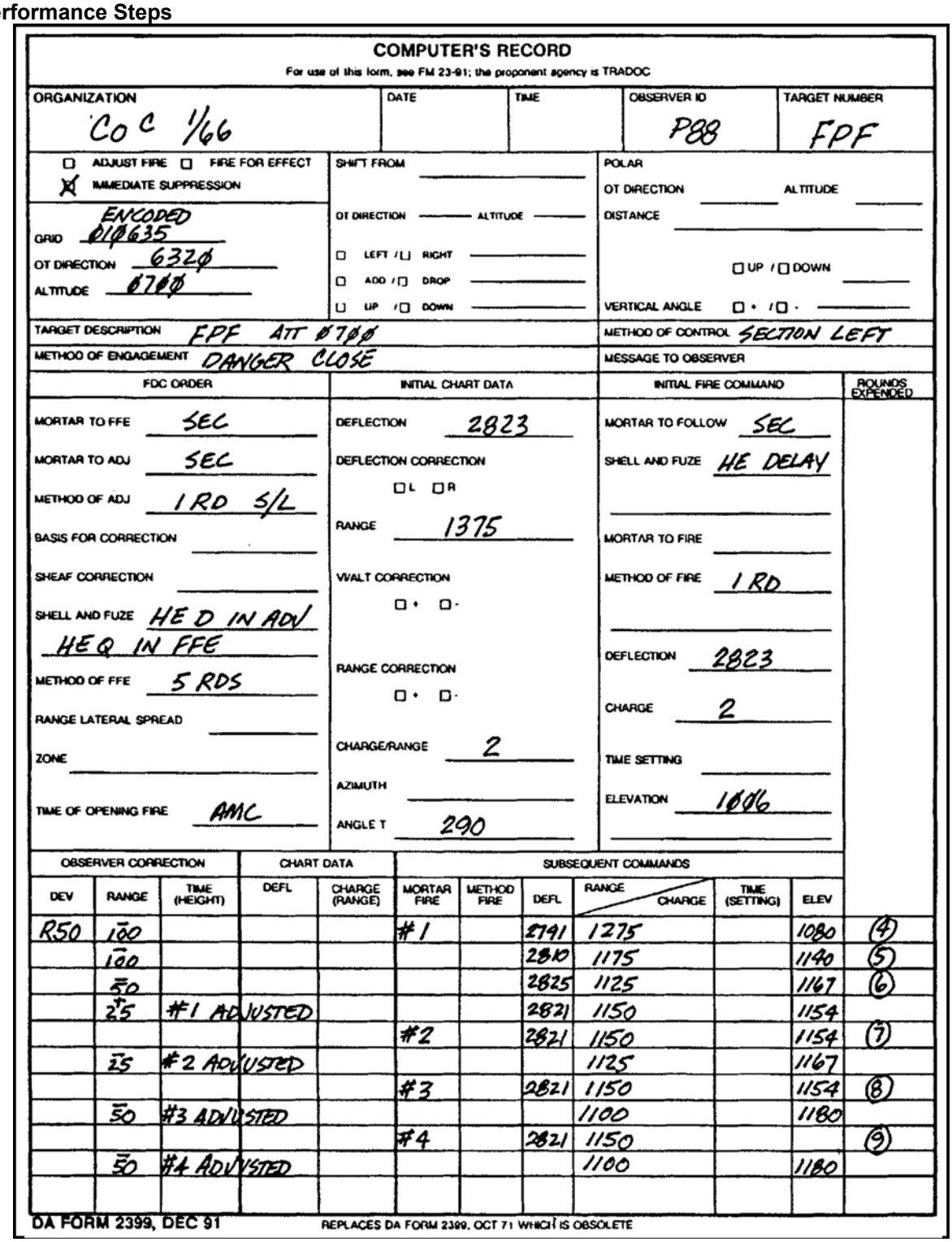
2. Because the FPF is adjusted close to friendly forces (no more than 200 meters in front), the FO uses the creeping method of adjustment.

3. During the adjustment, the fire direction center (FDC) fires fuze delay on all adjusting rounds to reduce the danger to friendly forces.

NOTE: The performance steps in this task are for a four-gun, 81-mm mortar platoon. Those procedures will apply whether firing a two-gun section or a six-gun platoon.

4. Normal FPF adjustment:
   a. Upon receiving the call-for-fire to adjust an FPF, the computer decodes and plots the target and computes the data to fire, based on the call-for-fire and FDC order (Figure 1).
   EXAMPLE:
   P88
   ADJUST FIRE GRID
   ZYFOPA
   (010635)
   FPF
   ALTITUDE 0700
   DANGER CLOSE

**Performance Steps**



COMPUTER'S RECORD

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| Co C 1/66 | | | P88 | FPF |

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☒ IMMEDIATE SUPPRESSION

GRID ENCODED 010635
OT DIRECTION 6320
ALTITUDE 0700

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION FPF ATT 0700
METHOD OF CONTROL SECTION LEFT
METHOD OF ENGAGEMENT DANGER CLOSE
MESSAGE TO OBSERVER

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE SEC | DEFLECTION 2823 | MORTAR TO FOLLOW SEC | |
| MORTAR TO ADJ SEC | DEFLECTION CORRECTION ☐L ☐R | SHELL AND FUZE HE DELAY | |
| METHOD OF ADJ 1 RD S/L | RANGE 1375 | MORTAR TO FIRE | |
| BASIS FOR CORRECTION | WALT CORRECTION ☐+ ☐- | METHOD OF FIRE 1 RD | |
| SHEAF CORRECTION | RANGE CORRECTION ☐+ ☐- | DEFLECTION 2823 | |
| SHELL AND FUZE HE D IN ADV HEQ IN FFE | CHARGE/RANGE 2 | CHARGE 2 | |
| METHOD OF FFE 5 RDS | AZIMUTH | TIME SETTING | |
| RANGE LATERAL SPREAD | ANGLE T 290 | ELEVATION 1006 | |
| ZONE | | | |
| TIME OF OPENING FIRE AMC | | | |

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R50 | 100 | | | | #1 | | 2791 | 1275 | | 1080 | (4) |
| | 100 | | | | | | 2810 | 1175 | | 1140 | (5) |
| | 50 | | | | | | 2825 | 1125 | | 1167 | (6) |
| | 25 | #1 ADJUSTED | | | | | 2821 | 1150 | | 1154 | |
| | | | | | #2 | | 2821 | 1150 | | 1154 | (7) |
| | 25 | #2 ADJUSTED | | | | | | 1125 | | 1167 | |
| | | | | | #3 | | 2821 | 1150 | | 1154 | (8) |
| | 50 | #3 ADJUSTED | | | | | | 1100 | | 1180 | |
| | | | | | #4 | | 2821 | 1150 | | | (9) |
| | 50 | #4 ADJUSTED | | | | | | 1100 | | 1180 | |
| | | | | | | | | | | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 1. Example of completed computer's record.

NOTES:
1. The FO always sends the FPF location in code.
2. When an FPF is adjusted by adjusting each mortar to its point in the FPF, the altitude given in the call-for-fire is not used by the computer.

**Performance Steps**

3. The target location given in the call-for-fire is NOT the location of the FPF. A 200-meter to 400-meter safety factor has been added to the location of the FPF by the FO, and this is the location given in the call-for-fire. The computer NEVER adds a safety factor.

b. Upon receiving the initial fire command, the entire section fires one round of high explosive (HE) with delay fuze.

c. The FO observes the impact of the four rounds and determines which mortar's round impacted closest to the FPF line or to friendly forces. This mortar is referred to as the danger gun (Figure 2).

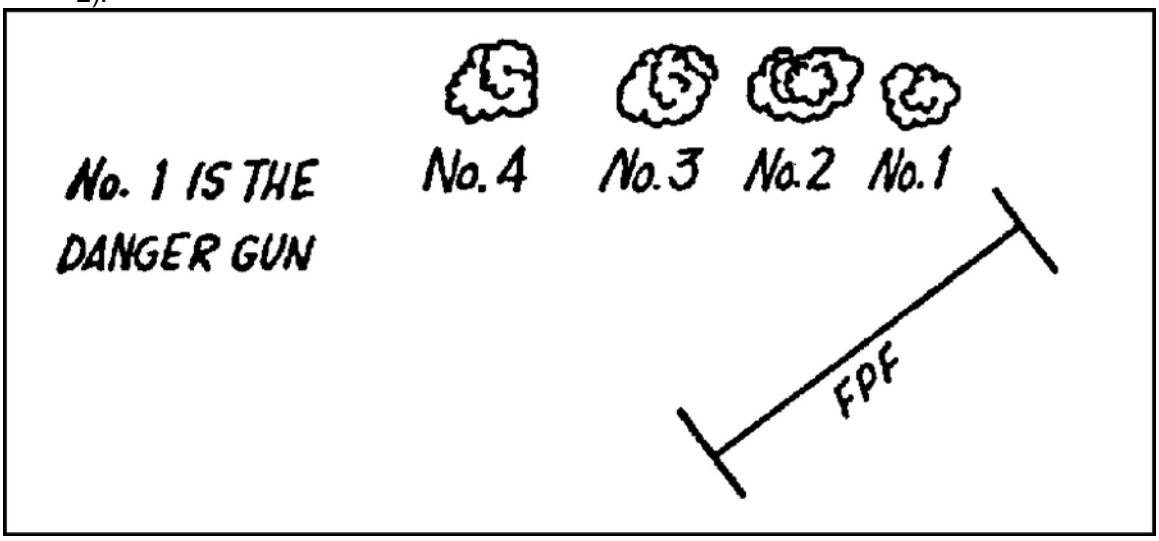



Figure 2. Determination of danger gun.

d. The FO then adjusts the danger gun onto its point on the FPF line using creeping fire.

e. The procedure for computing the data is the same for an FPF as for any other mission, except that the computer must keep in mind that it is a danger-close mission. The computer must recheck the data and ensure that the commands given to the guns are understood.

f. The adjustment procedure is continued for each individual mortar until the rounds from each mortar impact in the proper position on the FPF.

5. To compute FPF data without adjustments, the computer performs the following:

NOTE: Using this procedure, the FO must be informed that adjustment will not be conducted. The FO then gives the exact location of the FPF in the call-for-fire.

a. In some instances, there will not be time to adjust the FPF, or the commander may not wish to reveal the mortar's position by firing. Therefore, the FO sends the call-for-fire for the FPF, giving the grid center and altitude or grid for each end of the FPF.

b. To plot grid center.

(1) Using the grid coordinate of the center of the FPF, the computer plots the location of the FPF on the plotting board. This plot represents only the No. 2 mortar's position on the FPF.

NOTE: The number of mortars allotted to the FPF will determine the plots the computer will use.

(2) The computer plots the location of the No. 1, 3, and 4 mortars and determines the firing data for all three mortars.
EXAMPLE: (Figure 3)
The computer receives this call-for-fire:
C3A13
ADJUST FIRE GRID
ADXHZY
(009629)
FPF
altitude 2990

**Performance Steps**

( a) The computer decodes the grid location of the FPF, plots it on the plotting board, and indexes the FPF altitude at the index mark.

( b) The computer now plots the locations of the No. 1, 3, and 4 mortars. Keeping the altitude indexed, the computer goes 40 meters above the plot and makes a small plot; he then goes 40 meters below the first plot and makes another plot, then moves 40 meters below this plot and makes another plot. The computer now has four plots in a row, which represent the impact points of the four mortars on the FPF (Figure 3).

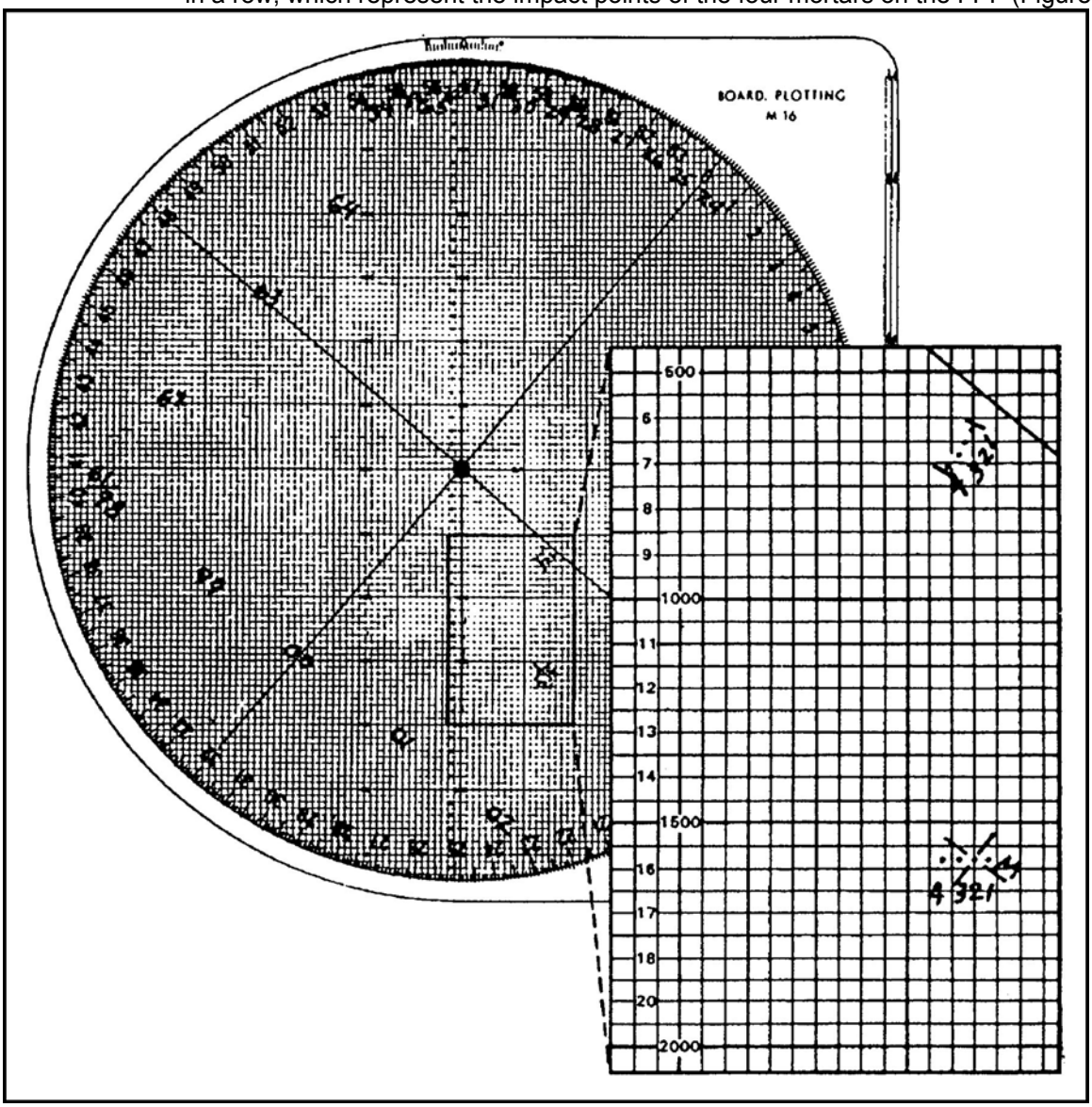



Figure 3. Plotting the impact points.

( c) Upon rotating the disk and aligning the FPF with the mortar, the computer sees that there are less than 40 meters between plots on the gun-target (G-T) line, which precludes firing a parallel sheaf.

( d) To determine the deflection and range to each point, the computer now plots the location of each mortar on the plotting board.

( e) Using the altitude (direction through the long axis of the mortar position) of the mortar section, indexed at the index mark, the computer again goes 40 meters above, and 40 meters and 80 meters below the plot in the center of the hollow cross marking the

**Performance Steps**

mortar position. By rotating the disk back and aligning the FPF and the mortar positions, the computer can easily tell which are the No. 1, 3, and 4 mortar plots and which plot on the FPF is each mortar's impact point (Figure 3).

( f) The computer aligns the plot for the No. 1 mortar and the No. 1 impact point, and he reads the deflection. This procedure is then used to determine the deflection for the other three mortars.

( g) Using the edge of the computer's record and alternate range scale, the computer determines the range for each mortar.

( h) This information is recorded, and each mortar is given its data for firing the FPF.

6. If a registration is conducted later and firing corrections are determined, the computer applies those corrections to update the FPF data.

**Evaluation Preparation:** SETUP: At the test site, provide all materials, equipment, and information given in the task condition statement.

The test has two parts:

1. Compute data for a final protective fire (FPF) adjustment by computing data for each mortar to place it in its position on the FPF.

2. Compute data for an FPF without adjustment. Use the altitude of the FPF as given in the call for fire and the altitude of the mortar section.

BRIEF SOLDIER: Tell the soldier he will be tested on computing an FPF using two procedures:

1. The Soldier will have all plotting equipment and materials, plus a computer's record with the call for fire recorded, the FDC order completed, and all FO corrections recorded. He must compute all data required, and record the final firing data for each mortar on a sheet of paper that is to be given to each squad leader.

2. The Soldier will have all plotting equipment and materials, plus a computer's record with the call for fire recorded, and the FDC order completed. He must compute the data and record the firing data for each mortar on a sheet of paper that is to be given to each squad leader.

NOTE: For each procedure, the altitudes of the mortar and FPF must differ by between 500 and 1000 mils.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Not to be sequence scored. | | |
| 1. Procedure 1: | ____ | ____ |
| a. Correctly decoded FPF location. | | |
| b. Correctly plotted FPF location. | | |
| c. Correctly completed the heading and initial fire command. | | |
| d. Correctly recorded rounds expended. | | |
| e. Correctly computed data for all FO corrections. | | |
| f. Correctly recorded each mortar's final firing data on a sheet of paper. | | |
| NOTE: All charges must be the lowest charge or elevation, deflection within 10 mils, and range within 25 meters or 1/8 charge. | | |
| 2. Procedure 2: | ____ | ____ |
| a. Correctly decoded FPF location. | | |
| b. Correctly plotted FPF location. | | |
| c. Correctly indexed FPF altitude and plotted impact points for No. 1, 3, and 4 mortars. | | |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| d. Correctly indexed the altitude of the mortar section and plotted the No. 1, 3, and 4 mortars. | | |
| e. Correctly computed the firing data for each mortar. | | |
| f. Correctly recorded each mortar's final firing data on a sheet of paper. | | |

NOTE: All charges must be the lowest charge or elevation, deflection within 10 mils, and range within 25 meters or 1/8 charge.

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for Sheaf Adjustment Using a Plotting Board**
**071-078-0006**

**Conditions:** Given a correction for one mortar that is out of sheaf less than 50 meters, and a correction for another mortar that is out of sheaf more than 50 meters. Also, given three DA Forms 2399 (Computer's Records), one completed with a call-for-fire for an open sheaf, a second for a converged sheaf, and a third for a special sheaf; final adjusted data for each sheaf; and the following problems:

1. As a computer in a fire-direction center (FDC), given a firing table; a plotting board (M16 or M19) prepared for operation as a modified observed chart, including a coordinate system, deflection scale, and plots for mortar and registration points (RP); a DA Form 2399 (Computer's Record) completed for a registration mission; a deflection conversion table; a No. 2 pencil, and a requirement to adjust the sheaf.

2. Given the same equipment as Problem 1 except with a DA Form 2399 (Computer's Record) with a call for fire requesting an open or converged sheaf, or a target description requiring a special sheaf; and the final adjusted data for the mission.

**Standards:** 1. Determined firing data for sheaf adjustment:

a. Mil correction to nearest 1 mil.

b. Deflection to the nearest 1 mil with a 10-mil tolerance.

2. Computed data for open and converged sheafs by determining deflection for each mortar to the nearest mil with a 10-mil tolerance.

3. Computed data for a special sheaf--

a. By determining deflection for each mortar to the nearest mil with a 10-mil tolerance.

b. By determining range for each mortar to the nearest 25 meters with a 25-meter tolerance.

**Performance Steps**
NOTE: The information in this task applies to the 60-mm, 81-mm, and 120-mm mortars. For the 60-mm, follow the instructions for the No. 1 and 2 mortars only. For the 120-mm, add mortars 5 and 6 using the same procedures as used for No. 3 and 4 mortars.

1. Definition and use. Individual weapon correction for deflections, fuze settings, charges, and elevations are sometimes computed and applied to achieve a special pattern of bursts. The term sheaf denotes the lateral distribution of the bursts of two or more weapons fired together. The width of the sheaf is the lateral distance between the centers of the flank bursts. The front covered by any sheaf is the width of the sheaf plus the effective width of one burst. A sheaf may be in any one of the following forms (Figure 1):

**Performance Steps**

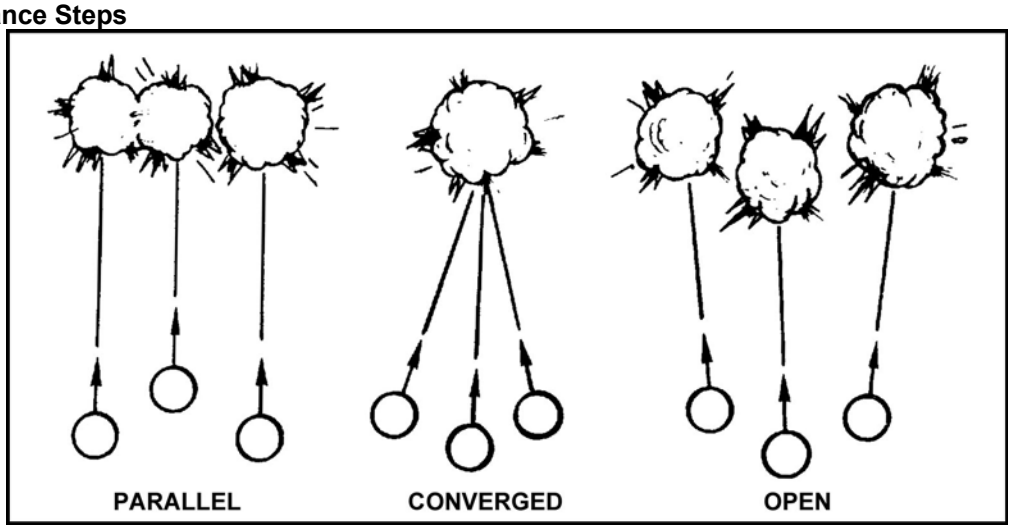



Figure 1. Types of sheaf.

a. Parallel sheaf. A parallel sheaf is one in which the trajectories of all weapons are parallel.
b. Converged sheaf. A converged sheaf is one in which the trajectories of all mortars intersect at the target.
c. Open sheaf. An open sheaf is one in which the lateral distance between the centers of any two adjacent bursts is equal to the maximum effective width of 1 1/2 bursts (60 meters).

2. Parallel sheaf.
   a. After registration by the base mortar, the computer directs the forward observer (FO) to adjust the sheaf. Although the mortars are laid parallel with a compass or aiming circle, the sheaf produced on the ground in the target area may not be parallel. This may be caused by the differences in the settling of the baseplates of the mortars or by improper boresighting.
      (1) There are two methods to adjust the sheaf. The method used depends on the location of the FO with respect to the gun-target (G-T) line (whether angle T is greater or less than 500 mils). The angle T is the difference between the azimuth of the G-T line and the azimuth of the observer-target (O-T) line.
      (2) Whenever possible, the computer selects an FO located near the G-T line so that angle T is less than 500 mils.
   b. For a parallel sheaf, the computer issues a fire command to No. 1, 3, and 4 mortars to fire a section right (or left) with the same adjusted deflection and elevation obtained by the No. 2 mortar. The FO sends back individual deviation corrections in meters for any burst that needs correcting to place it in the proper position in the sheaf. Using the mil-relation formula or the deflection conversion table, the computer changes those corrections in meters to mils. Those corrections are then applied to the deflection on the mortars. The mortars are re-laid on the aiming posts with the corrected deflection. Another section right (left) may be fired to recheck the sheaf.

NOTE: Any mortar with a correction of 50 meters or more is refired. When a parallel sheaf is attained, the computer notifies the gunners to refer all mortar sights to a common deflection and to realign aiming posts. This common deflection is the deflection for the base mortar (No. 2) to hit the RP. The computer disregards range errors when adjusting the sheaf. The range determined for the base mortar (No. 2) is used by all mortars in the section.

   c. For example, given a deflection of 2850 and a range of 1,200 meters, the FO's corrections are--

      NUMBER ONE, LEFT THREE ZERO
      END OF MISSION
      SHEAF ADJUSTED

      (1) Mortars No. 3 and 4. Since the FO reported no corrections for the No. 3 and 4 mortars, their position in the sheaf is correct. The computer determines the correct deflection for

**Performance Steps**

mortar No. 1 as below.

(2) Mortar No. 1. The FO's correction of LEFT THREE ZERO (in meters) is equal to 25 mils at a range of 1,200 meters (using the mil-relation formula or the deflection conversion table). The left 25 mils is added (LARS rule) to the deflection setting of 2850, because the FO's correction was left, and becomes 2875 mils. The computer issues the command, NUMBER ONE, DO NOT FIRE, DEFLECTION TWO EIGHT SEVEN FIVE. The gunner of mortar No. 1 indexes the new deflection on the sight and traverses back onto the aiming posts. When the mortar is laid, the computer issues the following command:
SECTION
REFER
DEFLECTION TWO EIGHT FIVE ZERO
REALIGN AIMING POSTS

(3) The gunner of mortar No. 1 refers his sight to a deflection of 2850 mils and directs the ammunition bearer in his squad to realign the aiming posts without moving the mortar. All mortars are then laid parallel with a common deflection of 2850 mils. Therefore, to fire a parallel sheaf on any target, each mortar of the section is given the same deflection--the one determined for the base mortar.

NOTE: If any of the other mortars have a compensated sight picture at this time, they would also realign aiming posts.

d. The plotting board may be used to convert the FO's corrections from meters to mils for mortars out of sheaf. This technique eliminates the need for the computer to convert the FO's correction to mils using the mil-relation formula or deflection conversion table, and apply the LARS rule to determine the deflection.

(1) Procedure. The FO's correction in meters for the mortar out of sheaf is plotted as a shift from the RP with the disk oriented on the O-T azimuth, and the deflection is read at the centerline of the mortars out of sheaf. After the deflection has been determined, the plot is removed from the plotting board. The deflection determined would move the No. 2 mortar the distance specified by the FO in his correction. Since all mortars were fired with a common deflection, a deflection that would move the No. 2 mortar a specified distance would also move the No. 1, 3, and 4 mortars the same distance.

(2) Sample problem. The section, mounted on an azimuth of 2000 mils, has completed registration with a range of 2,450 meters and a deflection of 2749 mils. The section fires for sheaf adjustment and the FO reports, "Number three, right three zero." The FO's azimuth is 2150 mils. To plot the correction, the computer rotates the disk to the FO's azimuth and makes a plot 30 meters to the right of the RP. He parallels the mortar position and the plot and determines the deflection (2737). This is the deflection that would move the No. 2 mortar 30 meters to the right. Since the No. 3 mortar has the same deflection on the sight as the No. 2 mortar, it also moves the No. 3 mortar 30 meters to the right.

e. Angle T over 500 mils. After the base mortar has adjusted on the RP, the computer and FO coordinate adjusting a converged sheaf. The computer determines the firing data to converge the sheaf on the RP.

(1) The FO adjusts the other mortars onto the RP, one at a time. As can be seen, this is a long, drawn-out mission. Therefore, adjusting the sheaf when the angle T is over 500 mils should only be used when no other method can be used.

(2) The computer orients the plotting board on the O-T azimuth. He plots each correction with the plotting board oriented on that azimuth. He considers the RP as the plot for the first round from each of the mortars. After each mortar completes the adjustment, he erases all plots for No. 1, 3, and 4 mortars. The computer orients the board to the G-T azimuth and places a plot 35 to 40 meters (the distance between mortars) left and right of the final adjusted plot of the No. 2 mortar and another plot 40 meters to the left of the No. 3 plot for No. 4. The range arm of the M16 plotting board can be used to determine the deflection for each mortar to open the sheaf when plotting from the pivot point. To do this, the range arm is rotated to the desired position to the right of the registration point, and the deflection is determined for the No. 1 mortar. The process is repeated to the left for the

**Performance Steps**

No. 3 and 4 mortars.

(3) After each mortar is laid with the correct deflection to form a parallel sheaf, the section is referred to a common deflection and the aiming posts are realigned.

3. Converged sheaf.
   a. The mortar section receives the following call for fire:
      F1A25
      ADJUST FIRE POLAR
      DIRECTION 5350, DISTANCE 600
      MACHINE GUN POSITION WITH LIGHT
      OVERHEAD COVER; CONVERGE
      The mortar section goes through a normal adjust mission until the FO's final correction of, "Add 25, fire for effect." At this point, the computer must determine a new deflection for the No. 1, 3, and 4 mortars to enable them to hit the same point as the No. 2 mortar.
   b. To do this, the computer uses the mil-relation formula or the deflection conversion table to convert the meter distance between the mortars to mils.

NOTE: Under normal emplacement, the mortars are 40 meters and the sheaf has been adjusted so the rounds impact 40 meters apart.

To use the mil-relation formula, the computer must have the range to the target and the distances between mortars to find the mils. He does this as follows:

Range to target --- 1,200 meters

Meters between mortars --- 40 meters

(33.3 / W) / (R x mils) = 40 / 1.2 x mils = 33 mils and 400 / 12 = 33.3

40 meters = 33 mils at 1,200 meters

   c. To determine the new deflection for the No. 1, 3, and 4 mortars, the computer uses the LARS (left add, right subtract) rule.
      No. 2 (base mortar) deflection--2735 mils
      Since the No. 1 mortar must move to the left, the computer adds the 33 mils to the base mortar deflection.
      (Base deflection (No. 2) --- 2735 mils) + (Deflection change --- 33 mils) = (New deflection for No. 1 --- 2768 mils).
      The No. 3 mortar barrel must move to the right, so the computer subtracts the 33 mils to the base mortar deflection.
      (Base deflection (No. 2) --- 2735 mils) + (Deflection change -33 mils) = (New deflection for No. 3 --- 2702 mils).

NOTE: The No. 4 mortar must also move to the right, but it must be moved 80 meters to the right. Therefore, the computer must double the 33 mils to 66 mils.

(Base deflection (No. 2) --- 2735 mils) + (Deflection change --- -66 mils) = (New deflection for No. 4 --- 2669 mils).

   d. The range remains the same for each mortar, but each mortar receives and fires a different deflection to allow all rounds fired to land on the same point.

4. Open sheaf.
   a. The FO has located a target that he believes is wider than a parallel sheaf will cover. He sends the following call for fire:
      F1A25
      ADJUST FIRE
      GRID 176543
      PLATOON IN TREE LINE
      HEQ AND DELAY IN EFFECT
      OPEN SHEAF
      DIRECTION 1450
   b. The section goes through a normal adjust mission until the FO's final correction of, "Drop 25, fire for effect." At this point, the computer must determine a new deflection for each mortar to open the sheaf.

**Performance Steps**

NOTE: An open sheaf is a sheaf opened half the distance between mortars. Normally, the mortars are 40 meters; thus, in an open sheaf, the rounds would land 60 meters.

(1) To determine the new deflection for the No. 1, 3, and 4 mortars, the procedure is as follows:
Range to target --- 2,000 meters
Meters between mortars --- 40 meters
W/R x mils = 40/2.0 x mils = 20 mils
40/20 = 2
40 Meters = 20 mils at 2,000 meters

(2) A result of 20 mils moves the strike of the round 40 meters, but the computer only wants to move the strike of the round 20 meters. To do this, he must use only half the determined mils (10 mils) to move the strike of the round 20 meters for No. 1 and 3 mortars. However, for the No. 4, he must move the strike of the round 40 meters. He applies the LARS rule.
No. 2 (base mortar) deflection--2815 mils.

(3) Since the No. 1 mortar must move to the right, the computer subtracts the 10 mils:
(Base deflection (No. 2) --- 2815 mils) + (Deflection change --- -10 mils) = (New deflection for No. 1 mortar --- 2805 mils)
The No. 3 mortar must move to the left, so add:
(Base deflection (No. 2) --- 2815 mils) + (Deflection change --- +10 mils) = (New deflection for No. 3 mortar --- 2825 mils)

NOTE: The No. 4 must also move to the left, but it must move 20 mils (40 meters) to open.
(Base deflection (No. 2) --- 2815 mils) + (Deflection change --- +20 mils) = (New deflection for No. 4 mortar --- 2835 mils)

5. Special sheaf using the plotting board.
   a. A special sheaf is any sheaf other than an open, converged, or parallel sheaf. This can include a wide target that an open sheaf will not cover, or a target running parallel or diagonally to the gun-target (G-T) line.
   b. Normally, a special sheaf requires a different deflection for each mortar, and each mortar fires a different range to engage the target. The FO may include the attitude (azimuth through long axis of target) of the target in the call for fire, or give the grid of the two ends of the target.
   c. The computer receives the following call for fire:
      F1A25
      FFE, SHIFT 251
      DIRECTION 0710, R100, ADD 100
      THREE TRUCKS HALTED ON ROAD
      50 x 100 METERS
      ATTITUDE 1100
      In the call for fire, the FO locates the target by giving the location of the center of target and saying the target is 100 meters long. He also gives the attitude of the target, which allows the computer to accurately plot the target.

NOTE: The following data were used in setting up the plotting board:
Grid intersection --- 2551
Direction of fire --- 0885
Mounting azimuth --- 0900
Referred deflection --- 2800
Mortar position grid --- 24874976
(RP) point --- 261508
Target (AA251) grid --- 262513
Attitude (gun section) --- 2450

   d. The data for a special sheaf are determined using the plotting board. Each mortar must be plotted on the board, as well as each expected point of impact of the rounds.
   e. The plotting board is set up as a modified observed chart (Figure 2).

**Performance Steps**

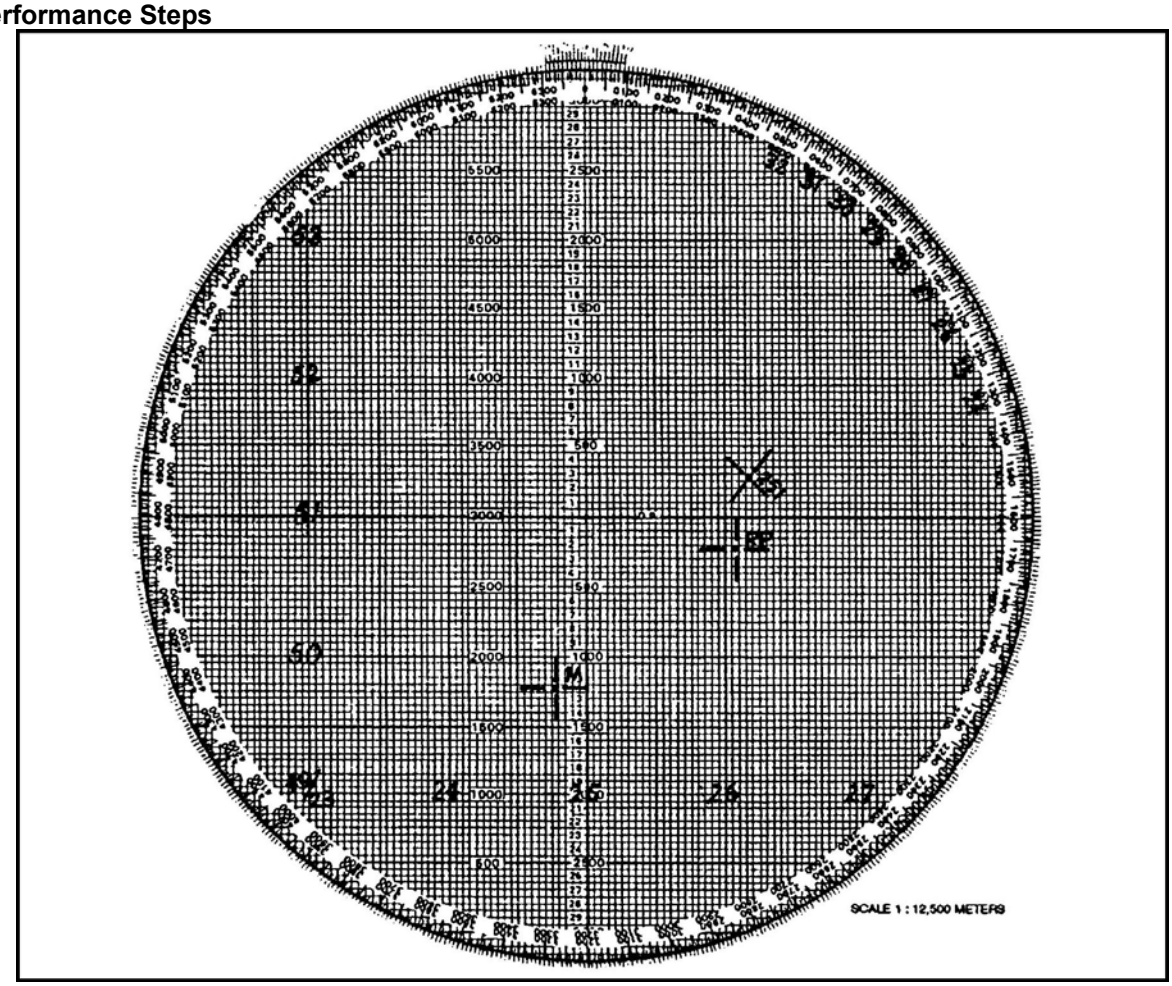
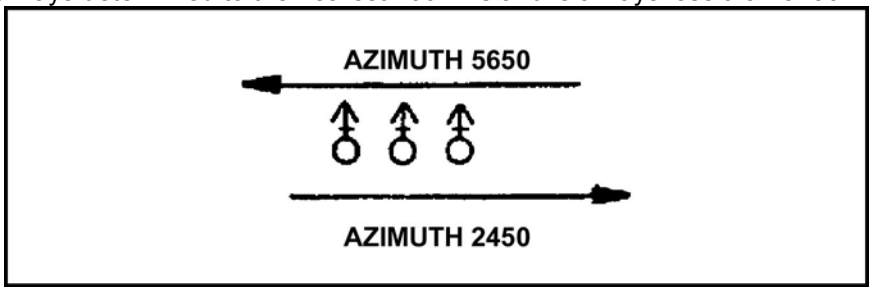



Figure 2. M16 plotting board set up as a modified observed chart (M19 is used like the M16).

(1) Using the grid intersection (2551), place a grid system on the plotting board.
(2) Plot the grid location of the mortar position and any other known points (RP, targets, and so forth).
(3) Rotate the disk and align the mortar plot and RP plot.
(4) Determine the direction of fire.
(5) Determine the mounting azimuth.
(6) Place the referred deflection scale on the disk.

f. In firing a special sheaf, each mortar normally fires with a different deflection and elevation. To determine these data, each mortar is plotted on the plotting board.
(1) To plot the mortars on the plotting board, the computer must know the attitude of the mortar section.
(2) The attitude is the direction through the long axis of the gun section (Figure 3). Attitude is always determined to the nearest 100 mils and is always less than 3200 mils.



**Performance Steps**

Figure 3. Attitude.

(3) To plot the mortars--
   ( a) Index the attitude of the gun section at the index mark.
   ( b) Locate the dot in the center of the hollow cross marking the mortar position. This represents the No. 2 mortar.
   ( c) To plot the No. 1 and 3 mortars, go 40 meters above (toward the top of the board) and 40 meters below (toward the bottom of the board) the No. 2 mortar plot and make small plots at those points to represent the No. 1 and 3 mortars. To plot the No. 4 mortar, go 80 meters below the No. 2 mortar plot (towards the bottom of the board) and make a small plot to represent the No. 4 mortar (Figure 4). Erase the arms of the hollow cross if they interfere with making those plots.

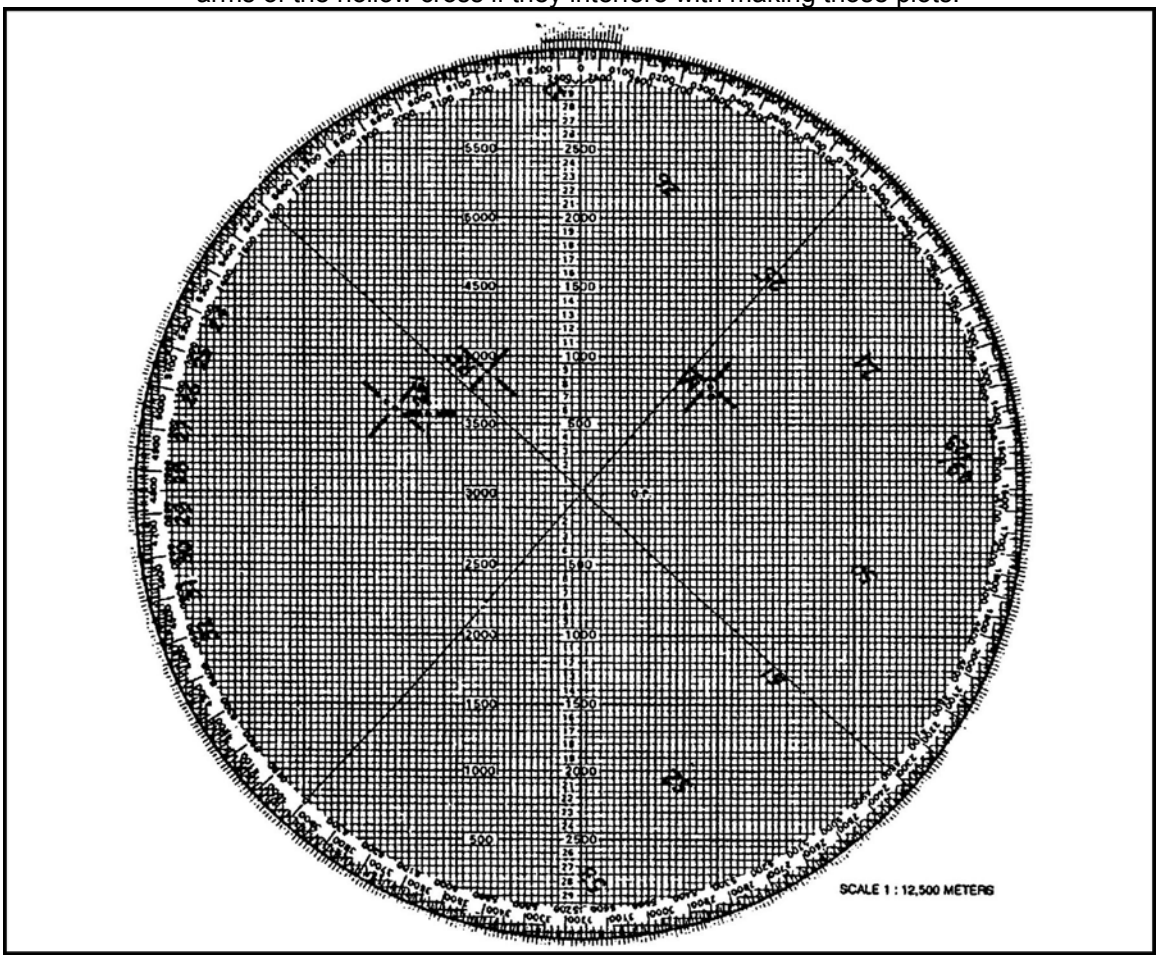



Figure 4. Plotting of No. 1, 3, and 4 mortars.

   ( d) At this point, it might be difficult to determine which is the No. 1 and which is the No. 3 and 4 mortar plots. By rotating the disk back to the mounting azimuth, the plots can easily be distinguished. The No. 1 mortar is always to the right of No. 2, and No. 3 and 4 mortars are to the left.
   ( e) The gun section is now plotted on the board exactly as on the ground in relation to the target area.

(4) To plot the impact points of the rounds on the target, use the same procedure as in plotting the gun section.
   ( a) Index target attitude.
   ( b) Go 40 meters above and below the target plot and make plots for impact points of

**Performance Steps**

No. 1 and 3 mortars, and then go 80 meters below the target plot to plot the No. 4 mortar impact point.

( c) Again, by rotating the disk and aligning these impact plots with the gun section plots, it can be determined which mortar will be firing at which plot (Figure 5).

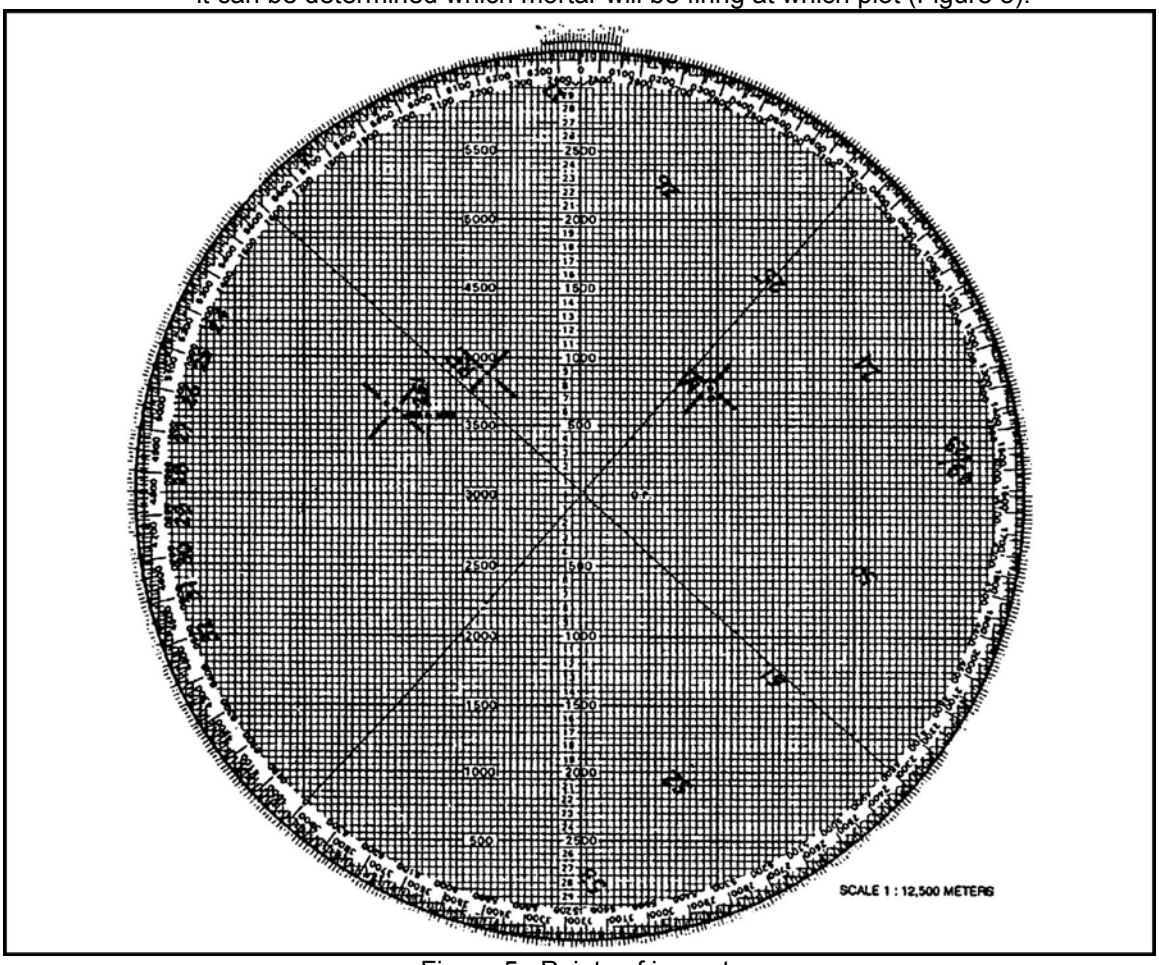



Figure 5. Points of impact.

(5) To determine the deflection and range from each mortar to its impact point, align the No. 1 mortar with the No. 1 impact point. Read the deflection and determine the range. Repeat this procedure for each mortar.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER:

1. Tell the soldier to record the sheaf corrections, compute data to correct the sheaf, and give the proper commands to the mortars to fire or not to fire. Tell him that he must convert the meter corrections to mils using both the mil-relation formula and the deflection-conversion table. He must give the proper command to the mortars to realign the aiming posts.

2. Tell the soldier to use the completed computer's records for an open sheaf, a converged sheaf, and a special sheaf; and to determine the data to converge the sheaf, to open the sheaf, or to fire a special sheaf. Tell him that he must use the mil-relation formula to compute the data for either the open or the

converged sheaf, and the deflection conversion table to compute the data for the other mission. He must use the M16 plotting board to determine the special sheaf data.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Do not score sequentially. | | |
| 1. Parallel sheaf: | ____ | ____ |
| a. Correctly recorded the sheaf corrections on the computer's record. | | |
| b. Converted the meter corrections to mils using the mil-relation formula without error. | | |
| c. Converted the meter corrections to mils using the deflection conversion table without error. | | |
| d. Determined new deflection without error. | | |
| e. Refired mortar. | | |
| f. Used the proper fire commands. | | |
| 2. Converged sheaf: | ____ | ____ |
| a. Converted the meter distance between mortars to mils using the mil-relation formula. | | |
| b. Converted the meter distance between the mortars to mils using the deflection conversion table. | | |
| c. Determined the correct deflection for the No. 1 mortar. | | |
| d. Determined the correct deflection for the No. 3 mortar. | | |
| e. Determined the correct deflection for the No. 4 mortar. | | |
| 3. Open sheaf: | ____ | ____ |
| a. Converted the meter distance between mortars to mils using the mil-relation formula. | | |
| b. Determined the mil correction to move the mortar impact from 40 meters to 60 meters apart. | | |
| c. Determined the correct deflection for the No. 1 mortar. | | |
| d. Determined the correct deflection for the No. 3 mortar. | | |
| e. Determined the correct deflection for the No. 4 mortar. | | |
| 4. Special sheaf: | ____ | ____ |
| a. Plotted target at final adjusted data. | | |
| b. Indexed target attitude. | | |
| c. Plotted impact points for No. 1, 3, and 4 mortars. | | |
| d. Indexed mortar position attitude. | | |
| e. Plotted the No. 1, 3, and 4 mortars. | | |
| f. Determined deflection and range for No. 1 mortar. | | |
| g. Determined deflection and range for No. 3 mortar. | | |
| h. Determined deflection and range for No. 4 mortar. | | |

NOTE: Deflection for performance measures 4f, 4g, and 4h above have a 10-mil tolerance for deflection and 25 meters for range.

**Evaluation Guidance:** Test the soldier on his corrections to the sheaf and on one of his three sheaf adjustments. For the 60-mm computer, he must only determine the data for two mortars.

Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for a Traversing and/or Searching Mission Using a Plotting Board**
**071-078-0007**

**Conditions:** As a computer in a fire-direction center (FDC), given a firing table; a plotting board set up as a modified observed chart with mortar position plotted and final plots for two targets:

* Target No. 1 is for a traversing mission.

* Target No. 2 is for a search mission.

Also given a completed DA Form 2399 (Computer's Record) for the adjustment phase of each mission; a call for fire for a wide or deep target; and paper and pencil.

**Standards:** 1. Determined deflection to within 1 mil with a 10-mil tolerance.

2. Determined range to within 25 meters with a 25-meter tolerance.

3. Determined turns to nearest half turn.

4. Determined charge to 1/8 charge.

**Performance Steps**
NOTE: The information provided in this task applies to all mortars. For 60-mm, use only the information for the No. 1 and 2 mortars. For a six-gun platoon, use the procedure used for the No. 3 and 4 mortars to determine the data for the No. 5 and 6 mortars.

1. Application.
    a. Traversing or searching fire is used by mortars when the target is wider or deeper than can be engaged by a parallel sheaf. Wide or deep targets are engaged by using a distributed fire for effect (FFE). This means that the mortar will be manipulated for elevation or deflection between rounds until the number of rounds given in the fire command has been fired. The 4.2-inch mortar will vary range using charges.
    b. To effectively engage a target using traversing fire (Figure 1), the attitude of the target cannot be more than 100 mils different than the attitude of the mortar section.

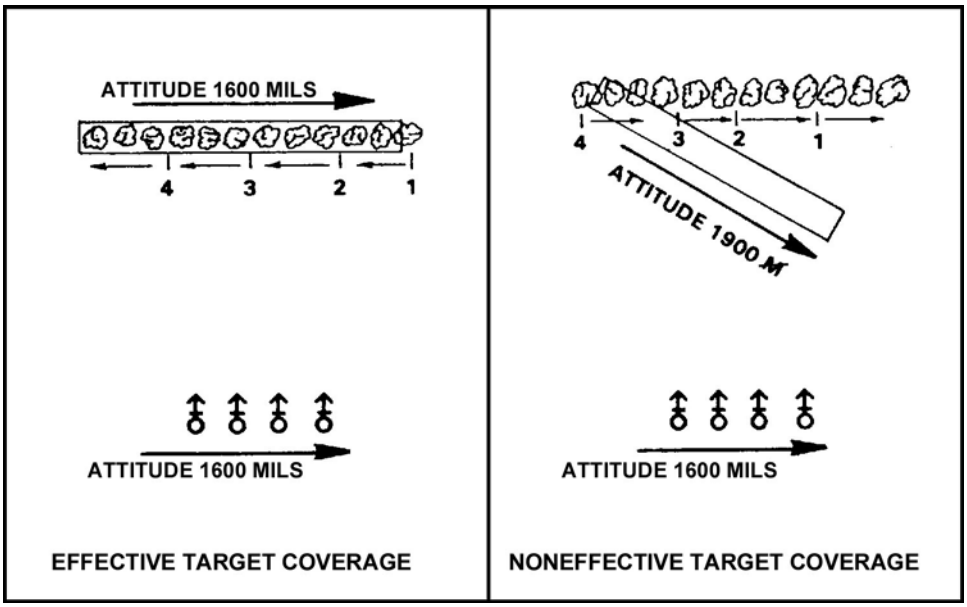


Figure 1. Traversing fire.

**Performance Steps**

c. To effectively engage a target using searching fire (Figure 2), the attitude of the target cannot be more than 100 mils different than the azimuth of the gun-target line.

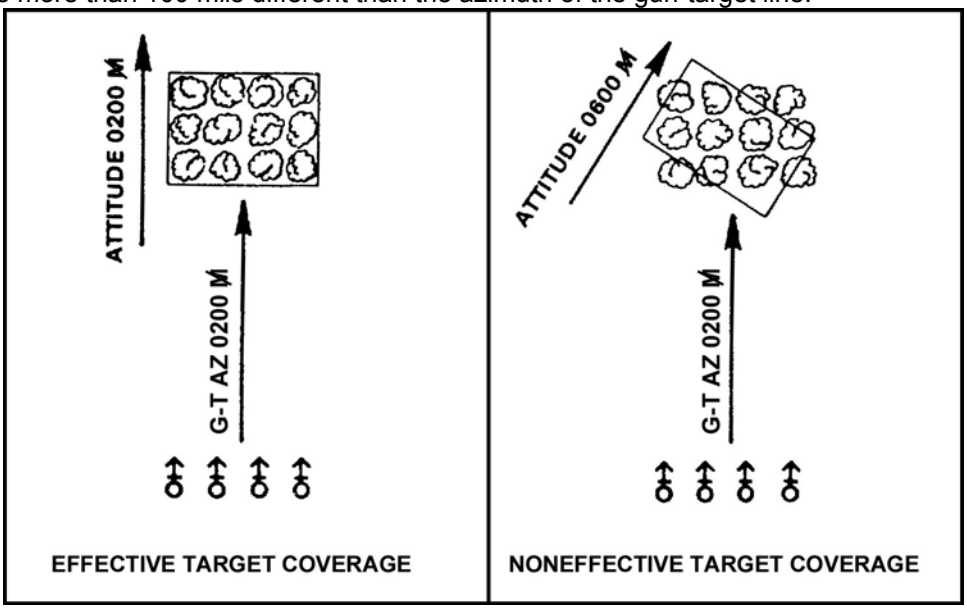



Figure 2. Searching fire.

2. Traversing fire.
   a. Upon receiving the call for fire, the section sergeant determines that, from the size and description of the target, traversing fire must be used to cover it. He then completes the fire direction center (FDC) order on DA Form 2399 (Figure 3).

**Performance Steps**

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| CO A 1/66 INF | 9 NOV | 1425 | F2E35 | AA0355 |

☒ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID 158911
OT DIRECTION 6320
ALTITUDE

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION INF IN CREEK BED 400 X 50 ATT 1150
METHOD OF CONTROL
METHOD OF ENGAGEMENT
MESSAGE TO OBSERVER

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE SEC | DEFLECTION 3038 | MORTAR TO FOLLOW SEC | |
| MORTAR TO ADJ #4 | DEFLECTION CORRECTION ☐ L ☐ R | SHELL AND FUZE HEQ | |
| METHOD OF ADJ IRD | RANGE 1925 - 50 = 1875 | MORTAR TO FIRE #4 | |
| BASIS FOR CORRECTION | WALT CORRECTION ☐ + ☑ 100 | METHOD OF FIRE IRD | |
| SHEAF CORRECTION | | 5RDS PROX IN EFFECT | |
| SHELL AND FUZE HEQ IN ADJ PROX IN EFFECT | RANGE CORRECTION ☐ + ☑ 50 | DEFLECTION 3038 | |
| METHOD OF FFE 5RDS | CHARGE/RANGE 3/1825 | CHARGE 3 | ① HE |
| RANGE LATERAL SPREAD | AZIMUTH | TIME SETTING | |
| ZONE | ANGLE T 430 | ELEVATION 962 | |
| TIME OF OPENING FIRE W/R | | | |

Figure 3. Example of completed FDC order.

b. With the completed FDC order, the computer must now compute the data to fire the mission (Figure 4).

**Performance Steps**

| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS NOT EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | SEC | DEFLECTION | 3038 | MORTAR TO FOLLOW | SEC | |
| MORTAR TO ADJ | #4 | DEFLECTION CORRECTION ☐L ☐R | | SHELL AND FUZE | HEQ | |
| METHOD OF ADJ | IRD | RANGE | 1925 - 50 = 1875 | MORTAR TO FIRE | #4 | |
| BASIS FOR CORRECTION | | VVALT CORRECTION ☐+ ☑- | 100 | METHOD OF FIRE | IRD | |
| SHEAF CORRECTION | | | | 5RDS PROX IN EFFECT | | |
| SHELL AND FUZE | HEQ IN ADJ PROX IN EFFECT | RANGE CORRECTION ☐+ ☑- | 50 | DEFLECTION | 3038 | |
| METHOD OF FFE | 5RDS | CHARGE/RANGE | 3/1825 | CHARGE | 3 | ① HE |
| RANGE LATERAL SPREAD | | AZIMUTH | | TIME SETTING | | |
| ZONE | | ANGLE T | 430 | ELEVATION | 962 | |
| TIME OF OPENING FIRE | W/R | | | | | |

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R100 | 200 | | 3037 | 1700 | | | 3037 | 1650 | | 1095 | ② HE |
| R25 | 100 | | 3033 | 1775 | | | 3003 | 1725 | | 1057 | ③ HE |
| | 50 | FFE | 2997 | 1825 | SEC | 5RDS PROX | 2997 | 1775 | | 1029 | ⑳ PROX |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 4. Computation of data.

(1) From the FDC order, the computer knows that No. 4 mortar will be used to adjust on the left flank of the target.

NOTES:

1. The following data were used to set up the plotting board:
   Grid intersection --- 1590
   Direction of fire --- 6085 mils
   Mounting azimuth --- 6100 mils
   Mortar position --- 16808945
   Mortar position attitude --- 1100 mils
   Mortar altitude --- 400 meters
   Target altitude --- 300 meters
   Referred deflection --- 2800 mils
2. Before this mission can be computed, the four mortars must be plotted individually at the mortar position. During the mission, the computer ensures that the correct plots are used to determine the data required; in other words, during the adjustment, the impact points are aligned with the No. 4 mortar plot.

(2) Using the information in the call for fire, FDC order, and observer corrections, the computer computes the data to adjust the No. 4 mortar onto the left flank of the target and records it on DA Form 2399 (Figure 4).

c. After the adjustment is complete, the computer must--

(1) Plot the 400-meter length of the target on the plotting board using the attitude of the target.

**Performance Steps**

(2) Divide the target into segments.
(3) Determine the mil width of one segment.
(4) Determine the number of turns it will take to cover one segment.
(5) Determine the number of turns between rounds.

d. The computer determines each of these items as follows:

(1) To plot the target on the plotting board, the computer rotates the azimuth disk until the target attitude (taken from the call for fire) is indexed. The computer erases all the plots except the last. Being sure that the attitude is indexed, the computer makes a plot 100 meters above that adjustment plot, then another plot 100 meters above the plot followed by one last plot 100 meters above that plot. These plots represent the start points for each mortar. The area between the plots, and for 100 meters beyond the last plot, is the area each mortar must cover with fire (Figure 5).

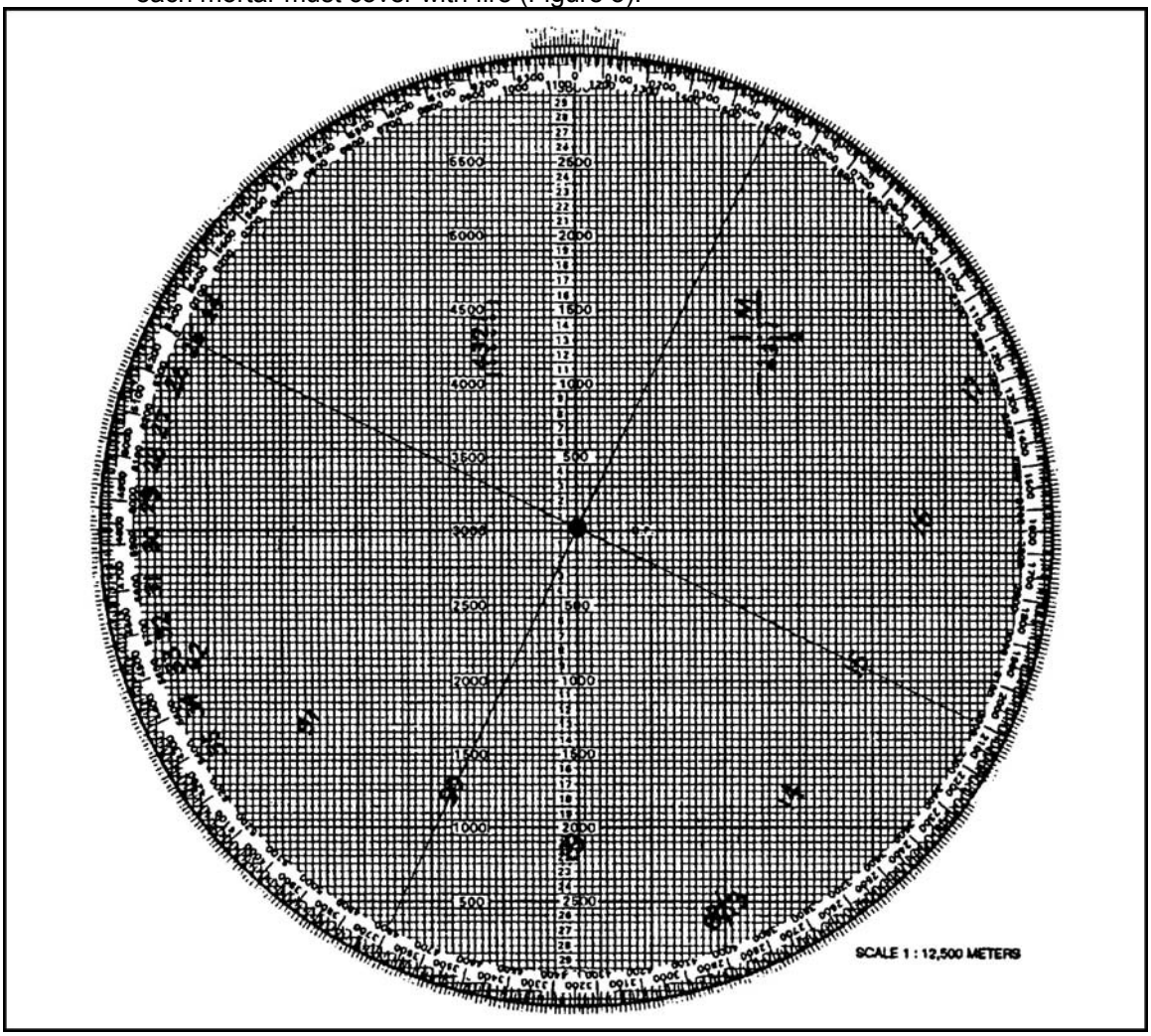



Figure 5. Mortar plots.

(2) The target is now divided into four segments. By determining the remaining data for one segment, the data will apply to all four mortars.
(3) Since each segment of the target is 100 meters wide, if the computer determines the mil width of one segment, the other three will be the same. At this time, the computer has the deflection that it took to hit the adjusting point on the target by the No. 4 mortar (adjusting mortar) (Figure 4). By aligning the adjusting mortar plot with the No. 3 plot on the target, the computer can now determine the deflection from the adjusting mortar to the start point

**Performance Steps**

of No. 3 mortar on the target.

NOTE: The deflection determined from the adjusting mortar to the No. 3 plot on the target is only used to determine the mil width of one segment of the target. Do not use this deflection for firing data.

(4) By subtracting these two deflections, the computer can determine the mil width of the segment.
(No. 4 plot deflection --- 2997 mils) + (No. 3 plot deflection --- -2940 mils) = (Mil width of segment --- 57 mils)

(5) Each turn of the traversing handwheel is 10 mils. Dividing the mil width of the segment (57 mils) by 10 gives the computer the total number of turns to cover the segment:
57/10 = 5.7 ÷ 6 total turns

NOTES:
1. 120-mm mortar: For the 120-mm mortar, each turn of the traversing handwheel is only 5 mils.
2. 60-mm mortar: When the bipod is in the upper saddle of the barrel, one turn of the traversing handwheel equals 10 mils; when in the lower saddle, one turn equals 15 mils. The upper saddle is used when firing less than 1100 mils elevation. The lower saddle is used when firing more than 1100 mils elevation.

(6) To compute the number of turns to take between each round, the computer must know how many rounds will be fired for each segment. This information is in the FDC order (four rounds). To determine the turns between rounds, divide the total turns by the interval between rounds (there will always be one less interval than the number of rounds: 4 rounds = 3 intervals).
6/2 = 2 = 2 turns between rounds

NOTES:
1. Turns are rounded to the nearest half turn.
2. The number of rounds to fire is based on the rule: 4 rounds per 100 meters of target width, or 1 round per 30 meters.

(7) At this point, the computer has only to determine the deflection for No. 1, 2, and 3 mortars, complete the subsequent command, and issue it to the mortar section (Figure 6). To do this, the computer aligns the No. 3, 2, and 1 mortars with their start points on the target and reads the deflection for each mortar. During this procedure, the computer should also determine the range for each mortar to its start point. If there is a range difference of 25 meters or more, the elevation for that mortar must reflect the range difference.

**Performance Steps**

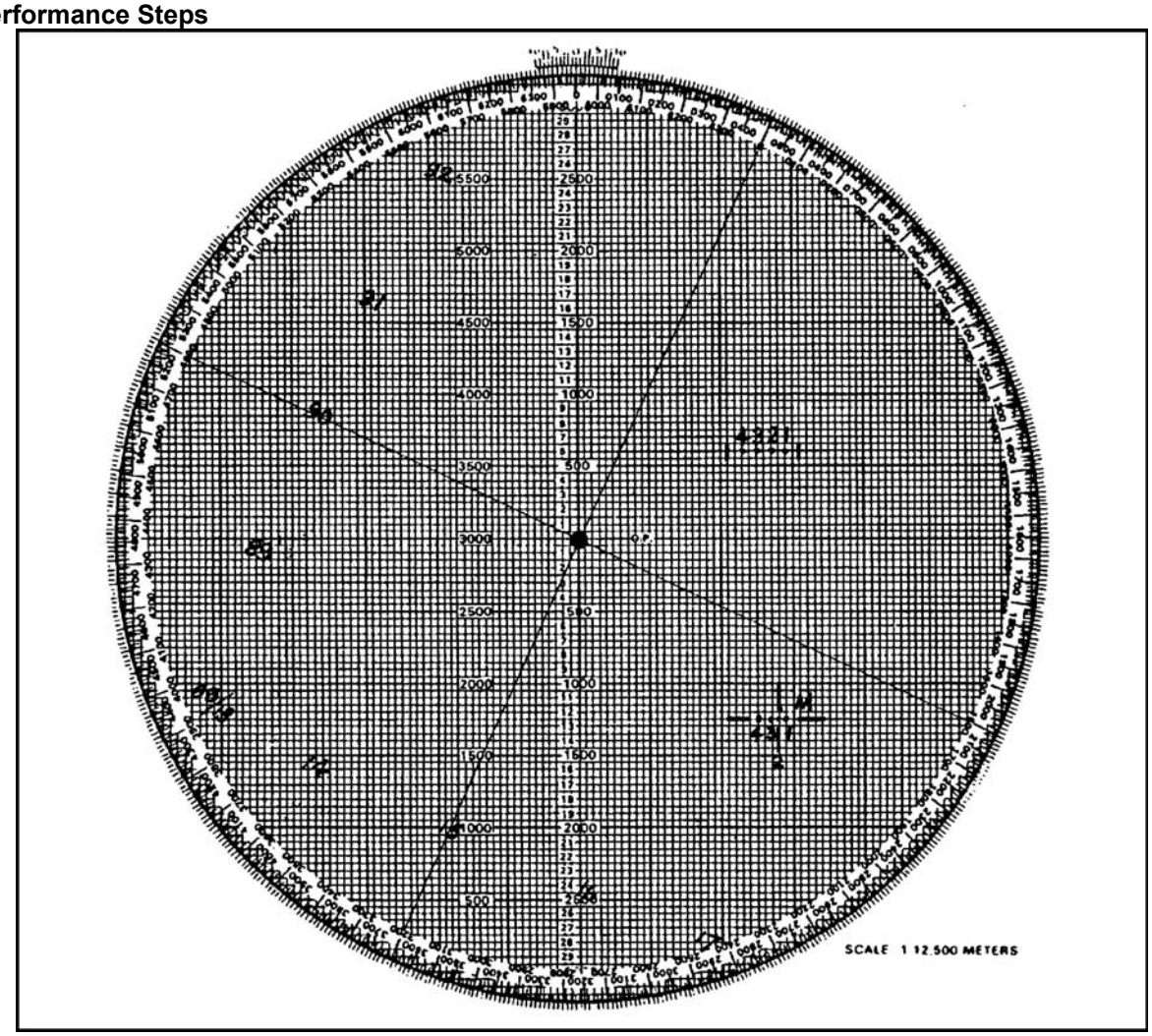



Figure 6. Alignment of mortars and impact points.

NOTE: Upon completion of the adjustment phase of the mission, the section is given the command, PREPARE TO TRAVERSE RIGHT (LEFT). The gunners traverse the mortar all the way in the opposite direction of that given, back off two turns (120-mm backs off four turns), and await instructions.

(8) As shown in Figure 7, each mortar is firing a different deflection, but the same charge and elevation. When the last round is fired, the mortars are left as laid and the squad again awaits instructions. As shown in Figure 7, the forward observer (FO) came back with, REPEAT. Rather than fire the mission as it was fired the first time by traversing right, the computer gives the command to traverse left.

**Performance Steps**

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| A 1/66 | 9 NOV | 1425 | F2E35 | AA0355 |

☑ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

GRID
OT DIRECTION
ALTITUDE

TARGET DESCRIPTION: INF IN CREEK BED 400 X 50 ATT 1150
METHOD OF ENGAGEMENT
METHOD OF CONTROL
MESSAGE TO OBSERVER

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE: SEC | DEFLECTION: 3038 | MORTAR TO FOLLOW: SEC | |
| MORTAR TO ADJ: #4 | DEFLECTION CORRECTION ☐ L ☐ R | SHELL AND FUZE: HEQ | |
| METHOD OF ADJ: 1 RD | RANGE: 1925 - 50 = 1875 | MORTAR TO FIRE: #4 | |
| BASIS FOR CORRECTION: — | WALT CORRECTION ☐ + ☑ 100 | METHOD OF FIRE: 1 RD | (1) |
| SHEAF CORRECTION: — | RANGE CORRECTION ☐ + ☑ 50 | 4 RDS PROX IN EFFECT | |
| SHELL AND FUZE: HEQ IN ADJ HE PROX IN EFFECT | CHARGE/RANGE: 3 | DEFLECTION: 3038 | |
| METHOD OF FFE: 4 RDS | AZIMUTH: — | CHARGE: 3 | |
| RANGE LATERAL SPREAD: — | ANGLE T: 430 | TIME SETTING: — | |
| ZONE: — | | ELEVATION: 962 | |
| TIME OF OPENING FIRE: W/R | | | |

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R100 | 200 | | 3037 | 1700 | | | 3037 | 1650 | | 1095 | (2) |
| R 25 | 100 | | 3003 | 1775 | | AMC | 3003 | 1725 | | 1057 | (3) HEQ |
| | 50 | FFE | | 1825 | SEC 4RDS PROX TRVS RIGHT 2 TURNS | #4 | 2997 | 1775 | | 1029 | |
| | | | | | | #3 | 2940 | 1775 | | 1029 | |
| | | | | | | #2 | 2889 | 1775 | | 1029 | |
| | | | | | | #1 | 2832 | 1775 | | 1029 | (16) PROX |
| | | | | | | | | | | | |
| REPEAT | | | | | SEC | 5RDS TRVS LEFT 2 TURNS | | | | | (32) PROX |
| | | | | | | | | | | | |
| CEASE | FIRE - | ENEMY | RETREATING | CAS | UNKNOWN | | | | | | |
| | | | | | | | | | | | |

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Figure 7. Example of completed computer's record.

3. Searching/zone fire.
   a. In firing a searching zone mission, the adjustment phase of the mission is the same as a regular adjust mission, using the base mortar (No. 2) as the adjusting mortar, except that the mortar is adjusted on either the near end or far end of the target--normally, the far end.

NOTE: The following data were used to set up the plotting board:

**Performance Steps**

Grid intersection --- 1590
Direction of fire --- 6085 mils
Mounting azimuth --- 6100 mils
Mortar position --- 16808945
Mortar altitude --- 400 meters
Target altitude --- 370 meters
Referred deflection --- 2800 mils

b. Upon completion of the adjustment phase of the mission, the computer now computes the data to cover the target with fire. The computer must--
   (1) Determine the mil length (depth) of the target.
   (2) Determine the number of turns it will take to cover the target.
   (3) Determine the number of turns between rounds.

c. The computer determines each of those items as follows:

NOTE: The following procedures apply only to the 60-mm and 120-mm mortars.

(1) To determine the mil length of the target, the computer must use the firing table. He subtracts the elevation to hit the near end of the target from the elevation for the far end of the target (adjusting point, 1002).
   Range to adjusting point --- 2,250, Elevation --- 1002
   Range to near end --- 2,025, Elevation --- 1101
   [1101 - 1002 = (Length of target) 99 mils]

(2) Each turn of the elevation crank is 10 mils. Dividing the mil length of the target (99 mils) by 10 gives the computer the total turns needed to cover the target:
   99.0/10 = 9.9 ÷ 10 (total turns)

(3) To compute the number of turns to take between each round, the computer must know how many rounds will be fired by each mortar. This information is in the FDC order (8 rounds). To determine the turns between rounds, divide the total turns by the intervals between rounds (there is always one less interval than the number of rounds: 8 rounds = 7 intervals).
   10/7 = 1.4 ÷ 1 1/2 (turns between rounds)

NOTES:
1. Turns are rounded to the nearest half turn.
2. The number of rounds to fire is based on the rule: 4 rounds per 100 meters of target depth, or 1 round per 30 meters.

d. At this point, the computer has all the information needed to complete the subsequent command and issue it to the mortars (Figure 8).

**Performance Steps**

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| A 1/66 | 9 NOV | 1645 | F2E35 | AA0364 |

☑ ADJUST FIRE ☐ FIRE FOR EFFECT ☐ IMMEDIATE SUPPRESSION

GRID 149908
OT DIRECTION 5890
ALTITUDE 2200

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION SUPPLY DEPOT 100 X 200 AIT 5800
METHOD OF CONTROL
METHOD OF ENGAGEMENT
MESSAGE TO OBSERVER

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE SEC | DEFLECTION 3472 | MORTAR TO FOLLOW SEC | |
| MORTAR TO ADJ #2 | DEFLECTION CORRECTION ☐L ☐R | SHELL AND FUZE HEQ | |
| METHOD OF ADJ IRD | RANGE 2350 | MORTAR TO FIRE #2 | |
| BASIS FOR CORRECTION — | VVALT CORRECTION ☐+ ☑- 30 | METHOD OF FIRE IRD | ① HE |
| SHEAF CORRECTION — | RANGE CORRECTION ☐+ ☐- | 10 RDS IN EFFECT | |
| SHELL AND FUZE HEQ | CHARGE/RANGE 4 | DEFLECTION 3459 | |
| METHOD OF FFE 8 RDS | AZIMUTH 5842 | CHARGE 4 | |
| RANGE LATERAL SPREAD — | ANGLE T 450 | TIME SETTING | |
| ZONE 200 M | | ELEVATION 941 | |
| TIME OF OPENING FIRE W/R | | | |

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| L100 | 100 | | 3534 | 2300 | | | 3534 | 2300 | | 974 | ② |
| | 100 | | 3558 | 2225 | | AMC | 3558 | 2225 | | 1015 | ③ |
| | 50 | FFE | 3544 | 2250 | SEC | 8 RDS | 3544 | 2250 | | 1002 | ㉝ |
| | | | | | | SEARCH UP | | | | | |
| | | | | | | 1½ TURNS | | | | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 8. Data for subsequent command.

e. To compute fire-for-effect data for a zone mission (4.2-inch mortar).
   (1) Upon completion of the adjustment phase of the mission, the computer must now determine the charge data to be placed on each round to be fired in the fire for effect.
   (2) The number of rounds fired may vary based on the size of the target given in the call for

**Performance Steps**

fire (platoon in open, 100 x 100, or company assembly area, 200 x 200). However, the charge difference will remain constant for each 50-meter spacing between rounds:

( a) 3/8 charge apart when firing without extension.
( b) 4/8 charge apart when firing with extension.
( c) 2/8 charge apart when firing the M329A2 round.

EXAMPLE:

Target description: PLATOON IN OPEN, 100 x 100. For this target, the FO adjusted on the center of target with the No. 2 mortar firing a charge of 21 5/8. Three rounds will be fired. To have one round fall 50 meters beyond the adjustment point, the computer adds 3/8 charge to the base charge of 21 5/8 and 21 5/8 + 3/8 = 22. For the round to fall short of the base round, the computer subtracts 3/8 charge, 21 5/8 - 3/8 = 21 2/8. When fired with this data, the rounds will impact about 50 meters apart (Figure 9).

Target description: COMPANY ASSEMBLY AREA, 200 x 200. For this target, the FO adjusted on the center of the target, with No. 2 mortar firing a charge of 28 3/8. Five rounds will be fired. The computer must now compute data to place rounds 50 meters and 100 meters beyond and 50 meters and 100 meters short of the base round: 100 meters over 28 3/8 + 1 = 29 3/8 ; 50 meters over 28 3/8 + 4/8 = 28 7/8 ; Base round charge 28 3/8 ; 50 meters short 28 3/8 - 4/8 = 27 7/8 ; 100 meters short 28 3/8 - 1 = 27 3/8 ; By firing five rounds at these charges, the target area (200 x 200) will be fully covered (Figure 10).

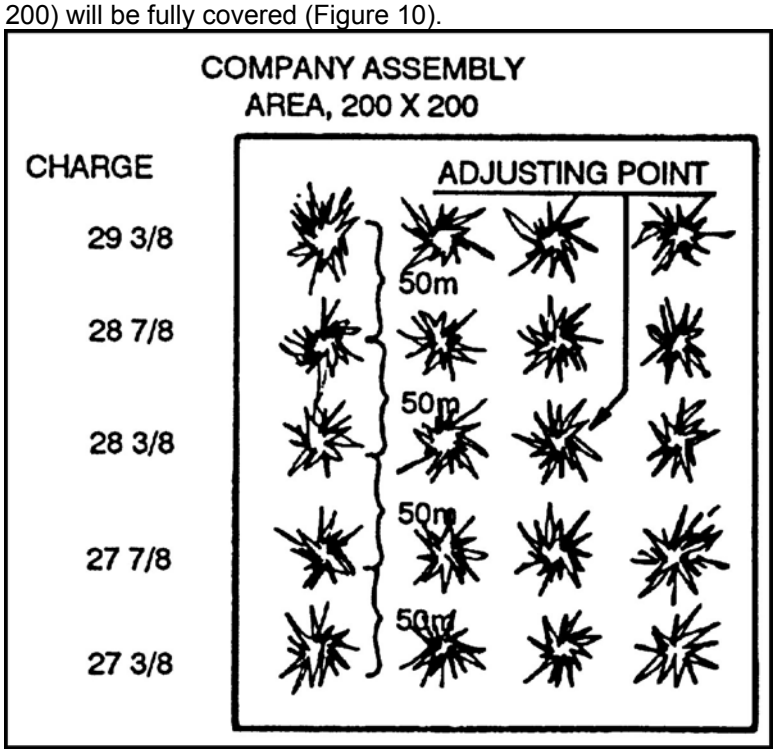


Figure 10. Company-size area.

**Performance Steps**

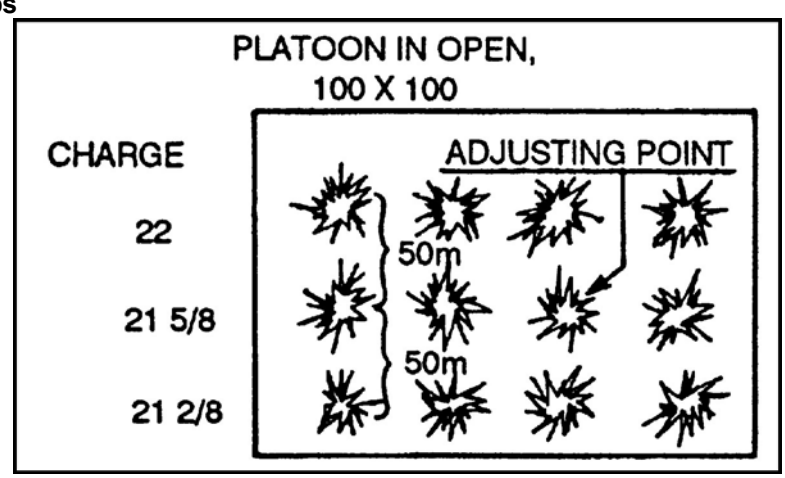


Figure 9. Platoon-size zone.

NOTE: Charges of 25 4/8 or above are fired with extension; those below 25 4/8 are fired without extension.

(3) When firing the fire for effect, the crews will mix the rounds to cause a scattered fire for effect on the target.

**Evaluation Preparation:** SETUP: At the test site, provide the materials and equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute the final firing data for a traversing mission, then the final firing data for a search mission.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Not to be sequence scored. | | |
| 1. Traversing mission: | ____ | ____ |
| a. Told the mortars, "Prepare to traverse right (left)." | | |
| b. Plotted the location of No. 2, 3, and 4 mortars, or No. 1, 2, and 3 mortars, using the mortar position attitude. | | |
| c. Plotted the meter length of the target using the target attitude. | | |
| d. Divided the target length into four equal segments and plotted those points on the plotting board. | | |
| e. Determined the mil width of one segment of the target (within 5 mils). | | |
| f. Determined the number of turns to cover one segment of the target. | | |
| g. Determined the number of turns between rounds (nearest half turn). | | |
| h. Determined the deflection to each mortar start point. | | |
| i. Issued the correct fire command to the mortars to fire the traverse part of the mission. | | |
| 2. Searching/zone mission: | ____ | ____ |
| a. Searching mission (60-mm, 81-mm, 120-mm). | | |
| (1) Computed the mil length of the target using the elevation to the near end and far end of the target. | | |
| (2) Determined the number of turns to cover the target. | | |
| (3) Determined the number of turns between rounds. | | |
| (4) Issued the correct fire command to the mortars to fire the search part of the mission. | | |
| b. Zone mission (4.2-inch mortar). | | |
| (1) Determined charge per 50 meters. | | |
| (2) Determined number of rounds to use (based on target description). | | |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| (3) Determined charge for each round. | | |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

**Compute Data for an Illumination Mission Using a Plotting Board**

**071-078-0008**

**Conditions:** As a computer in a fire-direction center (FDC), given a firing table; a plotting board set up as a modified observed chart, with mortar position and registration point (RP) plotted; DA Form 2399 (Computer's Record); a firing table; a call for fire for an illumination mission; two forward observer (FO) corrections; and paper and a No. 2 pencil.

**Standards:** Computed data to place illumination over the target area, to include deflections to the nearest mil with a 10-mil tolerance.

Computed ranges to the nearest 25 meters with a 25-meter tolerance.

Fuzed settings to within one-tenth of a second.

For the 4.2-inch mortar, charged to 1/8 charge with a 1/8-charge tolerance.

**Performance Steps**

NOTE: The information contained in this task has limited data that can be used with the 60-mm mortar. Due to the fixed time of function for the 60-mm illumination, time settings are not used.

1. Purpose of illumination. Battlefield illumination provides friendly forces with light to assist them in ground operations at night. The light provided by the mortar illumination round also allows the FO to detect targets of opportunity or enemy activity in the area. The indiscriminate use of illumination can give away friendly operations as well as reveal enemy operations. Therefore, the fire direction center (FDC), as well as the FO, must keep abreast of friendly activity within their area of responsibility.

2. Types of illumination.
   a. The amount of illumination required for a particular mission depends on the observer-target (O-T) distance, conditions of visibility, and the size and shape of the area to be illuminated.
   b. The FO may request any of the following patterns of illumination rounds. Therefore, the computers must be able to compute the data to provide the pattern requested.
      (1) One-gun illumination. Most illumination missions are fired by one mortar. In firing one-gun illumination, the remaining mortars are available to fire high explosive (HE), should a target be detected.
      (2) Two-gun illumination. This pattern is used when more light is needed than one round can provide. In providing this pattern, one round each is fired from two different guns (normally, the flank mortars). The rounds are set to burst at the same time.

NOTE: Mortars may normally fire this pattern by firing two rounds as quickly as possible from one mortar.

      (3) Two-gun illumination, range spread. This pattern is used when the area to be illuminated has greater depth than width. When this pattern is called for, the computer computes the data for one mortar to fire rounds 250 meters beyond the target (location given by the FO) on the gun-target (G-T) line, and data for one mortar to fire rounds 250 meters short of this point on the G-T line. This procedure causes rounds to burst 500 meters apart.

NOTE: For the 4.2-inch and the 120-mm mortar, use 500 meters in place of 250 meters.

      (4) Two-gun illumination, lateral spread. This pattern is used when the area to be illuminated has greater width than depth. When this pattern is called for, the computer computes the data for one mortar to fire rounds 250 meters to the left of the target (location given by the FO), and data for one mortar to fire rounds 250 meters to the right of the target. This procedure causes rounds to burst 500 meters apart.

3. Computing illumination data.
   a. The computer receives the following call for fire:
      A3K17
      ADJUST FIRE POLAR
      DIRECTION 6080

**Performance Steps**

DISTANCE 400
VEHICLE NOISE
SUSPECTED CONVOY
ILLUMINATION

The computer begins computing the data to fire an illumination round over the target area to aid the FO in determining whether there is enemy activity in his area.

b. Upon the completion of the FDC order, the computer knows which mortar will be firing the illumination and which will be firing HE, should it be called for.

c. The procedure for plotting and computing illumination is the same as for HE, with two exceptions.

(1) When plotting illumination rounds on the plotting board, the computer makes the plot and instead of placing a circle around it, he places a square around it (Table 1). This identifies illumination from HE rounds when plotting both illumination and HE for the same mission. Should it become necessary to plot both HE and illumination on the same point, this symbol is used (Table 1).

| | |
|---|---|
| **Illumination Round Plot Symbol** |  |
| **HE Round Plot Symbol** |  |

Table 1. Plot symbols.

(2) The firing table is used to determine the time of flight, corrections for time of flight, corrections for elevation, and range to impact.

( a) Time of flight is found in column 3 (Figure 1) under the heading FUZE SETTING. It is the time placed on the fuse of the illumination round.

CHARGE 3

FT 81-AI-3
CTG, ILLUMINATING, M371A3
FUZE, TIME, M84A1

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| RANGE TO BURST | ELEV | FUZE SETTING | CHANGE IN ELEV FS FOR 50M INCREASE IN HEIGHT OF BURST | | MAX ORD | RANGE TO IMPACT |
| M | MILS | | MILS | | M | M |
| 100 | 1467 | 6.3 | 14 | 0.7 | 900 | 413 |
| 150 | 1404 | 6.4 | 21 | 0.7 | 600 | 600 |
| 200 | 1344 | 6.6 | 27 | 0.7 | 600 | 788 |
| 250 | 1498 | 19.7 | -4 | -0.8 | 846 | 321 |
| 300 | 1476 | 19.7 | -5 | -0.8 | 842 | 386 |
| 350 | 1455 | 19.6 | -6 | -0.8 | 837 | 451 |
| 400 | 1433 | 19.4 | -7 | -0.8 | 832 | 517 |
| 450 | 1410 | 19.3 | -9 | -0.8 | 825 | 583 |
| 500 | 1388 | 19.1 | -10 | -0.9 | 818 | 651 |
| 550 | 1362 | 18.9 | -12 | -0.9 | 809 | 719 |
| 600 | 1337 | 18.7 | -15 | -1.0 | 799 | 788 |
| 650 | 1309 | 18.4 | -18 | -1.1 | 787 | 860 |
| 700 | 1280 | 18.1 | -24 | -1.2 | 774 | 934 |
| 750 | 1248 | 17.7 | -34 | -1.5 | 758 | 1012 |
| 800 | 1211 | 17.2 | | | 737 | 1098 |
| 850 | 1166 | 1 .4 | | | 710 | 1195 |

NOTE - FOR RANGES UP TO 200 METERS THE BURST WILL APPEAR ON THE ASCENDING BRANCH OF THE TRAJECTORY.

Figure 1. FT 81-AI-3.

( b) As the FO adjusts the rounds over the target area, the computer uses the corrections for time of flight and elevation found in columns 4 and 5 (Figure 1) to keep the burst of the round at the same height and over the same point on the ground. (This column is used to bring the round up or down.)

( c) The range to impact found in column 7 (Figure 1) is used to determine how far the round will travel if the round malfunctioned and fails to separate.

d. In handling this mission, the computer has the plotting board set up as a modified observed chart with mortars, reference point, and FO position plotted.

**Performance Steps**

(1) Using the target location given in the call for fire, the computer plots the target location (Figure 2) and determines the range and deflection to the target.

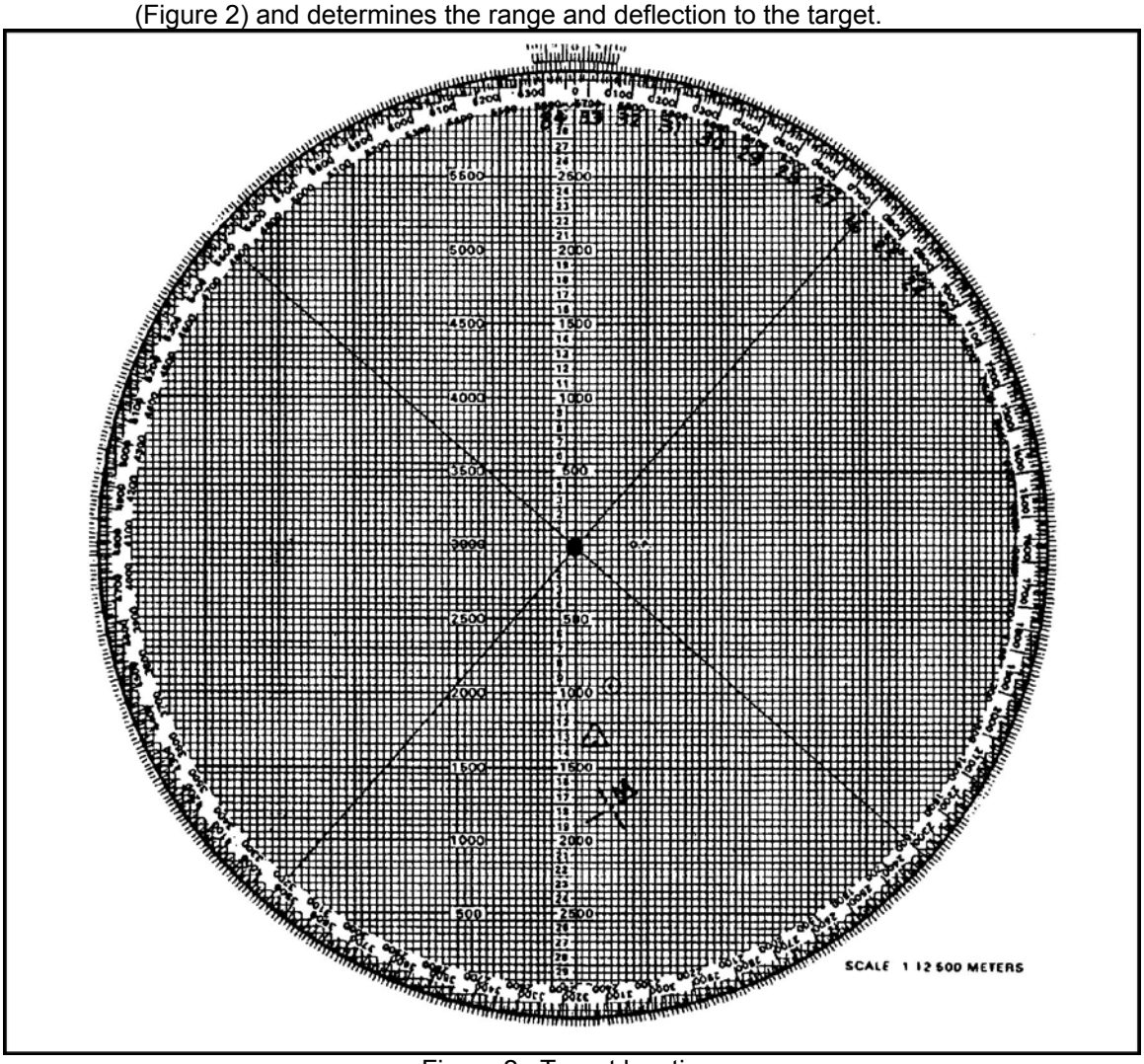


Figure 2. Target location.

(2) The computer now uses the firing table to complete the initial fire command.
- ( a) Range - Column 1.
- ( b) Elevation - Column 2.
- ( c) Fuze setting - Column 3.

NOTES:

1. Because of the large area illuminated by the illumination round, angle T is neither computed nor used for illumination adjustment.

2. Ranges given in the firing table for the 81-mm and 120-mm mortars are given in 50-meter increments. All ranges determined are rounded up to the next 50 meters. For the 4.2-inch mortar, enter the firing table at the range determined. If this range is not found, round the range up to the next higher range given.

EXAMPLE:

RANGE --- ROUNDED RANGE

925 ---------- 950

1,475 ---------- 1,500

(3) Because of the size of the area illuminated by the flare, range and deviation corrections of less than 200 meters should normally not be made. Height-of-burst corrections are made in multiples of 50 meters.

**Performance Steps**

e. Upon completion of the initial fire command, the round is fired and recorded in the rounds expended (RDS EXP) column on DA Form 2399 (Figure 3).

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| A 1/66 | 9 JUN | 2360 | | |

☐ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID
OT DIRECTION
ALTITUDE

SHIFT FROM
OT DIRECTION ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION 6080 ALTITUDE
DISTANCE 400
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION VEHICLE NOISE
METHOD OF CONTROL
METHOD OF ENGAGEMENT
MESSAGE TO OBSERVER

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE #4 | DEFLECTION 3310 | MORTAR TO FOLLOW #4 | |
| MORTAR TO ADJ — | DEFLECTION CORRECTION ☐ L ☐ R | SHELL AND FUZE ILLUM | 1 |
| METHOD OF ADJ IRD | RANGE 825 | MORTAR TO FIRE — | |
| BASIS FOR CORRECTION — | WALT CORRECTION ☐ + ☐ - | METHOD OF FIRE IRD | |
| SHEAF CORRECTION — | | DEFLECTION 3310 | |
| SHELL AND FUZE ILLUM | RANGE CORRECTION ☐ + ☐ - | CHARGE 3 | |
| METHOD OF FFE — | CHARGE/RANGE 3 | TIME SETTING 16.4 | |
| RANGE LATERAL SPREAD — | AZIMUTH — | ELEVATION 1105 | |
| ZONE — | ANGLE T — | | |
| TIME OF OPENING FIRE W/R | | | |

OBSERVER CORRECTION | CHART DATA | SUBSEQUENT COMMANDS

Figure 3. Rounds expended recorded on computer's record.

f. The FO then sends the following correction, RIGHT FOUR HUNDRED, ADD TWO HUNDRED, DOWN ONE HUNDRED.
   (1) The correction of RIGHT FOUR HUNDRED, ADD TWO HUNDRED is plotted in the normal manner (same as HE), and the data are recorded in the chart data blocks on DA Form 2399 (Figure 4).

**Performance Steps**

ANGLE T

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R400 | + 200 | ↓ 100 | 2812 | 975 | | | 2812 | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
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| | | | | | | | | | | | |

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Figure 4. Observer correction.

(2) The computer now determines the new time setting based on the new range and the DOWN ONE HUNDRED correction given by the FO.
(3) Determining the new elevation and time setting becomes challenging at this point. The computer has determined that he must go up to charge 4 because of the new range (975 = 1,000 meters). At a range of 1,000 meters, he determines the elevation and the time setting (23.0).
(4) The computer knows that the time settings in the firing table will give a height of burst of 600 meters (400 meters for the 4.2-inch and 120-mm mortars). If he had the round fired at the time setting of 23.0 seconds, the round would burst at 600 meters, the same as the first round fired. However, the FO requested a correction of DOWN ONE HUNDRED.
(5) The computer now computes the data to cause the round to burst at about 500 meters and over the same point on the ground. To do this at a range of 1,000 meters, he goes across to columns 4 and 5 (Figure 5) of the firing table (charge 4).

**Performance Steps**

FUZE, TIME, M84A1

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| RANGE TO BURST | ELEV | FUZE SETTING | CHANGE IN ELEV FS FOR 50M INCREASE IN HEIGHT OF BURST | | MAX ORD | RANGE TO IMPACT |
| M | MILS | | MILS | | M | M |
| 100 | 1456 | 5.1 | 13 | 0.5 | 600 | 579 |
| 150 | 1386 | 5.2 | 19 | 0.5 | 600 | 840 |
| 200 | 1320 | 5.3 | 25 | 0.5 | 600 | 1073 |
| 250 | 1258 | 5.4 | 30 | 0.5 | 600 | 1274 |
| 300 | 1200 | 5.6 | 34 | 0.4 | 600 | 1444 |
| 350 | 1498 | 24.6 | -2 | -0.5 | 1114 | 412 |
| 400 | 1483 | 24.5 | -2 | -0.5 | 1111 | 471 |
| 450 | 1468 | 24.4 | -3 | -0.5 | 1107 | 531 |
| 500 | 1453 | 24.4 | -3 | -0.5 | 1102 | 590 |
| 550 | 1437 | 24.3 | -3 | -0.5 | 1097 | 649 |
| 600 | 1422 | 24.2 | -4 | -0.5 | 1091 | 709 |
| 650 | 1405 | 24.1 | -4 | -0.6 | 1085 | 769 |
| 700 | 1389 | 24.0 | -5 | -0.6 | 1078 | 829 |
| 750 | 1372 | 23.8 | -5 | -0.6 | 1071 | 890 |
| 800 | 1355 | 23.7 | -6 | -0.6 | 1062 | 951 |
| 850 | 1338 | 23.6 | -7 | -0.6 | 1053 | 1012 |
| 900 | 1320 | 23.4 | -7 | -0.6 | 1043 | 1074 |
| 950 | 1301 | 23.2 | -8 | -0.6 | 1032 | 1137 |
| 1000 | 1281 | 23.0 | -9 | -0.7 | 1020 | 1200 |
| 1050 | 1261 | 22.8 | -11 | -0.7 | 1007 | 1264 |
| 1100 | 1240 | 22.5 | -12 | -0.7 | 992 | 1329 |

Figure 5. Data for time fuze M84A1.

(6) The corrections given in columns 4 and 5, as stated at the top of the columns, are for 50-meter increases in height of burst. In using those corrections, the computer first determines the number of 50-meter increments the FO requested in his UP and DOWN correction. For this mission, the FO requested, DOWN ONE HUNDRED; this would be two 50-meter increments.

(7) By knowing that the corrections given in the firing table are for 50-meter increments, and that the FO's correction was DOWN ONE HUNDRED, the computer doubles the corrections given in the firing table. This gives the following corrections:

ELEVATION ---------- TIME SETTING

-9 x 2 = -18 mils -0.7 x 2 = -1.4 seconds.

As stated at the top of the columns, these corrections as shown are for an INCREASE in height of burst, and both carry a minus sign (-). Since the FO's correction was DOWN ONE HUNDRED, the computer must reverse the signs. The corrections would be +18 mils and +1.4 seconds.

NOTE: When a number carries no sign, it is a plus (+).

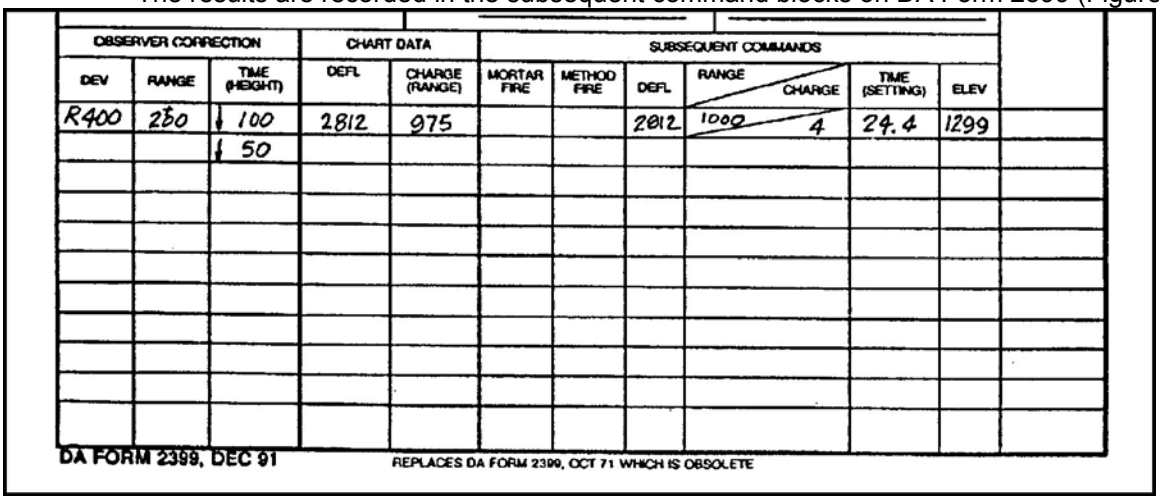
(8) The computer must now apply the corrections to the elevation and time settings given in the firing table:

ELEVATION --------- TIME SETTING

**Performance Steps**

1281 + +18 = 1299 23.0 + +1.4 = 24.4

The results are recorded in the subsequent command blocks on DA Form 2399 (Figure 6).



| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R400 | 250 | ↓ 100 | 2812 | 975 | | | 2812 | 1000 / 4 | 24.4 | 1299 | |
| | | ↓ 50 | | | | | | | | | |

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Figure 6. Subsequent commands.

NOTE: For the 4.2-inch mortar, the procedure is the same for the time setting. For a range change, the firing table gives the change in charges. Compute the change in charge in the same manner as the mils in elevation are determined.

(9) The FO's next correction is DOWN FIFTY and is recorded on DA Form 2399 (Figure 6). After recording the correction, the computer must again determine the corrections for elevation and time setting. Again, the corrections are based on the 600-meter (400 meters) height of burst and the total number of 50-meter increments in all FO corrections.
EXAMPLE: If the FO had requested "Up fifty" as the last correction, the computer would add the DOWN 100 and the UP 50:
The computer would be working with only one 50-meter increment.

- 100 + 50 = - 50

However, in the mission fired, the FO's last correction was DOWN 50. By adding all height corrections, the computer determines the new height-of-burst correction:

-100 - 50 = -150

The computer is now working with three 50-meter increments. The computer multiplies the height-of-burst correction (Figure 7) to apply to the firing data and records it on DA Form 2399.
EXAMPLE:

| ELEVATION | TIME SETTING |
|---|---|
| (-9 x 3 = -27 mils = +27 mils) | (-0.7 x 3 = -2.1 = +2.1) |
| (1281 + 27 = 1308) | (23.0 + 2.1 = 25.1) |

This again is recorded and the round is fired. The FO then comes back with his next transmission (Figure 8). The computer records this information on DA Form 2399.

**Performance Steps**

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R400 | 250 | ↓ 100 | 2812 | 975 | | | 2812 | 1000 / 4 | 24.4 | 1299 | 2 |
| | | ↓ 50 | 2812 | 975 | | | | | 25.1 | 1308 | 3 |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 7. Height-of-burst correction.

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R400 | ↓ 100 | 2812 | 975 | | | | 2812 | 1000 / 4 | 24.4 | 1299 | 2 |
| | ↓ 50 | 2812 | 975 | | | | | | 25.1 | 1308 | 3 |
| | EOM | | NO NOISE AT THIS TIME | | | | NO | TARGET VISIBLE | | | |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 8. Target surveillance.

(10) At this time, the mission is complete. As shown in Figure 3, no target number was assigned to this mission because the target was only suspected. The computer's record would be maintained if noise was again heard in the same area. Those data, however, would not be recorded on the data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute the data to fire an illumination mission.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Not to be sequence scored. | | |
| 1. Plotted illumination rounds on a plotting board using proper symbol. | ____ | ____ |
| 2. Used correct number of 50-meter increments or UP or DOWN corrections. | ____ | ____ |
| 3. Used correct column in firing table to correct for height of burst and elevation. | ____ | ____ |
| 4. Used correct sign (+ or -) when applying corrections to time and elevation settings (or charge) for each FO correction. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

## Compute Data for a Coordinated Illumination Mission Using a Plotting Board
## 071-078-0009

**Conditions:** As a computer in a fire-direction center (FDC), given a plotting board set up as a modified observed chart with mortar position, reference point, and suspected target upon which illumination has been adjusted and plotted; a DA Form 2399 (Computer's Record) completed for the illumination mission; another with the complete fire direction center (FDC) order; a blank DA Form 2188-R (Data Sheet); a call for fire for a coordinated illumination mission; three forward observer (FO) corrections; and paper and a No. 2 pencil.

**Standards:** Computed data for the adjustment of high explosive (HE) ammunition on the target, and provided illumination for the HE adjustment. Determined the deflections to the nearest mil with a 10-mil tolerance; determined ranges to the nearest 25 meters with a 25-meter tolerance; and determined fuse settings to within one-tenth of a second. For the 4.2-inch mortar, charged to 1/8 charge with a 1/8-charge tolerance.

**Performance Steps**
NOTE: The information contained in this task has limited data that can be used with the 60-mm mortar. Due to the fixed time of function for the 60-mm illumination, time settings are not used.

1. Compute Data for an Illumination Mission Using a Plotting Board, helps identify a suspected target in the FO's area of responsibility. When a target is identified, the FO must then call the FDC to have the target fired on. At this point, the FO has adjusted the illumination over the target area and identified a target (Figure 1). He must then initiate a call for fire for the target in the normal manner (Figure 2). The computer records this data on DA Form 2399.

**Performance Steps**

**COMPUTER'S RECORD**

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| B 1/66 | 12 AUG | 2310 | F2 346 | |

☑ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID
OT DIRECTION
ALTITUDE

SHIFT FROM
OT DIRECTION — ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR ✓
OT DIRECTION 6080 ALTITUDE
DISTANCE 400
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION VEHICLE NOISE
METHOD OF CONTROL
METHOD OF ENGAGEMENT
MESSAGE TO OBSERVER

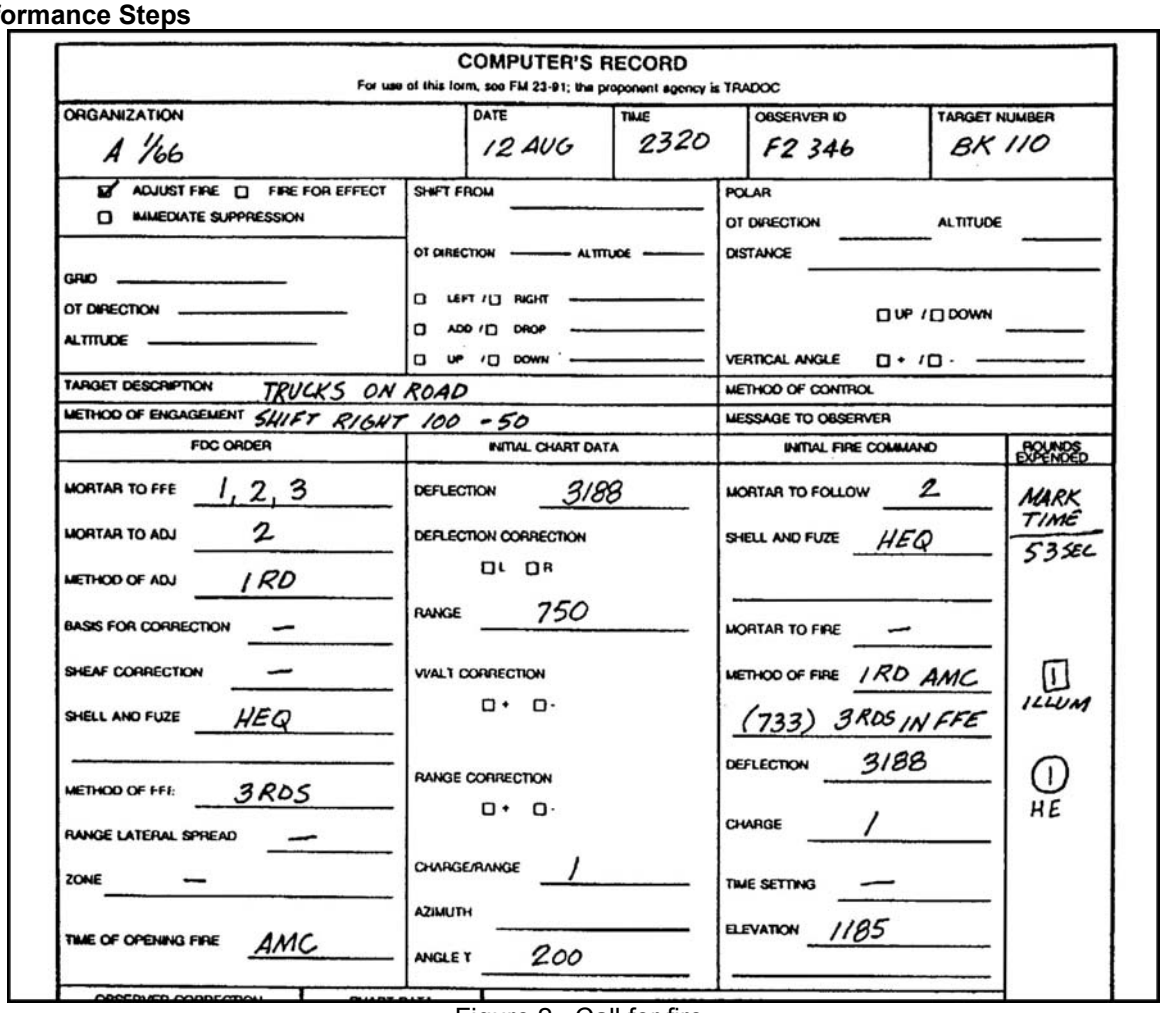
| FDC ORDER | | INITIAL CHART DATA | | INITIAL FIRE COMMAND | | ROUNDS EXPENDED |
|---|---|---|---|---|---|---|
| MORTAR TO FFE | #4 | DEFLECTION | | MORTAR TO FOLLOW | #4 | [1] |
| MORTAR TO ADJ | — | DEFLECTION CORRECTION ☐L ☐R | | SHELL AND FUZE | ILLUM | |
| METHOD OF ADJ | IRD | RANGE | | MORTAR TO FIRE | — | |
| BASIS FOR CORRECTION | — | WALT CORRECTION ☐+ ☐- | | METHOD OF FIRE | IRD | |
| SHEAF CORRECTION | — | RANGE CORRECTION ☐+ ☐- | | DEFLECTION | 3310 | |
| SHELL AND FUZE | ILLUM | CHARGE/RANGE | | CHARGE | 3 | |
| METHOD OF FFE | — | AZIMUTH | | TIME SETTING | 16.4 | |
| RANGE LATERAL SPREAD | — | ANGLE T | | ELEVATION | 1165 | |
| ZONE | — | | | | | |
| TIME OF OPENING FIRE | W/R | | | | | |

| OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| R400 | ±200 | ↓ 100 | 2812 | 975 | | | 2812 | 1000 / 4 | 24.4 | 1299 | [2] ILLUM |
| | | ↓ 50 | 2812 | 975 | | | | | 25.1 | 1308 | [3] ILLUM |

DA FORM 2399, DEC 91 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 1. Target identification.

**Performance Steps**



COMPUTER'S RECORD

For use of this form, see FM 23-91; the proponent agency is TRADOC

| ORGANIZATION | DATE | TIME | OBSERVER ID | TARGET NUMBER |
|---|---|---|---|---|
| A 1/66 | 12 AUG | 2320 | F2 346 | BK 110 |

☑ ADJUST FIRE ☐ FIRE FOR EFFECT
☐ IMMEDIATE SUPPRESSION

GRID
OT DIRECTION
ALTITUDE

SHIFT FROM
OT DIRECTION — ALTITUDE
☐ LEFT / ☐ RIGHT
☐ ADD / ☐ DROP
☐ UP / ☐ DOWN

POLAR
OT DIRECTION — ALTITUDE
DISTANCE
☐ UP / ☐ DOWN
VERTICAL ANGLE ☐ + / ☐ -

TARGET DESCRIPTION: TRUCKS ON ROAD
METHOD OF ENGAGEMENT: SHIFT RIGHT 100 - 50
METHOD OF CONTROL
MESSAGE TO OBSERVER

| FDC ORDER | INITIAL CHART DATA | INITIAL FIRE COMMAND | ROUNDS EXPENDED |
|---|---|---|---|
| MORTAR TO FFE: 1, 2, 3 | DEFLECTION: 3188 | MORTAR TO FOLLOW: 2 | MARK TIME 53 SEC |
| MORTAR TO ADJ: 2 | DEFLECTION CORRECTION ☐L ☐R | SHELL AND FUZE: HEQ | |
| METHOD OF ADJ: 1RD | RANGE: 750 | MORTAR TO FIRE: — | |
| BASIS FOR CORRECTION: — | | METHOD OF FIRE: 1RD AMC | 1 ILLUM |
| SHEAF CORRECTION: — | VI/ALT CORRECTION ☐+ ☐- | (733) 3RDS IN FFE | |
| SHELL AND FUZE: HEQ | | DEFLECTION: 3188 | (1) HE |
| METHOD OF FFE: 3RDS | RANGE CORRECTION ☐+ ☐- | CHARGE: 1 | |
| RANGE LATERAL SPREAD: — | | TIME SETTING: — | |
| ZONE: — | CHARGE/RANGE: 1 | ELEVATION: 1185 | |
| TIME OF OPENING FIRE: AMC | AZIMUTH | | |
| | ANGLE T: 200 | | |

Figure 2. Call for fire.

2. Since the illumination has been adjusted over the target area and the computer has received the call for fire for coordinated illumination, he determines the data to take the target under fire.

3. In the mark method (the most used), the FO may tell the FDC that he will be giving the illumination mark on the next round of illumination, or the FDC may tell the FO to give it on the next illumination round. Either way, the FO and FDC must know when it will be given.
   a. When the illumination has been adjusted to provide the best light on the target, the FO gives the command, MARK ILLUMINATION. The FDC has been timing the flight of the round from the time it was fired until the command, MARK. The HE time of flight taken from the firing table is subtracted from that time. This remainder is the number of seconds the HE is fired after the illumination.

NOTE: When determining the time to fire the HE, drop all tenths before all computations (example 19.7 = 19).

EXAMPLE:

| TIME FROM FIRING TO ILLUMINATION MARK | HE TIME OF FLIGHT | TIME TO FIRE HE |
|---|---|---|
| 53 seconds | 19 seconds | 34 seconds |

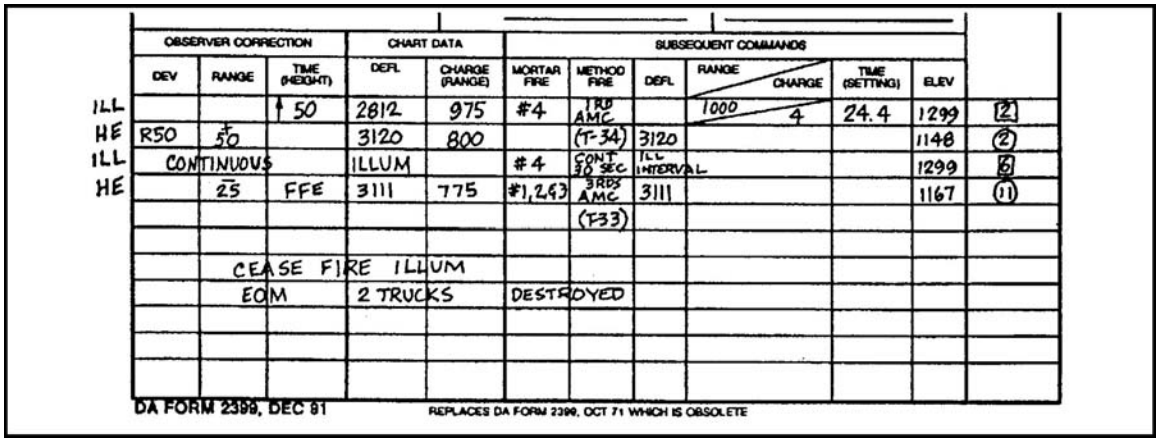
The HE will be fired 34 seconds after the illumination is fired.

   b. In firing a coordinated mission, the computer uses a new computer's record to record the coordinated illumination mission (Figure 2). The mark time is shown recorded in the rounds

**Performance Steps**

expended (RDS EXP) column. The computer also records in that column that an illumination round and HE round have been fired. The data used to fire the first illumination round were taken from the computer's record that was used to adjust the illumination mission (Figure 1).

c. In sending corrections, the FO precedes each with the type of round the correction applies to, for example, ILLUMINATION, UP FIFTY; HE, RIGHT FIFTY, ADD FIFTY. Those corrections are recorded on separate lines on DA Form 2399 (Figure 3). In computing data for illumination, the computer uses the computer's record for the illumination mission (Figure 1) to keep track of the number of 50-meter increments that have been used to adjust the illumination.



| | OBSERVER CORRECTION | | | CHART DATA | | SUBSEQUENT COMMANDS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DEV | RANGE | TIME (HEIGHT) | DEFL | CHARGE (RANGE) | MORTAR FIRE | METHOD FIRE | DEFL | RANGE / CHARGE | TIME (SETTING) | ELEV | |
| ILL | | | ↑ 50 | 2812 | 975 | #4 | IRD AMC | | 1000 / 4 | 24.4 | 1299 | (2) |
| HE | R50 | 50 | | 3120 | 800 | | (T-34) | 3120 | | | 1148 | (2) |
| ILL | CONTINUOUS | | | ILLUM | | #4 | CONT 30 SEC | ILL INTERVAL | | | 1299 | (6) |
| HE | | 25 | FFE | 3111 | 775 | #1,2,3 | 3RDS AMC | 3111 | | | 1167 | (11) |
| | | | | | | | (T33) | | | | | |
| | | CEASE FIRE ILLUM | | | | | | | | | | |
| | | EOM | | 2 TRUCKS | | DESTROYED | | | | | | |

DA FORM 2399, DEC 81 REPLACES DA FORM 2399, OCT 71 WHICH IS OBSOLETE

Figure 3. Corrections.

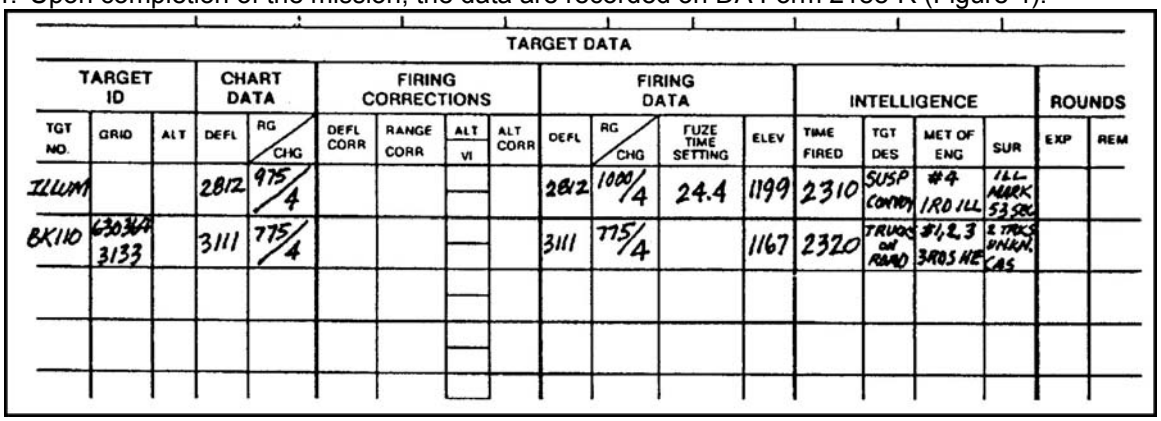
NOTES: There are two methods normally used to adjust illumination and HE:
1. Coordinated illumination using the illumination mark method. In this method, the FDC controls the firing of both the illumination and HE.
2. Coordinated illumination by shell at FO's command. In this method, the FO controls the firing of each round. The FO sends the corrections and the data are computed and sent to the mortars. The mortars then report when they are "Up," the FDC notifies the FO, and the FO gives the command to fire each round.

d. When the FO is certain that he can hit the target with the next round, he calls, "Continuous illumination, fire for effect," or "Continuous illumination, HE drop twenty-five, fire for effect."

e. By requesting the continuous illumination, the computer is telling the FDC that he wants the target illuminated during the fire for effect, and illuminated afterward to allow him to make his target surveillance.

NOTE: For continuous illumination, the illumination rounds should be fired at 30-second intervals.

4. Upon completion of the mission, the data are recorded on DA Form 2188-R (Figure 4).



| TARGET DATA | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TARGET ID | | | CHART DATA | | FIRING CORRECTIONS | | | | FIRING DATA | | | | INTELLIGENCE | | | | ROUNDS | |
| TGT NO. | GRID | ALT | DEFL | RG / CHG | DEFL CORR | RANGE CORR | ALT / VI | ALT CORR | DEFL | RG / CHG | FUZE TIME SETTING | ELEV | TIME FIRED | TGT DES | MET OF ENG | SUR | EXP | REM |
| ILLUM | | | 2812 | 975 / 4 | | | | | 2812 | 1000 / 4 | 24.4 | 1199 | 2310 | SUSP CONTD | #4 IRD ILL | ILL MARK 53 SEC | | |
| BK110 | 630364 3133 | | 3111 | 775 / 4 | | | | | 3111 | 775 / 4 | | 1167 | 2320 | TRUCKS on ROAD | #1,2,3 3RDS HE | 2 TRKS BRKN. CAS | | |

Figure 4. Data sheet.

**Evaluation Preparation:**
SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute the data to fire a coordinated illumination mission. At the end of the mission, give the soldier the FO's target surveillance and have him complete the data sheet.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| NOTE: Not to be sequence scored. | | |
| 1. Recorded the call for fire and FO corrections on the computer's record. | ____ | ____ |
| 2. Computed initial data and complete the heading and the initial fire command to tolerances given in the task standards. | ____ | ____ |
| 3. Determined the correct mark time to fire the HE. | ____ | ____ |
| 4. Determined the correct number of 50-meter increments to correct the elevation (charge) and time for the illumination round. | ____ | ____ |
| 5. Computed the firing data for each FO correction to tolerances given in the task standards. | ____ | ____ |
| 6. Properly recorded the final subsequent fire command for continuous illumination and fire for effect. | ____ | ____ |
| 7. Correctly recorded data on the data sheet. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

## Compute Data for a Quick-Smoke Mission Using a Plotting Board
## 071-078-0011

**Conditions:** As a computer in a fire-direction center (FDC), given a plotting board set up as a modified observed chart with the mortar position and the registration point (RP) plotted; a DA Form 2399 (Computer's Record); a smoke card for a 4.2-inch mortar; a call for a quick-smoke mission; relative humidity, temperature gradient, wind speed, classification of winds (heading, tailing, quartering, or crossing); and paper and pencils.

**Standards:** 1. Computed the adjustment data for each adjusting round; determined deflection to within 1 mil with a 10-mil tolerance; determined range to within 25 meters with a 25-meter tolerance.

2. Determined the exact number of white phosphorus (WP) rounds required to smoke the target as specified in the call for fire and as dictated by weather conditions in the target area.

3. Determined the time interval between rounds during the maintenance phase of the mission.

**Performance Steps**

NOTES:
1. Quick-smoke is a screening smoke mission used to place a curtain of smoke between enemy observers and friendly units to mask friendly maneuvers, or to deceive and confuse the enemy as to the nature of friendly operations. (Quick-smoke missions are normally directed by higher headquarters.)
2. Quick-smoke missions are normally planned missions because WP rounds are a small part of the basic load. Therefore, more WP ammunition must be requested to fire the mission. The computer determines the number of rounds the mission requires based on the worst conditions likely to exist at the time the mission is fired.

1. The computer computes a quick-smoke mission.
    a. The quick-smoke mission is computed the same as a high-explosive (HE) area-type mission (parallel sheaf) with the following exceptions (Figure 1).

**Performance Steps**

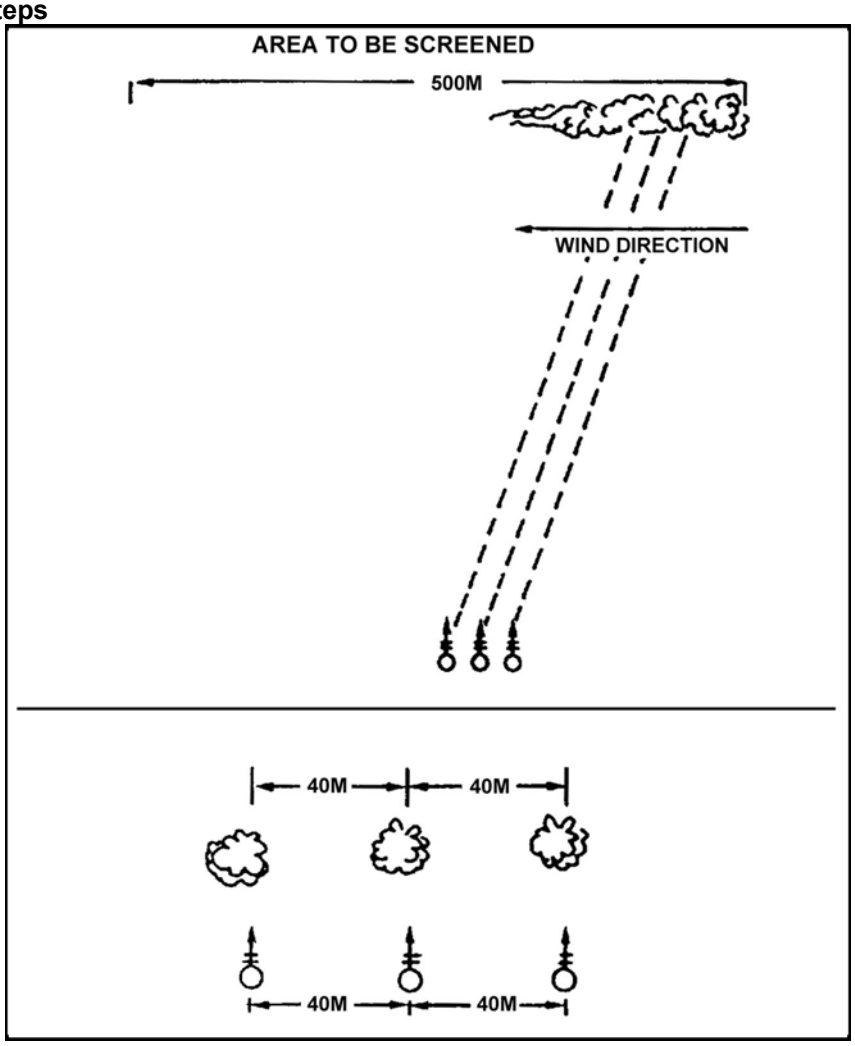



Figure 1. Quick-smoke, parallel sheaf.

(1) The upwind flank mortar is the adjusting mortar for the mission.
(2) The last adjusting round is a WP round (adjusting phase).
(3) Final corrections are made by the forward observer (FO) and the fire direction center (FDC) based on the WP round. Final data are given to the mortar crews, and the crews are told to stand by to fire for effect (FFE).
(4) During this wait, the crews are informed how the mission will be fired, and how many rounds each mortar will have prepared to fire.

b. The FDC recomputes the number of WP rounds required to fire the mission based on the requirements in the call for fire and the weather conditions in the area.

2. The computer computes the required rounds.
   a. For a mortar platoon (4.2-inch, 60-mm, 81-mm, or 120-mm) to fire a quick-smoke mission, WP must be ordered and stockpiled before the mission.
   b. When determining the number of rounds required for the mission, the FDC must know the length of time that the screen is to be maintained. This information should be passed to the FDC by either the commander calling for the mission, platoon leader, or fire support officer (FSO).
   c. To determine the number of rounds to order, the FDC determines the number based on the worst conditions that might be expected at the time the mission is fired.
   d. The quick-smoke mission is fired in three phases.

**Performance Steps**

(1) Adjustment phase: One round of WP is fired as the last adjusting round.
(2) Establishment phase: This is double the number of rounds to maintain for one minute, but never less than 12 rounds for 81-mm and never less than 10 rounds for 4.2-inch.
(3) Maintenance phase: This is the number of rounds indicated on the smoke card times the number of minutes the screen is to be maintained. For example, using the smoke card (Figure 2), the computer determines that the worst conditions expected are--
   o 30 percent relative humidity.
   o Lapse condition.
   o 2-knot wind speed.

With those conditions present, the smoke card (Figure 2), indicates that 13 rounds are required for each minute the screen is maintained (10 minutes). The computer computes the rounds required for the mission.

EXAMPLE:

Adjustment phase: 1 round
Establishment phase: 26 rounds (13 rounds x 2)
Maintenance phase: 130 rounds (13 rounds x 10 minutes)
Total rounds: 157

SMOKE AMMUNITION REQUIREMENTS FOR 4.2-INCH MORTARS

A. SMOKE CURTAIN. NUMBER OF WP ROUNDS PER MINUTE TO MAINTAIN A SMOKE CURTAIN ON A 500-METER FRONT IN FLANK WINDS.

| RELATIVE HUMIDITY (PERCENT) | TEMPERATURE GRADIENT | WIND SPEED, KNOTS 2 | 4 | 9 | 13 | 18 | 22 | 26 |
|---|---|---|---|---|---|---|---|---|
| 30 | LAPSE | 13 | 13 | 11 | 11 | 13 | | |
| | NEUTRAL | 9 | 9 | 7 | 7 | 9 | 9 | 11 |
| | INVERSION | 6 | 6 | 4 | | | | |
| 60 | LAPSE | 9 | 9 | 7 | 9 | 9 | | |
| | NEUTRAL | 6 | 6 | 4 | 4 | 6 | 7 | 9 |
| | INVERSION | 3 | 3 | 3 | | | | |
| 90 | LAPSE | 7 | 7 | 6 | 5 | 7 | | |
| | NEUTRAL | 4 | 4 | 3 | 3 | 4 | 6 | 6 |
| | INVERSION | 3 | 3 | 3 | | | | |

FOR QUARTERING WINDS, MULTIPLY TABLE VALUES BY 2.
FOR TAIL WINDS, MULTIPLY TABLE VALUES BY 2.
FOR HEAD WINDS, MULTIPLY TABLE VALUES BY 2-1/2.
TABLE QUANTITIES ARE FOR SHELL IMPACT ON LAND; FOR WATER IMPACTS, MULTIPLY TABLE VALUES BY 1.4.
FOR CURTAINS GREATER OR LESS THAN 500 METERS IN WIDTH, SCALE THE TABLE VALUES UP OR DOWN PROPORTIONALLY.
TO ESTABLISH A SMOKE CURTAIN, EMPLOY VOLLEY FIRE, USING TWICE THE TABLE VALUE (BUT NOT LESS THAN 10 ROUNDS).

B. OBSCURING SMOKE EFFECT. THE NUMBER OF ROUNDS PER MINUTE REQUIRED TO MAINTAIN AN OBSCURING SMOKE EFFECT ON A 500-METER FRONT IS OBTAINED BY DOUBLING THE VALUES IN A ABOVE.

Figure 2. 4.2-inch smoke card.

**Performance Steps**

NOTE: The time used during the establishment phase is not considered as any part of the maintenance phase time of the mission.

3. The computer computes the time interval between rounds to maintain the screen.
   a. In the example above, the screen is maintained for 10 minutes. The computer divides the 13 rounds that it takes per minute to maintain the screen by the number of mortars that will be firing: 13 divided by 3 = 4.3 rounds per minute.
   b. Since a mortar cannot fire a part of a round, the computer must decide another way to fire the required rounds. He knows that he can have each mortar fire 4 rounds that equal 12 of the 13 rounds required. For this mission, this leaves 1 round still required. The computer decides that the downwind mortar will fire the remaining 1 round per minute to maintain the screen.
   c. The firing of any screen must be closely coordinated between the individual who controls the firing and the squad leaders/mortar crews.
   d. In the example mission, the computer has determined that the mortars will fire three volleys per minute. Dividing 60 seconds by the number of volleys fired (three), the computer determines that a volley must be fired every 20 seconds during the maintenance phase.
   e. This also means that since the No. 3 mortar is the downwind mortar, it will fire one more round per minute than the other three mortars. The individual controlling the fire must fully explain to the squad leader that, at some point during the firing, he will be given the command, NUMBER THREE, FIRE ONE ROUND. Of the 157 rounds fired during the maintenance phase, 40 rounds each are placed by the No. 1 and No. 2 mortar positions and 59 rounds by the No. 3 mortar position.

4. Control of the FFE.
   a. When the FO calls for the FFE, the establishment phase is fired as rapidly as safety permits.
   b. Thirty seconds after the last round of the establishment phase is fired, the first rounds of the maintenance phase is fired. Volley fire continues at the time interval determined for the maintenance phase.

5. The data given on the smoke card are for a 500-meter smoke screen in flank wind. When a wider or narrower screen is fired, the computer must scale the data up or down to determine the required rounds per minute.

   EXAMPLE: (Scaling up).
   Smoke card data: 9 rounds per minute to maintain
   Target Length: 600 meters
   600 divided by 500 = 1.2
   1.2 x 9 = 11 rounds per minute to maintain

   EXAMPLE: (Scaling down).
   Smoke card data: 9 rounds per minute to maintain
   Target Length: 200 meters
   200 divided by 500 = .4
   .4 x 9 = 3.6 = 4 rounds per minute to maintain

   EXAMPLE MISSION:

| | | |
|---|---|---|
| Target Length | 300 meters | |
| Time to maintain: | 15 minutes | |
| Weather conditions: | Relative humidity | 60 percent |
| | Temperature gradient | Lapse |
| | Wind speed | 2 knots |
| | Wind direction | Quartering wind |
| Smoke card (rounds per minute) | | 9 rounds |
| Rounds per minute due to quartering wind | | 18 rounds |
| 300 meters (width of screen) | | |

**Performance Steps**

500 (smoke card) = .6
.6 x 18 = 10.8 = 11 rounds per minute to maintain
Adjustment phase: 1 round
Establishment phase: 22 rounds (2 x 11)
Maintenance phase: 165 rounds (11 x 15)
Total rounds: 188

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement. Test this task either live or dry-fire. If dry-fire, provide three corrections for the adjustment phase.

BRIEF SOLDIER: Tell the soldier to compute the mission, determine the number of white phosphorus (WP) rounds required for the mission, and then to determine the time interval between volleys.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Computed the number of WP rounds the mission requires based on the worst conditions likely to exist at the time. | ____ | ____ |
| 2. Computed the adjustment phase of the mission to meet the task standards. | ____ | ____ |
| 3. Recomputed the number of WP rounds required for the mission on actual weather conditions at the time of firing. | ____ | ____ |
| 4. Computed the time interval between volleys for the FFE. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

## Compute Data for a Grid Mission Using a Plotting Board

**071-078-0012**

**Conditions:** As a computer in a fire-direction center (FDC), given a plotting board, map, and protractor; a firing table, sector of fire, and DA Form 2399 (Computer's Record); a call for a grid mission and three FO corrections; and paper and pencil.

**Standards:** Determined deflection to within 1 mil with a 10-mil tolerance and determined range to within 25 meters with a 25-meter tolerance. Charged the 4.2-inch mortar to 1/8 charge with a 1/8-charge tolerance.

**Performance Steps**

NOTE: The information provided in this task applies to the 4.2-inch, 60-mm, 81-mm, and 120-mm mortars.

1. Observed chart.
    a. To plot a grid mission on an observed chart, the computer must have a map of the area and protractor.
    b. The computer plots the target on the map using the grid given in the call for fire.
    c. He then determines the direction and distance from the mortar position to the target.
    d. This information is then transferred to the plotting board. The same procedure is used whether the computer is using the pivot-point method or the below-the-pivot-point method.

NOTE: When firing over 2,900 meters, use the below-the-pivot-point method.

    (1) Pivot point. Ensure the direction (azimuth) between the mortar position and the target is indexed at the index point. Then go up the vertical center line to the determined range and make a plot.
    (2) Below pivot point. Ensure the direction (azimuth) between the mortar position and the target is indexed at the index point. To plot the range, place the edge of the computer's record on the alternate range scale. Place a tick mark on the edge of the computer's record at the determined range. Move the computer's record to the mortar position. Keeping the edge of the computer's record aligned with the vertical lines, make a plot on the plotting board opposite the tick mark on the computer's record.

    e. By using either of these methods, the computer should have the target plotted, and it can be taken under fire.

2. Modified observed and surveyed chart.
    a. With a grid system, the target is plotted directly on the board using the same procedure as plotting a grid coordinate on a map.

NOTE: Ensure zero is indexed at the index mark before plotting the target.

    b. By aligning the target with the mortar position, the computer can determine the deflection and range to take the target under fire.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to prepare the plotting board as an observed chart, to set up the plotting board as a modified observed chart, and to compute the mission given.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Observed chart. | ____ | ____ |
| a. Plotted the mortar position and target on the map. | | |
| b. Determined the azimuth and range to the target. | | |
| c. Correctly transferred determined data to the plotting board. | | |
| d. Determined all firing data to destroy the target. | | |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 2. Modified observed chart. | ____ | ____ |
| a. Determined the grid intersection to set up the plotting board. | | |
| b. Correctly set up the grid system on the plotting board. | | |
| c. Plotted the mortar position and target. | | |
| d. Correctly placed the deflection scale on the plotting board. | | |
| e. Determined all firing data to destroy the target. | | |

NOTE: The same call for fire and FO corrections are used in both procedures.

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

## Compute Data for a Mark-Center-of-Sector Mission Using a Plotting Board
## 071-078-0013

**Conditions:** As a computer in a fire-direction center (FDC), given a plotting board set up as a modified observed chart, a map and protractor; a firing table and an overlay of the sector of fire; a DA Form 2399 (Computer's Record); a call for a mark-center-of-sector mission; paper; and a No. 2 pencil.

**Standards:** Determined deflections to within 1 mil with a 10-mil tolerance and determined ranges to within 25 meters with a 25-meter tolerance. Charged the 4.2-inch mortar to 1/8 charge with a 1/8-charge tolerance.

**Performance Steps**

1. The computer uses marking rounds.

    a. Poor visibility, unreliable maps, deceptive terrain, or rapid movement through unfamiliar terrain sometimes make difficult, if not impossible, the observer's task of accurately locating a target--or of locating himself. He can request that the FDC fire on specific points to orient him and help him determine his location. Rounds fired for this purpose are known as marking rounds.

    b. The observer may call for a marking round to be fired on a registration point, previously plotted or fired target, or prominent terrain feature. For example--

        MARK REGISTRATION POINT ONE
        MARK TARGET AB1001
        MARK HILL 437

    c. As a last resort, the observer may call for a round to be fired into the center of the target area. This type of mission is known as mark-center-of-sector. It should only be used if the firing section has not registered or fired on any other targets in the area.

2. The computer computes a mark-center-of-sector round. He then determines where to fire the center-of-sector round.

    a. Plot the left and right limits of the sector of responsibility on a map (if not done yet), and then plot a line through the exact center of this sector (Figure 1).

**Performance Steps**

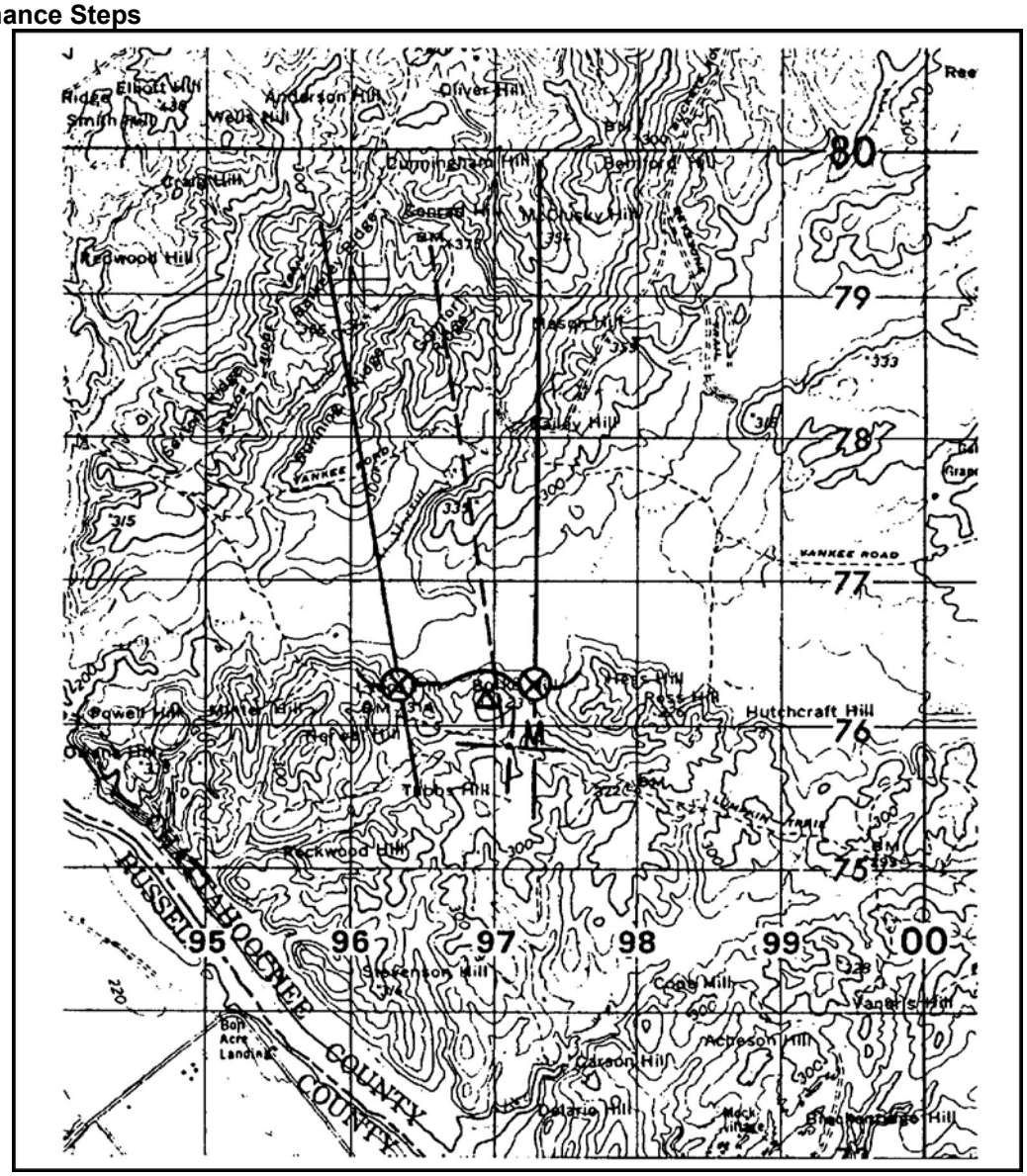



Figure 1. Sector of fire.

b. Look at the terrain that this center-of-sector line crosses. Place a round somewhere along this line where the FO can see it.

(1) The center-of-sector line crosses a ridgeline, of which Hill 335 is a part (Figure 1). A wide valley appears before the line crosses high ground again at Comfort Ridge.

(2) Only two areas are left to fire the marking round either on or short of Hill 335 or on Comfort Ridge.

(3) Of these two areas, the marking round should be fired just short of Hill 335. Should the FO come back with "Cannot observe," the next round can be fired at Comfort Ridge.

NOTE: Place the marking round where the FO will probably see it, otherwise, marking the exact center of sector serves no purpose.

**Performance Steps**

3. When firing a marking round, the FDC should fire a round that is easily identifiable, such as white phosphorus or an illumination round. The illumination round is identifiable even during daylight and is the safest round to fire.
4. After the FO identifies the marking round, he uses the shift-from-a-known-point method to engage the target. He may also use the round to identify a point to orient himself.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and materials given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to plot the sector of fire on the map, to plot the center of sector, to determine where to fire the marking round, and then to transfer this information to the plotting board and determine the initial data.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Plotted the sector of fire on a map. | ____ | ____ |
| 2. Plotted the center of sector. | ____ | ____ |
| 3. Determined the best place to fire the marking round. | ____ | ____ |
| 4. Transferred information to the plotting board. | ____ | ____ |
| 5. Determined initial data to fire the marking round. | ____ | ____ |

**Evaluation Guidance:** Determine the best place to fire the marking round. Give extra space in the placement of the round as long as the point that the soldier selects is near your selected point.

Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

## Compute Data for a Shift Mission Using a Plotting Board
## 071-078-0016

**Conditions:** Given a plotting board prepared for operation, base mortar location, a shift mission call-for-fire and corrections, graphical firing chart or firing tables, Computer's Record, DA Form 2399 and pencil, and a military map of the firing area.

**Standards:** Firing data was produced which resulted in fire being placed on the target or within bursting radius of the round fired.

**Performance Steps**

1. Record the call-for-fire.

NOTE: The FDC order is normally prepared by the senior individual involved in the FDC activity. If working alone, the computer assumes the responsibility for the order.

NOTE: All shift CFFs must contain the FO's direction, and the angle T must be determined by the computer.

2. Locate the known point from which the shift is to be made.
3. Index the FO's direction.
4. Plot the shift.
5. Apply no-fire/safety restrictions.
6. Determine deflection
7. Determine range.
8. Determine charge.
9. Apply firing corrections.
10. Formulate/issue a fire command.
11. Record the correction.
12. Index the FO's direction.
13. Plot the correction.
14. Apply no-fire/safety restrictions
15. Determine deflection.
16. Determine range.
17. Determine charge
18. Apply firing corrections.
19. Formulate/issue a fire command.

NOTE: Steps K through S are repeated, as necessary, until a fire- for-effect (FFE) is requested, or the mission is terminated for other reasons. All necessary data is recorded on the computer's record, and the target recorded, assigned a number, or disposed of in accordance with instructions or the situation.

20. Formulate/issue the fire command
21. Record the FO's observations.

**Performance Steps**

22. Update the plotting board.
23. Update the computer's record and firing data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute data for a shift mission using a plotting board.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Recorded the call for fire. | ____ | ____ |
| 2. Located the known point from which the shift is to be made. | ____ | ____ |
| 3. Indexed the FO's direction. | ____ | ____ |
| 4. Plotted the shift. | ____ | ____ |
| 5. Applied no-fire/safety restrictions. | ____ | ____ |
| 6. Determined deflection. | ____ | ____ |
| 7. Determined range. | ____ | ____ |
| 8. Determined charge. | ____ | ____ |
| 9. Applied firing corrections. | ____ | ____ |
| 10. Formulated/issued a fire command. | ____ | ____ |
| 11. Recorded the correction. | ____ | ____ |
| 12. Indexed the FO's direction. | ____ | ____ |
| 13. Plotted the correction. | ____ | ____ |
| 14. Applied no-fire/safety restrictions | ____ | ____ |
| 15. Determined deflection. | ____ | ____ |
| 16. Determined range. | ____ | ____ |
| 17. Determined charge. | ____ | ____ |
| 18. Applied firing corrections. | ____ | ____ |
| 19. Formulated/issued fire command. | ____ | ____ |
| 20. Recorded the FO's observations. | ____ | ____ |
| 21. Updated the plotting board. | ____ | ____ |
| 22. Updated the computer's record and firing data sheet. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 23-91

**Compute Data for a Split-Section Mission Using a Plotting Board**
**071-078-0017**

**Conditions:** Given a plotting board set up as an observed, modified observed, or surveyed chart; a graphical firing scale, firing tables, or both; a DA Form 2399 (Computer's Record); a firing data sheet; an FO who can observe the firing area; a split firing section; one or more targets; one or more surveyed positions; a call for fire; communications with all involved elements; paper; and a pencil.

**Standards:** Produced firing data that resulted in both elements of the split section placing fire on the target.

**Performance Steps**

1. Receive and record the call for fire.
2. Set up the plotting board for both firing sections.
3. Adjust to the target with the red section.
4. Mark or label the target for the red section.
5. Adjust to the target with the blue section.
6. Mark or label the target for the blue section.
7. Consolidate data onto one target.
8. Continue the mission.
9. Add setup data for the blue section.
10. Fire and adjust the blue section to any target previously fired by the red section.
11. Continue the mission.
12. Add setup data for the blue section.
13. Register the blue section on the RP.
14. Apply registration corrections to the blue section's firing data.
15. Apply registration corrections to the blue section's firing data.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute data for a split-section mission using a plotting board.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Received and recorded the call for fire. | ____ | ____ |
| 2. Set up the plotting board for both firing sections. | ____ | ____ |
| 3. Adjusted to the target with the red section. | ____ | ____ |
| 4. Marked or labeled the target for the red section. | ____ | ____ |
| 5. Adjusted to the target with the blue section. | ____ | ____ |
| 6. Marked or labeled the target for the blue section. | ____ | ____ |
| 7. Consolidated data onto one target. | ____ | ____ |
| 8. Added setup data for the blue section. | ____ | ____ |
| 9. Fired and adjusted the blue section to any target previously fired by the red section. | ____ | ____ |
| 10. Added setup data for the blue section. | ____ | ____ |
| 11. Registered the blue section on the RP. | ____ | ____ |
| 12. Applied registration corrections to the blue section's firing data. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

**Compute Data for an Immediate-Suppression or Smoke Mission Using a Plotting Board**
**071-078-0018**

**Conditions:** Given a plotting board prepared for operation, a call for an immediate-suppression or smoke mission, and a pencil.

**Standards:** Determined firing data that resulted in gunners firing smoke or high-explosive (HE) ammunition for effect without adjustment, that is, with the type of round dependent on the type requested.

**Performance Steps**
NOTE: Immediate-suppression and/or smoke missions are computed in the same manner as a standard grid, shift, or polar mission. The principal difference is that a standard number of rounds (SOP dependent) are immediately fired for effect on the target plot, using a standard sheaf, without adjustments.

1. Receive/record the call for fire.
2. Plot the firing data.
3. Formulate/issue the fire command.
4. Record the mission/update the plotting board.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute data for an immediate-suppression or smoke mission using a plotting board.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Received/recorded the call for fire. | ____ | ____ |
| 2. Plotted the firing data. | ____ | ____ |
| 3. Formulated/issued the fire command. | ____ | ____ |
| 4. Recorded the mission/updated plotting board. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

**Compute Registration Corrections Using a Plotting Board**

**071-078-0019**

**Conditions:** Given a plotting board set up as a modified observed or surveyed chart; a requirement or request to register the section; the firing section; a registration point (RP) with or without graphical firing scale; firing records; and a pencil.

**Standards:** Registered the section on the registration point (RP). Determined differences between chart data and adjusted data; recorded the data; and applied it to fire-control equipment.

**Performance Steps**

1. Fire/adjust to the RP.
2. Adjust the sheaf on the RP.
3. Refer sights and realign aiming stakes on adjusting mortar data.
4. Determine and record the charge correction (Firing Tables).
5. Construct an adjusted charge gauge line.
6. Determine and record deflection correction.
7. Determine range difference.
8. Determine range correction factor.
9. Determine deflection correction.
10. Update the plotting board.
11. Update the firing data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute registration corrections using a plotting board.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Fired/adjusted to the RP. | ____ | ____ |
| 2. Adjusted the sheaf on the RP. | ____ | ____ |
| 3. Referred sights and realigned aiming stakes on adjusting mortar data. | ____ | ____ |
| 4. Determined and recorded the charge correction. | ____ | ____ |
| 5. Constructed and adjusted charge gauge line. | ____ | ____ |
| 6. Determined and recorded deflection correction. | ____ | ____ |
| 7. Determined range difference. | ____ | ____ |
| 8. Determined range correction factor. | ____ | ____ |
| 9. Determined deflection correction. | ____ | ____ |
| 10. Updated the plotting board. | ____ | ____ |
| 11. Updated the firing data sheet. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
| --- | --- |
| | FM 23-91 |

**Prepare a Plotting Board for Operation Using the Pivot-Point Method**
**071-078-0001**

**Conditions:** Given an M16 plotting board; a DA Form 2399 (Computer's Record); a range and direction to the reference point (RP); a firing table (FT 81-AI-3) or the card firing table packed with the ammunition; a referred deflection of 2800 mils; a map of the area with the mortar position plotted; and a No. 2 pencil.

SME: What is a card firing table?

**Standards:** 1. Determined the mounting azimuth without error.

2. Correctly plotted the reference point (RP) using range and directions.

3. Correctly placed the deflection scale on the azimuth disk to cover 400 mils left and right of the referred deflection.

4. Plotted the RP and determined the RP deflection to within 1 mil with a 10-mil tolerance.

**Performance Steps**
Prepare the M16 plotting board for operation (Figure 1).

1. The given direction of fire must be rounded off to the nearest 50 mils to determine the mounting azimuth.

NOTE: The direction of fire used in this task is 2316 mils. This was determined by plotting the mortar position and the target on the map, then using a protractor.

2. Rounding off the direction of fire (2316) gives the mounting azimuth of 2300.

3. With the mounting azimuth known, set up the plotting board as follows:
   a. The azimuth disk is rotated, and the mounting azimuth is indexed at the index mark (align the tick mark for azimuth 2300 directly over the index mark).
   b. Using a No. 2 pencil, write in the referred deflection being used (in this case, 28) below azimuth 2300 on the azimuth disk.
   c. After placing the referred deflection (28) on the disk, place enough deflection scale on the disk to cover the area of responsibility. Using the LARS (left add, right subtract) rule, place the rest of the deflection scale on the disk. Going left every 100 mils, the deflection scale increases as the azimuth scale decreases; going right, the deflection scale decreases as the azimuth scale increases. A range of 400 to 500 mils left and right of the referred deflection normally covers the area of responsibility.
   d. To plot the first round (range must be known--in this example, the range is 2,600 meters), index the direction of fire (azimuth from mortar to target, 2316 mils). Then move up the range scale from the pivot point to a range of 2,600 meters. Make a small plot directly over the vertical center line, circle it, and label it with a small number "1."

**Performance Steps**

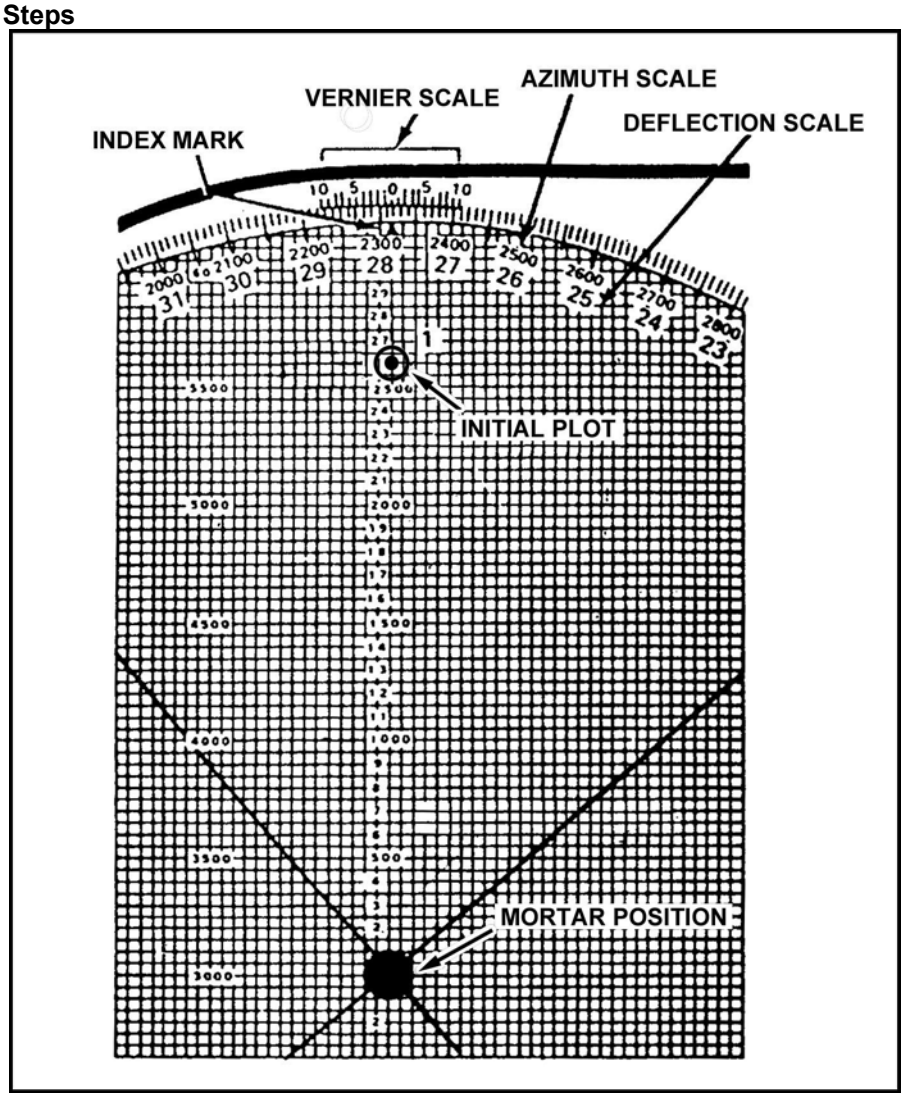



Figure 1. M16 Plotting board.

NOTE: The range is also taken from the map by measuring the straight-line distance between the mortar position and the target, in meters.

e. To determine the deflection for the first round, keep the direction of fire (2316) indexed and read the deflection as follows (Figure 2):
   (1) The first two digits are read from the deflection scale the computer placed on the plotting board. Since deflections increase to the left, the first number to the right of the index mark is 27.
   (2) The third digit is read from the 10-mil mark between deflection numbers 27 and 28. The index mark is between the eighth and ninth 10-mil mark, which makes the third digit 8.
   (3) The fourth digit is read at the Vernier scale. For deflections, use the left half of the scale. Count the 1-mil marks of the Vernier scale and one of the 10-mil marks on the azimuth disk. When aligned, they make the fourth digit 4.

**Performance Steps**

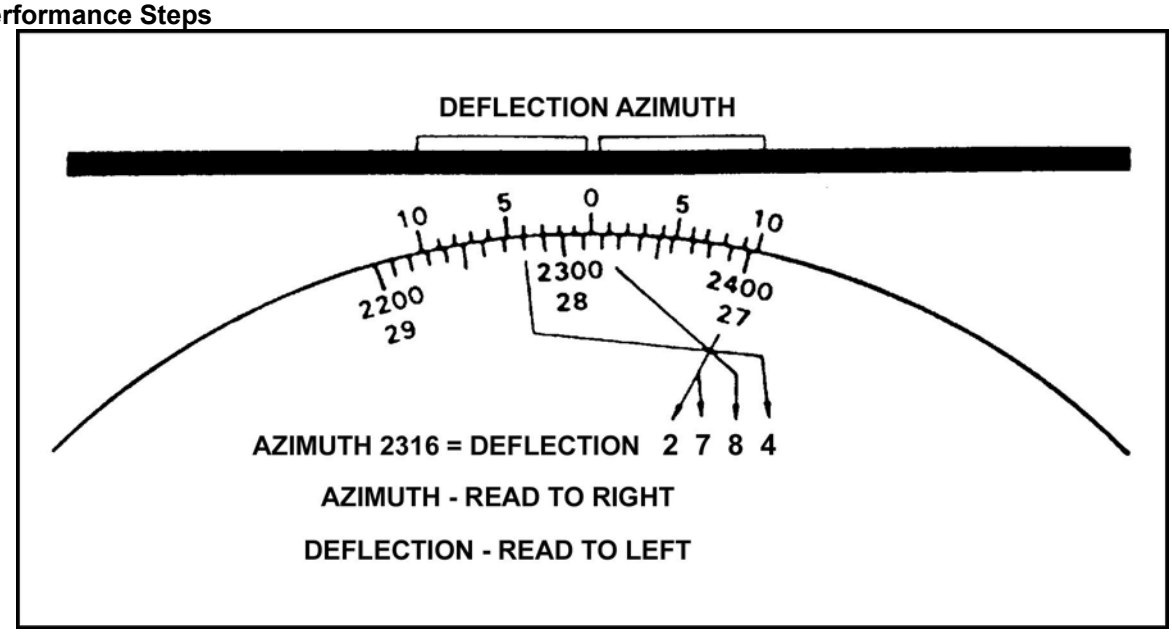



Figure 2. Deflection.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the equipment and information provided to set up the plotting board as an observed chart using the pivot-point method.

| **Performance Measures**<br>NOTE: Not to be sequence scored. | **GO** | **NO GO** |
|---|---|---|
| 1. Determined mounting azimuth without error. | ____ | ____ |
| 2. Plotted RP without error. | ____ | ____ |
| 3. Superimposed deflection scale without error. | ____ | ____ |
| 4. Determined deflection to RP to within 1 mil with a 10-mil tolerance. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |

Subject Area 52: WEAPONS: MORTARS

**Conduct Occupation of a Mortar Firing Position by a Squad**
**071-074-0012**

**Conditions:** As the squad leader, given a mortar complete with sight and aiming posts and squad members with combat equipment.

**Standards:** Supervised the squad as members prepared the mortar, the mortar position, and the ammunition so that the mortar and the crew were prepared to fire.

**Performance Steps**
As the squad leader, your duties upon moving into a new position include, but are not limited to--

1. Positioning yourself so that you can properly supervise and control your squad.
2. Supervising the temporary emplacement of the mortar so that all safety checks are accomplished as outlined in tasks on performance of safety checks on 4.2-inch, 60-mm, 81-mm, and 120-mm mortars.
3. Supervising the boresighting of the mortar, if this was not done before occupation of the position.
4. Supervising the laying of the mortar to include laying the mortar by the aiming circle or compass, referring the sight to the announced referred deflection, and placing out the aiming posts.
5. Supervising the unloading and positioning of ammunition for ground-mounted mortars, ensuring that enough of each type is unloaded so that any ammunition called for by the FDC is readily available to the mortar crew.
6. Supervising the moving of the mortar and ammunition from the temporary position into the prepared mortar position, re-laying the mortar, placing out aiming posts, and camouflaging the mortar pit.
7. Supervising the establishment of wire communications (when required).

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, personnel, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to supervise the initial emplacement of the mortar, the preparation of the ammunition and the mortar position, and the emplacement of the mortar in the prepared position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Assumed a position to observe and supervise all procedures. | ____ | ____ |
| 2. Supervised temporary emplacement of the mortar and preparation of ammunition. | ____ | ____ |
| 3. Supervised boresight of mortar. | ____ | ____ |
| 4. Supervised the laying of the mortar and placing out the aiming posts. | ____ | ____ |
| 5. Supervised the emplacement and re-laying of the mortar in the completed position. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**

FM 7-90

**Fire a Ladder Mission**

**071-074-0013**

**Conditions:** Acting as a forward observer (FO) or squad leader, given a complete mounted mortar in a defilade position, already laid on a directional stake; ammunition; mortar crew; an FO position with observable targets; and a firing table.

**Standards:** Placed effective fire on the target; located the target with three adjusted rounds or less.

**Performance Steps**

The ladder method of adjustment, which is a modification of the bracketing method, reduces adjustment time and allows a more rapid delivery of FIRE FOR EFFECT. The procedure for firing the ladder adjustment is as follows:

1. Estimate gun-target range. The mortar is either aligned on the target, or the FO or squad leader measures the deviation of the target from the registration point (RP) or other known point (amount of shift). He then estimates the gun-target (G-T) range.
2. Determine size of ladder. The FO or squad leader uses the minimum range change guide to determine the size ladder he must fire (Table 1). The object is to have one of the three rounds impact beyond the target and one to fall short of the target (Figure 1). Once the target is between the far round and the near round, the FO or squad leader knows the exact range to the target (Figure 1). Using the example in Figure 2, the G-T range is 1,400 meters; therefore, the FO/squad leader fires a 200-meter ladder.

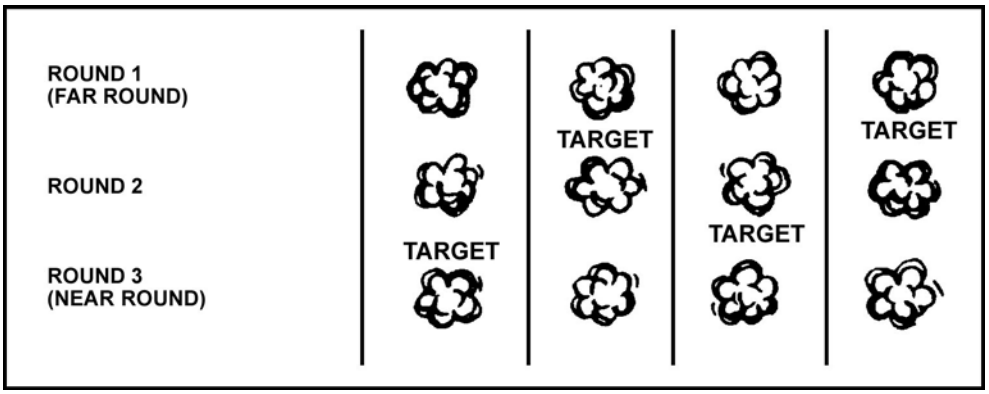



Figure 1. Determining size of ladder.

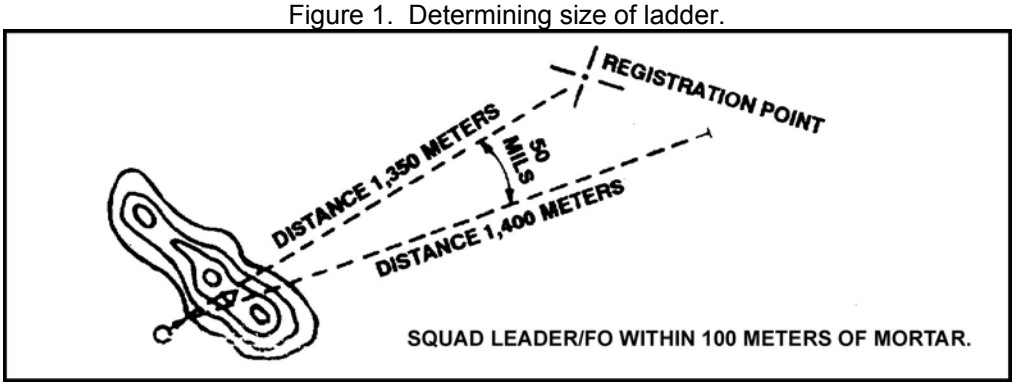



Figure 2. Firing a 200-meter ladder.

**Performance Steps**

| GUN-TARGET RANGE | LADDER SIZE |
|---|---|
| 0 - 999 METERS | 100-METER LADDER |
| 1,000 - 1,999 METERS | 200-METER LADDER |
| 2,000 - TO MAXIMUM RANGE | 400-METER LADDER |

Table 1.

3. Determine mil length of ladder.
   a. The FO or squad leader must now determine the number of mils of elevation needed to move the barrel from the elevation to fire the far round to the elevation to fire the near round (Figure 3).

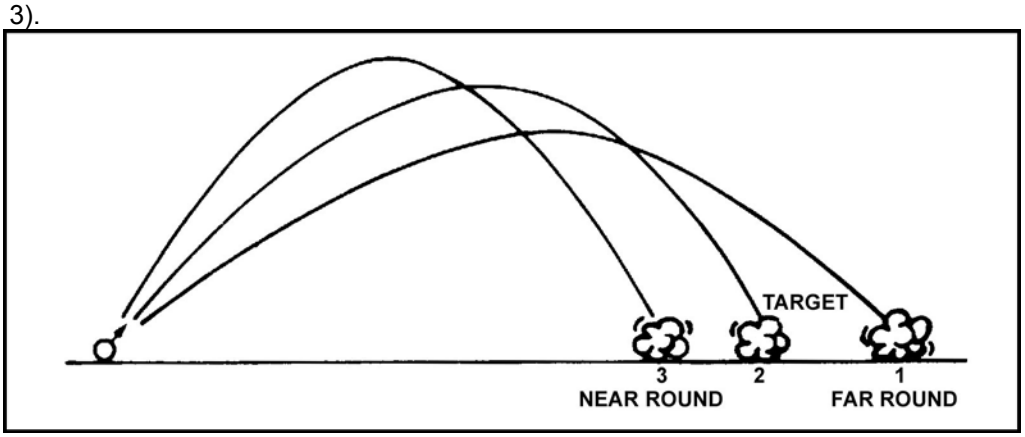



Figure 3. Determining mil length of ladder.

   b. The FO or squad leader uses the 81-mm firing table (Figure 4) to determine the mil length of the target. When he determines that the range to the target is 1,400 meters, he fires a 200-meter ladder. Round 1 is fired at a range of 1,500 meters; round 2 at 1,400 meters; and round 3 at 1,300 meters. He then uses the firing table and finds the following information: (see Table 2).

**Performance Steps**

CARTRIDGE, HE, M374A2
FUZE, PD, M524A6

FT 81-AJ-2
(ABRIDGED)

| RANGE M | ELEV MILS | MAX ORD M | CHG | ELEV MILS | MAX ORD M | CHG |
|---|---|---|---|---|---|---|
| 75 | 1504 | 202 | 0 | | | |
| 100 | 1472 | 200 | 0 | | | |
| 125 | 1438 | 198 | 0 | | | |
| 150 | 1405 | 196 | 0 | | | |
| 175 | 1370 | 193 | 0 | | | |
| 200 | 1334 | 190 | 0 | 1501 | 533 | 1 |
| 225 | 1296 | 186 | 0 | 1489 | 531 | 1 |
| 250 | 1256 | 181 | 0 | 1476 | 530 | 1 |
| 275 | 1214 | 176 | 0 | 1464 | 528 | 1 |
| 300 | 1168 | 169 | 0 | 1451 | 526 | 1 |
| 325 | 1116 | 161 | 0 | 1438 | 524 | 1 |
| 350 | 1056 | 151 | 0 | 1425 | 522 | 1 |
| 375 | 980 | 137 | 0 | 1412 | 520 | 1 |
| 400 | 824 | 107 | 0 | 1398 | 517 | 1 |
| 425 | | | | 1385 | 514 | 1 |
| 450 | | | | 1371 | 511 | 1 |
| 475 | | | | 1357 | 508 | 1 |
| 500 | 1428 | 771 | 2 | 1343 | 504 | 1 |
| 525 | 1419 | 769 | 2 | 1329 | 501 | 1 |
| 550 | 1410 | 767 | 2 | 1315 | 497 | 1 |
| 575 | 1401 | 764 | 2 | 1300 | 493 | 1 |
| 600 | 1392 | 761 | 2 | 1285 | 488 | 1 |
| 625 | 1382 | 758 | 2 | 1269 | 483 | 1 |
| 650 | 1373 | 755 | 2 | 1253 | 478 | 1 |
| 675 | 1363 | 752 | 2 | 1237 | 473 | 1 |
| 700 | 1354 | 748 | 2 | 1220 | 467 | 1 |
| 725 | 1344 | 745 | 2 | 1203 | 461 | 1 |
| 750 | 1334 | 741 | 2 | 1185 | 454 | 1 |
| 775 | 1324 | 737 | 2 | 1167 | 447 | 1 |
| 800 | 1314 | 733 | 2 | 1148 | 439 | 1 |
| 825 | 1304 | 729 | 2 | 1128 | 431 | 1 |
| 850 | 1294 | 725 | 2 | 1106 | 422 | 1 |
| 875 | 1283 | 720 | 2 | 1084 | 412 | 1 |
| 900 | 1273 | 715 | 2 | 1059 | 401 | 1 |
| 925 | 1262 | 710 | 2 | 1033 | 389 | 1 |
| 950 | 1251 | 705 | 2 | 1003 | 375 | 1 |
| 975 | 1240 | 699 | 2 | 969 | 358 | 1 |
| 1000 | 1228 | 693 | 2 | 928 | 338 | 1 |

| RANGE M | ELEV MILS | MAX ORD M | CHG | ELEV MILS | MAX ORD M | CHG |
|---|---|---|---|---|---|---|
| 1000 | 1228 | 693 | 2 | 928 | 338 | 1 |
| 1025 | 1217 | 687 | 2 | 867 | 307 | 1 |
| 1050 | 1205 | 681 | 2 | | | |
| 1075 | 1192 | 674 | 2 | | | |
| 1100 | 1180 | 667 | 2 | 1301 | 975 | 3 |
| 1125 | 1167 | 660 | 2 | 1293 | 970 | 3 |
| 1150 | 1154 | 652 | 2 | 1285 | 965 | 3 |
| 1175 | 1140 | 644 | 2 | 1277 | 961 | 3 |
| 1200 | 1126 | 636 | 2 | 1268 | 955 | 3 |
| 1225 | 1111 | 627 | 2 | 1260 | 950 | 3 |
| 1250 | 1096 | 617 | 2 | 1252 | 945 | 3 |
| 1275 | 1080 | 607 | 2 | 1243 | 939 | 3 |
| 1300 | 1063 | 596 | 2 | 1235 | 934 | 3 |
| 1325 | 1046 | 584 | 2 | 1226 | 928 | 3 |
| 1350 | 1027 | 571 | 2 | 1217 | 921 | 3 |
| 1375 | 1006 | 556 | 2 | 1208 | 915 | 3 |
| 1400 | 984 | 541 | 2 | 1199 | 908 | 3 |
| 1425 | 959 | 522 | 2 | 1190 | 902 | 3 |
| 1450 | 930 | 501 | 2 | 1180 | 894 | 3 |
| 1475 | 894 | 474 | 2 | 1170 | 887 | 3 |
| 1500 | 839 | 433 | 2 | 1160 | 879 | 3 |
| 1525 | | | | 1150 | 871 | 3 |
| 1550 | | | | 1140 | 863 | 3 |
| 1575 | | | | 1129 | 854 | 3 |
| 1600 | 1237 | 1174 | 4 | 1118 | 845 | 3 |
| 1625 | 1230 | 1168 | 4 | 1107 | 836 | 3 |
| 1650 | 1223 | 1162 | 4 | 1095 | 826 | 3 |
| 1675 | 1216 | 1156 | 4 | 1083 | 816 | 3 |
| 1700 | 1208 | 1149 | 4 | 1070 | 805 | 3 |
| 1725 | 1201 | 1143 | 4 | 1057 | 793 | 3 |
| 1750 | 1194 | 1136 | 4 | 1044 | 781 | 3 |
| 1775 | 1186 | 1129 | 4 | 1029 | 768 | 3 |
| 1800 | 1178 | 1121 | 4 | 1014 | 754 | 3 |
| 1825 | 1170 | 1114 | 4 | 998 | 739 | 3 |
| 1850 | 1162 | 1106 | 4 | 981 | 722 | 3 |
| 1875 | 1154 | 1098 | 4 | 962 | 704 | 3 |
| 1900 | 1146 | 1090 | 4 | 941 | 683 | 3 |

Figure 4. 81-mm firing table.

| RANGE | ELEVATION |
|---|---|
| 1,300 METERS | 1063 MILS |
| 1,400 METERS | 984 MILS |
| 1,500 METERS | 839 MILS |

Table 2.

NOTE: Take data from an 81-mm firing table, then subtract the elevation for the far round from that for the near round:
NOTE: Mils per turn will depend on the mortar being used.

Near round--1,300 meters 1063 mils
Far round---1,500 meters 839 mils
Length of ladder in mils 224 mils
Length of ladder in turns---224 divided by 10 = 22 turns

**Performance Steps**

NOTE: Since there are two intervals, the 22 turns are divided by 2. This gives 11 turns between rounds. The gunner fires the first round at elevation 839; he elevates 11 turns and fires the second round, then he elevates 11 more turns and fires the third round.

c. In Figure 5, the target appears between round 1 and round 2. After firing round 3, the gunner leaves the mortar as it was when fired (up 22 turns). The FO or squad leader knows that if he goes down 11 turns, he could hit where round 2 hit; the target is halfway between No. 2 and No. 1 rounds. If he goes down five more turns, he will be right on target and be ready to fire for effect.

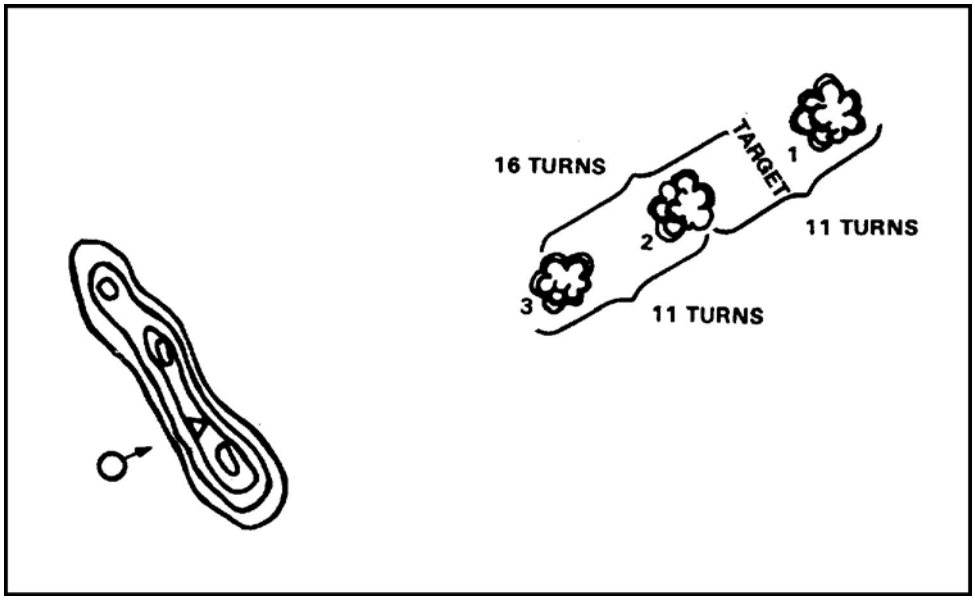



Figure 5. Firing for effect.

d. The FO or squad leader gives the subsequent command to the gunner: FIVE ROUNDS, DOWN SIXTEEN TURNS. The gunner lowers the barrel 16 turns and then levels the elevation bubble on the sight by using the elevation micrometer knob. This allows the gunner to keep the mortar level during fire for effect.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, material, information, and personnel given the task condition statement.

BRIEF SOLDIER: Tell the soldier to engage the target with a ladder mission.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Determined size of ladder to be fired. | ____ | ____ |
| 2. Determined total turns to cover ladder. | ____ | ____ |
| 3. Determined turns between rounds. | ____ | ____ |
| 4. Laid mortar at elevation to fire ladder. | ____ | ____ |
| 5. Fired the ladder mission. | ____ | ____ |
| 6. Determined turns to engage target. | ____ | ____ |
| 7. Determined elevation to fire for effect. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 7-90 |

**Select Mortar Firing Positions**

**071-074-0017**

**Conditions:** As a platoon leader or section sergeant, given an overlay that shows all areas of responsibility; a standard 1:50,000-scale military map; a compass; a radio; and a vehicle.

**Standards:** Within time and tactical constraints, conducted a map reconnaissance and selected at least two possible positions. Reconnoitered these positions and selected the best one, based on--

* The mission.

* The best possible cover and concealment with, if possible, the option of moving into defilade.

* Access routes that aid resupply and displacement.

* Firm ground and drainage.

* Mask and overhead clearance.

* Dispersion between squads.

**Performance Steps**

1. Reconnaissance.
    a. Selection of mortar positions. Select mortar positions that aid rapid movement of mortars into position, and that ensure close and immediate fire support. The platoon leader/section sergeant must keep informed of the situation and future operations to make timely reconnaissance, selection, and occupation of positions (RSOP). Position areas and routes selected are reported to the company commander (60-mm mortar) or battalion S3 and fire support officer (FSO)(4.2-inch/81-mm/120-mm mortars).

    b. Route reconnaissance. Reconnaissance should allow selection of a route that--
        o Leads from the present position to the next position.
        o Permits vehicle movement to the next firing position.
        o Provides as much cover and concealment as possible.
        o Supports the scheme of maneuver.
    c. Position reconnaissance.
        (1) Position reconnaissance is a search for firing position sites. Due to range limitations, reconnaissance for new firing positions is continuous. In addition to the primary position, alternate and supplementary positions should be reconnoitered and selected. If time permits, these positions and the routes between them are prepared.

        (2) The platoon sergeant and section sergeant/chief computer recommend position areas from which they can give the desired fire support.
        (3) Positions should provide concealment and defilade, space for dispersion, and terrain adaptable for defense of the unit. The position must permit accomplishment of the mission.

        (4) Normally, positions are well forward in offense. This precludes the need for them to displace early to support advancing attack companies. In defense, positions are normally farther back, which permits continuous fires in support of the battalion reserve if it is committed against an enemy penetration.

        (5) Due to the depth of the battle area, two squads may be needed initially to support the covering force from one site. When the covering force withdraws, the squads provide

**Performance Steps**

cover to another location in the battle area. They can support troops on the forward edge of the battle area (FEBA). When selecting the last location, the minimum range of the mortar must be considered.

(6) Mortars can be positioned in small openings in woods, close to the base of hills or bluffs, and in ravines. These areas offer some protection from enemy observation. Mortars may be hand-carried and ground-mounted in positions not accessible to their vehicles.

(7) Good mortar positions, including--

o Dry, well-drained ground that is accessible to vehicles and free from obstructions.

o Alternate positions.

o Mask and overhead clearance, and room for dispersion.

2. Occupation. The platoon leader/section sergeant must plan for occupying the position to include location of the mortars, vehicle park, wire routes, and security. Sometimes a position is occupied only long enough to adjust on targets. Then the mortars and crews move to a covered and concealed area until a fire mission is required. For this procedure, the baseplates are left in place. In open terrain, the primary position might be selected, but not immediately occupied, if enemy air is active. Firing data are prepared as completely as possible without registration. Because this procedure slows response to fire requests, it is used only when necessary.

3. Alternate and supplementary positions. The platoon leader/section sergeant selects the location and directs the preparation of alternate and supplementary positions. All members of the platoon must know the routes to these positions. An alternate position is usually occupied only when the primary position becomes untenable. Supplementary positions are usually occupied only after the commander of the supported force approves the move.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and materials given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the equipment and materials provided and select and organize mortar platoon or section positions.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Selected defilade positions. | ____ | ____ |
| 2. Selected firm ground with drainage. | ____ | ____ |
| 3. Selected an area with mask and overhead clearance. | ____ | ____ |
| 4. Ensured dispersion between squads. | ____ | ____ |
| 5. Informed the platoon leader of the positions and routes. | ____ | ____ |
| 6. Selected alternate and supplementary positions. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 7-90 |

**Conduct a Displacement by a Mortar Squad**
**071-074-0022**

**Conditions:** Given simulated combat conditions and an operation, fragmentary, or warning order to displace a squad.

**Standards:** Selected the best method to displace a mortar squad to support the tactical operation.

**Performance Steps**

1. Mission. To carry out the mortar squad's mission of providing close, immediate fire support, it must displace promptly from one position to another. Good planning and reconnaissance (when possible) reduce the time that weapons are out of action during a displacement. The supported unit's scheme of maneuver influences the time and method of displacement to new positions.
2. Displacement method by squad or section. This method is similar to displacement by sections, except fewer mortars are involved. Displacement is usually employed by platoons or sections with two or three mortars. In two-mortar platoons/sections, displacement means displacing one mortar while the other provides continuous support. In three mortar platoons/sections, one or two mortars remain in place while one or two displace. When the first mortar to displace is in position and ready to fire, the remaining mortar can be displaced. When possible, part of the FDC is normally sent with the displacing squad, or a squad leader with an M16 plotting board or MBC can serve as a temporary FDC. When displacing by section or squad, successive or alternate bounds are used (Figure 1).

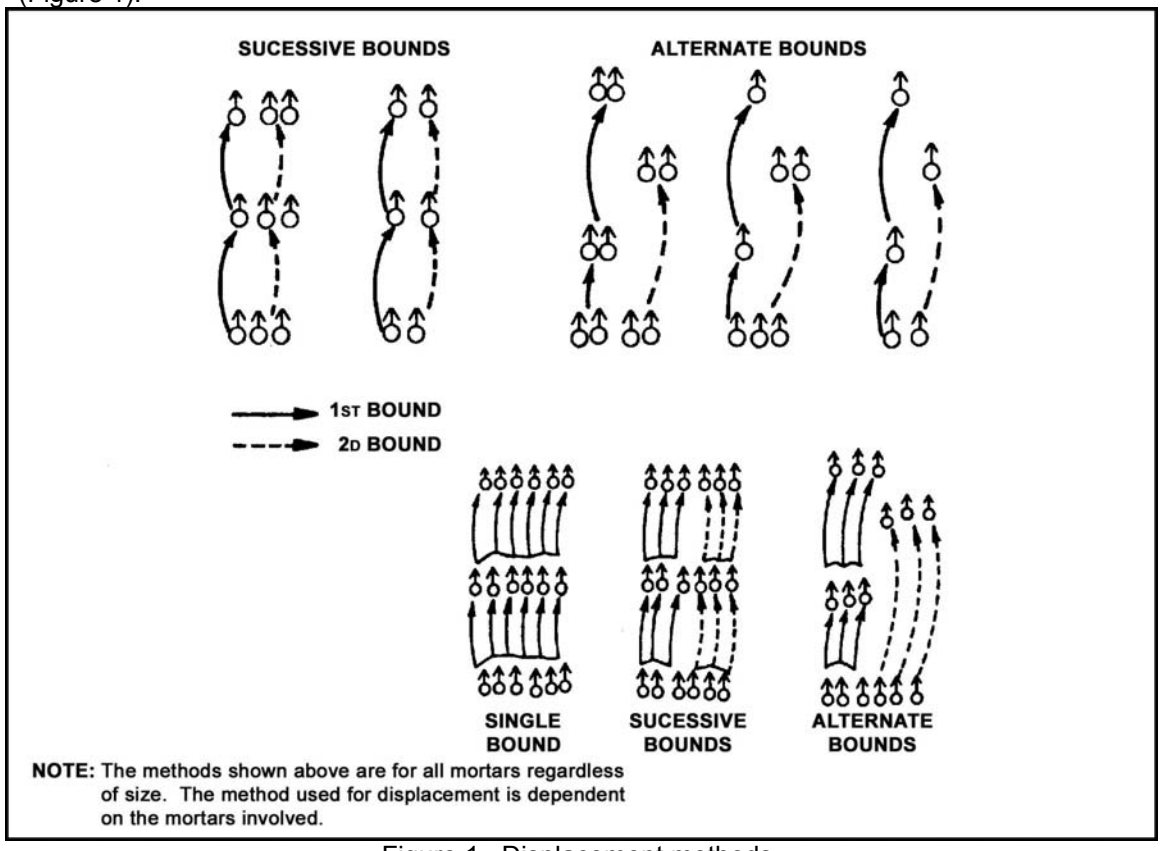



Figure 1. Displacement methods.

NOTES:
1. Alternate bounds are used when displacement is rapid in order to stay up with supported elements. Successive bounds are used when the maneuver element's movements are not rapid, such as in

**Performance Steps**
defensive or retrograde operations.
2. Displacement by section/platoon should only be used when there is little likelihood of enemy contact, or when supporting artillery units can provide adequate support during displacement.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, personnel, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to conduct a displacement using bounding techniques to displace to a new position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Used alternate bounding techniques to keep up with supported element. | ____ | ____ |
| 2. Ensured that the displacing squad had the means to plot rounds downrange. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 7-90 |

**Conduct the Defense of a Mortar Firing Position by a Squad**
**071-074-0033**

**Conditions:** Given a mortar squad position in a combat situation, subject to or under attack; with or without the aid of friendly units.

**Standards:** 1. Developed an overall plan that included a security plan, priority of work, locations of positions, and a sector of fire for each soldier (and vehicle, if applicable); ensured the locations took maximum advantage of the natural defensive characteristics of the terrain, the capabilities of assigned weapons, and of mines and early warning devices to cover enemy approaches.

2. Prepared defensive positions so that--
   a. They covered the squad position by fire, observation, or both.
   b. Mines and early warning devices covered enemy approaches and dead spaces, forming a final protective line.
   c. Fighting positions had cover, concealment, camouflage, clear fields of fire, interlocking fires, and mutual support.
   d. Preselected targets were engageable during limited visibility

3. Prepared range cards (DA Form 5517-R) for required weapons.

4. Used obstacles to enhance the defense.

5. Defended the squad area by--
   a. Controlling and directing fires.
   b. Moving personnel as needed.
   c. Controlling ammunition and equipment.
   d. Reorganizing and reestablishing the defense during lulls.

**Performance Steps**

1. Develop a defensive plan.

2. Coordinate the following with adjacent units (if situation provides adjacent friendly troops):
   a. The integration of mortar fire in local security.
   b. The location of primary, alternate, and supplementary positions.
   c. Sectors of fire.
   d. Location of deadspace between units and how to cover it.
   e. Locations of observation posts.
   f. Locations and types of obstacles and how to cover them.
   g. Patrols to be conducted (size, type, routes, and times).
   h. Communications information.
   i. Mission and tentative plans.

3. Supervise preparation for the defense.

4. Implement the defensive plan.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, personnel and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to supervise the initial emplacement of the mortar, preparation of the ammunition, preparation of the mortar position, and emplacement of the mortar in the prepared position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Developed a defensive plan. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 2. Coordinated with adjacent units (if situation provided adjacent friendly troops). | ____ | ____ |
| 3. Supervised preparation for the defense. | ____ | ____ |
| 4. Implemented the defensive plan. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**
DA FORM 5517-R
FM 7-90

## Adjust Mortar Fire Using Direct Alignment

**071-074-0036**

**Conditions:** As the forward observer (FO) or squad leader for the mortar crew, acting without a fire direction center, given a mortar complete with crew; a known point; an identifiable target; and a designated observation post within 100 meters of the mortar position or within 100 meters of the gun-target (G-T) line.

**Standards:** Achieved effective fire on the target within five adjustments: for an area target, the round landed within 50 meters; for a point target, the round landed within 25 meters.

**Performance Steps**

NOTE: When employing the mortar in the direct-alignment role, the squad leader may have to use the ammunition bearer due to the lack of communications equipment within the squad.

1. Under certain conditions, such as communications failure, lack of equipment, and so on, it may be impossible to use an FDC. In fire without an FDC, the FO/squad leader makes corrections differently than when operating with an FDC. He makes all his deviation corrections with respect to the gun-target (G-T) line, rather than with respect to the observer-target (O-T) line. All deviation corrections are sent in mils or turns of the traversing handwheel.

2. Forward observer within 100 meters of the mortar position.
   a. When using direct alignment, the best position for the FO/squad leader is within 100 meters of the mortar. This means the FO/squad leader can be in front, behind, or to either side of the mortar, as long as his position is not more than 100 meters from it.
   b. When the FO/squad leader is within 100 meters of the mortar position, he sends all deviation corrections to the gunner as determined without converting them in any way.
   c. Since the FO/squad leader has no binoculars, he must use the finger-hand method to determine how many mils a round is to the left or right of the target to make the required corrections (Figure 1).
      EXAMPLE: The first round has been fired. The FO/squad leader determines the round landed two fingers (70 mils) to the left of the target. The FO/squad leader's correction to the gunner would be RIGHT 70. The gunner applies this correction to the previous deflection setting using the LARS rule.
      [Previous setting: 3200 mils, Correction: R70;
      3200 mils - 70 = NEW SETTING: 3130 mils]

**Performance Steps**

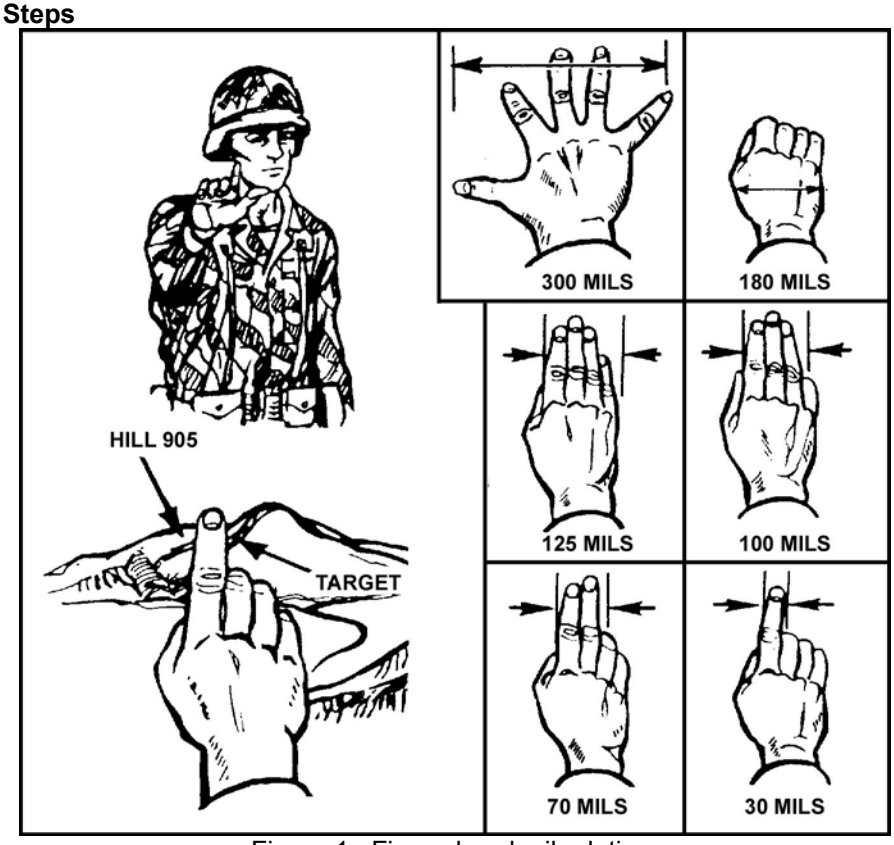



Figure 1. Finger-hand mil relation.

d. After determining the new deflection setting, the gunner indexes the new deflection on the sight, re-lays on the aiming point, and fires the next round.
e. If range corrections are required, the elevation for the new range can be sent by the FO/squad leader, or he can send the range for the next round. The gunner then determines the elevation and charge from the firing table for the range given.

3. Forward observer more than 100 meters from the mortar.
   a. The FO/squad leader must position himself more than 100 meters from the mortar (either to the front or to the rear), he must stay within 100 meters of the G-T line. This may be almost impossible if the FO/squad leader is attacking targets over a wide frontage; he then has to move often to stay within 100 meters of the G-T line.
   b. When the FO/squad leader is closer to the target by being in front of the mortar or is farther from the target by being behind the mortar, the corrections will be different, as seen from the FO/squad leader position.

      EXAMPLE: If the FO/squad leader is halfway between the mortar and the target, the correction is half of the spotting (Table 1).

      However, if the mortar is halfway between the FO/squad leader and the target, the correction is twice the spotting (Table 2).

| GUN-TARGET DISTANCE | FO TARGET DISTANCE | SPOTTING | CORRECTION |
|---|---|---|---|
| 1,200 METERS | 600 METERS | L50 | L25 |

Table 1.

**Performance Steps**

| GUN-TARGET DISTANCE | FO TARGET DISTANCE | SPOTTING | CORRECTION |
|---|---|---|---|
| 600 METERS | 1,200 METERS | L50 | R100 |

Table 2.

c. Since the distance between the FO/squad leader, mortar, and the target differ, there is a simple formula to determine the needed corrections: O-T distance over G-T distance.
EXAMPLE: The O-T distance is 1,000 meters, and the G-T distance is 1,200 meters. The spotting by the FO/squad leader is L60. To determine the correction to send to the gunner, the FO/squad leader determines the correction (Figure 2) as follows:
O-T/G-T = 1,000/1,200 = (5/6) x 60 = 50-mil deflection.
The correction sent to the gunner is R50.

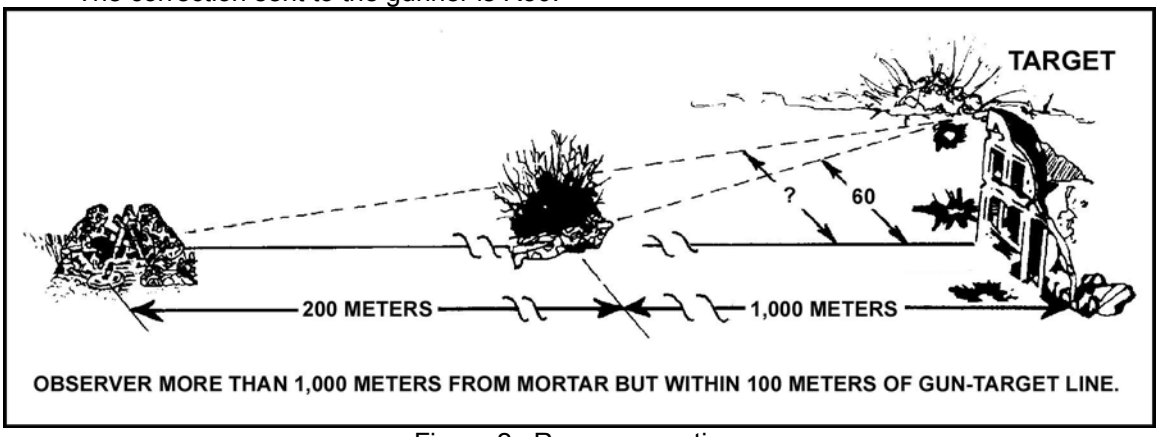



Figure 2. Range correction.

4. Turns can also be used to adjust for range as an alternate method. (Example: the round lands over the target--the gunner searches up eight turns; the next round lands short of the target--the gunner searches down four turns to bracket the target. He continues splitting the bracket until the target is hit.)

**Evaluation Preparation:** SETUP: Provide all equipment, material, situations, and personnel given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to identify the forward observer's or squad leader's position and to determine the corrections needed to engage the target indicated; and to relay these corrections to the mortar crew when engaging the target.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Defined the limits for the FO/squad leader position. | ____ | ____ |
| 2. Demonstrated proper finger-hand mil relation. | ____ | ____ |
| 3. Determined deviation correction for mortar. | ____ | ____ |
| 4. Determined range correction for mortar. | ____ | ____ |
| 5. Engaged target within 5 or less rounds. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
| --- | --- |
| | FM 7-90 |

**Lay a Mortar Using Direct Alignment**
**071-074-0042**

**Conditions:** As a mortar squad leader, given a mounted mortar in a defilade position, an aiming post or stake with a cross-arm ("T" bar), an observable target, and a gun crew.

**Standards:** Aligned the mortar, the aiming post or stake, and the target.

**Performance Steps**
NOTE: The information and procedures given in this task apply to the 60-mm, 81-mm, and 120-mm mortars. Direct alignment is the most often used method when employing mortars without an FDC.

1. Direct-alignment method.

    a. When using the direct-alignment method, the squad leader acts as the forward observer (FO) for the squad.

    b. To use the direct-alignment method, the squad leader must select a target within his area of responsibility and a position for the mortar that can be seen from his FO position (Figure 1).

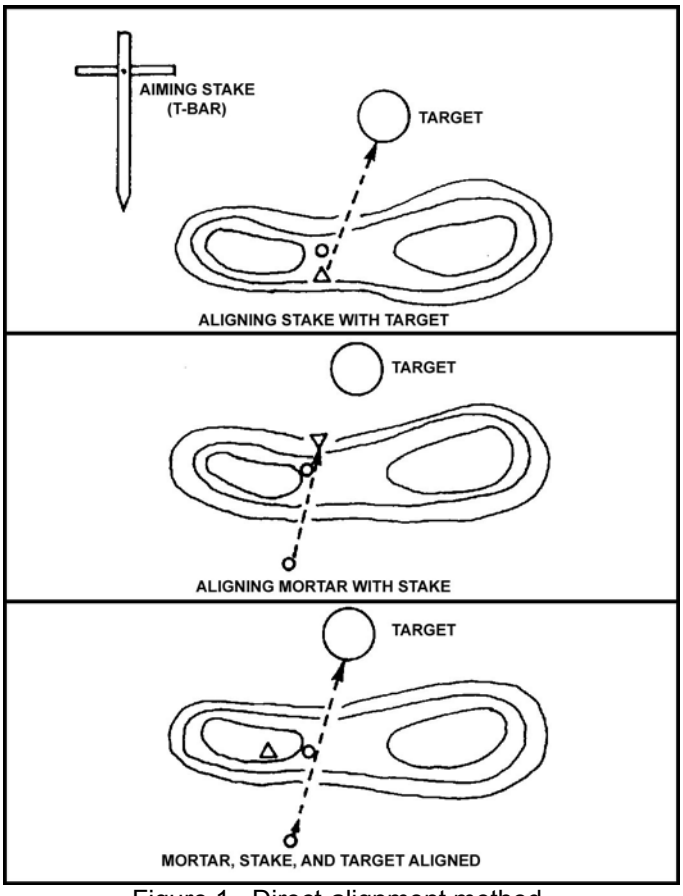



Figure 1. Direct-alignment method.

    c. After selecting the approximate position for the mortar, the squad leader moves to his FO position.

**Performance Steps**
NOTE: In the direct-alignment method, the mortar must be in a defilade position. Also the FO or squad leader must be able to see both the target and the mortar from his position.

d. In aligning the mortar and the target, the squad leader can use an aiming post for the alignment point. However, the best and most accurate method is to use an aiming stake with a cross-arm (T-bar) on it (Figure 1).

NOTE: Two narrow pieces of wood from an ammunition box nailed together to form a cross can serve as the aiming stake (T-bar).

e. To align the target and the mortar, the squad leader moves to a point (FO position) where he can see the target (or reference point) and also see the mortar. He then positions the stake with the crossarm pointed at the target/reference point. Without disturbing the stake, he sights back along the crossarm and directs the positioning of the mortar, using arm-and-hand signals until the mortar is aligned with the crossarm.

f. The gunner ensures that a deflection of 3200 mils (M64 or M53) is set on the sight, and that the vertical crossline of the sight is laid on the crossarm aiming stake.

g. The target/reference point, aiming stake, and mortar are now aligned, and the mortar is ready to fire.

2. When registration or adjustment has been completed, aiming posts can be placed out on a referred deflection as in the normal procedure. All fire commands and subsequent corrections from the FO/squad leader are sent to the gunner, who sets them on the sight.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, material, and personnel given in the task condition statement.

BRIEF SOLDIER: Show the soldier his area of responsibility and tell him to select a target, emplace his aiming stake, and align the mortar onto his target.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Selected initial mortar position. | ____ | ____ |
| 2. Selected FO position. | ____ | ____ |
| 3. Aligned aiming stake on target. | ____ | ____ |
| 4. Aligned mortar. | ____ | ____ |
| 5. Commanded mortar crew to lay on aiming stake. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | ARTEP 7-90-DRILL |
| | FM 23-90 |
| | FM 7-90 |

**Boresight a Mortar for Deflection Using an M2 Aiming Circle**
**071-321-4001**

**Conditions:** As a section sergeant, given, for both methods (Station 1 or 2) a gunner and assistant gunner; a mounted M2 aiming circle located at least 25 meters from a mortar mounted off-line; a sight set to a 5- to 10-mil error; a screwdriver; and, for the second (distant-aiming-point, Station 2) method, a point at least 200 meters from the aiming circle.

**Standards:** Using each method in turn, boresighted the mortar for deflection to a 0-mil accuracy.

**Performance Steps**

1. Calibrate for deflection, using the aiming circle (angle method) when the boresight is not available.
   a. The section sergeant sets up the aiming circle 25 meters to the rear of the mounted mortar.

   b. With the azimuth scale and micrometer of the aiming circle at 0, the gunner aligns the vertical crosshair on the center of the baseplug of the mortar by sliding the mortar sideways.

   c. The gunner traverses and cross-levels the mortar until the center axis of the barrel from the baseplug to the muzzle is aligned with the vertical crosshair in the telescoping reticle of the aiming circle (Figure 1).

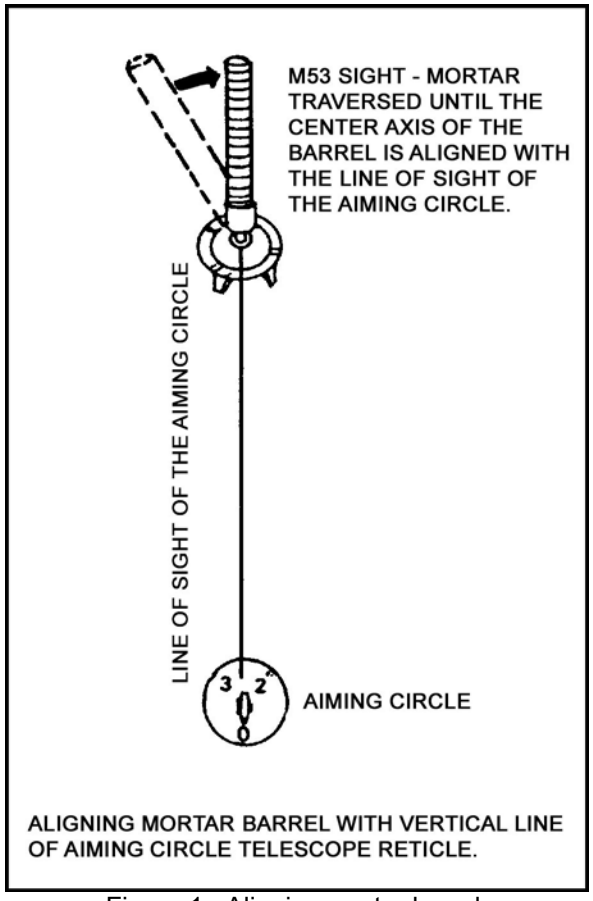


Figure 1. Aligning mortar barrel.

NOTE: The traversing bearing should remain as near center as possible.

**Performance Steps**

d. The gunner is directed to turn the deflection knob of the sight until the vertical line is centered on the lens of the aiming circle, and angle A is read on the red scale of the sight (Figure 2).

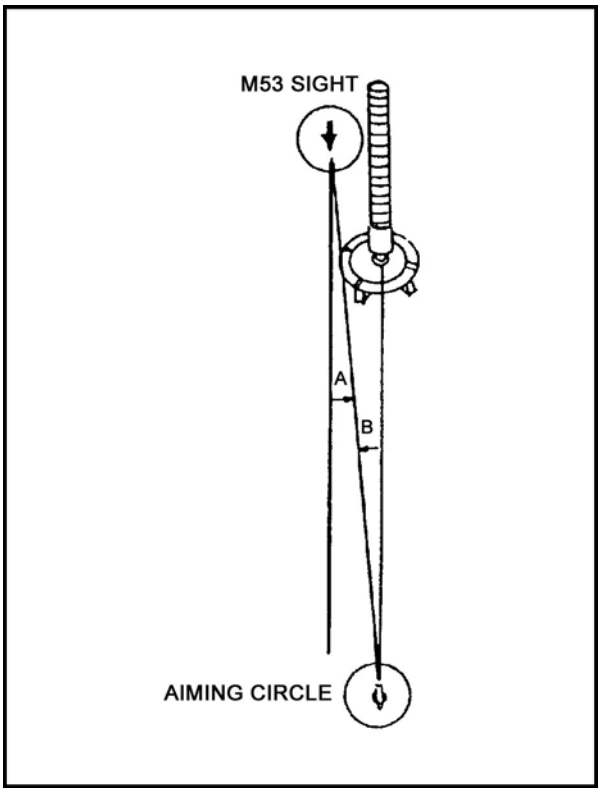



Figure 2. Determining angle A.

e. The section sergeant turns the azimuth micrometer knob of the aiming circle until the vertical crosshair in the telescope lies on the center of the sight lens. He then reads angle B (Figure 2) opposite the azimuth scale index.

f. If the angles are equal, then the sight is calibrated. If not, then the gunner adjusts the sight by loosening the two boresight locking screws on the deflection knob of the sight and slipping the micrometer deflection scale until the arrow on the index aligns with the deflection reading of the aiming circle.

2. Calibrate for deflection, distant-aiming-point method, using the aiming circle when boresight is not available.

a. The section sergeant sets up the aiming circle and aligns the vertical crosshair on a distant aiming point (a sharp, distinct object at least 200 meters away.

b. The crew mounts the mortar on level ground about 25 meters from the aiming circle and on the line between the aiming circle and the distant aiming point.

c. The gunner centers the traversing bearing, and then cross-levels.

d. With the vertical line of the aiming circle still laid on the distant aiming point, the crew moves the mortar baseplate until the center of the baseplug aligns with the vertical line of the aiming circle.

**Performance Steps**

e. The gunner traverses and cross-levels until the axis of the barrel, from baseplug to muzzle, aligns with the vertical line of the aiming circle.

NOTE: The traversing bearing should remain as near center as possible.

f. The gunner is directed to lay the vertical line of the sight unit on the same distant aiming point using the micrometer knob. If the sight is calibrated, the deflection reading will be 3200. If it does not read 3200, the gunner loosens the screws in the base of the micrometer knob of the sight, slips the scale to 0, and retightens the screws.

**Evaluation Preparation:** SETUP: At the test site, provide everything listed in the Task Condition statement.
BRIEF SOLDIER: Tell the soldier to--
1. Correctly boresight the mortar for deflection using both the angle and the distant-aiming-point methods of boresighting with the aiming circle.
2. Operate the aiming circle.
3. Correctly brief the mortar crew.
4. Correctly talk them through aligning the mortar with the aiming circle.
5. Correctly talk them through each step of the boresighting procedure.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Angle method. | ___ | ___ |
| a. Indexed "0" on the azimuth scale of the aiming circle. | | |
| b. Aligned the mortar with the aiming circle. | | |
| c. Directed the gunner to lay the vertical crosshair. | | |
| d. Directed the gunner to give the Angle A reading from the red azimuth scale of the sight. | | |
| e. Laid the vertical crosshair of the aiming circle on the lens of sight. | | |
| f. Read Angle B from the azimuth scale of the aiming circle. | | |
| g. Directed and supervised the correcting of the micrometer scale of the sight to the Angle B reading. | | |
| 2. Distant-aiming-point method. | ___ | ___ |
| a. Aligned the aiming circle on the distant aiming point. | | |

NOTE: During boresighting using this method, the aiming circle azimuth scale may be set on any reading.

| | | |
|---|---|---|
| b. Directed the mortar crew to align the mortar with the vertical crosshair of the aiming circle. | | |

| Performance Measures | GO | NO GO |
|---|---|---|
| c. Directed the mortar crew to lay the mortar sight on the distant aiming point. | | |
| d. Directed the gunner to read from the red azimuth scale of the sight. | | |
| e. Directed and supervised the correcting of the micrometer scale of the sight to 3200. | | |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | TM 9-1290-262-10 |

**Boresight a Mortar for Elevation Using an M2 Compass**
**071-321-4002**

**Conditions:** As a gunner, given an M2 compass and a mounted mortar complete with sight.

**Standards:** Boresighted the mortar for elevation to a 1-mil accuracy.

**Performance Steps**
The gunner boresights for elevation, using the M2 compass when the M45 boresight is not available.

1. Center the traversing bearing.
2. Elevate the barrel to 800 mils.
    a. Set an elevation of 800 on the elevation scale of the M2 compass.
    b. Turn the compass on its left side and lay it on the top of the barrel.
    c. Elevate or depress the mortar until the bubble is centered in the vial of the compass.
3. Cross-level the mortar and recheck the compass.
4. Center the elevation bubble of the sight by turning the elevation micrometer knob on the sight unit.
5. If the reading of the elevation of the sight is not "800 mils," and the reading on the elevation micrometer is not "0," adjust for elevation on the elevation scale and micrometer knob.

**Evaluation Preparation:** SETUP: At the test site, provide the equipment and situation given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to boresight the mortar for elevation using the M2 compass.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Checked to ensure that the traversing bearing was centered. | ____ | ____ |
| 2. Indexed 800 on the elevation scales of the sight and leveled the mortar. | ____ | ____ |
| 3. Set an elevation of 800 mils on the elevation scale of the M2 compass. | ____ | ____ |
| 4. Laid the left side of the M2 compass on the top of the mortar barrel. | ____ | ____ |
| 5. Leveled the bubble in the M2 compass. | ____ | ____ |
| 6. Checked the mortar cross-level bubble and leveled it, if needed. | ____ | ____ |
| 7. Leveled the elevation bubble of sight using only the elevation micrometer. | ____ | ____ |
| 8. Corrected elevation scales, if needed. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
| --- | --- |
| | TM 9-1290-333-15 |

**Lay a Carrier-Mounted Mortar Using an M2 Compass**
**071-321-4007**

**Conditions:** As a squad leader, given an M2 compass; mounting azimuth; squad members; carrier-mounted mortar complete with sight; aiming posts; and compass stake, use the compass.

**Standards:** Determined deflection to be placed on mortar sight to within 10 mils.

**Performance Steps**

NOTE: Laying mortars on a mounting azimuth with the M2 compass is not as accurate as the aiming-circle method, but it does allow the squad to quickly begin adjusting on the target.

1. The squad leader places his compass on a steady object (compass stake) that is away from the carrier and away from any other metal object that could affect the compass needle. He uses the compass as an aiming point for the base mortar.

    a. The squad leader directs squad members to move the carrier into position and to point the mortar in the direction of fire. The squad leader--

        (1) Measures the grid azimuth to the base mortar.

        (2) Subtracts the grid azimuth on which the mortar is to be laid from the grid azimuth to the mortar (adding 6400, if necessary).

        (3) Announces the remainder of the grid azimuth as, "Deflection," (subtracting 3200, if necessary, when using the M34A2 sight; Figure 1).

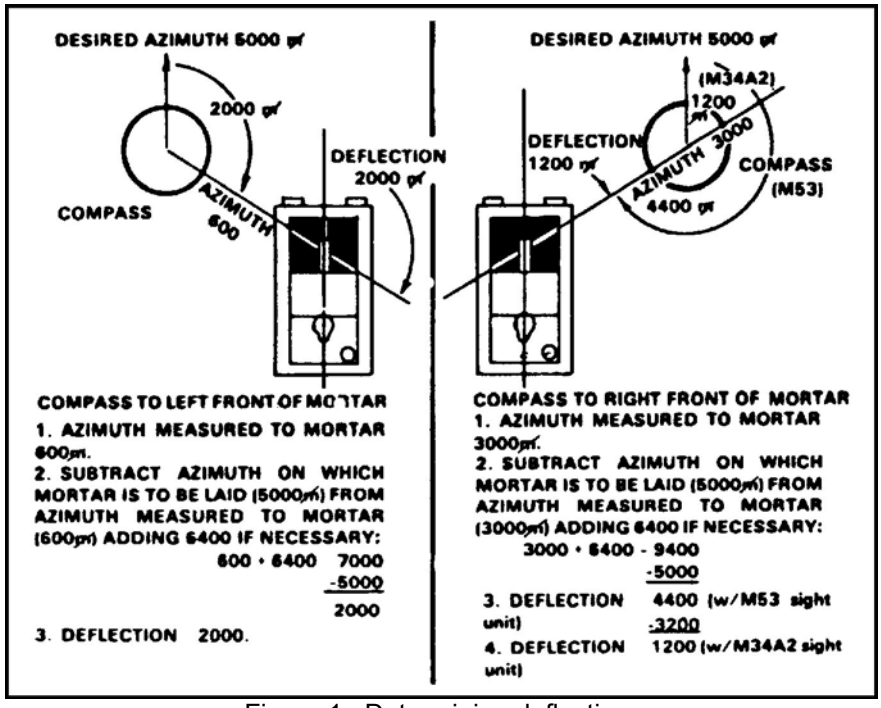


Figure 1. Determining deflection.

    b. The gunner sets the announced deflection on his sight and lays on the aiming point--the compass (Figure 1). He centers the traversing assembly slide, and then centers the mortar to

**Performance Steps**

the rear of the carrier. He directs the driver to pivot the carrier to obtain an approximate correct sight picture on the compass. With the assistant gunner, the gunner traverses and cross-levels the mortar until he obtains the correct picture on the compass. (The traversing mechanism must be within two turns of center traverse.) When using the M2 compass, only one lay is required. The mortar is now laid on the approximate grid azimuth.

2. During the time required to lay the mortar, the gunner guides the ammunition handler in placing out the aiming posts.

NOTE: The carrier-mounted mortar section can be laid on the mounting azimuth using the compass-mil method by first laying the base mortar on the mounting azimuth using the technique previously described. Then, by using the mortar sight, the other mortars are reciprocally laid.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, information, and personnel given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to determine the deflection to be placed on the mortar sight, then to give the gunner the reading.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Placed the compass on the compass stake so that compass was leveled. | ____ | ____ |
| 2. Directed the carrier to move into position with rear of carrier pointed in general direction of fire. | ____ | ____ |
| 3. Determined grid azimuth to mortar. | ____ | ____ |
| 4. Determined deflection to be placed on mortar sight to within 10 mils. | ____ | ____ |
| 5. Announced the deflection to the gunner. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

NOTE: Shifting the carrier and laying the sight on the compass are not part of this test.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1290-333-15 |

**Lay a Ground-Mounted Mortar Using an M2 Compass**

**071-321-4009**

**Conditions:** As the squad leader, given an M2 compass with the declination constant indexed; a prescribed mounting azimuth; squad members; and mortar complete with sight, aiming posts, and baseplate stake.

**Standards:** Positioned baseplate stake where the mortar was to be mounted, and aligned the directional stakes to within 20 mils of the prescribed mounting azimuth.

**Performance Steps**

To quickly lay the section parallel, perform a reciprocal lay using the M2 compass. Use this method only when an aiming circle is not available or when time dictates, since it is not as accurate as the other methods.

1. Before mounting the mortars, each squad leader puts a baseplate stake in the ground to mark the location of his mortar.
2. The section leader announces the desired mounting azimuth; for example, "Mount mortars, azimuth two two zero zero."
3. Each squad leader places his compass on the baseplate stake to mark the location of his mortar, and orients the compass on the mounting azimuth. He sights through the compass, and directs the second ammunition handler to align the aiming posts along the mounting (grid) azimuth.
4. Each mortar is mounted (baseplate is positioned to the baseplate stake as shown in the task on ground-mounting), and is laid on the aiming posts, with a deflection of 3200 mils set on the M53 sight (zero on the M34A2 sight). If no error exists, the mortars are now laid parallel; however, both mechanical and human error can easily occur.

NOTE: There are differences in compasses; therefore, the section sergeant may direct that all mortars be laid with one compass to avoid some error. It is also possible to lay the base mortar only as described, and then to lay the other mortars parallel using the mortar-sight method. In any event, use the compass method only when the aiming circle or mortar-sight method is not feasible.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, personnel, and information given in the task condition statement. Provide an aiming circle to check the lay of the mortar and provide the mounting azimuth.

BRIEF SOLDIER: Tell the soldier to emplace the mortar using the compass method of lay. Tell him to use the aiming circle to verify that the mortar is laid within 20 mils of the mounting azimuth.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Emplaced the baseplate stake. | ____ | ____ |
| 2. Emplaced the compass on the baseplate stake. | ____ | ____ |
| 3. Directed the emplacement of the directional stake. | ____ | ____ |
| 4. Directed the mounting of the mortar. | ____ | ____ |
| a. Ensured that the baseplate was correctly positioned to the baseplate stake. | | |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|

b. Ensured vertical crosshair in sight was within 2 mils of directional stake.

c. Ensured traversing bearing was within two turns of center.

d. Ensured mortar was laid within 20 mils of the mounting azimuth.

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | TM 9-1290-333-15 |

Skill Level 3

Subject Area 9: MOVE: BASIC TACTICS

**Direct a Driver Over a Terrain Route**

**071-326-3001**

**Conditions:** Given a tactical vehicle, a driver, a 1:50,000-scale topographic map of the area, an enemy situation, and a mission to move from one point to another.

**Standards:** Selected the best route from one point to another and directed the movement of the vehicle over this route, observing all terrain driving rules.

**Performance Steps**

1. Give the driver clear, specific instructions as to the route that affords the best use of available cover and concealment (Figure 1).

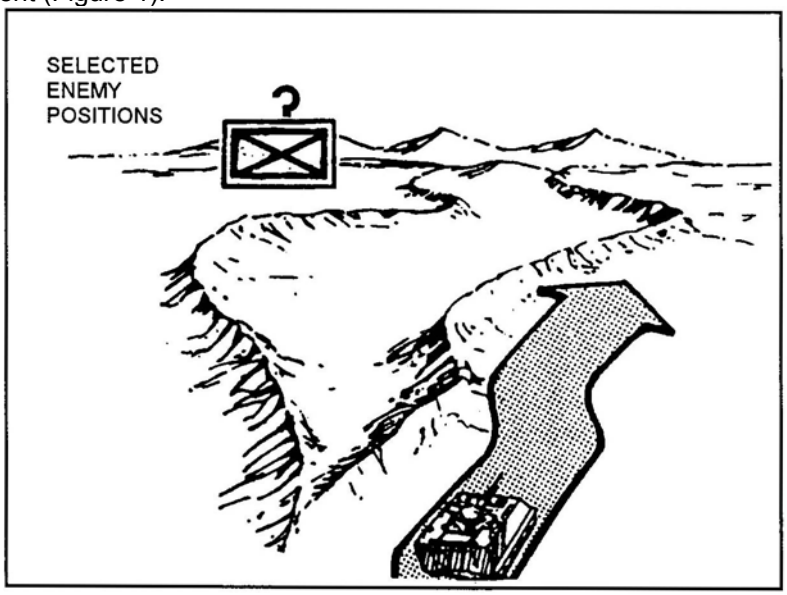



Figure 1. Choose route cover and concealment.

**Performance Steps**

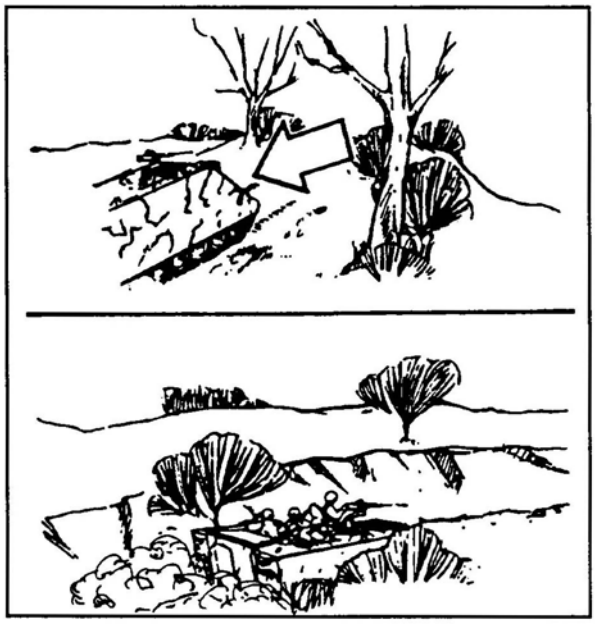


Figure 2. Move from defilade or hull-down firing position.

2. Follow these terrain-driving rules to reduce exposure to effective enemy fire and detection:
   a. Never skyline or move directly forward from a defilade or hull-down firing position (Figure 2).
   b. Avoid dusty terrain when possible, since it betrays the movement of armored vehicles (Figure 3).

Figure 3. Select terrain.

   c. Use all available cover and concealment.
   d. Try to leave the terrain looking as natural as possible to make tracking by the enemy harder (Figure 4).

**Performance Steps**

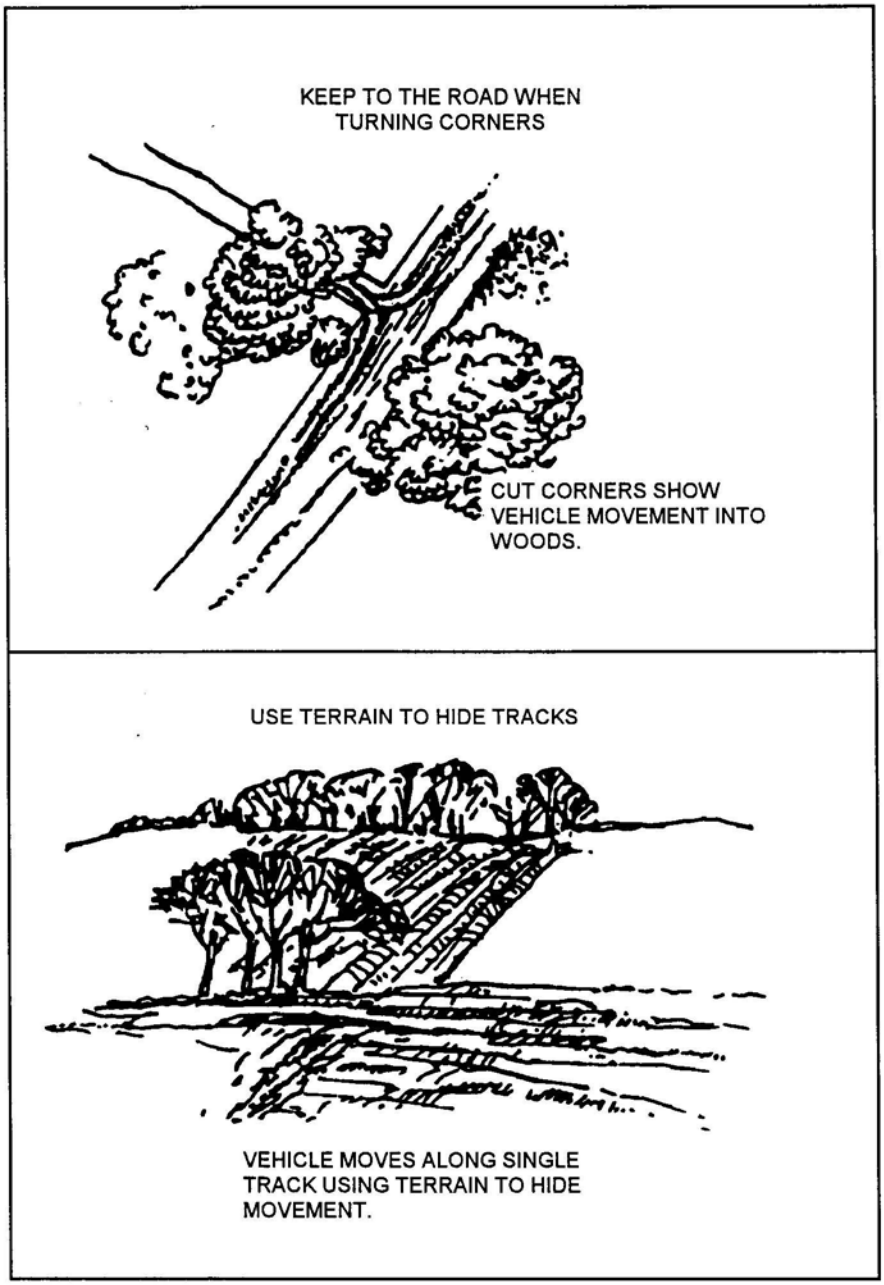



Figure 4. Hide tracks.

e. To cross an open area (as in emerging from a woodline, crossing a ridge, and so forth), check it first for possible enemy positions, then cross it quickly (Figure 5). If enemy locations are identified or suspected, suppress or smoke them before crossing. Cross the open area as rapidly as possible from one covered position to the next.

**Performance Steps**

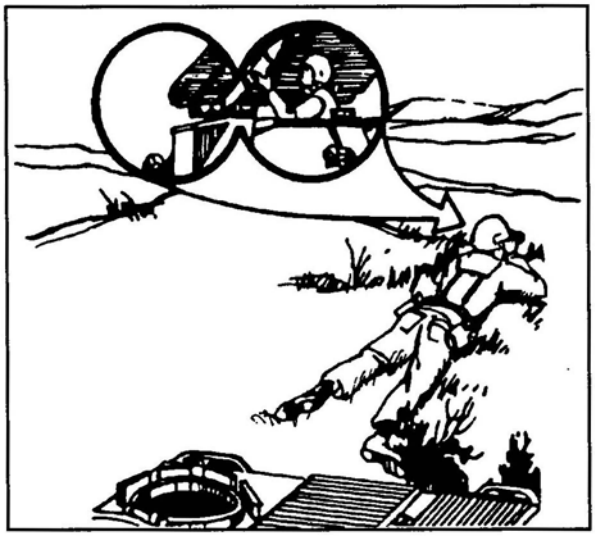


Figure 5. Plan routes.

f. Where covered or concealed routes are not available, or when their use would be time consuming, plan routes that have "escape valves" available (Figure 6). The figure shows how a dense tree line provides protection from Saggers.

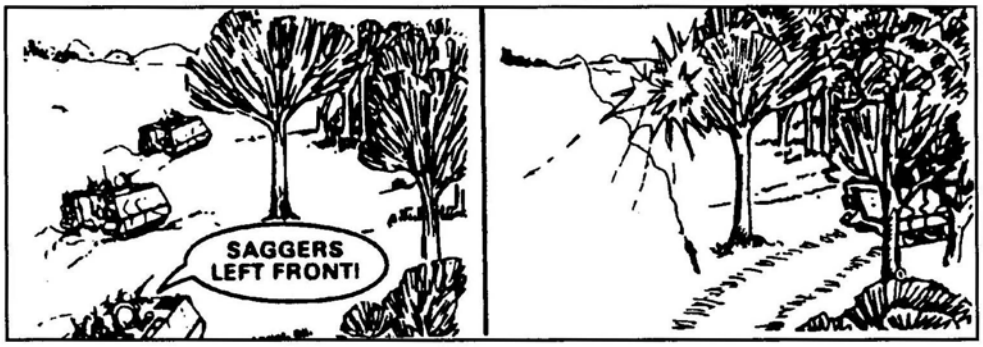



Figure 6. Use terrain.

**Evaluation Preparation:** SETUP: At the test site, provide a vehicle, driver, map, and all information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to select the exact terrain route for the vehicle and direct the driver over the route. The soldier will be given the enemy situation, the mission, a vehicle, and a driver to move from one point to another.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Gave clear and specific instructions as to routes that afforded the best cover and concealment. | ____ | ____ |
| 2. Followed the correct terrain driving rules.<br>a. Did not skyline or move directly forward from a defilade or hull-down firing position.<br>b. Avoided dusty terrain.<br>c. Used available cover and concealment.<br>d. Left terrain looking as natural as possible. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 3. Used proper procedures to cross open areas. | ____ | ____ |
| 4. Planned routes with escape valves available. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 7-7 |
| | FM 7-7J |

**Establish a Helicopter Landing Point**

**071-334-4002**

**Conditions:** Given an area to be prepared for the landing site; smoke grenades; strobe lights, flashlights, or vehicle lights; marker panels; and equipment and personnel to clear the site when required.

**Standards:** Identified landing site large enough for a helicopter to land and take off. All obstacles that cannot be removed are marked or identified, and the touchdown site is designated.

**Performance Steps**

CAUTION:

1. Comply with unit SOP and or local environmental regulations concerning the cutting of live vegetation, digging holes, and or erosion prevention.

1. Select a landing site. The factors which should be considered are:
   a. The size of the landing site.
      (1) A helicopter requires a relatively level landing area 30 meters in diameter. This does not mean that a loaded helicopter can land and take off from an area of that size. Most helicopters cannot go straight up or down when fully loaded. Therefore, a larger landing site and better approach and departure routes are required.
      (2) When obstacles are in the approach or departure routes, a 10 to 1 ratio must be used to lay out the landing site (Figure 1). For example, during the approach and departure, if the helicopter must fly over trees that are 15 meters high, the landing site must be at least 150 meters long (10 x 15 = 150 meters).

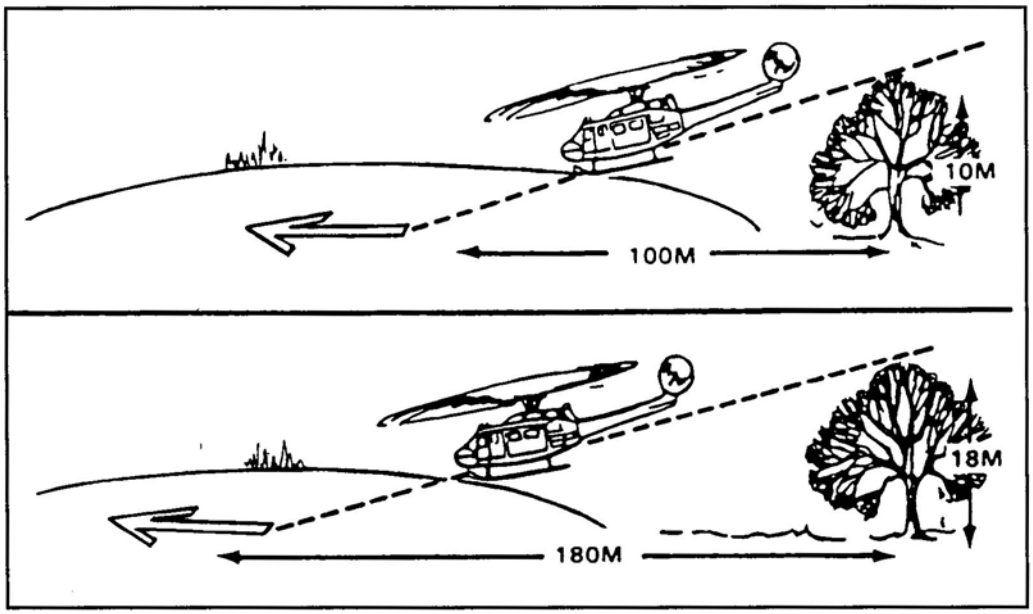



Figure 1. Landing site distance from obstacles.

   b. The ground slope of the landing site (Figure 2). When selecting the landing site, the ground slope must be no more than 15 degrees. Helicopters cannot safely land on a slope of more than 15 degrees.

**Performance Steps**

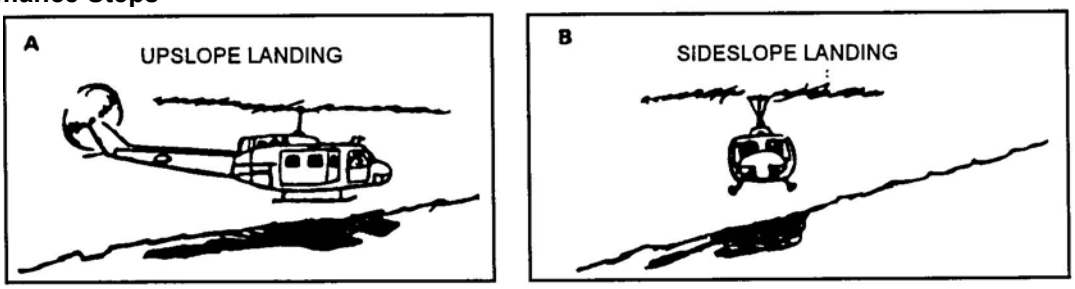



Figure 2. Ground slope of landing site.

(1) When the ground slope is under 7 degrees, the helicopter should land up slope (Figure 2, A).
(2) When the ground slope is 7 to 15 degrees, the helicopter must land side slope (Figure 2, B).

c. Surface conditions.
(1) The ground must be firm enough that the helicopter does not bog down during loading or unloading. If firm ground cannot be found, the pilot must be told. He can hover at the landing site during the loading or unloading.
(2) Rotor wash on dusty, sandy, or snow-covered surfaces may cause loss of visual contact with the ground. Therefore, these areas should be avoided.
(3) Loose debris that can be kicked up by the rotor wash must be removed from the landing site. Loose debris can cause damage to the blades or engines.

d. Obstacles.
(1) Landing sites should be free of tall trees, telephone lines, power lines or poles, and similar obstructions on the approach or departure ends of the landing site.
(2) Obstructions that cannot be removed (such as large rocks, stumps, or holes) must be marked clearly within the landing site.

2. Establish security for the landing site. Landing sites should offer some security from enemy observation and direct fire. Good landing sites will allow the helicopter to land and depart without exposing it to unneeded risks. Security is normally established around the entire landing site.

3. Mark the landing site and touchdown point.
a. When and how the landing site should be marked is based on the mission, capabilities, and situation of the unit concerned. Normally, the only mark or signals required are smoke (colored) and a signalman. VS-17 marker panels may be used to mark the landing site, but MUST NOT be used any closer than 50 feet to the touchdown point. In addition to identifying the landing site, smoke will give the pilot information on the wind direction and speed.
b. At night, the landing site and touchdown points are marked by an inverted "Y" composed of four lights. Strobe lights, flashlights, or vehicle lights may also be used to mark the landing site. The marking system used will be fully explained to the pilot when contact is made (Figure 3).

**Performance Steps**

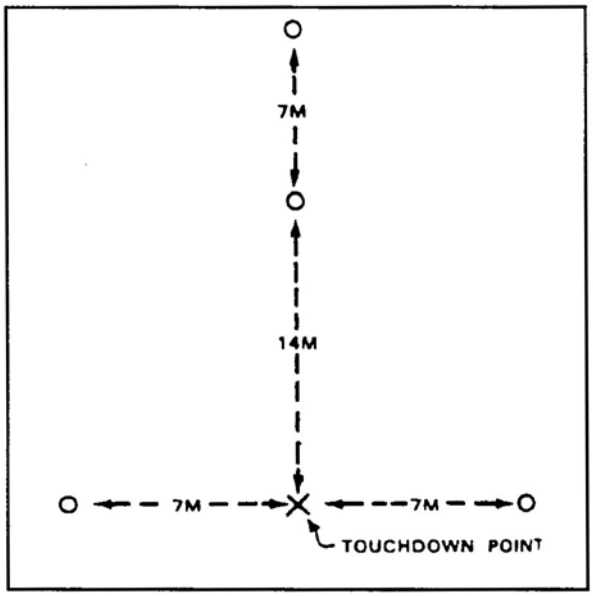



Figure 3. Landing site marked at night.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, information, and personnel given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to select and prepare a helicopter landing site.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Selected a site large enough to permit the helicopter to land and take off. | ____ | ____ |
| 2. Removed or mark all obstacles and debris. | ____ | ____ |
| 3. Marked or identified the landing site and the touchdown point. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| FM 7-8 | FM 21-60 |

## Conduct a Leader's Reconnaissance

**071-410-0010**

**Conditions:** Given a squad-sized element occupying an objective rally point (ORP) and a requirement to conduct final preparation for the leader's reconnaissance and actions at the objective.

**Standards:** The reconnaissance confirms the best covered and concealed routes, avenues of approach, overwatch positions, threat positions, surveillance points, and other mission-essential requirements.

**Performance Steps**

1. Upon occupying the ORP and establishing security, the squad leader conducts his map reconnaissance and prepares to conduct the leader's reconnaissance. The squad leader tells the soldier in charge of the ORP:
   a. Who will be going with him.
   b. How long he will be gone.
   c. What to do if he fails to return.
   d. What to do if the reconnaissance party makes contact with the enemy.
   e. What to do if the ORP makes contact with the enemy.
2. The squad leader takes a compass man and the team leaders with him on the leader's reconnaissance of the objective.
3. During the leader's reconnaissance, the squad leader points out the objective and picks the positions for the squad members. He determines the best covered and concealed routes and avenues of approach. He selects overwatch positions and surveillance points. He determines threat positions, and gets any other information that can be used to either confirm or alter the plan, based on METT-TC.
4. After the reconnaissance is completed, everyone returns to the ORP. There the squad leader shares the information obtained and completes his plans.

**Evaluation Preparation:** SETUP: This task should be evaluated during a field training exercise. Otherwise, assign an objective and an ORP and provide troops to be team leaders and compass man.

BRIEF SOLDIER: Tell the soldier to conduct a leader's reconnaissance of the assigned objective. Issue an operation order containing the information that would have been provided when the mission was assigned.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Updated the map reconnaissance. | ____ | ____ |
| 2. Selected the personnel to accompany you on the reconnaissance. | ____ | ____ |
| 3. Moved to the objective. | ____ | ____ |
| 4. Evaluated each of the following using METT-TC.<br>a. Covered and concealed routes.<br>b. Avenues of approach.<br>c. Overwatch positions.<br>d. Threat positions.<br>e. Surveillance points. | ____ | ____ |
| 5. Returned to the ORP. | ____ | ____ |
| 6. Shared information. | ____ | ____ |
| 7. Completed the plan. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 8. Prepared to move out to the objective. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 7-7<br>FM 7-7J<br>FM 7-8 |

Subject Area 10: MOVE: DEFENSE/OFFENSE

**Reorganize a Unit**

**071-430-0029**

**Conditions:** Given a squad leader with squad, or platoon sergeant with platoon, or mortar section sergeant, or acting platoon leader defending as part of a larger unit; your element has just repelled an enemy assault.

**Standards:** Reorganized the unit (squad, platoon, or mortar section) in the defense following enemy contact.

**Performance Steps**

1. The platoon leader must plan the required reorganization of the platoon while defending (either deliberate or hasty). He must include his plan in the order to the squad leaders. The plan must be tentative and flexible and may be changed as the situation evolves. The leader's plan must be complete and detailed as possible.
2. Reorganize a unit:
    a. Reestablish the chain of command; fill all key positions from the remaining element members and ensure the new chain of command is disseminated down to the last member of your element.
    b. Evacuate the dead and seriously wounded according to your casualty evac plan; ensure all positions and sectors remain mutually supporting; check all sectors of fire after all casualties are evacuated to ensure all sectors are covered; If necessary, shift positions or reassign sectors to cover any gaps in your sector.
    c. Redistribute or resupply ammunition, weapons, and fuel; ensure the squad leaders pass out additional ammunition (if available), or divide the remainder equally throughout the squad or platoon; conduct a quick inventory and submit a supply request to higher if necessary.
    d. Ensure all enemy prisoners of war (EPWs), enemy material, and enemy information are collected, reported, and evacuated. (if possible)
    e. Ensure all crew-served weapons are manned and positioned on likely avenues of approach.
    f. Issue to higher headquarters, a LACE report to include:
        (1) L - Liquid, how much water each soldier has left (canteens per).
        (2) A - Ammunition, how much ammunition does the squad or platoon have per man (after redistribution).
        (3) C - Casualties, how many casualties did the squad or platoon encounter.
        (4) E - Equipment, how much special equipment does the squad and platoon have remaining.
3. For mortar section:
    a. Reestablish section communications.
    b. Reestablish the FDC

**Evaluation Preparation:** SETUP: Provide a squad or platoon in an established defensive position, simulated casualties, simulated EPWs, simulated destroyed crew-served weapons, blank ammunition, and a communication network.

BRIEF SOLDIERS: This task should be conducted and evaluated in a realistic field environment using a realistic combat scenario.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Reestablished and disseminated the chain of command. | ____ | ____ |
| 2. Evacuated the dead and seriously wounded. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 3. Ensured all positions remained mutually supporting. | ____ | ____ |
| 4. Checked sectors of fire. | ____ | ____ |
| 5. Redistributed or resupplied ammunition, weapons, and fuel if needed. | ____ | ____ |
| 6. Ensured squad leaders and platoon sergeants passed out additional ammunition if available. | ____ | ____ |
| 7. Ensured all EPWs were reported and evacuated ASAP. | ____ | ____ |
| 8. Ensured all crew-served weapons were manned. | ____ | ____ |
| 9. Issued a LACE report to higher headquarters. | ____ | ____ |
| 10. Reestablished section communications (mortar section). | ____ | ____ |
| 11. Reestablished the FDC (mortar section). | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| FM 7-8 | FM 23-90 |
| | FM 7-10 |
| | FM 7-7 |
| | FM 7-7J |

Subject Area 13: MOVE: SPECIALIZED MISSIONS

**Conduct a Relief**

**071-450-0027**

**Conditions:** In a tactical environment, as the acting platoon leader in a BFV platoon, given a mission to conduct a relief as part of the company.

**Standards:** The platoon's specified and implied task received and analyzed from the company's operation order is accomplished. A warning order is issued to start initial preparation and movement.

**Performance Steps**

1. The plan for the relief considers the subsequent mission for both the relieved and relieving platoon.
2. Detailed planning is executed concerning the time required to conduct the relief.
3. The plan allows for both a daylight and night reconnaissance, so that all leaders are able to identify positions, routes, and assembly areas.
4. Planning considered as a minimum:
   a. Times for starting and completing the platoon's routes.
   b. Routes, guides, and assembly areas for each squad/section.
   c. Critical control measures (signals, contact points, and checkpoints).
   d. Sequence of squad/section relief.
   e. Maximum use of limited visibility.
   f. Adjustment for dissimilarities in unit equipment.
   g. Provisions to maintain unit and tactical integrity.
   h. When change of sector responsibility would occur.
   i. Assembly areas and appropriate of guides.
5. Supervision for the relief included rehearsal of all approved phases of the plan when time, troop availability, and tactical situation allowed.

**Evaluation Preparation:** SETUP: This task will be evaluated during the conduct of a platoon or larger tactical exercise. The fire team or BFV section will maneuver as part of the platoon or larger element conducting a movement to contact or deliberate relief in place.

BRIEF SOLDIER: Tell the soldier that he is the platoon leader moving as part of a larger element of the company. Upon contact the soldier must maneuver the platoon/section and conduct a deliberate relief in place.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Conducted movement minimizing use of checkpoints without massing troops. | ____ | ____ |
| 2. Exchanged current enemy information between leaders. | ____ | ____ |
| 3. Accomplished communications security through the use of wire. | ____ | ____ |
| 4. Exchanged range cards (DA Form 5517-R), target lists, and sector sketches with the incoming squad/section and platoon leaders. | ____ | ____ |
| 5. Transferred key weapons where identified and coordinated. | ____ | ____ |
| 6. Coordinated and transferred all classes of supplies. | ____ | ____ |
| 7. Coordinated responsibility for sector as planned. | ____ | ____ |

**Evaluation Guidance:** Score the soldier a GO if all performance measures are passed. Score the soldier a NO-GO if any performance measure is failed. If the soldier scores a NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
| --- | --- |
| | FM 3-90.1 |
| | FM 7-20 |

## Conduct a Passage of Lines

**071-450-0030**

**Conditions:** In a combat environment, given a platoon and a mission requiring a passage of lines.

**Standards:** Identified routes to assembly area, occupied the assembly area, contacted the friendly unit, and exchanged recognition signals, linked up with guides, moved through the friendly lines and obstacles.

**Performance Steps**

1. Occupy the assembly area (or initial rally point). Contact the forward unit.
2. Coordinate the passage of lines with the forward unit commander or with a designated representative.
   a. Provide the stationary unit with the passing unit's-
      (1) Identification and size.
      (2) Departure and return times.
      (3) Area of operation.
      (4) Any other special information.
   b. Obtain information about the current situation, to include-
      (1) Known or suspected enemy locations.
      (2) Likely enemy ambush sites.
      (3) Latest enemy activity.
      (4) Detailed location information of all nearby friendly forces.
      (5) Obstacle locations.
      (6) Fire plan.
      (7) Friendly support available.
      (8) Signal operation instructions (SOI).
      (9) Locations of contact and passage points.
      (10) Primary and alternate routes.
      (11) Contingency plans.
      (12) Guides (if needed).
3. Control the passage of lines.
   a. Move to initial rally point, if required. Conduct final coordination with forward commander and guide (if any).
   b. Move the unit to a covered and concealed position near the passage point.
   c. When necessary, have the security team clear the area forward of the passage point to the first covered and concealed position. Signal the unit.
   d. Move unit to passage point.
   e. Guide is told how long to wait at release point and running password is confirmed.
   f. Make a security halt beyond friendly units direct fire support.

**Evaluation Preparation:** SETUP: At the test site, provide the materials and information according to the task condition statement.

BRIEF SOLDIER: Tell the soldier to identify routes to the assembly area, occupy the assembly area, contact the friendly unit, and link up with guides.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Occupied assembly area (or initial rally point). Contacted forward unit. | ____ | ____ |
| 2. Coordinated with the forward unit. | ____ | ____ |
| 3. Controlled the passage of lines.<br>a. Moved unit to covered and concealed position near the passage point. | ____ | ____ |

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| b. Ensured that security team cleared and secured the first covered and concealed position forward of the passage point. | | |
| c. Moved the unit through the passage point. | | |
| d. Made a security halt. | | |

**Evaluation Guidance:** Score the soldier a GO if all performance measures are passed. Score the soldier a NO-GO if any performance measure is failed. If the soldier scores a NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | ARTEP 7-8-MTP |
| | FM 7-20 |
| | FM 7-7J |

Subject Area 14: MOVE: URBAN OPERATIONS

**Select a Mortar Position During an Urban Operation**
**071-440-0026**

**Conditions:** Given a mortar complete, crew members, aiming posts, filled sandbags or building rubble, and two No. 10 cans.

**Standards:** Prepared a mortar position and mounted the mortar so that the mortar is safe to fire, and firing will cause the least amount of damage to the baseplate and bipod.

**Performance Steps**

1. The high-angle fire of mortars gives the commander a valuable means of providing indirect-fire support during an urban operation. The high rate of fire and short minimum range (70 meters for the 60-mm/81-mm mortar; 720 meters for the 4.2-inch mortar; and 200 meters for the 120-mm mortar), combined with the high angle of fire, let the mortar engage targets other weapons cannot engage.
2. The selection of a mortar position in an urban environment depends on the size of buildings, the size of the built-up area, and the sector to be covered. Mortars can be fired through the roof of a ruined building if the ground-level flooring is solid enough to withstand the recoil.

NOTE: Do not place mortars on top of buildings.

3. Mortars should be mounted on dirt. However, if the mission requires that mortars be mounted on a solid surface (concrete or asphalt), the crew must prepare a buffer upon which to mount the mortars.
   a. Sandbags are best to use as a buffer. A mortar is mounted on the sandbags with the back of the baseplate against a curb, wall, or other solid object. This prevents the baseplate from kicking backward when fired. Placing a sandbag on each side of the baseplate weighs it down and reduces bounce when firing.
   b. Building rubble (brick, cinder blocks) can be further broken up to form a buffer on which to mount the baseplate when sandbags are not available.
   c. When using sandbags or rubble under the baseplate, the squad leader or gunner must ensure the feet of the bipod are at the same height as the baseplate.
4. The best method for positioning the aiming posts is to place posts in cans filled with dirt. This allows easy movement or alignment of the posts.
5. When selecting the mortar position, mortar crews should use all available cover and concealment for protection from snipers.

**Evaluation Preparation:** SETUP: Provide a test site that meets the requirements of the task, and all material, equipment, and personnel given in the task condition statement.

BRIEF SOLDIER: Tell the squad leader of the general location of the mortar position and the direction of fire. Tell the crew that they are to construct the position so that the mortar will be safe to fire after it is mounted.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Prepared the base for the baseplate. | ____ | ____ |
| 2. Braced the baseplate to prevent kickback. | ____ | ____ |
| 3. Used sandbags on top of the baseplate to reduce bounce. | ____ | ____ |
| 4. Ensured bipod feet are about the same height as the baseplate when the mortar is mounted. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 5. Used the proper method to emplace the aiming posts. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 3-06.11<br>FM 7-90 |

Subject Area 16: NAVIGATE: GENERAL/COMPASS/MAP

**Determine Location Using Hasty Survey Techniques**
**071-500-0001**

**Conditions:** Given an M2 aiming circle, M16 plotting board, a map (1:50,000), two sections of aiming post, reflective or black tape, a number of small stakes and a hammer, and one assistant.

**Standards:** Perform a hasty survey with an accuracy of one unit of error in 100 units.
EXAMPLE: Starting point-base mortar 600 meters:
Azimuth: _+6 mils
Distance: _+6 meters, round up to next 10

**Performance Steps**

1. Determine the need to perform hasty survey.
   a. The platoon may be required to locate its own position more accurately than a map inspection permits.
   b. Locate primary, alternate, and supplementary positions accurately.
   c. The mortar position should be constantly improved to include a more accurate platoon center location.

2. Perform hasty survey. To conduct a hasty survey, two items are needed: a start point and an end point. The end point will be the mortar firing position. The start point of the hasty survey must be selected carefully. The start point can be any well defined object that can be identified on the ground and on the map of the area. This point could be a road junction, bridge, or building or any other identifiable object, natural or manmade. This start point should not be more than 1,000 to 1,500 meters from the intended mortar position. The longer the length of the survey, the greater the chance of error during the survey.

NOTE: Keep in mind that the accuracy of the grid of the mortar location or that of the firing correction obtained from a surveyed chart and based on the hasty survey is dependent upon the time, care, and accuracy employed in conducting a hasty survey.

   a. To start the hasty survey, place the M2 aiming circle over the selected start point and level it.
   b. Index the declination constant using the azimuth micrometer knob, and with the nonrecording (lower) motion, orient the magnetic needle toward north. Now the grid azimuth can be measured.
   c. Direct an assistant (the "post" man) to move toward the mortar position with the aiming post (subtense bar). The post man joins the two sections of the post together and places reflective or black tape stripes exactly 2 meters apart on the aiming post. The post then becomes a 2-meter subtense bar (Figure 1).

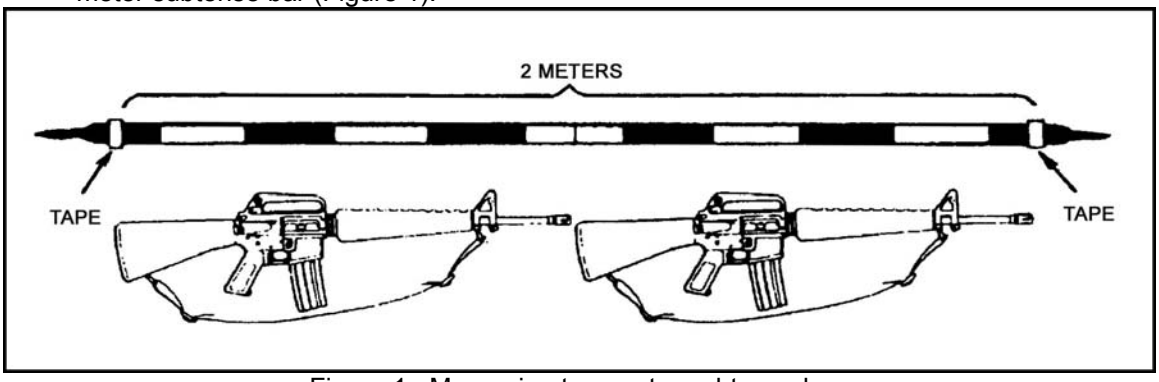



Figure 1. Measuring two-meter subtense bar.

NOTE: To construct the subtense bar, use a M16 series rifle. For the M16A1 rifle, use twice the length of

**Performance Steps**

the rifle to mark a length of two meters on the aiming posts. For the M16A2 rifle, use twice the length of the rifle, minus one length of the flash suppressor.

d. Tell the post man to move toward the desired mortar position until he has not exceeded approximately 290 meters--the maximum distance for the 2-meter subtense bar. Then, he places the post vertically on the ground, moving either right or left as directed by the aiming circle operator until stopped. At this point, the post man marks the ground and drives a stake into the ground. This point on the ground becomes Traverse Station 1 (TS-1).

e. With the post man again holding the post vertical on the stake, the aiming circle operator rotates the azimuth motion (upper motion) until the vertical crossline of the telescope is on the center of the post. The aiming circle operator records the azimuth to the post and labels it Traverse Station 1(TS-1)(Figure 2).

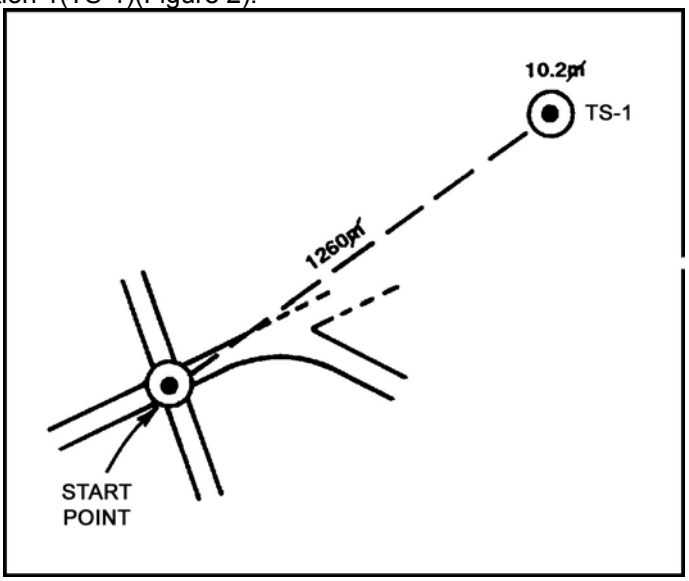



Figure 2. Start point and traverse station.

f. Direct the post man to pick up the post and hold it parallel to the ground, facing the aiming circle. Measure the mil angle between the two strips of tape on the subtense bar, and record the mil reading along with the azimuth to TS-1 (Figure 3).

**Performance Steps**

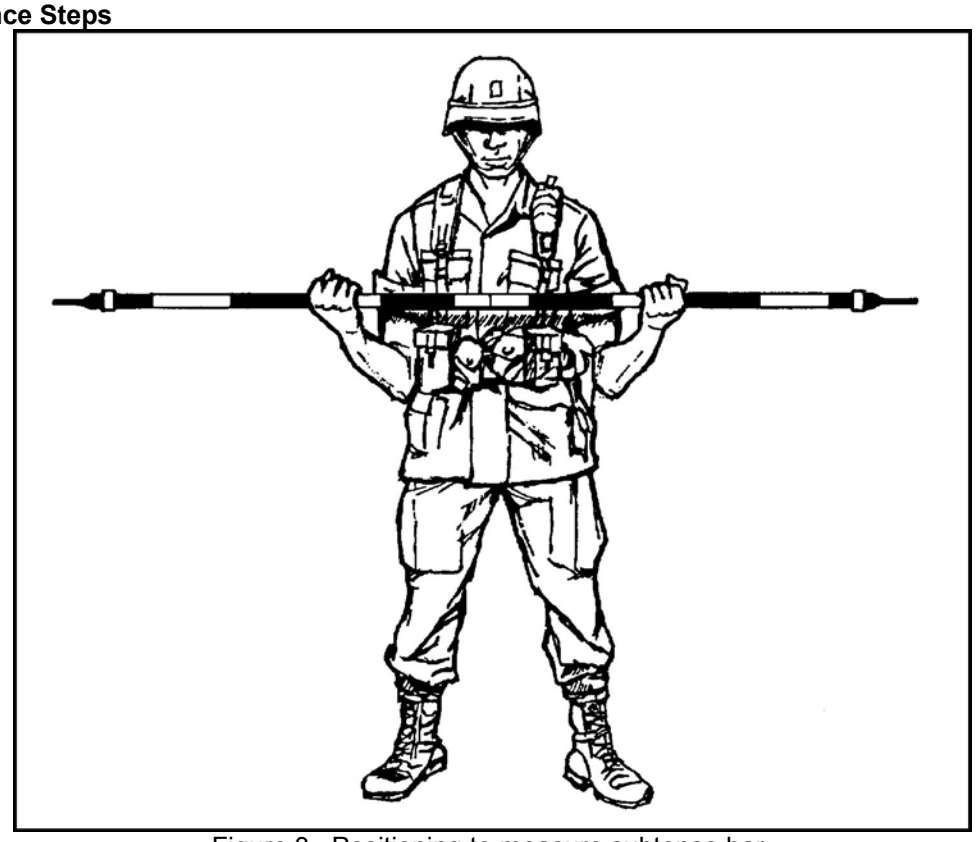


Figure 3. Positioning to measure subtense bar.

g. Move forward to TS-1, and set up the aiming circle directly over the stake that was driven in the ground. This completes the first traverse leg.
h. Repeat this process for each traverse leg until the mortar position is reached. The information obtained may be written down as an azimuth, a mil angle and a traverse leg, or a diagram may be constructed (Figure 4).

**Performance Steps**

START POINT
Road junction
LG 75879315

Grid Intersection
7894

MORTAR POSITION
Vicinity LG 767939

| TRAVERSE LEGS | AZIMUTH (mils) | MILS | DISTRIBUTION (meters) |
|---|---|---|---|
| 1 | 1260 | 10.2 | 200 |
| 2 | 1145 | 7 | 290 |
| 3 | 0010 | 8.2 | 250 |
| 4 | 0605 | 10.2 | 200 |
| 5 | 1600 | 10.2 | 200 |
| 6 | 0680 | 12 | 170 |

RECORDED DATA

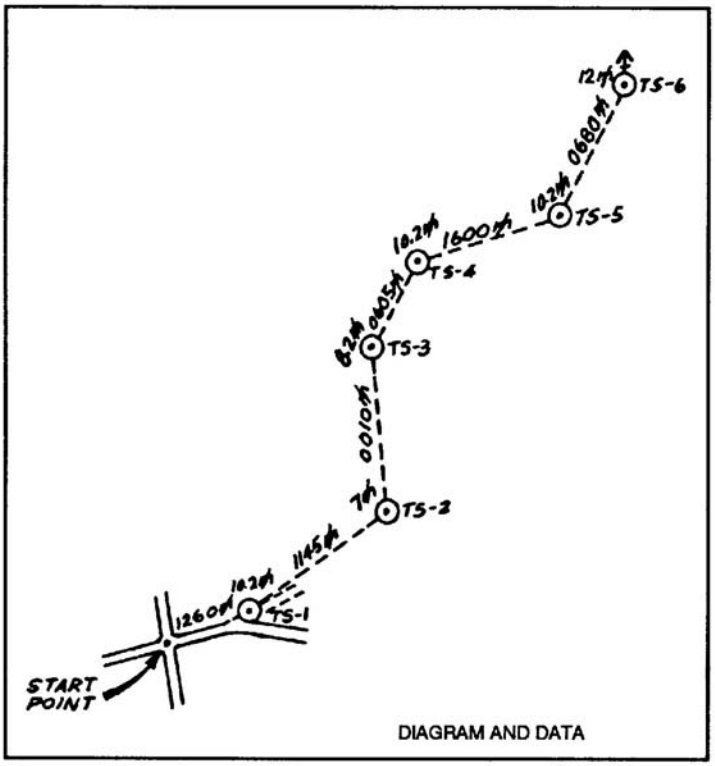



DIAGRAM AND DATA

Figure 4. Initial and survey data and constructed diagram.

3. Construct a diagram on the M16 plotting board.
   a. The aiming circle operator can give the data to the FDC as each traverse leg is completed or after all the legs have been completed. When plotting the data, the starting point is the pivot point of the M16 plotting board.
   b. The starting point for the hasty survey was the road junction located at grid LG 75879315. The mortar position is located at grid LG 767939 (Figure 5).

**Performance Steps**

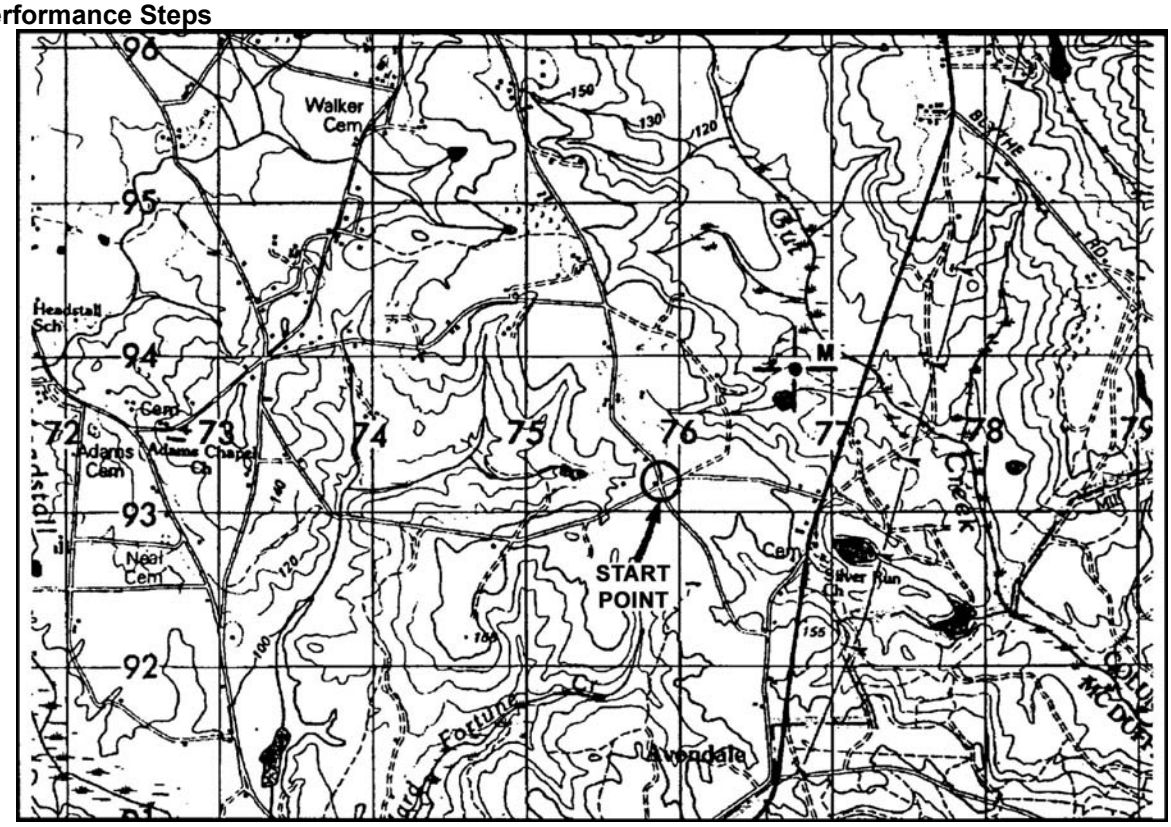



Figure 5. Selected start point of survey.

(1) Index the azimuth for the first traverse leg (1260 mils) on the plotting board. The measured distance between the two strips of tape on the aiming post (subtense bar) was 10.2 mils.

(2) Refer to the 2-meter subtense table; 10.2 mils is equal to a distance of 200 meters.

NOTE: For plotting the hasty survey data, break down the M16 plotting board into 25-meter squares, but use the M16 plotting board in the standard 50-meter-square mode to construct a diagram.

(3) From the pivot point, move 200 meters (8 squares) along the index line (ensure azimuth 1260 is indexed), place a dot, and circle it. Mark this point as TS-1 to complete traverse leg 1.

(4) The azimuth for the second traverse leg is 1145 mils. Once again, index this azimuth on the plotting board.

(5) For TS-2, the mil angle for the 2-meter subtense bar width was 7.0 mils; this equals a distance of 290 meters. Index 1145 mils on the plotting board, move a distance of 290 meters (5 4/5 squares) from TS-1 along or parallel to a vertical line, and place a dot. Circle it and mark it TS-2. Complete traverse legs 4, 5, and 6 using the same procedures (Figure 6).

**Performance Steps**

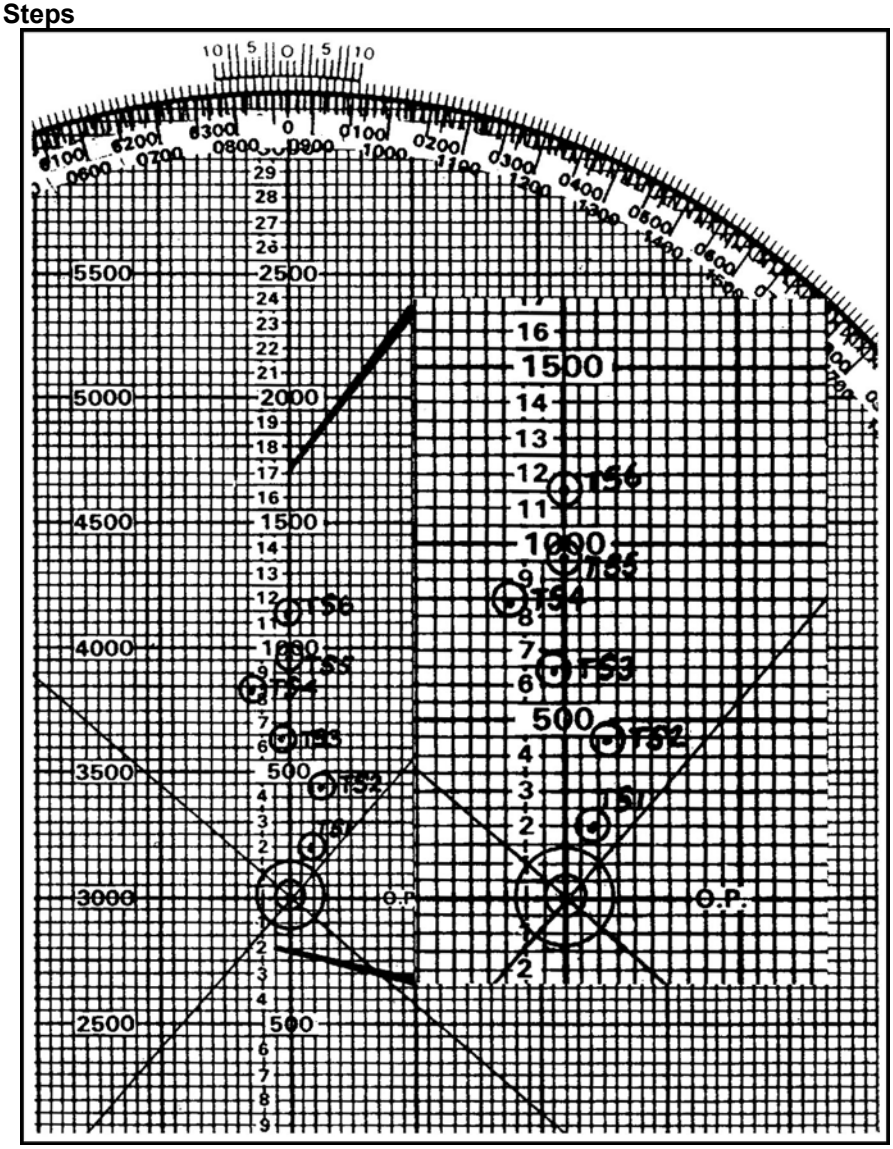



Figure 6. Plotted survey data from pivot point.

(6) Rotate the M16 plotting board until TS-6 (mortar position) is directly over the vertical centerline (Figure 6). Read the azimuth. This is the azimuth from the starting point to the base mortar position. Now determine the distance between the pivot point and TS-6. The result is the azimuth and distance from the start point to the base mortar position. From the starting point to the base mortar, the azimuth should have been 0873 mils and a distance of 575 meters (_+5 mils and 10 meters).

(7) Place this information on the map. From the start point along the direction of 0873 mils, move 575 meters. The eight-digit grid at that point is the eight-digit grid of the mortar position. The FDC can now set up a modified-observed chart. If the forward observer can find a point in his area of responsibility that can be identified to an eight-digit grid, then the FDC can set up a surveyed firing chart.

4. There is an alternate method of applying the results of the survey to the plotting board and obtaining the eight-digit grid of the base mortar.

5. Modified observed chart method.
   a. From a map inspection, you know the general location of the mortar position.

**Performance Steps**

b. Use this general location of the mortar position to determine the grid intersection to use in placing a grid system on the plotting board (Figure 4).
c. After placing the grid system on the plotting board, determine the eight-digit grid of the starting point (Figure 4). After ensuring that azimuth zero is indexed, plot the start point on the plotting board, enclose it in a hollow cross, and label it "SP" (starting point).
d. From this point, the procedure is the same as plotting from the pivot point. Index the azimuth of the first traverse leg, go up the board the distance given for the first traverse leg, and make an accurate plot, circle it, and label it (Figure 7).

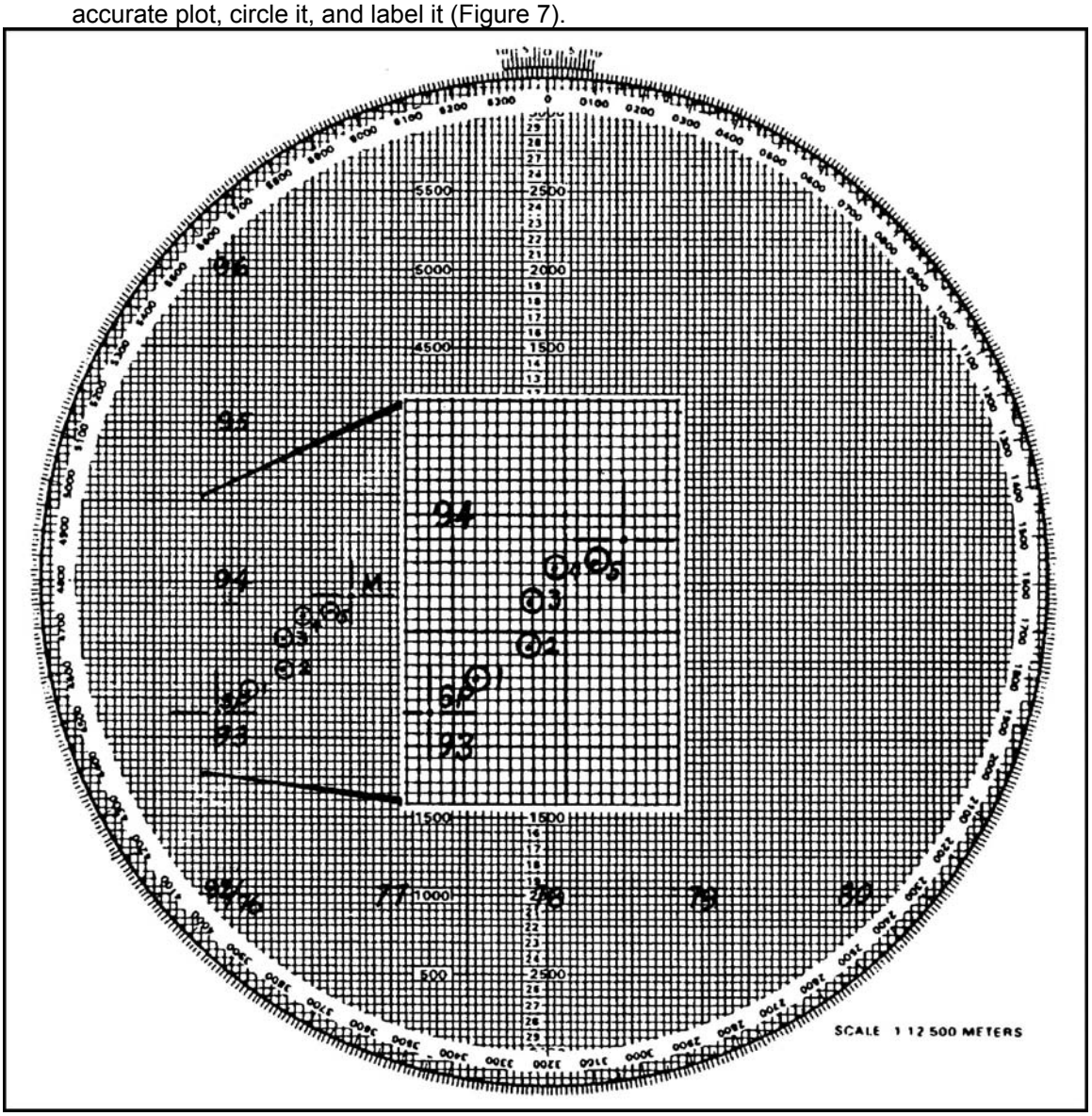



Figure 7. Plotted survey data from start point.

e. Continue this procedure for each traverse leg of the survey.
f. When making the last plot, enclose it in a hollow cross, and label it "M." This plot is the base mortar's position (Figure 7). Determine the eight-digit grid of this point and record it on your data sheet.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, materials, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to conduct a hasty survey, placing all traverse legs on the M16 plotting board and locating the new mortar position.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Set up the M2 aiming circle over the known point (start point). | ____ | ____ |
| 2. Directed the post man which direction to move. | ____ | ____ |
| 3. Measured the azimuth to the post held by the post man. | ____ | ____ |
| 4. Measured the mil angle between the two strips of tape on the subtense bar. | ____ | ____ |
| 5. Moved the aiming circle forward and correctly set up aiming circle over the end of the first traverse leg. | ____ | ____ |
| 6. Repeated Steps 1, 2, 3, and 4 until the base mortar is reached. | ____ | ____ |
| 7. Met task standards for an azimuth and distance. | ____ | ____ |

**Evaluation Guidance:** Score then Soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores a NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

Subject Area 20: RECON-SECURITY: OPSEC AND COMSEC

**Protect Classified Information and Material**

**301-348-6001**

**Conditions:** Given classified material, AR 380-5, local standard operating procedures (SOP), Standard Forms (SF) 700, 702, 703, 704, 705, and standard office supplies and equipment. This task is performed in all environments.

**Standards:** Maintained classified material under physical control and prevent unauthorized access 100 percent of the time.

**Performance Steps**

1. Determine official requirement for individual access to classified material.
    a. Identify the specific documents needed to accomplish official duties.
    b. Determine need-to-know. Ensure that access to classified information or material is required to perform official duties.

Note: No one has a right to have access to classified information solely by virtue of rank or position.

    c. Determine security clearance. Ensure that personal security clearance is equal to or exceeds the classification level of the material required to perform official duties.

2. Arrange to receive the documents from the document custodian.

3. Prevent unauthorized persons from gaining access to classified material.
    a. Place one of the following cover sheets on the classified material:
        (1) SF 705 for CONFIDENTIAL material.
        (2) SF 704 for SECRET material.
        (3) SF 703 for TOP SECRET material.
    b. Review documents for proper classification markings.
        (1) Ensure that each portion of a classified document is marked according to its content.
        (2) Ensure that each page is marked top and bottom according to the highest classification of information contained on that page.
    c. Examine all classified documents for completeness.
    d. Keep all classified documents under constant observation when removed from storage.
    e. Keep all classified documents face down or covered when not in use.
    f. Use one of the following methods when uncleared personnel enter the work area:
        (1) Place all classified material face down.
        (2) Cover the classified material.
        (3) Place classified material in a General Services Agency (GSA) approved security container.
    g. Use one of the following methods when departing the work area temporarily:
        (1) Give the classified material to a properly cleared individual who has a need-to-know.
        (2) Place the classified material in an approved security container.
    h. Do not give classified material to other persons without determining their-
        (1) Need-to-know.
        (2) Security clearance.
    i. Prevent display of classified material in public places.

4. Do not discuss classified information over nonsecure telephones. Conduct classified discussions only on-
    a. Approved secure communications circuits.
    b. Protected distribution systems installed in accordance with (IAW) National Communication Security (COMSEC) Instruction 4009.

5. Use the following procedures when working papers containing classified information are created:

**Performance Steps**

a. Date the document.
b. Mark the document with the words "Working Papers".
c. Mark each page, top and bottom, according to content.
d. When the document is no longer needed, destroy the document IAW the SOP for that document's level of classification.
e. Bring working papers under control as a finished document when-
   (1) Retained more than 90 days from date of origin.
   (2) Released outside the originator's agency.
   (3) Transmitted electrically or electronically.
   (4) Filed permanently.
   (5) Papers contain TOP SECRET information.

6. Use the following procedures when presenting a classified briefing:
   a. Ensure that the briefing area has been cleared to the highest level of material to be discussed.
   b. Check the attendance roster to ensure all personnel are cleared and have a need-to-know.
   c. Establish a sign-in roster at the main entrance to the briefing area and control access at all other entrances.
   d. Ensure that all training aids are marked with security classification according to their content.
   e. At the beginning of the briefing, inform the audience of the security classification of the briefing, and the policy concerning note taking.
   f. Repeat the security classification at the end of the briefing.

7. Protect classified material when transporting outside of a building.
   a. Double wrap classified material in opaque envelopes or similar wrapping
      (1) Mark the inner envelope with the overall classification of the contents.
      (2) Do not mark the outer envelope with any indication of the contents.
   b. During transportation, do not display classified material in public places.
   c. During transportation, do not store classified material in any detachable storage compartment, such as automobile trailers or luggage racks.
   d. During transportation, maintain constant observation of the classified package.

8. Secure all classified material in a proper storage container when that material is not in use.
   a. Return all classified material to the original custodian, if applicable.
   b. Secure all classified material in an appropriate security container, if applicable.
      (1) Place all classified material, to include typewriter ribbons, computer disks, notes, and similar materials in an approved security container.
      (2) Lock the security container.
      (3) Write date, time, and initials in the appropriate block of SF 702.
      (4) Turn the "OPEN/CLOSED" sign located on the front of the security container to the "CLOSED" position.
      (5) Ensure that another person checks the container to make sure it is locked and initials the SF 702.

9. Take action upon discovery of unsecured classified material.
   a. Use the following procedure when discovering a security container open and unattended:
      (1) Keep the container under guard or surveillance.
      (2) Immediately notify one of the persons listed on the SF 700 affixed to the container.

Note: If one of the individuals listed on the SF 700 cannot be contacted, notify the duty officer or commander.

   b. Use the following procedure when discovering unattended classified documents:
      (1) Take custody of the classified material.
      (2) Protect the material to prevent unauthorized access.
      (3) Immediately notify the Security Manager.

10. Destroy classified material when no longer needed IAW AR 380-5.

**Evaluation Preparation:** SETUP: Provide the soldier with the materials listed in the condition statement of this task.

BRIEF SOLDIER: Tell the soldier to protect the classified material. Note to the trainer: If this task is to be evaluated during training, prepare and provide the soldier material which is classified "FOR TRAINING PURPOSES ONLY". Ensure that the material is marked to this effect.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Determined requirement for access. | ____ | ____ |
| 2. Prevented unauthorized access to classified information.<br>a. Placed cover sheet on classified material.<br>b. Reviewed document for proper classification.<br>c. Accounted for all pages of document.<br>d. Kept classified material under constant observation.<br>e. Kept documents face down or covered when not in use.<br>f. Took appropriate action when uncleared persons enter the work area.<br>g. Took appropriate action when temporarily departing the work area.<br>h. Determined need-to-know and security clearance before releasing classified material to other persons.<br>i. Prevented display of classified material in public places. | ____ | ____ |
| 3. Prevented classified material from being discussed on the telephone. | ____ | ____ |
| 4. Protected classified material during transportation. | ____ | ____ |
| 5. Secured classified material when not being used.<br>a. Returned documents to original custodian, if applicable.<br>b. Locked classified material in an appropriate security container, if applicable. | ____ | ____ |
| 6. Took appropriate action upon discovery of unsecured classified material.<br>a. Secured classified material.<br>b. Notified appropriate official. | ____ | ____ |
| 7. Destroyed classified material if applicable in accordance with SOP for that level of classification. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If the soldier fails scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| AR 380-5 | |

Subject Area 22: SUSTAIN: GENERAL

**Coordinate with Supported Units**
**071-600-0009**

**Conditions:** Given an assignment as the section sergeant, platoon sergeant, or acting platoon leader of a TOW platoon or section attached to a unit participating in an offensive or defensive operation.

**Standards:** Coordinated with the supported unit, included the time and reporting location, the unit's mission, the friendly and enemy situation, and the logistical support your platoon or section will need.

**Performance Steps**
After receiving an order of attachment to a unit for an offensive or defensive operation, coordinate with the commander or leader of the supported unit. If you receive the order while other leaders are present, take that opportunity to coordinate as much as possible. This will help avoid delays in the operation. While many of the details will vary with the situation, essential items must always be coordinated.

1. In the offense, coordinate the following:
   a. Movement routes. Ensure that you and the supported unit can provide mutual support-by-fire, that you can maintain maneuver, and can cover the supported unit's movement routes.
   b. Visual signals such as arm and hand signals and pyrotechnics.
   c. Radio frequencies and call signs.
   d. Resupply.
2. In the defense, coordinate to ensure that you can provide interlocking TOW fires and mutually coordinate those fires with the supported unit. Coordinate--
   a. The location of the supported unit's primary, alternate, and supplementary positions.
   b. The sector(s) of fire.
   c. Dead spaces.
   d. TRPs.
   e. The location of any troops or vehicles forward of the FEBA.
   f. Signals.
   g. Patrols and ambushes (size, type, time of departure and return, and routes).
   h. Radio frequencies and call signs.
   i. Resupply.

**Evaluation Preparation:** SETUP: In the offense, provide a field location with varying terrain and give an operational briefing. In the defense, provide a field location with varying terrain, give an operational briefing, and assign sectors of fire.

BRIEF SOLDIER: Inform the element leader to coordinate with the commander/leader of the unit of attachment. Tell him whether the mission is to be an offensive or defensive operation.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Coordinated with the commander/leader for offensive operations.<br>a. Movement routes.<br>b. Visual signals.<br>c. Radio frequencies and call signs.<br>d. Resupply. | ____ | ____ |
| 2. Coordinated with commander/leader for defensive operations.<br>a. Location of primary position.<br>b. Location of alternate position.<br>c. Location of supplementary position.<br>d. Sector(s) of fire. | ____ | ____ |

**Performance Measures** **GO** **NO GO**

e. Dead space(s).
f. Locations of troops or vehicles forward of the FEBA.
g. Signals.
h. Patrols and ambushes (times and sites).
i. Radio frequencies and call signs.
j. TRPs.
k. Resupply.

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 7-8 |
| | FM 7-91 |

Subject Area 24: SUSTAIN: NBC

**Control Unit Radiation Exposure**

**031-503-4003**

**Conditions:** Given two or more dosimeter readings, commander's operational exposure guidance (OEG), paper, pencil, and a means of reporting information.

**Standards:** Determine radiation exposure status (RES) category and ensure it does not exceed the commander's OEG. There is no change in standards if performed in MOPP4.

**Performance Steps**

Note: Wearers of dosimeters should be in the same area doing activities similar to the rest of the platoon.

1. Obtain a reading from each dosimeter.
2. The dose reported should be the net amount received since last reading. If the dosimeter was not zeroed before this reading, subtract the first reading from the second reading.
3. Add the net dosimeter readings.
4. Divide the sum of the readings by the total number of readings.
5. Round averaged readings to the nearest whole number. Any final average of .5 or above should be rounded up, while any final average ending in a number below .6 should be rounded down. Example: 10 plus 15 = 25 (sum of readings) 25 divided by 2 = 12.5 Round 12.5 to nearest whole number.

Note: Radiation doses are cumulative. Add any previous dose received to the new dose to determine an accurate unit total radiation dose.

6. Determine the RES from the unit total radiation dose (see Table 7).
7. Compare the unit total radiation dose to the commander's OEG and ensure it is not exceeded.

Note: The commander's OEG is the level of radiation exposure that a commander does not want to exceed for his unit.

8. Report daily readings, total radiation dose, and the unit RES category to your supervisor/next higher headquarters or in accordance with (IAW) local Standard Operating Procedures (SOP).

**Evaluation Preparation:** Setup: Gather the items provided in the Conditions statement. Prepare two or more dosimeter readings on an index card or piece of paper to give the soldier being tested. One reading should be with the dosimeter not zeroed.

Brief Soldier: Tell the soldier being tested to collect and report the total radiation dose based on the dosimeter readings you provide. Tell the soldier the means of reporting the information.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Averaged the dosimeter readings.<br>a. If the dosimeter was not zeroed, subtracted first reading from second reading.<br>b. Added the net dosimeter readings.<br>c. Divided the sum of the readings by the total number of readings. | ____ | ____ |
| 2. Rounded the figure to nearest whole number. | ____ | ____ |
| 3. Determined the RES category. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 4. Ensured the commander's OEG is not exceeded. | ____ | ____ |
| 5. Reported daily readings, total radiation dose, and RES category. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any steps are failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| FM 3-3 | FM 3-100 |
| | FM 3-4 |

**Supervise Operational Decontamination**

**031-507-3003**

**Conditions:** Given a requirement to supervise hasty decontamination (decon), a contaminated unit with organic decon equipment and a battalion power-driven decontaminating equipment (PDDE) crew, an M12A1 power-driven decontaminating apparatus (PDDA) or M17 light weight decontaminating system (LDS), unit SOP, and FM 3-5.

**Standards:** 1. Coordinate with all necessary personnel to obtain required supplies, equipment, and support. 2. Ensure hasty decon procedures are performed in accordance with (IAW) unit Standard Operating Procedure (SOP) and FM 3-5. 3. Ensure hasty decon operation is completed in a timely manner, based on mission requirements.

**Performance Steps**

1. Coordinate operational decon.
    a. Ensure coordination with battalion for decon support.

Note: If Battalion assets are not available to provide decon support, battalion should coordinate with division (or brigade) for help.

    b. Ensure coordination with battalion/higher on site location and rendezvous.
    c. Ensure coordination with company supply section to deliver additional water requirements.

2. Supervise the operation of a hasty decon site.
    a. Make maximum use of the area to include overhead concealment.
    b. Monitor water consumption.

NOTE: If a water source is not available at the site, plan to use about 100 gallons of water for each armored personnel carrier.

    c. If existing facilities are being used, such as car washes and swimming pools, ensure facilities are able to handle the numbers of vehicles and/or largest vehicle.
    d. Ensure the proper drainage is maintained during decon operations.
    e. Ensure vehicles ENTER and EXIT the site properly.
    f. Ensure crews are briefed before performing decon:
        (1) Vehicles are concealed while awaiting washdown.
        (2) Maintain proper intervals between vehicles as they move through the site.
        (3) Wheeled vehicle crews dismount before washdown.
        (4) Tracked vehicle crews remain buttoned up during washdown.

Note: Local SOP should describe the rendezvous procedures for all parties involved to avoid confusion, delay, or confrontation with enemy forces.

    g. Ensure MOPP gear exchange runs concurrent with vehicle washdown.

3. Supervise the closure of the hasty decon site.
    a. Ensure the battalion PDDA crew properly marks the site and reports contamination.
    b. Ensure the battalion PDDA crew properly disposes contaminated items.

**Evaluation Preparation:** Setup: Evaluate this task during a field exercise or normal training session. Choose a site that has already been setup and/or operating. Have communications available for coordination of teams/materials.

Brief Soldier: Tell the soldier he will be evaluated on the ability to supervise hasty decon operations.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Coordinated a operational decon. | ____ | ____ |
| 2. Supervised a operational decon site. | ____ | ____ |
| 3. Supervised the closure of the operational decon site. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all steps are passed. Score the soldier NO-GO if any step is failed. If any step is failed, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
| --- | --- |
| FM 3-5 | |

Subject Area 52: WEAPONS: MORTARS

## Reciprocally Lay a Mortar Using an M2 Aiming Circle
## 071-074-0007

**Conditions:** Given a declinated aiming circle prepared for operation (oriented to magnetic North); a mounted mortar with crew and calibrated sights; a mounting azimuth; and an (optional) surveyed line of orientation.

**Standards:** Brought the 0- to 3200-mil line on the mortar sight to within 1 mil of parallel with the 0- to 3200-mil line on the aiming circle.

**Performance Steps**

1. Orient the aiming circle parallel to the mounting azimuth.
    a. Parallel to a grid azimuth.
        (1) Check setup and level of the aiming circle.
        (2) Determine the difference between the declination constant and grid azimuth. Declination Constant + 6400 Mils (if the grid azimuth is larger than the declination constant) = Factor - Grid Azimuth = the difference between the declination constant and the grid azimuth.
        (3) Apply the difference to the micrometer scale using the upper (recording) motion.
        (4) Reorient to magnetic north using the lower motion.
        (5) Do not disturb the lower motion until lay is complete, as the 0- to 3200-mil line is now oriented to the mounting azimuth.
    b. Parallel to a magnetic azimuth.
        (1) Check the orientation and level of the aiming circle.
        (2) Subtract the mounting azimuth from 6400.
        (3) Place the remainder on the micrometer scale using the upper (recording) motion.
        (4) Reorient to magnetic north using the lower motion.
        (5) Do not disturb the lower motion until lay is complete, as the 0-3200 line is now oriented to the mounting azimuth.

NOTE: For step 1c, the section leader disregards the north orientation given in the task standard. The orienting-line method precludes all magnetic errors associated with declination and preparation for operation. At this point, the aiming circle has been positioned to lay the section (or mortar).

    c. Parallel to an orienting line.
        (1) Check the orientation and lay of the aiming circle.

NOTE: If the mounting azimuth is the same as the orienting-line azimuth, disregard steps 2 and 3. If there is a difference between the mounting azimuth and the orienting line azimuth, include steps 2 and 3.

        (2) Subtract the lay azimuth from the orienting line azimuth.
        (3) Apply the difference to the deflection micrometer (moving the sight in a clockwise direction) using the upper motion.
        (4) Using the lower motion, rotate the instrument until a sight picture is obtained on the far end of the orienting line.
        (5) The 0- to 3200-mil line of the aiming circle is now oriented to the mounting azimuth.

2. Have gunner sight on the aiming circle.
3. Sight on the mortar sight lens.
4. Read/announce the aiming circle deflection to the mortar.
5. Have the gunner lay on the aiming circle.
6. Complete the lay.
7. Use a referred deflection.

**Evaluation Preparation:** SETUP: At the test site (a declination station), provide the soldier with all equipment and information as stated in the task condition statement, and paper and pencil.

BRIEF SOLDIER: Tell the soldier to set up the aiming circle and place it over the declination point using the plumb bob. Then, using the known azimuths to the azimuth marks, he must determine the declination for the aiming circle.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Oriented the aiming circle parallel to the mounting azimuth. | ____ | ____ |
| 2. Had gunner sight on the aiming circle. | ____ | ____ |
| 3. Sighted on the mortar sight lens. | ____ | ____ |
| 4. Read or announced the aiming circle deflection to the mortar. | ____ | ____ |
| 5. Had the gunner lay on the aiming circle. | ____ | ____ |
| 6. Completed the lay. | ____ | ____ |
| 7. Used a referred deflection. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

**Required**

**Related**
FM 23-91
TM 9-1290-262-10

**Conduct Occupation of a Mortar Firing Position by a Section**
**071-074-0010**

**Conditions:** Given a mortar section en route to a designated firing position.

**Standards:** The section occupied the firing position.

**Performance Steps**

1. Halt the section short of the objective.
   a. Stop the section as close as feasible to the proposed position without violating security, based on METT-TC.
   b. Coordinate procedures for moving forward after reconnaissance.
2. Perform reconnaissance. Determine whether the location meets the criteria for a mortar position, and if it is secure and free of mines, booby traps, and other obstacles that could interfere with mission accomplishment.
3. Secure the position. Take measures to preclude enemy surprises during occupation.
4. Provide guide(s) or move the section into the position.
5. Designate location of section facilities.
   a. Emplace directional stakes; mount the aiming circle and prepare to lay the section.
   b. Select a site for the FDC.
   c. Select tentative wire routes.
   d. Select locations for all administrative facilities such as latrines, access routes, and antennas.
6. Lay the section.
7. Establish the FDC.
8. Lay wire.
9. Construct mortar positions.
10. Construct fighting positions.
11. Camouflage positions.
12. Designate and construct alternate and supplementary positions.
13. Improve the position.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, personnel, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to supervise the initial emplacement of the mortar, prepare the ammunition, prepare the mortar position, and emplace the mortar in the prepared position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Halted the section short of the objective. | ____ | ____ |
| 2. Performed reconnaissance. | ____ | ____ |
| 3. Secured the position. | ____ | ____ |
| 4. Provided guide(s) or moved the section into the position. | ____ | ____ |
| 5. Designated locations of section administrative facilities. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 6. Laid the section. | ____ | ____ |
| 7. Established FDC. | ____ | ____ |
| 8. Laid wire. | ____ | ____ |
| 9. Constructed mortar positions. | ____ | ____ |
| 10. Constructed fighting positions. | ____ | ____ |
| 11. Camouflaged positions. | ____ | ____ |
| 12. Designated and constructed alternate and supplementary positions. | ____ | ____ |
| 13. Improved the position. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 7-90 |

## Recommend Employment of Mortars

**071-074-0015**

**Conditions:** Given a tactical situation in which the unit commander or his representative requires recommendations about the employment of mortars.

**Standards:** Made clear recommendations; presented the best possible courses of action; and based recommendations on the tactical situation (METT-TC), personal experience, the solicited advice of subordinates, and the capabilities and limitations of the mortar platoon or section.

**Performance Steps**

1. Analyze mission.
   a. An analysis was conducted, based on METT-TC, which includes issued orders, commander's intent, existing tentative plans, available intelligence, and reconnaissance as possible.
2. Make recommendations concerning the following aspects of mortar support:
   a. Command relationship.
   b. Priority of fires.
   c. Priority of targets.
   d. Types of fires.
   e. Locations and displacement of mortars

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to make recommendations on the employment of mortars.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Analyzed mission. | ____ | ____ |
| 2. Made recommendations concerning the aspects of mortar support. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 7-90 |

**Prepare Mortar Fire Plans**

**071-074-0016**

**Conditions:** As a section sergeant, given a standard 1:50,000-scale military map of the area and guidance from the unit commander that includes the locations of forward units; a scheme of maneuver; a known enemy location; avenues of approach; assembly areas; fires desired; the locations of mortar and artillery final protective fires (FPF); and the location of the command post.

**Standards:** Made recommendations to aid the commander and prepared a fire-support plan with a complete target list, including target descriptions and locations.

**Performance Steps**

NOTE: The fire-support officer (FSO) assists in preparing fire-support plans by making target recommendations to aid the unit commander in enforcing his planned operations. In the absence of the fire-support team (FIST), the performance steps in this task can help you prepare a fire-support plan.

1. The section sergeant considers planned targets to include known and suspected enemy locations and prominent or key terrain features.
   a. Known enemy locations. Plan fires on all known enemy locations that could hinder the supported unit's mission. Plan targets beyond the range of supporting weapons.
   b. Suspected enemy locations. These include such areas as probable observation posts, troop positions, assembly areas, avenues of approach, and routes of withdrawal. Plan these targets so that they are readily available if the target is confirmed.
   c. Prominent or key terrain features. These include hilltops, road junctions, buildings, objectives, and other locations easily identified on a map and on the ground. These targets are selected to deny their use to the enemy, to aid friendly forces in capturing the enemy, and to provide reference points from which to shift fires.

2. In the offense, the section sergeant plans targets from the line of departure (LD) to the objective; on the objective; and to the flanks of and beyond the objective. In the defense, he plans targets in front of positions, in front of friendly barriers and obstacles, on top of positions, on the flanks (to protect the force), and behind friendly positions.

3. The FIST makes a target list (Table 1), describing each target and its location. This list is submitted to the company commander to be incorporated into the unit fire-support plan. The target list is then sent to the FSO at battalion, to platoon FOs, to platoon leaders, and to the FDC.

**EXAMPLE: TARGET LIST**

| LINE NUMBER | TARGET NUMBER | DESCRIPTION | LOCATION | REMARKS |
|---|---|---|---|---|
| 1 | C | FPF | | |
| 2 | AA0050 | DEFENSIVE TARGET | 148834 | |
| 3 | AA0051 | DEFENSIVE TARGET | 159833 | |
| 4 | AA0052 | DEFENSIVE TARGET | 152833 | |
| 5 | AA0053 | DEFENSIVE TARGET | 153881 | |
| 6 | AA0054 | SUSPECTED OP | 148825 | |
| 7 | AA0160 | HILLTOP | 15039196 | |
| 8 | AA0161 | SUSPECTED OP | 150817 | |
| 9 | AA0162 | HILL | 1518080 | |
| 10 | AA0163 | ENEMY POSITION | 152802 | 100-Meter Zone |
| 11 | AA0164 | ROAD JUNCTION | 149838 | |
| 12 | AA0165 | CROSSROADS | 15028303 | |
| 13 | AC7010 | ROAD JUNCTION | 15528303 | |
| 14 | AC7011 | ROAD JUNCTION | 14288187 | |

Table 1. Example target list.

**Performance Steps**

4. The FSO must ensure that the platoon FOs, platoon leaders, and FDC computers know the fire plan. Target overlays (Figure 1) should be provided to them and to the company commander, if time permits.

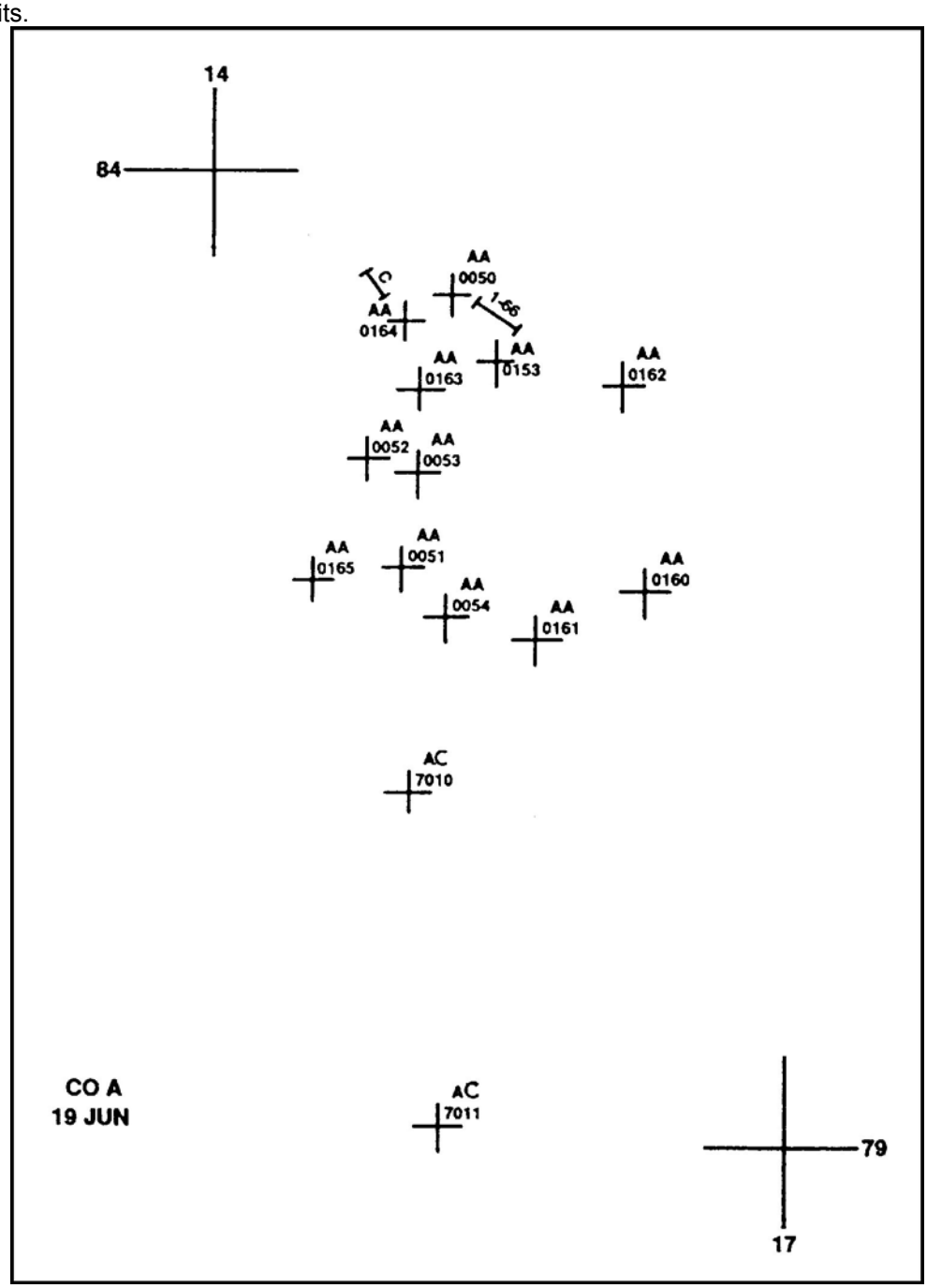



Figure 1. Target overlay.

5. The FSCOORD at each level (FSOs at company and battalion) plans and coordinates.
   a. Plans.
      (1) Anticipates mission requirements so he can advise the commander how to best use fire support.

**Performance Steps**

(2) Assesses fire-support means and recommends priorities and allocations of fire support.
(3) Ensures that all agencies that can provide target information are used effectively.
(4) Studies the enemy situation and mission, and recommends what targets to attack and how.
(5) Plans how to offset surprises and expedite changes.
(6) Plans use of all fire-support agencies as they contribute to the overall fire support.
(7) Determines coordinating measures that best facilitate maneuver actions and provide safeguards to protect friendly elements.
(8) Develops and coordinates an efficient, fully integrated fire-support plan.

b. Coordinates.
(1) Anticipates changes dictated by the developing battle and recommends revision of the fire-support plan.
(2) Directs the fire-support attack of targets in the order set by the commander.
(3) Tasks the most effective fire-support means to attack targets.
(4) Coordinates all fire support in the commander's zone or sector.
(5) Safeguards friendly elements.
(6) Ensures the continued flow of targeting information.

**Evaluation Preparation:** SETUP: At the test site, provide all the equipment and material given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the equipment and material provided and to help the unit commander prepare the indirect fire-support plan.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Assisted in making recommendations for the target list. | ____ | ____ |
| 2. Planned fires on all known enemy locations. | ____ | ____ |
| 3. Planned fires on all suspected enemy locations. | ____ | ____ |
| 4. Planned fires on prominent or key terrain. | ____ | ____ |
| 5. Submitted target list through the platoon leader to the company commander. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |
| | FM 6-20 |
| | FM 7-90 |

**Conduct a Displacement by a Mortar Section**

**071-074-0024**

**Conditions:** Given simulated combat conditions and an operation, fragmentary, or warning order to displace the mortar section.

**Standards:** Selected the best method to displace a mortar section to support the tactical operation.

**Performance Steps**

1. Mission. To carry out its mission of providing close and immediate fire support, the mortar section must displace promptly from one position to another. Good planning and reconnaissance (when possible) help keep weapons in action during a displacement. The scheme of maneuver of the supported unit affects the time and method of displacement to new positions.
2. Displacement by sections. This method requires one section to remain in position while the other section moves. When the displacing section is in position and ready to fire, the remaining section displaces. Depending on the platoon's organization, each section displaces with a portion of the platoon fire-direction center (FDC) or with its organic FDC. They displace by sections when continuous mortar support is required. Since one section must provide fire support while another moves, this is slower than displacing by platoon. Platoons with four or more mortars usually displace by sections (Figure 1).

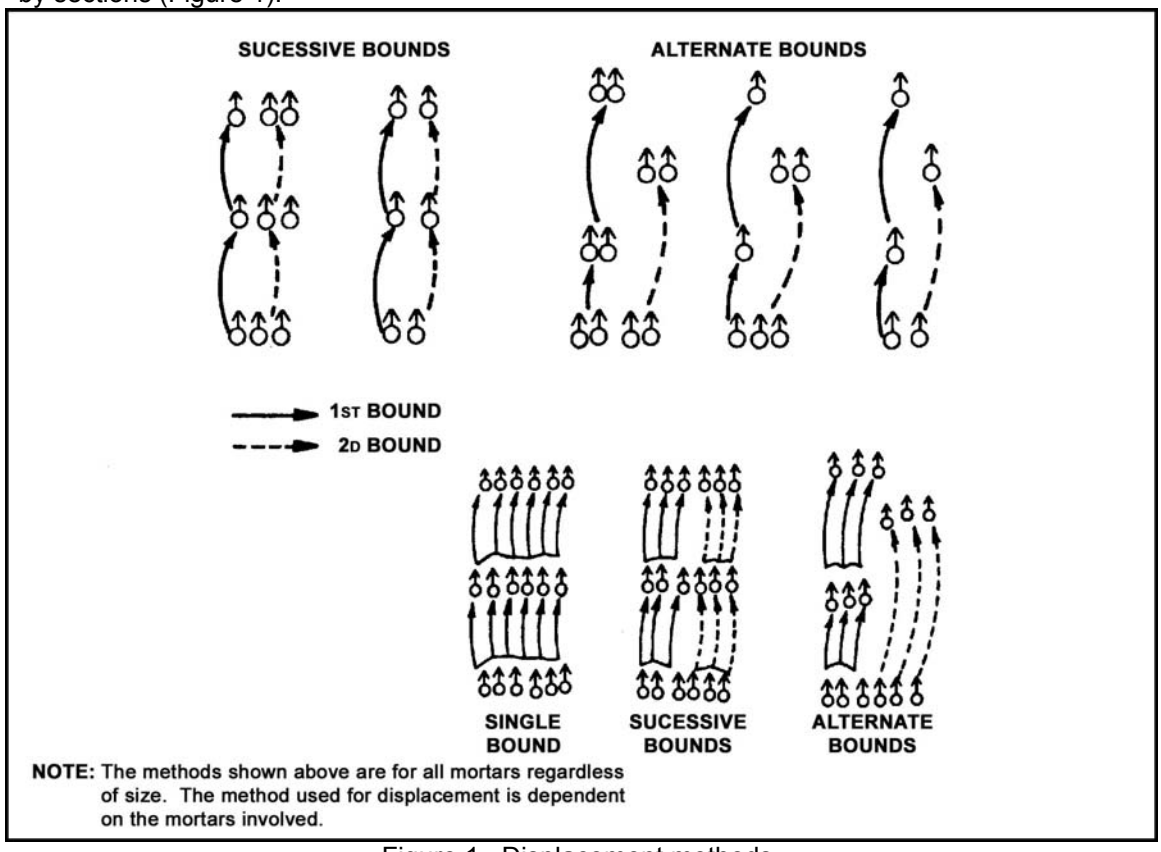



Figure 1. Displacement methods.

NOTES:
1. The section uses alternate bounds to keep up with rapidly displacing supported elements. It uses successive bounds when the maneuver element is moving slowly such as in defensive or retrograde operations.
2. The platoon should displace as a whole only when little likelihood of enemy contact exists, or when

**Performance Steps**
supporting artillery units can adequately support the displacement.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, personnel, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to conduct a displacement using bounding techniques when displacing to a new position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Used alternate bounding techniques to keep up with supported element. | ____ | ____ |
| 2. Section had an FDC element when it moved. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 7-90 |

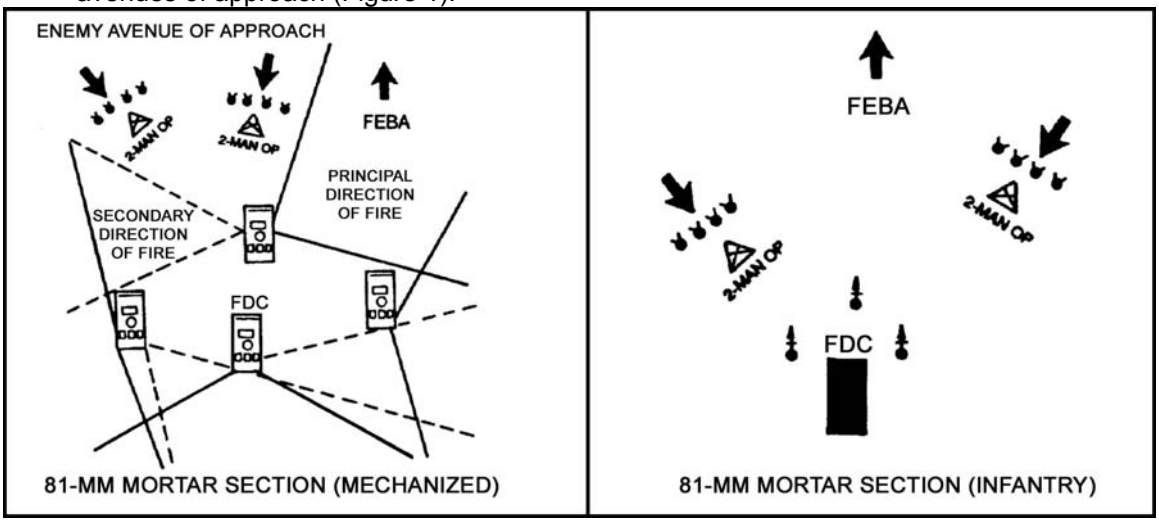
**Conduct a Defense of a Mortar Firing Position by a Section**
**071-074-0029**

**Conditions:** Given a mortar section and an operation or fragmentary order.

**Standards:** After he moved the section into position, he organized it to accomplish the mission and to provide section security.

**Performance Steps**

1. Defensive positions for the section and positions for its elements must locate where each can best accomplish its mission. Sometimes, positions are away from reserve elements, so all mortarmen must be trained to defend their positions against ground and air attack. Organizing for security involves arranging a defensive perimeter with weapons and vehicles. The section should (when possible) organize its defense with nearby units. Defense measures include camouflage, concealment, dispersion, and preparation of observation posts (OPs) on possible avenues of approach. During a motor march, air guards are designated.
2. After it moves into a position, a mortar squad tactically organizes so that it can efficiently perform its mission. At the same time, the squad must be prepared to defend against enemy attack. All-round security is established, and emplacements are prepared and continuously improved.
    a. Security begins when the advance party thoroughly searches and inspects an area position. Security ends only after the last of the equipment and mortarmen have safely displaced from the position. At the squad level, security is especially directed to noise and light discipline and continuous observation of the squad's area of responsibility in the section's defense plan. The section leader should plan all-round security and prepare a fire plan for the section's direct-fire weapons.
    b. When time and situation permit, positions should be constantly improved to achieve well-dug-in and fortified areas with mutually supporting defensive fires.
    c. In mechanized units, the caliber .50 machine gun is a good defensive antiaircraft weapon. Due to the number of soldiers in the section, the machine gun should not be dismounted. Each machine gun should be given a principal and an alternate sector of fire. Then, range cards (DA Form 5517-R) must be prepared to ensure adequate coverage is obtained and to ensure left and right limits are understood. With this in mind and knowing the limits of the caliber .50 machine gun when fired from the armored personnel carrier, areas not covered by the machine gun and all areas for the infantry mortars must rely heavily on M16s for direct-fire support. However, mortar units do not have enough members to provide all-round coverage of the section's area. The section leader must analyze the terrain and determine the most likely avenues of approach (Figure 1).



**Performance Steps**

Figure 1. Section area avenue of approach.

d. Place one-soldier or, when possible, two-soldier OPs on the most likely avenues in order to block possible enemy penetration and provide early warning. Due to the rapid movement required of mortars to support friendly troop displacements and to avoid enemy countermortar fire, mortar crews must rely upon other weapons to help in position defense. Barbed wire, though effective, takes considerable time to emplace; therefore, it is not used often, but is always planned.
e. The Claymore mine and light antitank weapons are easy to emplace and displace. These weapons should be used to assist in position defense. The number of each may be specified or unit SOP. Trip flares and anti-intrusion devices may also be used.
f. Place OPs in covered and concealed positions to watch likely avenues of approach and to fall within effective small-arms range. If the enemy attacks, OPs must be able to warn the unit, so they need land-line or radio communications.

3. A rally point must be selected where forces can assemble to do whatever the platoon leader decides. The defense plan must be rehearsed to be effective.
   a. The platoon leader/company commander can determine the degree to which the section must defend.
   b. Other elements may be assigned the mission to help defend the mortars, if they are close enough to react quickly.
   c. Other indirect-fire means may also be asked to help defend or disengage from an enemy force. Planning targets around the mortar position reduces time in calling for and adjusting fire.

4. The formations employed by the section (and the area the squads are assigned in the section defense plan) depend on the situation, mission, terrain, and available security.
   a. The lazy "W" formation (Figure 2), which employs the 4.2-inch, 81-mm, and 120-mm mortars on a modified line, provides wide coverage to the front and rear, but poor coverage to the sides. The lazy "W" needs an area at least 150 meters wide and 50 meters deep. It is a good formation for conventional warfare.

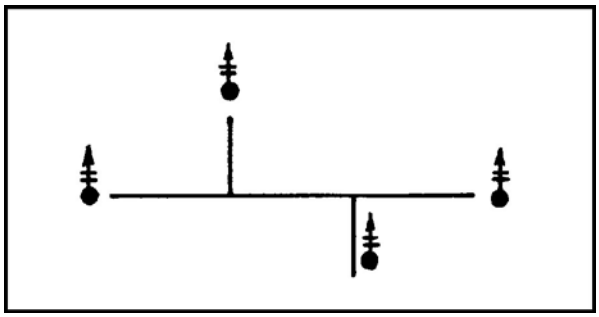


Figure 2. Lazy W formation.

   b. The diamond formation (Figure 3), also used with the same mortars, is about 100 meters square. From this formation, mortars can fire well in all directions; it is the formation to use in restrictive terrain and where attached or added security is limited (as in a counterinsurgency).

**Performance Steps**

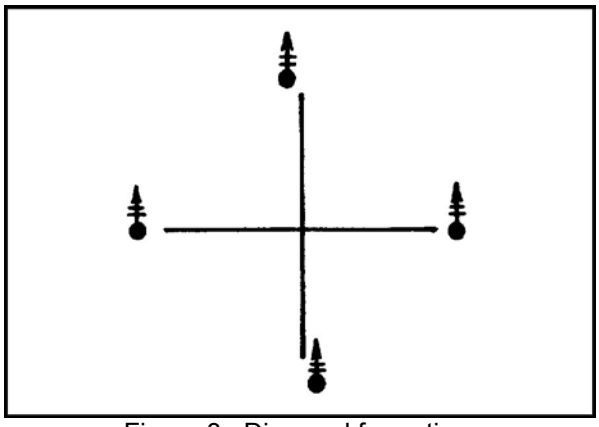


Figure 3. Diamond formation.

c. The triangle formation (Figure 4) is used with the 4.2-inch and 120-mm mortar sections. The base mortar is about 20 meters forward or to the rear of the other two mortars.

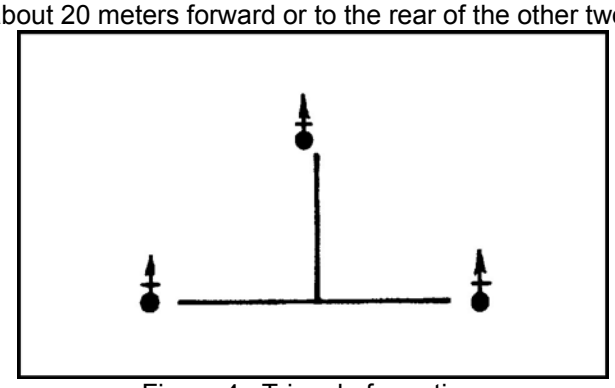


Figure 4. Triangle formation.

NOTE: Since the 60-mm mortar section consists of two mortars, it can be employed in the line formation only.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to use the given equipment and information to provide for mortar section defense within the time specified in the fragmentary or operation order.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Used camouflage, concealment, and dispersion measures. | ____ | ____ |
| 2. Selected and informed soldiers of the rally point location. | ____ | ____ |
| 3. Gave each machine gun a principal and alternate sector of fire. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 7-90 |

## Control the Expenditure of Mortar Ammunition

**071-074-0040**

**Conditions:** Given an inventory of ammunition; a call for fire; a fire-support plan that specifies priority of fires and final protective fire; a scheme of maneuver for the supported unit; and ammunition records.

**Standards:** Controlled the expenditure of ammunition to best support the mission of the supported unit.

**Performance Steps**

1. Assess the target. Determine whether the target has sufficient priority to warrant required ammunition expenditure, or whether to reject it as unengageable, or whether to refer it to another support unit (direct or indirect fire).
2. Allocate ammunition. Base the amount and type of ammunition allocated on the type and size of target, ammunition available, priority of the target, mission of the supported unit, and enemy situation.
3. Monitor expenditure. Fire the amount and type of ammunition allocated or note exceptions.
4. Update records. Maintain an accurate inventory of ammunition.

**Evaluation Preparation:** SETUP: This task is tested during a live-fire exercise. Provide the soldier with all equipment, personnel, ammunition, and information normally associated with a live fire.

BRIEF SOLDIER: Tell the soldier he will be tested on controlling mortar ammunition.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Assessed the target. | ____ | ____ |
| 2. Allocated ammunition. | ____ | ____ |
| 3. Monitored expenditure. | ____ | ____ |
| 4. Updated records. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 23-91 |
| | FM 7-90 |

**Declinate an M2 Aiming Circle**

**071-321-4000**

**Conditions:** As a section sergeant, given an M2 aiming circle with accessories, a declination station with at least two known directions; paper; and a pencil.

**Standards:** Declinated the M2 aiming circle to within 1 mil.

**Performance Steps**

1. The section sergeant declinates the aiming circle--
   a. When it is moved 25 miles (40 km) or more from the area where it was last declinated.
   b. After an electrical storm or after a severe shock such as being dropped.
   c. Every 30 days.
   d. When it is initially received or returned from maintenance.

2. The section sergeant declinates the aiming circle.
   a. Mount and level the aiming circle over the declinating station using the plumb bob (Figure 1).

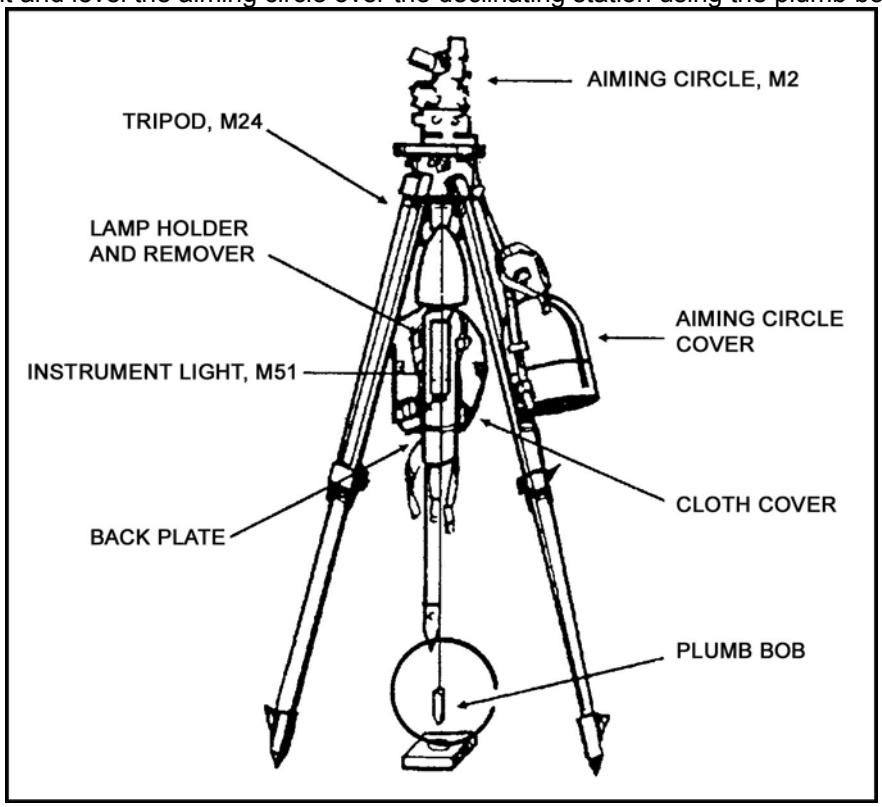



Figure 1. Plumb bob.

   b. Set the known grid azimuth to one of the azimuth marks on the instrument using the recording motion.
   c. Place the vertical crosshair in the telescope on the left edge of the azimuth mark using the non-recording motion. The aiming circle is now oriented on grid north.
   d. With the recording motion, rotate the instrument to zero. Release the magnetic needle, look through the magnifier, and use the azimuth micrometer to center the needle (Figure 2).

**Performance Steps**

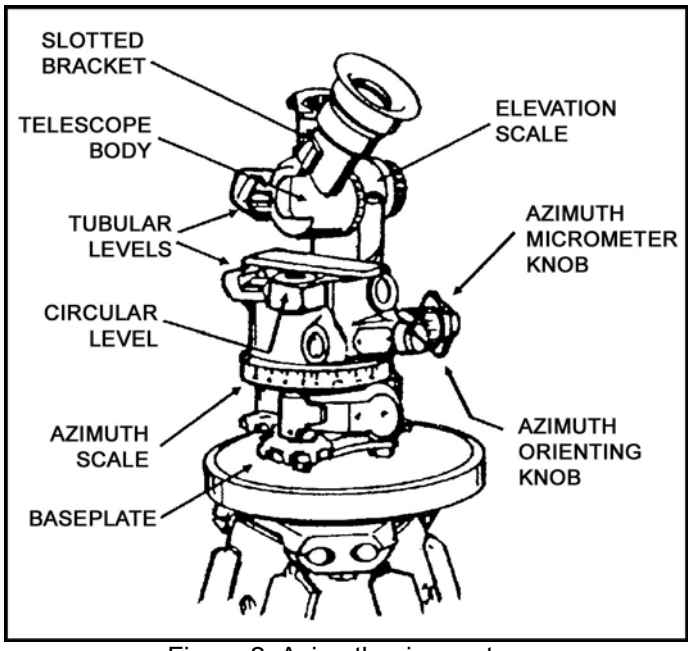



Figure 2. Azimuth micrometer.

e. Determine the declination constant (mils off zero) from the azimuth scales to the nearest mil. Relock the needle.
f. Use steps 2a through 2e to determine the declination constants to the remainder of the azimuth marks.
g. Compare the declination constants to all azimuth marks. If they agree within 2 mils, determine the average and record it to the nearest 1 mil. If they vary more than 2 mils, repeat the entire process.

**Evaluation Preparation:** SETUP: At a declination station, provide the soldier with the equipment and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to set up the aiming circle and place it over the declination point using the plumb bob. Then, he must use the known azimuths to determine the declination for the aiming circle.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Correctly set up the aiming circle. | ____ | ____ |
| 2. Placed the aiming circle directly over the declination point using the plumb bob and leveled the aiming circle so that the tubular level was level in all positions. | ____ | ____ |
| 3. Determined the declination constant for each azimuth marker. | ____ | ____ |
| 4. Repeated number 3 if any declination constant disagree was more than 2 mils. | ____ | ____ |
| 5. Averaged the declination constant and determined the declination constant of the aiming circle. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
| --- | --- |
| | TM 9-1290-262-10 |

Skill Level 4

Subject Area 1: COMMAND AND STAFF

**Prepare an Oral Operation Order**

**071-326-5626**

**Conditions:** Having received the unit commander's oral operation order (OPORD) and map overlay, given a platoon, pencil, paper, and a map of the operational area.

**Standards:** 1. Within the time allotted, developed a clear and concise order and issued it to subordinate leaders. The order must be issued so that all subordinate leaders understand their missions and any coordinating instructions.

2. The order followed the standard OPORD format.

**Performance Steps**

1. Receiving an OPORD. The most important part of receiving an order is a clear understanding of what your unit has to accomplish in relation to the ground and to the other platoons. You must know exactly what you are supposed to, what the other units are doing, and where and when these actions are to be done, to succeed. Ask questions to clarify commander's intent.

2. Think through the order. As soon as you receive the order and understand the leader's plan, review your notes. As you think about the order, answer these questions:
   What mission(s) did I receive?
   How much do I know about the enemy?
   How does the terrain and weather influence the operation?
   What supplies or equipment do I need?
   Do I need to assign special tasks to anyone?
   a. Mission.
      (1) In analyzing your mission, identify exactly what your unit is to accomplish. Be sure you know how much time you have to prepare. Make sure you are aware of any restrictions or special tasks that apply to your platoon.
      (2) A thorough understanding of the mission will allow you to establish a time schedule for your preparation. You will be told what time the operation is to begin and what time your unit must be ready to go. This allows you to allocate time to prepare for the mission. Identify the things that must be done to get ready and, working backwards from the "ready" time, allow your soldiers time to accomplish each task. This technique is called the reverse planning sequence. An example of this for a platoon leader might be as follows:
      1420: Company commander said to be ready.
      1415: Inspect assembly area.
      1400: Inspect platoon.
      1315: Issue order to platoon.
      1300: Finalize platoon order.
      1200: Reconnoiter with company commander and receive order.
      1100: Issue warning order to platoon.
      1040: Receive company warning order.
   b. Enemy.
      (1) Develop the best picture of exactly where the enemy is located, what his strength is, and what kind of weapons and equipment he has. Tell your men as much as you know about how to destroy or suppress the kind of enemy you are likely to meet.
      (2) Sometimes the enemy in a certain area will repeat the same pattern. For example, if you know that the enemy habitually ambushes in the vicinity of trail junctions, make sure all of your men know about it.
   c. Terrain and weather.

**Performance Steps**

(1) Most decisions pertaining to route, objective, sectors of fire, positioning of key weapons, and movement techniques are made by the unit leader. However, both the company commander and the subordinate leaders must closely study the ground if they are to properly employ their men and equipment, and gain an advantage over the enemy.
(2) Proper use of terrain will:
( a) Provide cover and concealment before, during, and after the battle.
( b) Increase the effectiveness of your fire.
( c) Decrease the effectiveness of the enemy's weapons.
(3) You must also understand how weather can influence your men. Cold, heat, rain, or snow can create problems if you don't properly prepare your platoon.

d. Supplies, equipment, and special tasks. If you have been given a task that requires a special skill, such as setting demolitions to blow a building, make sure you know how to do it. You must have the right weapons, equipment, and supplies. If you need specialized personnel or equipment, tell your leader or commander.

3. Issuing an OPORD. After you have received an OPORD, think it through and prepare your own order. You must issue that order. Leaders should issue their orders from a position that allows the subordinate leaders to see the ground on which they are going to operate.

4. Structure of the OPORD.
a. The OPORD contains five paragraphs and always follows the same sequence. An outline and brief explanation of each paragraph follows:
(1) Paragraph 1.
( a) Situation: This paragraph contains all available information concerning the enemy and friendly situations.
( b) Enemy forces: Any available information such as strengths, weaknesses, probable courses of action, weather, and terrain.
( c) Friendly forces: All available information concerning the missions of next higher and adjacent forces.
( d) Attachments and detachments: Information concerning any units that have been attached to or detached from the platoon.
(2) Paragraph 2. Mission: A clear, concise statement of the task that must be accomplished by the platoon.
(3) Paragraph 3. Execution: Contains the mission for each section and attached element (if any). This paragraph also contains any special instructions that apply to a specific section or to the platoon as a whole, and the plan for fire support.
(4) Paragraph 4. Service support: Administrative details to include ammunition supply, ration resupply, and the evacuation of casualties.
(5) Paragraph 5. Command and signal: Communications instructions to include visual signals, radio frequencies and call signs, and the platoon leader and company commander's location during the operation.
b. In preparing your platoon order, look for those items in the company order that you must alter to fit the platoon's mission. For example, if paragraphs 2 and 3 of the company order are given as:
(1) Paragraph 2. Mission: Company A attacks 240600 May to seize Hill 492 and Hill 475 and continues the attack, on order, to seize Hill 510.
(2) Paragraph 3. Execution: 2d platoon makes the main attack on the right to seize Objective 1 and, on order, Objective 3.
c. Subordinate leaders should also try to issue their orders from vantage points that overlook the terrain. However, many times this will not be possible, and they will have to sketch the terrain on the ground. Terrain models are easy to construct and allow the leader to associate his order and terrain features so that each man will have an idea of what to expect.
d. The OPORD. An OPORD is the presentation of the information and instructions needed to accomplish a specific mission. The amount of detailed information included in your OPORD depends on the information you received and the time you have to prepare.

**Performance Steps**

e. As 2d platoon leader, you might alter your paragraphs 2 and 3 as follows:
   (1) Mission: 2d platoon attacks 240600 May to seize Hill 492 and, on order, Hill 475.
   (2) Execution: From the line of departure (LD) to the final coordinating line (FCL), we use bounding overwatch. Heavy Team, you will overwatch initially, and light team will bound. Heavy Team, at the FCL you link up with 3d platoon on the right. Light Team, you link up with the 1st platoon on the left. Movement from the FCL is on my command. Heavy Team, after consolidation, you...

5. Paragraph 1 should contain the mission of the company, which was stated in paragraph 2 of the company OPORD. Paragraphs 4 and 5 of the company order are narrowed down to apply only to your platoon. For example, if paragraph 4 of the company order gives you the location of the battalion field trains, your platoon order will probably not contain that information because if does not directly affect your squads. Your responsibility as a platoon sergeant or acting platoon leader is to give your men the information that pertains to them. The five-paragraph order format should be used as a checklist to avoid omitting important information. It is not all inclusive, however, and may be modified as necessary.

**Evaluation Preparation:** SETUP: Provide at the test site a complete written company OPORD; also provide pencil and paper.

BRIEF SOLDIER: Tell the soldier to develop a platoon OPORD by using the written company order and upon completion to orally give it to you.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Developed a clear and concise oral platoon OPORD that includes the following:<br>a. The mission of the company.<br>b. The mission of the platoon.<br>c. The concept of how the battle would be fought, to include:<br>(1) Location of the objective.<br>(2) Time of the attack.<br>(3) Location of the LD.<br>(4) Location of the assault position.<br>(5) Route and order of march.<br>(6) Consolidation instructions.<br>d. Critical signal instructions.<br>e. The location of platoon sergeant or acting platoon leader during the attack.<br>NOTE: In order to receive a "pass" for performance measure 1c, all subelements must be included in the OPORD. | ____ | ____ |
| 2. Issued the order in a clear and concise manner and that clarified question(s). | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| FM 101-5-1 | |
| FM 7-7 | |
| FM 7-8 | |

## Conduct Resupply of a Platoon
## 071-940-0002

**Conditions:** In a combat environment, given a platoon.

**Standards:** 1. Developed a plan that provides for operational security; covered and concealed routes to company trains and platoon positions with enough replacement of personnel, water, rations, lubricants, ammunition, and repair parts to meet expected needs until the next resupply.

2. Preparations must have included preparing the resupply point to include marking and securing of landing zone when required.

3. The unit was resupplied without restricting its security, communications, movement, delivery of direct fire, or ability to provide indirect fire support.

**Performance Steps**

1. Order supplies.
2. Receive supplies.
3. Control movement to the platoon resupply point.
4. Control the resupply.
5. Maintain flexibility.

**Evaluation Preparation:** SETUP: At the test site, provide an area in which a resupply can be conducted. Test this task during a platoon or larger tactical exercise.

BRIEF SOLDIER: Tell the soldier that he is the leader of a platoon conducting a resupply.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Ordered supplies. | ____ | ____ |
| 2. Received supplies. | ____ | ____ |
| 3. Controlled movement to the platoon resupply point. | ____ | ____ |
| 4. Controlled the resupply. | ____ | ____ |
| 5. Maintained flexibility. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 7-7 |

Subject Area 9: MOVE: BASIC TACTICS

**Conduct Movement Techniques by a Platoon**

**071-326-5630**

**Conditions:** You are directed to conduct a movement to contact. Given a platoon size unit, an operations order (OPORD), a map of the area, an overlay of the area, and control measures, such as phaselines, boundaries, routes, and an axis of advance.

**Standards:** 1. Complied with control measures (such as the times planned for crossing phaselines) unless or until you contact an enemy force.
2. Kept at least one squad prepared to maneuver or at least prepared to provide suppressive force.
3. Controlled movement continuously.
4. Selected the movement technique based on the likelihood of contact.

**Performance Steps**

1. Proper use of terrain. Because dismounted soldiers are vulnerable to all weapons, they can survive and accomplish their mission on the battlefield ONLY if they can operate without being seen. The platoon's best protection is terrain. Maximum use must be made of available cover and concealment at all times, especially when moving against a hidden enemy.

2. Selection of movement technique when not in contact. The platoon adjusts its technique of movement to the likelihood of making contact with the enemy.
   a. LIKELIHOOD OF CONTACT - MOVEMENT TECHNIQUE
      (1) Not Likely - Traveling
      (2) Possible - Traveling Overwatch
      (3) Expected - Bounding Overwatch

3. Movement techniques.
   a. Traveling. Use the traveling technique when speed is important and contact with the enemy is not likely. All squads use the traveling technique and move in a column, keeping about 20 meters apart, depending on the terrain and visibility. When the platoon is traveling the platoon leader will normally be behind the lead squad to make control easier. The platoon sergeant normally travels at the head of the trail squad to help the platoon leader control the trail elements of the platoon. A machine gun, a Dragon, or both may move with the platoon sergeant if the platoon leader determines this would provide an advantage.
   b. Traveling overwatch. Use the traveling overwatch technique when enemy contact is possible, but not expected. In this technique, only the lead squad contacts the enemy, leaving the platoon free to support the lead squad by fire or to maneuver against the enemy. This technique also gives the platoon some time and space in which to react to unexpected enemy fire.
      (1) The platoon leader increases the distance between the lead squad and the platoon. Terrain and visibility determine the distance. The distance must be short enough to permit visual contact between the lead squad and the platoon, yet great enough that the platoon will not be pinned to down by enemy fire directed at the lead squad. To the extent permitted by terrain and visibility, the platoon lead should strive to maintain a distance of at least 50 meters and preferably 100 meters or more.
      (2) The lead squad uses the traveling overwatch technique. The platoon leader is normally at the head of the platoon for control and observation. All elements of the platoon use the traveling technique.
      (3) Crew-served weapons (Dragons and machine guns) may be dispersed throughout the column by attaching them to the platoon sergeant or to trail squads. Regardless of how the platoon is organized, the platoon leader normally retains direct control over at least one machine gun and one Dragon, which travel directly behind him. Placing crew-served weapons in these locations in the column:

**Performance Steps**

( a) Provides immediate responsiveness to the platoon leader.
( b) Lets them better support the lead squad.
( c) Ensures that they will not be pinned down by enemy fire directed at the lead squad.

c. Bounding overwatch. Use the bounding overwatch technique when contact is expected. The basic pattern of this technique is a three-legged walk, with squads rotating the following mission.
   (1) One squad overwatching. One squad covers the advance of the platoon from covered and concealed positions. The positions must offer observation and fire against potential enemy positions. The squad can support the bounding squad by fire immediately if that squad makes contact. The overwatching squad's leader must know:
      ( a) The direction of the enemy threat.
      ( b) The location of his overwatch position.
      ( c) The route and destination of the bounding squad.
      ( d) The location of the platoon leader.
      ( e) The action he can expect to take next.
      ( f) The manner in which he will receive his orders.
   (2) One squad bounding. One squad moves to a farther position from which it will take overwatch mission, unless it makes contact enroute. This squad should find the enemy. The length of its bound depends on the terrain, the range of the overwatching squad's weapons, and the ability of the platoon leader to control his squads. This squad normally uses the bounding overwatch technique since contact is expected. The bounding squad leader must know:
      ( a) The route and destination of the squad.
      ( b) The movement technique to use (dependent upon speed required).
      ( c) The action to take when he gets to the overwatch position.
      ( d) The location of the overwatching squad and the platoon leader.
      ( e) The action he can expect to take next.
      ( f) The manner in which he will receive his orders.
   (3) One squad awaiting orders. One squad is committed and available for employment as the platoon leader directs. The squad leader awaiting orders must know how he will receive his orders. He should know:
      ( a) The events that are taking place.
      ( b) The actions he can expect to take next.

      The platoon leader normally positions crew-served weapons with the overwatch element, along with any fire support team member who is able to call for and adjust indirect fire.

NOTE: The above technique can be varied to fit the situation. A platoon may move the squad awaiting orders to an overwatch position, thus having two squads in overwatch and one squad bounding. Where there is not a suitable squad overwatch position, the platoon leader may have the lead squad use squad bounding overwatch, with the trailing squads using traveling or traveling overwatch.

**Evaluation Preparation:** SETUP: Provide the soldier with the personnel and equipment listed in the condition statement.

BRIEF SOLDIER: Tell the soldier to lead a platoon-sized element in a movement to contact. Tell him to adhere to the information given in the OPORD and the overlay while maintaining control of the element and using the proper movement techniques to prove security and best use of terrain. During the movement, tell the soldier the likelihood of contact.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Organized element into squad-sized elements. | ____ | ____ |
| 2. Followed the OPORD and overlay. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 3. Used the proper movement techniques based on the situation, terrain, and visibility. | ____ | ____ |
| 4. Used the terrain's cover and concealment to the best advantage. | ____ | ____ |
| 5. Maintained proper position in formation to maintain control. | ____ | ____ |
| 6. Maintained control throughout the movement. | ____ | ____ |
| 7. Made proper reports as required by the OPORD. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| FM 3-90.1 | |
| FM 7-7 | |
| FM 7-7J | |
| FM 7-8 | |

Subject Area 10: MOVE: DEFENSE/OFFENSE

**Conduct a Disengagement by a Platoon While Under Enemy Pressure**
**071-326-5832**

**Conditions:** Given a 1:50,000 map of the area of operations, and a requirement to plan for a withdrawal under enemy pressure as part of a larger force.

**Standards:** Prepared a plan that included, as a minimum, the sequence of withdrawal and methods of disengagement.

**Performance Steps**

1. A platoon's withdrawal under enemy pressure is conducted as part of a company's withdrawal. The withdrawal is conducted when the company is forced from its defensive positions, to either continue the defense or disengage and move elsewhere for another mission. Each platoon tries to disengage from the enemy by fire and maneuver to the rear. Once a platoon has disengaged and move to the rear of its original position, the company commander will direct what it is to do next. This may include covering the rearward movement of other platoons, occupying a new defensive position, or moving to perform another mission.
2. The company commander controls the sequence of withdrawal of the platoons. His decision on which platoon to withdraw first is usually based on where the enemy attacks and how heavily each platoon is engaged. Once the decision is made to withdraw, the company commander will normally order the least heavily engaged platoon to withdraw first. That platoon then disengages and moves to a position where it can overwatch the disengagement of the more heavily engaged platoons. The platoons then change roles and leapfrog to the rear using fire and maneuver. This leapfrogging continues until contact is broken or the company reaches a new defensive position (Figure 1).

**Performance Steps**

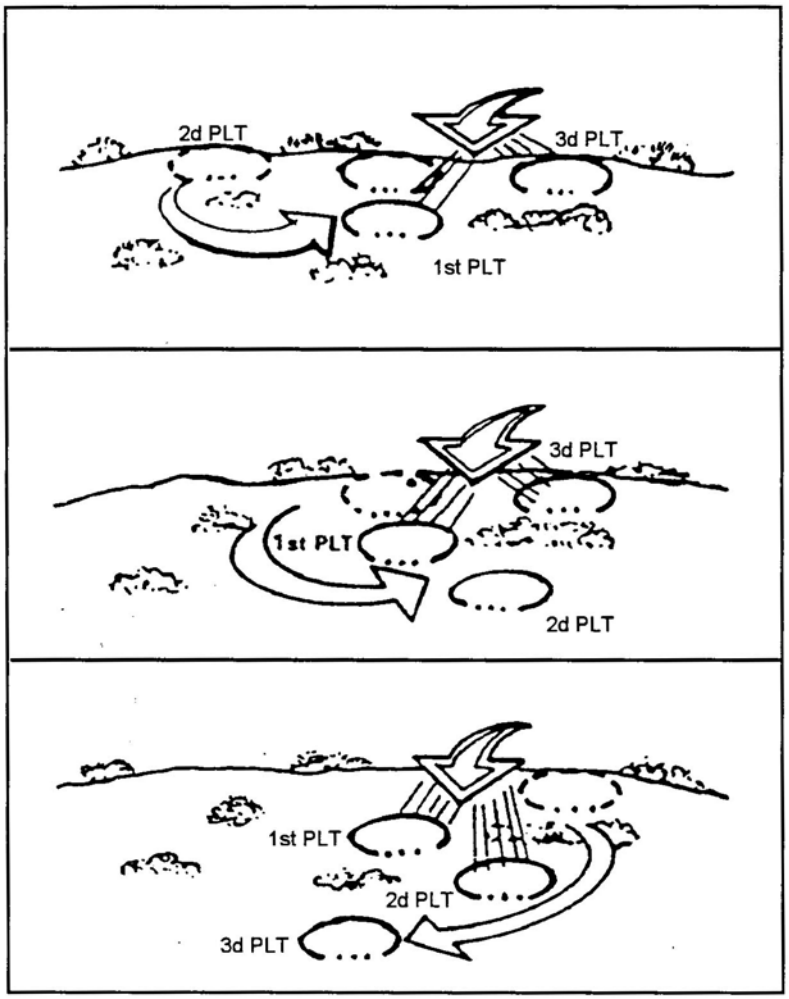



Figure 1. Withdrawal under pressure.

3. Platoons have three basic methods of disengaging from the enemy: by thinning the lines, by fire teams, and by squads. Fire and maneuver and bounding overwatch are keys to each method. The degree of fire and maneuver and bounding overwatch depends on how closely the enemy follows and the pressure he applies.
   a. Disengagement by thinning the lines. The first state of the fire and maneuver rearward is in the squads. Squad and team leaders have men move rearward singly to where each takes a firing position to cover the move of the others as they, in turn, move back (Figure 2).

**Performance Steps**

Figure 2. Thinning the lines.

b. Disengagement by fire teams. If enemy fire is such that thinning the lines is unnecessary, or if the squads have moved back far enough to make it unnecessary, the squads move back by fire teams. One team fires and the other moves. They alternate roles with each move (Figure 3).

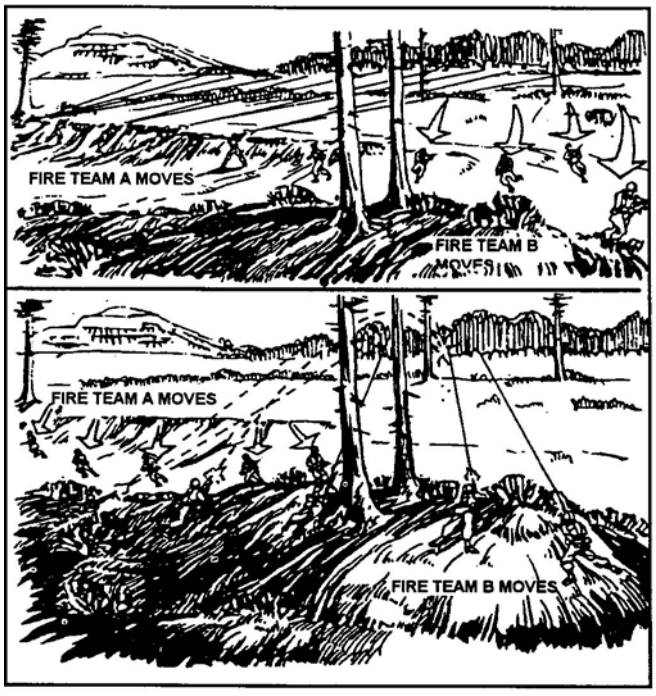



Figure 3. Disengagement by fire teams.

c. Disengagement by squad. If enemy fire is such that fire and maneuver by fire teams is unnecessary, or if squads have moved back to a point where it is no longer necessary, the platoon moves back by squads. The platoon leader has each squad, in turn, move back covered by the fire of the others (Figure 4).

**Performance Steps**

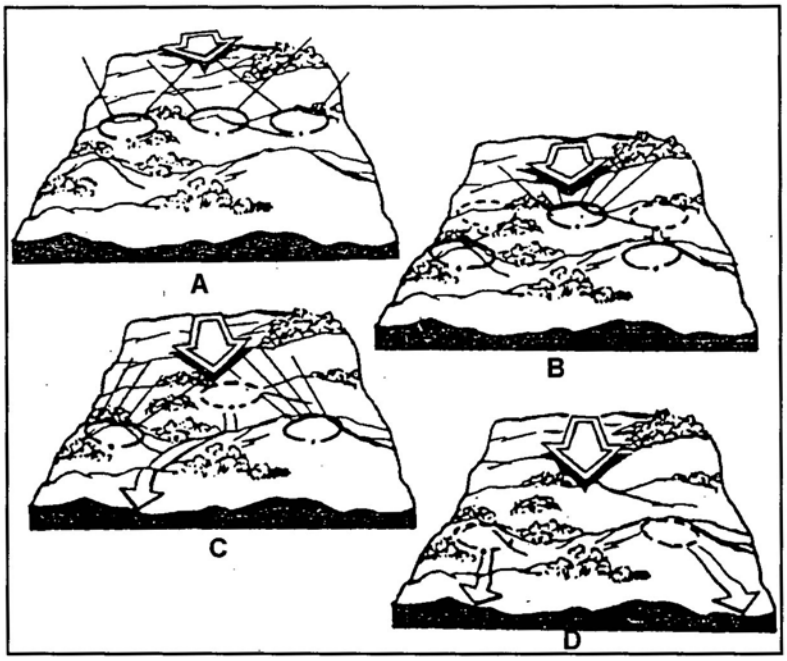
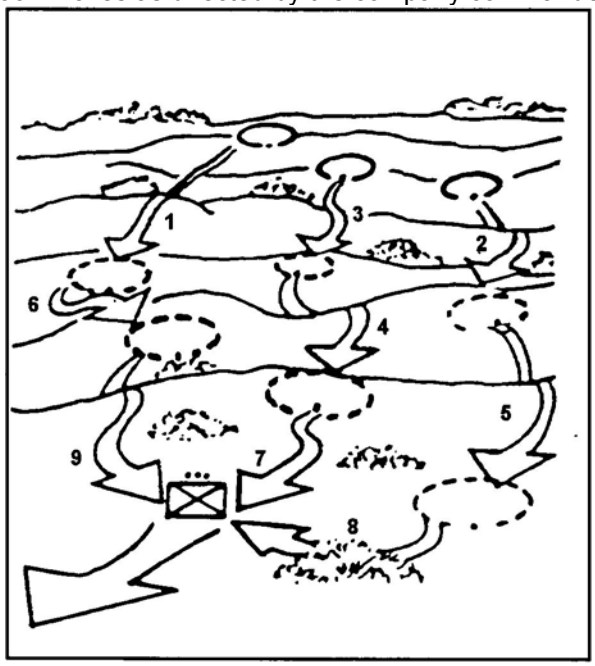



Figure 4. Disengagement by squad.

4. The platoon may use all three methods of disengaging as it moves rearward. As enemy fire lessens, the platoon changes to the next faster method of disengagement (first by thinning the lines, then by fire team, and then by squads). It uses only those methods necessary for its safety while moving.

5. At some point in the action, the platoon can stop fire and maneuver. It then continues its withdrawal by bounding overwatch to the rear (Figure 5). This occurs when the platoon is no longer under enemy direct fire or when another platoon is covering its move. Once disengagement is complete, the platoon moves as directed by the company commander.



**Performance Steps**

Figure 5. Bounding overwatch to the rear.

6. Because the actions taken during a withdrawal under enemy pressure depend a lot on the enemy's action (for example, which squad is the most heavily engaged, and the uncertainty of when the enemy will attack), you may have little time, if any, to plan for the withdrawal. You should therefore prepare a contingency plan for a withdrawal each time a platoon moves into a defensive position. Control measures, such as the signal to begin the withdrawal, the location of the next position, and routes to that position, should be planned, and each member of the platoon should know them. Also, if time and the situation permit, and before a plan for the platoon's withdrawal is begun, you should check with the company commander and find out what the company's plan is; this will ensure that your plan will support the company's

**Evaluation Preparation:** SETUP: At the test site, with information given in the task condition statement.

BRIEF SOLDIER: Tell the rifle platoon leader to fix and assault the enemy. The leader must take appropriate action to maneuver the element in order to prevent serious injury or casualties to personnel. The leader will be given the enemy situation.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Platoon withdrew under pressure. | ____ | ____ |
| 2. The lines were thinned as required | ____ | ____ |
| 3. Controlled the platoon through the action. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measure is failed. If the soldier scores NO-GO, show the soldier what was done wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 7-7 |
| | FM 7-7J |
| | FM 7-8 |

Subject Area 51: WEAPONS: MORTAR FDC PLOTTING BOARD

**Compute Terrain Mortar Positions Using a M16 Plotting Board**
**071-078-0020**

**Conditions:** As a computer in a mortar platoon fire-direction center (FDC), given an M16 plotting board; a 1:50,000 map; a coordinate scale and mil protractor; an overlay of the company's area of responsibility, including mortar positions and reference points; an azimuth lay of 6400 mils; and a pencil; the deflection and distances from the aiming circle to each mortar are--

| MORTAR | DEFLECTION (mils) | DISTANCE(meters) |
|---|---|---|
| No 1 | 800 | 200 |
| No 2 | 1900 | 135 |
| No 3 (Base Piece) | 2400 | 95 |
| No 4 | 2950 | 120 |
| No 5 | 3400 | 140 |
| No 6 | 3950 | 115 |

**Standards:** Computed positions so that the burst line, using the mortar systems' high-explosive (HE) ammunition, was within 30 meters for the M224, 35 meters for the M29A1, 40 meters for the M252 and M30, and 60 meters for the M120.

**Performance Steps**

1. Index the lay deflection from the aiming circle to No 1. (800 mils over the center line arrow).
2. Count off 200 meters parallel to the center line down from the aiming circle. Place a circled dot there and label it No. 1.
3. Index the lay deflection from the aiming circle to No. 2 (1900 mils over the center line area).
4. Count off 135 meters parallel to the center line down from the aiming circle. Place a circled dot there and label it No. 2.
5. Index the lay deflection from the aiming circle to the No. 4 (2950 mils over the center line).
6. Count off 120 meters parallel to the center line down from the aiming circle. Place a circled dot there and label it No. 4.
7. Follow the same procedures to plot No. 5 and No. 6.
8. Once all mortar locations are plotted, erase the temporary lay deflection scale and superimpose a referred deflection scale as performed when setting up the M16/19 plotting board.
9. Index the azimuth of lay (6400 mils over the center line arrow) and read the displacement of each mortar right/left and forward/behind the base piece.

**Evaluation Preparation:** SETUP: At the test site, provide the soldier with all the equipment given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to compute terrain mortar positions using the M16 plotting board.

| Performance Measures | GO | NO GO |
|---|---|---|
| 1. Indexed the lay deflection for each mortar. | ____ | ____ |
| 2. Counted off the meters parallel to the center line for each mortar. | ____ | ____ |
| 3. Indexed the azimuth of lay. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if all performance measures are passed. Score the soldier NO-GO if any performance measures are failed. If the soldier scores a NO-GO show what was done wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 23-91 |

Subject Area 52: WEAPONS: MORTARS

**Conduct Occupation of a Mortar Firing Position by a Platoon**
**071-074-0011**

**Conditions:** Given a mortar platoon en route to a designated firing position.

**Standards:** The platoon occupied a firing position.

**Performance Steps**

1. Halt the platoon short of the objective.
2. Perform reconnaissance.
3. Secure the position.
4. Provide guide(s) and move the platoon into the position.
5. Designate the location of section facilities.
6. Lay the platoon.
7. Establish the FDC.
8. Lay wire.
9. Construct mortar positions.
10. Construct fighting positions.
11. Camouflage positions.
12. Designate and construct alternate and supplementary positions.
13. Improve the position.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, personnel, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to supervise the initial emplacement of the mortar; to prepare the ammunition and the mortar position; and to emplace the mortar in the prepared position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Halted the platoon short of the objective. | ____ | ____ |
| 2. Performed a reconnaissance. | ____ | ____ |
| 3. Secured the position. | ____ | ____ |
| 4. Provided guide(s) or moved the platoon into the position. | ____ | ____ |
| 5. Designated the locations of section facilities. | ____ | ____ |
| 6. Laid the platoon. | ____ | ____ |
| 7. Established the FDC. | ____ | ____ |
| 8. Laid wire. | ____ | ____ |

| Performance Measures | GO | NO GO |
|---|---|---|
| 9. Constructed mortar positions. | ____ | ____ |
| 10. Constructed fighting positions. | ____ | ____ |
| 11. Camouflaged positions. | ____ | ____ |
| 12. Designated and constructed alternate and supplementary positions. | ____ | ____ |
| 13. Improved the position. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| Required | Related |
|---|---|
| | FM 7-90 |

## Conduct a Displacement by a Mortar Platoon
## 071-074-0026

**Conditions:** Given simulated combat conditions and an operation, fragmentary, or warning order to displace the mortars.

**Standards:** Selected the best method to displace mortars to support the tactical operation.

**Performance Steps**

1. Mission. To carry out its mission of providing close and immediate fire support, the mortar platoon must displace promptly from one position to another. Good planning and reconnaissance (when possible) reduce the time that weapons are out of action during a displacement. The scheme of maneuver of the supported unit influences the time and method of displacement to new positions.
2. Displacement by platoon. The platoon displaces all of its mortars in one move. This is the fastest way to displace the platoon; however, the platoon cannot provide immediate responsive fire support while moving. If the platoon must fire during movement, then it uses emergency techniques of engagement. The platoon should only displace as a whole when little likelihood of enemy contact exists, or when supporting artillery units can provide adequate support during displacement.

NOTE: In a rapid displacement, the platoon uses alternate bounds to keep up with supported elements. It uses successive bounds when the maneuver element is moving more slowly such as in defensive or retrograde operations.

**Evaluation Preparation:** SETUP: At the test site, provide all equipment, personnel, and information given in the task condition statement.

BRIEF SOLDIER: Tell the soldier to conduct a displacement using bounding techniques when displacing to a new position.

| **Performance Measures** | **GO** | **NO GO** |
|---|---|---|
| 1. Used alternate bounds to keep up with supported element. | ____ | ____ |
| 2. Displaced as a platoon only when enemy contact was very unlikely. | ____ | ____ |

**Evaluation Guidance:** Score the soldier GO if he passes all performance measures. Score him NO-GO if he fails any performance measure. If he scores NO-GO, show him what he did wrong and how to do it correctly.

**References**

| **Required** | **Related** |
|---|---|
| | FM 7-90 |

# GLOSSARY

## Section I
## Acronyms & Abbreviations

| | |
|---|---|
| **BNCOC** | Basic Noncommissioned Officer Course |
| **DAP** | decontamination apparatus, portable |
| **HAW** | heavy antitank weapon |
| **HMMWV** | high-mobility, multipurpose wheeled vehicle |
| **ICOM** | intercommunications |
| **ITEP** | Individual Training Evaluation Program |
| **LAW** | lubricating oil, Arctic weapon; light antitank weapon |
| **MAW** | medium antitank weapon |
| **METT-T** | mission, enemy, terrain, troops and time available |
| **MOUT** | Military Operations on Urban Terrain |
| **NATO** | North Atlantic Treaty Organization |
| **OSUT** | One-station Unit Training |
| **SAW** | squad automatic weapon |
| **TOW** | tube-launched, optically tracked, wire-guided |

## Section II
## Terms

**AC**
Active Component; assistant commandant; alternating current

**ACCP**
Army Correspondence Course Program

**AGS**
a 30-mm automatic grenade launcher developed by the former Soviet Union

**AHD**
antihandling device

**AIT**
Advanced Individual Training

**AKM**
a 7.62-mm assault rifle developed by the former Soviet Union

**AKMS**
a 7.62-mm assault rifle developed by the former Soviet Union

**ALT**
alternate

**ammo**
ammunition

**APC**
armored personnel carrier

**AR**
Army Regulation; Army Reserve

**ARNG**
Army National Guard

**ARTEP**
Army Training and Evaluation Program

**AT**
antitank

**AT**
antitank

**ATGM**
antitank guided missile

**BATT**
battery

**beaten zone**
the pattern formed where rounds or bursts have struck the ground or a target

**BII**
basic issue items

**BMD**
a vehicle developed by the former Soviet Union

**BML**
by-product materials license

**BMP**
a fighting vehicle developed by the former Soviet Union

**BRDM**
a scout car developed by the former Soviet Union

**BT**
basic training

**C**
centigrade

**CB**
circuit breaker; chemical, biological

**centigray**
a unit of absorbed dose of radiation equal to a rad

**cGy**
Centigray

**cGyph**
centigray per hour

**CLP**
cleaner, lubricant, preservative

**cm**
centimeter; control monitor

**COMSEC**
communications security

**CP**
command post

**CRT**
cathode ray tube

**CSS**
combat service support

**CTA**
common table of allowance

**CTT**
Common Task Test

**CX**
blister agent; coaxial cable designator

**DA**
Department of the Army

**defile**
a narrow passage in which troops can march only in a file

**DS**
direct support

**DS2**
decontaminating solution No. 2

**DTG**
date-time group

**ECCM**
Electronic Counter-Counter Measures

**ECM**
Electronic Countermeasures

**EENT**
end of evening nautical twilight

**ENCODED**
(a message) converted into code

**EOD**
explosive ordnance disposal

**EPW**
enemy prisoner of war

**ERF**
electronic remote fill (offset frequency)

**EW**
electronic warfare

**F**
fahrenheit; fail

**F**
fahrenheit; fail

**FDC**
fire direction center

**FH**
frequency hopping

**FM**
field manual; frequency modulated (radio)

**FM**
field manual; frequency modulated (radio)

**FO**
forward observer

**FOV**
field of view

**FPF**
final protection fires

**FPL**
final protection line

**FRAGO**
fragmentary order

**FREQ**
frequency

**ft; FT**
feet; firing table

**gnd**
ground

**GSR**
ground surveillance radar

**GTA**
Graphic Training Aid

**HE**
high-explosive

**IAW**
in accordance with

**ID**
identification

**IEDK**
individual equipment decontamination kit

**IET**
initial entry training

**IL**
Illinois

**in; IN**
Infantry

**ir; IR**
infrared; intelligence requirements; information requirement

**ITP**
individual training plan

**JB**
job book

**km**
kilometer

**LBE**
load-bearing equipment

**LD**
line of departure

**LSA**
lubricating oil, semifluid, automatic weapon; logistics support analysis

**LZ**
landing zone

**m**
meter(s)

**MANPACK**
designed to be carried by one person

**MEDEVAC**
medical evacuation

**METL**
mission-essential task list

**MG**
machine gun

**MIJI**
meaconing intrusion jamming interference

**mm**
millimeter

**MOPP**
mission-oriented protective posture

**MOS**
military occupational specialty

**MOSC**
military occupational specialty code

**MPRJ**
Military Personnel Records Jacket, US Army

**MRL**
multiple rocket launcher

**MTP**
mission training plan

**NBC**
nuclear, biological, and chemical

**NCO**
noncommissioned officer

**NCOIC**
Noncommissioned Officer In Charge

**NCOIC**
Noncommissioned Officer In Charge

**NCS**
net control station

**NSN**
national stock  number; nonstandard number

**OEG**
operational exposure guidance

**OIC**
officer in charge

**OP**
observation post

**OPCODE**
operations code

**OPLAN**
operation plan

**OPORD**
operation order

**OPSEC**
operations security

**ORP**
objective rally point

**P**
pass

**PDF**
principal direction of fire

**PEWS**
Platoon Early Warning System

**PIR**
priority intelligence requirement

**PKM**
a general-purpose machine gun developed by the former Soviet Union

**PL**
phase line

**PLAINTEXT**
the intelligible form of an encrypted text or of its elements

**PLDC**
Primary Leadership Development Course

**PMCS**
preventive maintenance checks and services

**PMCS**
preventive maintenance checks and services

**PSI**
pounds per square inch

**PSYOP**
psychological operations

**PTT**
push-to-talk

**RATELO**
radiotelephone operator

**RBC**
rifle bore cleaner

**RCU**
remote control unit

**RDF**
radio direction finding

**RF**
Reserve Forces; radio frequency

**RPG**
a rocket-propelled grenade launcher developed by the former Soviet Union

**RPK**
a 7.62-mm light machine gun developed by the fomer Soviet Union

**RPK-74**
a 5.45-mm light machine gun developed by the former Soviet Union

**RPO**
radiation protection officer

**RT**
receiver/transmitter

**SC**
Signal Corps; single-channel

**SI**
skill identifier; set indicator

**SINCGARS**
single-channel ground-air radio system

**SL**
squad leader; skill level

**SM**
soldier's manuals

**SMCT**
soldier's manual of common tasks

**SOI**
signal operating instructions

**SOP**
standing operating procedure

**SPG-9**
a 73-mm antitank recoilless gun developed by the former Soviet Union

**STP**
soldier training plan

**SVD**
a 7.62-mm sniper rifle developed by the former Soviet Union

**T&E**
traversing and elevating

**TC**
training circular

**TEK**
traffic encryption key

**TG**
trainer's guide

**TMDE**
test measurement and diagnostic equipment

**TOE**
table of organization and equipment

**TP**
target practice; tank platoon

**TRIP WIRE**
a low-placed concealed wire used to trip an enemy or trespasser and to trigger an alarm or explosive device

**TRP**
target reference point

**TW**
target width

**US**
United States

**USAIS**
United States Army Infantry School

**USAR**
United States Army Reserve

**ZULU TIME**
Greenwich mean time

# REFERENCES

## Required Publications

Required publications are sources that users must read in order to understand or to comply with this publication.

### Army Regulations

| | |
|---|---|
| AR 350-41 | Training in Units 19 March 1993 |
| AR 380-5 | Department of The Army Information Security Program 25 February 1988 |

### Department of Army Forms

| | |
|---|---|
| DA Form 2404 | Equipment Inspection and Maintenance Worksheet |
| DA Form 5517-R | Standard Range Card |

### Department of Army Pamphlets

| | |
|---|---|
| DA PAM 738-750 | Functional Users Manual for the Army Maintenance Management System (TAMMS) 1 August 1994 |

### Field Manuals

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|---|---|
| FM 101-5-1 | Operational Terms and Graphics 30 September 1997 |
| FM 20-3 | Camouflage, Concealment and Decoys 30 August 1999 |
| FM 20-32 | Mine/Countermine Operations 29 May 1998 |
| FM 21-75 | Combat Skills of the Soldier 3 August 1984 |
| FM 23-14 | M249 Light Machine Gun in the Automatic Rifle Role 26 January 1994 |
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| FM 23-65 | Browning Machine Gun, Caliber .50 HB, M2 19 June 1991 |
| FM 24-1 | Signal Support in the Airland Battle 15 October 1990 |
| FM 24-18 | Tactical Single-Channel Radio Communications Techniques 30 September 1987 |
| FM 24-19 | Radio Operator's Handbook 24 May 1991 |
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| FM 3-23.25 | Light Antiarmor Weapons 30 August 2001 |
| FM 3-3 | Chemical and Biological Contamination Avoidance 16 November 1992 |
| FM 3-4 | NBC Protection 29 May 1992 |
| FM 3-5 | NBC Decontamination 28 July 2000 |
| FM 3-90.1 | Tank and Mechanized Infantry Company Team 9 December 2002 |
| FM 7-7 | The Mechanized Infantry Platoon and Squad (APC) 15 March 1985 |
| FM 7-7J | The Mechanized Infantry Platoon and Squad (Bradley) 7 May 1993 |
| FM 7-8 | The Infantry Platoon and Squad 22 April 1992 |

### Graphic Training Aids

| | |
|---|---|
| GTA 17-02-011 | Combat Vehicle Identification (CVI) Training Cards 1 January 1984 |

| | |
|---|---|
| GTA 17-02-013 | Armored Vehicle Recognition 1 May 1987 |
| KTC 1400 (*) | TRAINING SOI |
| KTC 600(*) | TACTICAL OPERATIONS CODE |

**Other Product Types**

| | |
|---|---|
| ACP 125 US SUPP-1 | COMMUNICATION INSTRUCTIONS RADIOTELEGRAPH PROCEDURES FOR USE BY UNITED STATES GROUND FORCES 1 October 1985 |
| ACP 125(D) | Radiotelephone Procedures 1 July 1970 |

**Technical Bulletins**

| | |
|---|---|
| TB 11-5820-890-12 | Technical Bulletin, Operator and Unit Maintenance for AN/CYZ-19 Automated Net Control Device (ANCD) NSN: 5810-01-343-194 (EIC: QSU) With the Single Channel Ground and Airborne Radio Systems (SINCGARS) 1 March 1993 |

**Technical Manuals**

| | |
|---|---|
| TM 11-5805-201-12 | OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL FOR TELEPHONE SET, TA-312/PT AND TA-312A/PT |
| TM 11-5805-243-13 | OPERATORS, UNIT, AND INTERMEDIATE DIRECT SUPPORT MAINTENANCE MANUAL FOR TELEPHONE SET TA-1/PT 15 July 1987 |
| TM 11-5805-650-12 | OPERATORS AND ORGANIZATIONAL MAINTENANCE MANUAL FOR TELEPHONE SET, TA-838/TT AND TA-838A/TT 25 January 1985 |
| TM 11-5820-401-10-1 | OPERATOR'S MANUAL: RADIO SETS, AN/VRC-12, AN/VRC-43, AN/VRC-45, AN/VRC-46, AN/VRC-47, AN/VRC-48, AND AN/VRC-49 (USED WITHOUT INTERCOM SYSTEMS) |
| TM 11-5820-401-10-2 | OPERATOR'S MANUAL: RADIO SETS, AN/VRC-12, AN/VRC-43, AN/VRC-44, AN/VRC-45, AN/VRC-46, AN/VRC-47, AN/VRC-48, AND AN/VRC-49 [USED WITH AND INTERCOM SYSTEM] |
| TM 11-5820-498-12 | OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL: RADIO SETS, AN/VRC-53, AN/VRC-64, AN/GRC-125, AND AN/GRC-160 AND AMPLIFIER-POWER SUPPLY GROUPS OA-3633/GRC AND OA-3633A/GRC |
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| TM 11-5830-340-12 | OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL FOR INTERCOMMUNICATION SET, AN/VIC-1(V); CONTROL, INTERCOMMUNICATION SET C-10456/VRC AND AMPLIFIER AUDIO FREQUENCY: AM-7046/VRC |
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| TM 3-6665-331-10 | OPERATOR'S MANUAL FOR CHEMICAL AGENT MONITOR (CAM) 12 June 1992 |
| TM 3-9905-001-10 | OPERATOR'S MANUAL FOR MARKING SET, CONTAMINATION: NUCLEAR, BIOLOGICAL, CHEMICAL (NBC) |
| TM 9-1005-201-10 | OPERATOR'S MANUAL FOR MACHINE GUN, 5.56-MM, M249 |
| TM 9-1005-213-10 | MACHINE GUN, CAL. .50, BROWNING, M2, HEAVY BARREL (AUG 92) 1 August 1992 |
| TM 9-1005-317-10 | OPERATOR'S MANUAL FOR PISTOL, SEMI-AUTOMATIC, 9-MM, M9 |

**Training Circulars**

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|---|---|
| TC 24-19 | Radio Operator's Handbook 24 June 1985 |
| TC 24-20 | Tactical Wire and Cable Techniques 3 October 1988 |

## Related Publications

Related publications are sources of additional information. They are not required in order to understand this publication.

**Army Correspondence Course Program Subcourses**

| | |
|---|---|
| EN5501 | Landmine Warfare, Part I |
| FA6064 | Recording MET Data |
| FA6066 | Perform Shift Chief Duties |
| SS0410 | Local-Battery Telephone Principles |

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| | |
|---|---|
| ARTEP 7-8-MTP | Mission Training Plan for the Infantry Rifle Platoon and Squad 5 October 2001 |
| ARTEP 7-90-DRILL | Drills for the Infantry Mortar Platoon, Section, and Squad 26 July 2002 |

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| DA FORM 2408-4 | WEAPON RECORD DATA 1 January 1979 |
| DA FORM 2601-1 | NET Data Correction Sheet for Mortars 1 October 1971 |
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| DA FORM 5986-E | PREVENTIVE MAINTENANCE SCHEDULE AND RECORD (AUTOMATED) 1 March 1991 |
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| 622-113-1886-B | TA-312/PT TELEPHONE SET - INTRODUCTION |

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| FM 100-10 | Combat Service Support 3 October 1995 |
| FM 100-14 | Risk Management 23 April 1998 |
| FM 11-43 | Signal Leader's Manual 12 June 1995 |
| FM 11-50 | Combat Communications Within the Division (Heavy and Light) 4 April 1991 |
| FM 17-12-1-1 | Tank Gunnery (Abrams) Volume I 5 May 1998 |
| FM 20-3 | Camouflage, Concealment and Decoys 30 August 1999 |
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| FM 23-90 | Mortars 1 March 2000 |
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| FM 24-19 | Radio Operator's Handbook 24 May 1991 |
| FM 24-33 | Communications Techniques: Electronic Counter-countermeasures 17 July 1990 |
| FM 24-35-1 | Signal Supplemental Instructions 2 October 1990 |
| FM 3-06.11 | Combined Arms Operations in Urban Terrain 28 February 2002 |
| FM 3-100 | Chemical Operations Principles and Fundamentals 8 May 1996 |
| FM 31-70 | Basic Cold Weather Manual 12 April 1968 |
| FM 3-22.31 | 40-mm Grenade Launcher, M203 13 February 2003 |
| FM 3-23.25 | Light Antiarmor Weapons 30 August 2001 |
| FM 3-23.35 | Combat Training with Pistols, M9 and M11 25 June 2003 |
| FM 3-3 | Chemical and Biological Contamination Avoidance 16 November 1992 |
| FM 3-4 | NBC Protection 29 May 1992 |
| FM 3-5 | NBC Decontamination 28 July 2000 |
| FM 3-90.1 | Tank and Mechanized Infantry Company Team 9 December 2002 |
| FM 4-25.11 | First Aid 23 December 2002 |
| FM 5-250 | Explosives and Demolitions 15 June 1992 |
| FM 5-34 | Engineer Field Data 30 August 1999 |
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| FM 6-20 | Fire Support in the AirLand Battle 17 May 1988 |
| FM 6-30 | Tactics, Techniques, and Procedures for Observed Fire 16 July 1991 |
| FM 7-10 | The Infantry Rifle Company 14 December 1990 |
| FM 7-20 | The Infantry Battalion 6 April 1992 |
| FM 7-7 | The Mechanized Infantry Platoon and Squad (APC) 15 March 1985 |
| FM 7-7J | The Mechanized Infantry Platoon and Squad (Bradley) 7 May 1993 |
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| FM 7-90 | Tactical Employment of Mortars 9 October 1992 |
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| DVC 05-14 | SOVIET LAND MINE, TRAINING AID SET |
| DVC 05-17 | LAND MINE TRAINING KIT |
| DVC 11-03 | TA-312/PT TELEPHONE TRAINER |
| DVC 5-17 | LAND MINE TRAINING KIT |
| ENG 051-142 | SOVIET MINE CARD |
| FT 4.2-H-2 | Mortar, 4.2-Inch, M30 Carrier, 107-mm Mortar: M106A1 and M106; Firing Cartridge, HE, M329A1; Cartridge, Smoke, WP, M328A1; Cartridge, Tactical CS, XM630 and Cartridge, Illuminating: M335A1 and M335A2 30 August 1968 |
| FT 4.2-K-2 | Mortar, 4.2-Inch, M30 and Firing Cartridge, HE, M329A2 30 June 1984 |
| FT 60-P-1 | Mortar, 60-mm: M224, Firing Cartridge, HE, M720; Cartridge, HE, M49A4; Cartridge, HE, XM888; Cartridge, TP, M50A3; Cartridge, WP, M302A1 and Cartridge, Illuminating, M83A3 22 March 1980 |
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| TM 11-5820-1025-10 | Operator's Manual Radio Set AN/PRC-126 1 February 1988 |
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| | AN/VRC-87D, AN/VRC88, AN/VRC-88D, AN/VRC-89, AN/VRC-90, AN/VRC-91, AN/VRC-92 9 January 1992 |
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| TM 11-5855-213-10 | OPERATOR'S MANUAL FOR NIGHT VISION SIGHT, INDIVIDUAL SERVED WEAPON AN/PVS-4 |
| TM 11-5855-238-10 | OPERATOR'S MANUAL: NIGHT VISION GOGGLES, AN/PVS-5, AN/PVS-5A, AN/PVS-5B, AND AN/PVS-5C |
| TM 11-5855-246-10 | OPERATOR'S MANUAL VIEWER, INFRARED AN/PAS-7 |
| TM 11-5855-262-10-1 | OPERATOR'S MANUAL FOR NIGHT VISION GOGGLE, AN/PVS-7A (NSN 5855-01-228-0939) (EIC: IPT) [TO 12S10-2PVS7-1] |
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| TM 11-5855-301-12&P | OPERATOR'S AND UNIT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR LIGHT, AIMING, INFRARED AN/PAQ-4B (NSN 5855-01-361-1362) (EIC: N/A) AN/PAQ-4C (5855- 15 August 1996 |
| TM 11-5855-309-12&P | Operator's and Unit Maintenance Manual (Including Repair Parts and Special Tools List) |
| TM 11-5860-201-10 | Operator's Manual for Laser Infrared Observation Set, AN/GVS-5 2 February 1982 |
| TM 3-4230-214-12&P | OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR DECONTAMINATING APPARATUS, PORTABLE, 14 LITER, M13 15 August 1992 |
| TM 3-4230-216-10 | Operator's Manual For Decontamination Kit, Skin: M285A1 and Training Aid, Skin Decontaminating: M58A1 17 May 1985 |
| TM 3-4240-279-10 | Operator's Manual for Mask, Chemical-Biological: Field ABC-M17, M17A1, and M17A2 5 October 1987 |
| TM 3-6665-307-10 | Operator's Manual for Chemical Agent Detector Kit, M256 and M256A1 1 September 1985 |
| TM 3-9905-001-10 | OPERATOR'S MANUAL FOR MARKING SET, CONTAMINATION: NUCLEAR, BIOLOGICAL, CHEMICAL (NBC) |
| TM 43-0001-28 | Army Ammunition Data Sheets for Artillery Ammunition: Guns, Howitzers, Mortars, Recoilless Rifles, Grenade Launchers and Artillery Fuzes 28 April 1994 |
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| TM 9-1010-221-10 | OPERATOR'S MANUAL FOR 40-MM GRENADE LAUNCHER, M203 |
| TM 9-1010-223-10 | Operator's Manual for Lightweight Company Mortar, 60-mm: M224 18 December 1987 |
| TM 9-1010-230-10 | OPERATOR'S MANUAL AND COMPONENTS LIST FOR MACHINE GUN, 40-MM, MK19 MOD3 |

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| TM 9-1240-413-12&P | Operator and Unit Maintenance Manual Including Repair Parts and Special Tools List for M68 Sight, Reflex, w/Quick Release and Mount 20 October 1997 |
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| TM 9-1290-333-15 | Operator's, Organizational, Direct Support, General Support and Depot Maintenance Manual (Including Repair Parts and Special Tools List): Compass, Magnetic, Unmounted: M2 7 November 1963 |
| TM 9-1300-206 | Ammunition and Explosives Standards 30 August 1973 |
| TM 9-1315-886-12 | OPERATOR'S AND UNIT MAINTENANCE MANUAL LAUNCHER AND CARTRIDGE, 84 MM : M136 (AT-4) 15 May 1990 |
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| TM 9-2350-252-10-1 | OPERATOR'S MANUAL FOR FIGHTING VEHICLE, CAVALRY, M3, M3A1, HULL 1 November 1986 |
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| TM 9-2350-259-10 | OPERATOR'S MANUAL FOR COMBAT VEHICLE, ANTITANK, IMPROVED TOW VEHICLE M901 |
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| TC 24-19 | Radio Operator's Handbook 24 June 1985 |
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| FM 5-34 | Engineer Field Data 30 August 1999 |

**STP 7-11C14-SM-TG**
**6 AUGUST 2004**

By Order of the Secretary of the Army:

**PETER J. SCHOOMAKER**
*General, United States Army*
*Chief of Staff*

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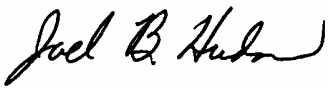

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