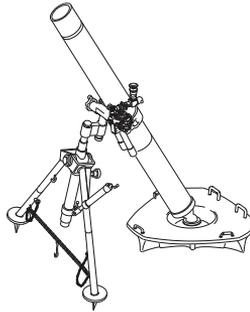


TM 9-1015-256-13&P

TECHNICAL MANUAL
OPERATOR AND
FIELD MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND
SPECIAL TOOLS LIST
(INCLUDING DEPOT REPAIR PARTS)
FOR
MORTAR, 120MM, M120A1
NSN 1015-01-554-0749 (EIC:4SN)



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HEADQUARTERS, DEPARTMENT OF THE ARMY
NOVEMBER 2009

WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous materials icons used within the technical manual.

FIRST AID

For first aid information, refer to FM 4-25.11, First Aid.

EXPLANATION OF SAFETY WARNING ICONS



EAR PROTECTION - headphones over ears shows that noise level will harm ears.



EXPLOSION - rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition, or high pressure.



EYE PROTECTION - person with goggles shows that the material will injure the eyes.



FLYING PARTICLES - arrows bouncing off face shows that particles flying through the air will harm face.



HEAVY OBJECT - human figure stooping over heavy object shows physical injury potential from improper lifting technique.



HEAVY PARTS - hand with heavy object on top shows that heavy parts can crush and harm.



HEAVY PARTS - heavy object pinning human figure against wall shows that heavy, moving parts present a danger to life or limb.



HOT AREA - hand over object radiating heat shows that part is hot and can burn.



TRIPPING HAZARD - human figure shows that falling may occur when items are on the ground.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION

WARNING



HEARING CONSERVATION

The 120mm mortar poses a significant risk of hearing loss. Hearing loss is a certainty for those not using hearing protection properly. Significant damage can occur even for a single, unprotected exposure. Some individuals are particularly susceptible to noise, and they can only be identified if they report for scheduled hearing checks.

- Crew members and all personnel within 5 meters of the M120A1 mortar must wear double hearing protection when firing. All personnel within 200 meters must wear hearing protection.
- All 120mm mortar crewmen must be trained in the proper use of both types of hearing protection.
- All 120mm mortar crewmen must be checked by appropriate medical personnel to ensure proper fit of earplugs.
- An individual (medical, safety, or range personnel), who has evidence of hearing conservation training equivalent to standards of Council for Accreditation in Occupational Hearing Conservation, must ensure proper fit and use of the earplugs before any firing.

WARNING



EYE PROTECTION

Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

WARNING SUMMARY - Continued

WARNING



SPRING TENSION

To avoid injury, use extreme caution when removing or installing parts which are under spring tension.

WARNING



EMPLACEMENT HAZARDS

If elevation angle of cannon is not high enough (approximately 55 degrees), the mortar baseplate may slide backward upon first shots. Personnel injury may result.

Mortar components are heavy. To avoid injury to personnel, use two crew members when moving components.

Mortar must be securely fastened to the mortar stowage kit.

Bipod assembly, mortar barrel assembly, and mortar baseplate must be securely connected to each other.

Ensure clamp handle assembly is not loosened more than two turns.

WARNING



TRIPPING HAZARD

Cables running between electronics rack, gunner's display, Pointing Device Mount Assembly - Dynamic Quick Release (PDMA-DQR), and trailer pose a tripping hazard.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

WARNING



BEFORE FIRING CHECKS HAZARDS

Do not use weapon if serial numbers on breech cap and cannon tube do not match or white line on barrel does not align with firing pin when fully assembled. Failure to use matched or properly aligned components can cause breech cap to unlock from baseplate socket, causing possible injury to mortar crew or supported personnel.

Before firing, wipe dry the cross leveling mechanism's clamping surface on elevating mechanism housing, the clamping surfaces of buffer mechanism, and the exterior surface of barrel with a clean cloth. **DO NOT LUBRICATE.**

Do not allow the bipod assembly to lean forward (downrange) of a vertical position under any circumstance of elevation setting or positioning of buffer housing assembly on the barrel.

The exterior surface of the barrel must be wiped free of lubrication in the area of the buffer housing assembly prior to firing. If this portion is not dry, the buffer housing assembly may move excessively on the barrel during firing.

WARNING



LOADING AND FIRING HAZARDS

Always check mask and overhead clearance before firing.

Gunner and Assistant Gunner's heads must be away and below muzzle blast (no higher than 1.2 meters above ground) during all loading and firing operations.

Do not assemble or use a cartridge unless authorized.

Do not drop a cartridge down the cannon tube with the firing pin removed. Firing pin must line up with stripe on barrel.

To avoid injury, do not bring hands over muzzle of barrel while releasing cartridge.

Do not try to force a cartridge down the barrel.

WARNING SUMMARY - Continued

WARNING



LOADING AND FIRING HAZARDS - Continued

The normal time required for a round to drop down the barrel is 2 to 3 seconds. If a longer drop time is noticed, the barrel should be dry-swabbed before firing is resumed to reduce the chance of misfire.

The mortar crew must have adequate cover for protection from fragments when firing to ranges of 600 meters or less.

Firing ammunition in a heavily lubricated bore can result in hangfires or failures to fire. Short rounds may occur if water or excessive oil is in the barrel during firing.

Heavy rainfall may prematurely explode Point Detonating (PD) and proximity fuzes.

Cannon bore is required to be dry-swab cleaned after every fire mission or ten rounds fired (approximately).

During rapid and sustained rates of fire, there is a possibility of residual flame and cook offs. Rapid and sustained rates of fire are 16 and 4 rounds per minute. If a cookoff occurs, the crew should wait 10 minutes for the weapon to cool, swab the barrel, and resume firing.

WARNING



SERVICE UPON RECEIPT OF MATERIEL HAZARDS

Inspect cannon tube to make sure it is empty before servicing or beginning maintenance. Keep live ammunition out of the area during maintenance operations.

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

WARNING



MISFIRE PROCEDURES - CRUSHING HAZARDS

Ensure cross-leveling T-handle is as tight as physically possible so barrel will not fall on personnel during misfire procedure.

Do not stand directly behind mortar when removing a misfire.

WARNING



MISFIRE PROCEDURES - HOT MORTAR

If the mortar is hot, avoid serious burns by waiting until the barrel is cool enough to touch with bare hands.

If operating in MOPP IV gear/environment, don leather gloves over chemical-resistant gloves to protect hands from burns.

WARNING



MISFIRE HAZARDS

Serious injury or death may result from misfire. Cookoff may result in an unexpected blast with the crew improperly positioned. Another cartridge dropped on top of a misfired cartridge may result in detonation of both propelling charges, both fuzes, and both main charges, rupturing the barrel. The cartridge may detonate while removing the misfire.

Keep head and body away from front of mortar when removing a misfire.

Do not open buffer housing assembly when removing a misfire. Failure to comply could cause collapse of the mortar system.

WARNING SUMMARY - Continued

WARNING



MISFIRE HAZARDS - Continued

When removing the cartridge, do not touch the primer and do not stand directly in front of barrel.

Firing a round with cleaning fluid, rain water, or excess oil left in barrel results in discharge of heavy black smoke, and will result in the projectile falling short of its expected range, or could cause misfire.

WARNING



MISFIRE HAZARD

If kicking the barrel, or striking the barrel with rubber mallet, does not cause the cartridge to fire during a misfire and the mortar is hot, wait until the mortar is cool enough to handle with bare hands. If the mortar is cool at the time of the misfire, wait 1 minute before removing the cartridge. Water or snow applied to the outside of the barrel can be used for cooling. This is to avoid an accident from possible delayed action of the ignition cartridge.

WARNING



AMMUNITION HAZARDS

Handle explosive ammunition and components containing explosives with utmost care. Do not drop, drag, throw, tumble, or strike packaged or unpackaged ammunition or related components.

Do not fire unpackaged ammunition that has been dropped. These will be returned to the Ammunition Supply Point (ASP) as unserviceable. If an M930 or M983 Illum Cartridge has been dropped, do not attempt to retrieve the cartridge for 10 minutes. Personnel retrieving the cartridge must be sure that the fuze and fin ends of the cartridge are pointed away from their bodies in the event that the cartridge separates. The cartridge is to be placed in the dud pit and destroyed by Explosive Ordnance Disposal (EOD).

WARNING SUMMARY - Continued

GENERAL SAFETY WARNINGS DESCRIPTION - Continued

WARNING



AMMUNITION HAZARDS - Continued

Do not fire packaged M57, M68, or M91 cartridges that have been dropped from a height greater than 1 meter. These cartridges will be returned to the ASP as unserviceable.

Ammunition exposed directly to sunlight, or in unventilated containers, enclosures, shelters, freight cars, closed vehicles, and similar structures exposed to direct sunlight, may reach temperatures exceeding upper storage limits. Avoid exposure of ammunition and related components to direct sunlight.

Do not fire ammunition in temperatures above +145 °F (+63 °C) or below -28 °F (-33 °C).

At temperatures exceeding 111.4 °F (44.1 °C) (melting point of white phosphorus (WP)), store and transport WP rounds in a vertical position (nose up) to prevent voids in the WP.

Do not store ammunition under trees or next to towers or other structures that attract lightning.

When burning excess increments:

- Burning area must be at least 100 meters from the nearest mortar position, parked vehicles, and ammunition piles.
- Burning area shall be cleared of all dead grass or brush within 30 meters.

M781 fuze may be armed if packing clip is missing or red band on striker is protruding from nose cap. Force applied to the nose of an armed fuze can result in ignition of propelling charge. Do not attempt to fire a cartridge with an armed fuze. Remove cartridge without striking nose of fuze.

Propelling charges are not interchangeable. Do not substitute one model for another. Do not mix lots.

Reposition remaining propellant increments toward rear of fin assembly for most effective ignition and flight of cartridge. Erratic or shortened flight may cause injury to personnel.

WARNING SUMMARY - Continued

EXPLANATION OF HAZARDOUS MATERIALS ICONS



CHEMICAL - drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



EYE PROTECTION - person with goggles shows that the material will injure the eyes.



FIRE - flame shows that a material will ignite and cause burns.



POISON - skull and crossbones shows that a material is poisonous or is a danger to life.



RADIATION - three circular wedges shows that the material emits radioactive energy and can injure human tissue.



VAPOR - human figure in a cloud shows that material vapors present danger to life or health.

WARNING SUMMARY - Continued

HAZARDOUS MATERIALS DESCRIPTION

WARNING



DRY CLEANING SOLVENT

Dry cleaning solvent is flammable. Do not clean parts near an open flame or in a smoking area. Dry cleaning solvent evaporates quickly and has a drying effect on the skin. When used without protective gloves, this chemical may cause irritation to, or cracking of, the skin. Wear safety goggles or glasses.

WARNING



SEALING COMPOUND

Sealing compound is a combustible mixture which contains lead. Excessive contact and prolonged breathing of vapor can cause headaches, nausea, and long term effects. Avoid excessive contact by wearing gloves and use only in a well-ventilated area. Keep away from heat sources to prevent combustion.

WARNING SUMMARY - Continued

WARNING



RADIATION HAZARD - TRITIUM GAS (H₃)

This item contains radioactive tritium gas in sealed source form.

- The beta radiation emitted by tritium is only a hazard if the tritium vial is broken and contaminates personnel or work areas.
- If the luminous vial is broken, the tritium gas will dissipate into the surrounding air quickly. However, when released into a confined space such as an arms room or unventilated room, the tritium will convert to tritiated water vapor.
- Tritiated water is readily absorbed by the body through inhalation, ingestion, or absorption through the skin when contact is made with contaminated surfaces or devices.
- Unlike other radioactive materials, tritiated water readily leaves the body through normal body functions.
- Eating, drinking, or smoking is NOT allowed in tritium device maintenance areas.
- For more information, see "Tritium (H₃) Safety, Care, and Handling" in the next section.

TRITIUM (H₃) SAFETY, CARE, AND HANDLING

1. Description: Radioactive tritium gas is contained in the following mortar components: M67 Sight Unit and M58/M59 Aiming Post Lights. Control of this radioactive materiel is mandated by Federal Regulation.
2. Lost or Stolen: Immediately report any suspected lost or damaged items to your Radiation Safety Officer (RSO). If your local Radiation Safety Officer cannot be reached, contact the TACOM-RI Safety Office during regular duty hours at DSN 793-2965/4594, or (309) 782-2965/4594. After duty hours, contact the Staff Duty Office through the operator at DSN 793-6001, Com (309) 782-6001.
3. Procedures for Handling Damaged Tritium Lamps: The following procedures shall be followed when a tritium lamp contained in a mortar component is broken or does not show illumination.
 - a. If the tritium lamp is broken, cracked, or there is no illumination, immediately wrap the device in two clear plastic bags, seal with tape, and mark the bag "Broken Tritium Device – Do Not Open". Personnel handling the tritium device should wear impermeable gloves. If gloves are not available, use the inverted bag method in picking up the device. Place the potentially contaminated gloves between the first and second plastic bag prior to sealing.
 - b. If skin contact is made with any device or area potentially contaminated with tritium, wash immediately (within 3 minutes) with nonabrasive soap and cold water for at least 1 minute.
 - c. Notify your local RSO immediately to report the incident. Contact the base safety office or your NBC officer for the name and telephone number of the local RSO.

LOCAL RSO: _____ TELEPHONE: _____
 - d. Broken tritium sources indoors may result in tritium contamination of the areas, such as work bench table tops, ceilings, floors, etc. Personnel need to inform other persons to vacate the immediate area and secure the immediate area from entry until the RSO has determined the extent of contamination. This can only be determined by the RSO performing a wipe test survey of the potentially contaminated work surfaces/areas.

- e. Your local RSO will perform a leak test on the damaged device and related work area by performing wipe tests to determine the extent of tritium contamination. If wipe test results are in excess of 1,000 disintegrations per minute (DPM), decontaminate the area per guidance provided by the TACOM-RI license RSO. The local RSO will perform another wipe test after decon to be certain decontamination was successful.
- f. Additional guidance for safe handling and maintenance is located in TM 9-254, General Maintenance Procedures for Fire Control Materiel.
- g. Spare parts to include modules containing tritium lamps must be stored in the shipping container, as received, until installation into the mortar component. Storage of radioactive items is required to be in a secured, well-ventilated area that is designated by the RSO.

NOTE

Due to expired shelf life, not all non-illuminated devices will have evidence of tritium contamination, but will still be handled as if they were contaminated.

- 4. Handling Precautions Prior to Maintenance: These precautions implement mandatory license requirements for use and maintenance of tritium radio luminous fire control devices used on mortars. This procedure is applicable to all personnel working with tritium devices, including depot and field maintenance levels. Modules containing tritium lamps can be replaced at the field maintenance level. The module secures the tritium lamp. Any repair requiring the removal of the tritium lamp itself from the module is prohibited by TACOM-RI NRC license except at depot level approved facilities. Do not attempt to repair a known broken device until it has been determined by the RSO that the device is free of tritium contamination. It may or may not be economically feasible to repair mortar components.

WARNING



Eating, drinking, or smoking is NOT allowed in tritium device maintenance areas.

NOTE

Level vials are considered to be modules.

- a. Maintenance of mortar components containing tritium fire control involving module replacement ONLY will be performed in a controlled area designated by the installation or mission/unit RSO.

TRITIUM (H₃) SAFETY, CARE, AND HANDLING - Continued

- b. All mortar tritium fire control devices requiring replacement of the tritium lamp(s) contained INSIDE the module will be evacuated to the appropriate Tritium Instrument Repair Facility designated by the TACOM-RI RSO as indicated below. Severely damaged devices must be turned in to your installation or mission RSO immediately for disposal.
 - c. Check for illumination prior to maintenance in a low light or darkroom. If the device is not illuminated, do not repair. Wrap the entire device in plastic bag as outlined above and notify your RSO immediately.
 - d. Wear protective gloves as noted above.
 - e. Perform work in a well-ventilated designated area.
 - f. Wash hands immediately (within 3 minutes) with nonabrasive soap and cold water after handling a broken mortar fire control device that contains tritium modules.
 - g. Mortar components containing radioactive self-luminous vials are identified by means of radioactive warning labels. These labels should not be defaced or removed during maintenance and should be replaced immediately when necessary. Refer to the local RSO or the TACOM-RI RSO for instructions on handling, storage, or disposal.
 - h. When mortar tritium module components are replaced during maintenance, they must be placed into a clear plastic bag, labeled radioactive tritium component, the NSN, and activity present in millicuries. The maintainer must turn in the fire control component immediately to the unit RSO for proper radioactive waste disposal and security.
5. Posting Requirements: In accordance with Title 10 CFR Section 19.11, the following rules and regulations shall be posted in work area where mortar tritium fire control devices are repaired. Copies may be requested or further information obtained by contacting the TACOM-RI LCMC RSO/licensee, ATTN: AMSTA-CS-CZR, Rock Island, IL 61299-7630.

NOTE

Postings e and f (below) may be filed in the installation safety office for review, rather than posting them in the work area.

- a. NRC License (TACOM license no. 12-00722-06).
 - b. Standard Operating Procedures specifying maintenance procedures.
 - c. NRC Form 3 (May 1999) and Reorganization Act of 1974, Section 206.
 - d. Emergency contact information (local RSO and license RSO).
 - e. 10CFR Part 19 - Notices, Instructions, and Reports to Workers.
 - f. 10CFR Part 20 - Standards for Protection against Radiation.
6. Approved Depot Level Tritium Instrument Repair Facilities:
- a. Anniston Army Depot
 - b. Fort Drum, NY
 - c. Fort Stewart, GA
 - d. Fort Bragg, NC
 - e. Fort Lewis, WA
 - f. Schofield Barracks, HI
 - g. MCLB Albany, GA
 - h. MCLB Barstow, CA
 - i. TACOM-RI, Rock Island, IL

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NOTE: Zero in the "Change No." column indicates an original page or work package.

Date of issue for the original manual is:

Original 30 November 2009

**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 54 AND
TOTAL NUMBER OF WORK PACKAGES IS 63, CONSISTING OF THE
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HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 November 2009

TECHNICAL MANUAL

OPERATOR AND
FIELD MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST
(INCLUDING DEPOT REPAIR PARTS)
FOR
MORTAR, 120MM, M120A1
NSN 1015-01-554-0749 (EIC:4SN)

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Index

HOW TO USE THIS MANUAL

The safest, easiest, and best way to operate and maintain the M120A1 120mm mortar is to use this manual. Learning to use this TM is as easy as reading through the next few pages of this section. Knowing what is in this manual and how to use it will save you time and work and will help you to avoid exposing yourself to unnecessary hazards while performing your job.

So where do you start?

Right here, if this is the first time you are using this TM. Be sure to completely read this section on how to use this manual first. There's a lot of information here that you need to know.

Organization

This manual covers the operation and maintenance of the M120A1 mortar. The manual itself is divided into nine chapters. The nine chapters, and what they contain, are found in the Table of Contents in the front of this manual. For example, to learn about operating the M120A1 mortar, you would look in the table of contents and discover that Chapter 2 provides all pertinent information about the operation of the weapon system. Since Chapter 2 covers a great deal of information, you will have to scan the chapter to find the specific information you will need.

In the back of this manual, you will find supporting information. Each work package provides specific information that will assist you in performing the various tasks. The work packages provide such information as additional references (i.e., other TMs or FMs), as in WP 0056, and Basic Issue Items (BII), as in WP 0059. Become familiar with all supporting information work packages before beginning any operational or maintenance task.

Performance of Maintenance Task

The first page of a maintenance procedure lists everything you will need to perform the procedure. The following paragraphs describe the blocks of information you will encounter.

a. **TOOLS AND SPECIAL TOOLS.** Individual tools from your mechanic's tool kit will not be listed under this heading. If any tools from this kit are required, the tool kit itself will be listed. Special tools, fabricated tools, and tools from any other source will be listed with a reference to a specific item and work package number. The referenced work package will provide you with the necessary information to find the tool.

HOW TO USE THIS MANUAL - Continued

b. MATERIALS/PARTS. If any expendable or consumable supplies are needed to perform the task, they will be listed under this heading along with the quantity in parentheses and with a reference to the appropriate item and work package. The referenced work package will give you detailed information to requisition the supply if necessary. Replacement parts are not normally listed under this heading. The inspection steps in the removal or disassembly procedure will tell you which parts to replace. Mandatory repair parts (parts that are destroyed in disassembly or are not normally re-used, such as gaskets and lockwashers) are listed under this heading by their nomenclature only.

c. PERSONNEL REQUIRED. The number of personnel necessary to perform the task will be listed here. You will find this heading only in procedures that require more than one person.

d. EQUIPMENT CONDITION. This heading will list the special conditions which must be met prior to performing your task. In many cases, the condition has already been identified in another procedure. In these cases, the Equipment Condition will refer to that maintenance procedure for details in performing the preliminary task.

e. REFERENCES. These are other technical publications you will need to do the task which are found in WP 0056. This heading will only appear when other references are needed.

How is the maintenance task organized?

The maintenance procedure is arranged for performance of the task. Besides the information already discussed, categories such as inspection, service, disassembly, lubrication, repair, and assembly will be listed. Specific instructions will be given to perform that part of the maintenance procedure. Be sure to follow all the steps given and do not skip any categories unless you are absolutely sure that they are not required for the completion of your maintenance task.

Readiness to Use this TM

If you've taken the time necessary to read this section, and are sure of the location and arrangement of the different sections of this TM, you are ready to begin. Remember, this TM has been arranged with you, the user, in mind. Your safety and ability to perform the operational and maintenance tasks in the most efficient manner possible hinge on your ability to perform and understand the information contained in this manual. If you fully understand the arrangement and purpose of this TM, and have taken the time to read through this section, you will have no trouble operating and maintaining this weapon system in the manner for which it was designed.

CHAPTER 1

**GENERAL INFORMATION,
EQUIPMENT DESCRIPTION, AND
THEORY OF OPERATION
FOR
M120A1 120MM MORTAR**

OPERATOR AND FIELD MAINTENANCE**GENERAL INFORMATION**

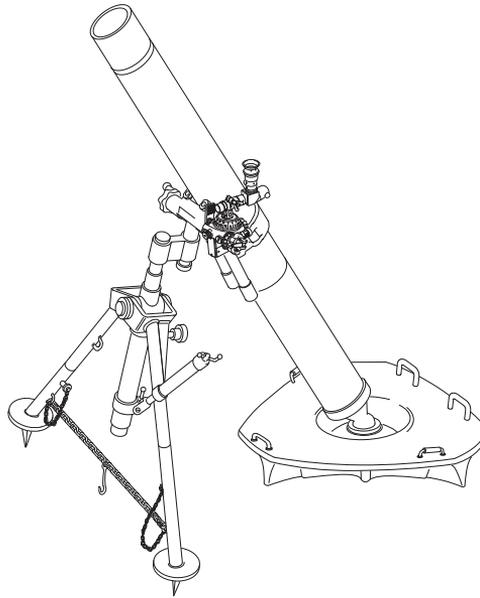
SCOPE

Figure 1. 120mm Mortar, M120A1.

Type of Manual

Operator's and Field Maintenance manual.

Model Number and Equipment Name

120mm Mortar, M120A1.

Purpose of Equipment

The M120A1 120mm mortar is a smooth bore, muzzle-loaded, crew-served, high angle fire weapon that provides indirect fire support.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your M120A1 mortar needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. If you have Internet access, the easiest and fastest way to report problems or suggestions is to go to <https://aeps.ria.army.mil/aepspublic.cfm> (scroll down and choose the "Submit Quality Deficiency Report" bar). The Internet form lets you choose to submit an Equipment Improvement Recommendation (EIR), a Product Quality Deficiency Report (PQDR), or a Warranty Claim Action (WCA). You may also submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 via e-mail, regular mail, or facsimile using the addresses/facsimile numbers specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual. We will send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

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

Corrosion specifically occurs with metals. It is an electrochemical process that causes degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking.

Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking.

SF 368, Product Quality Deficiency Report, should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

DESTRUCTION OF MATERIEL TO PREVENT ENEMY USE

Procedures and materials used for the destruction of the 120mm mortar in order to prevent enemy use will be found in TM 750-244-7.

PREPARATION FOR STORAGE OR SHIPMENT

See WP 0044.

NOMENCLATURE CROSS-REFERENCE LIST

<u>Common Name</u>	<u>Official Nomenclature</u>
Barrel	Cannon Tube
Bipod Leg	Mortar Mount Leg
Coarse Deflection Index Arrow	Telescope Mount Index
Coarse Elevation Index Arrow	Telescope Mount Index
Cross Leveling Locking Knob	Handle Assembly
Dovetail Slot Cover	Sightunit Adapter Cover
Fine Elevation Index Arrow	Telescope Mount Index
M191 Bipod Assembly	M191 Mortar Mount
Mortar Barrel Assembly	M298 120mm Cannon
Mortar Baseplate	M9 Mortar Baseplate
Turntable Locking Handle	Manual Control Handle

LIST OF ABBREVIATIONS/ACRONYMS**Abbreviation/Acronym**

ASP	Ammunition Supply Point
CAPS/ACAPS	Communication Aural Protective System/ Artillery Communication Aural Protective System
CPC	Corrosion Prevention and Control
CVC	Combat Vehicle Crewman
DPM	Disintegrations Per Minute
EIR	Equipment Improvement Recommendation
EOD	Explosive Ordnance Disposal
ER	Electronics Rack
FCC	Fire Control Computer
FDC	Fire Direction Center
GD	Gunner's Display
HMMVW	High Mobility Multipurpose Wheeled Vehicle
IP	Internet Protocol
LRRS	Loose Round Restraint System
LRU	Line Replaceable Unit
MFCS-D	Mortar Fire Control System - Dismounted
NRC	Nuclear Regulatory Commission
PASGT	Personnel Armored System for Ground Troops
PD	Point Detonating
PD	Pointing Device
PDMA	Pointing Device Mount Assembly
PDMA-DQR	Pointing Device Mount Assembly - Dynamic Quick Release
PQDR	Product Quality Deficiency Report
RSO	Radiation Safety Officer

LIST OF ABBREVIATIONS/ACRONYMS - Continued**Abbreviation/Acronym - Continued**

SF	Standard Form
SOP	Standard Operating Procedures
TAMMS	The Army Maintenance Management System
UV	Ultraviolet
WCA	Warranty Claim Action
WP	White Phosphorus

SAFETY, CARE, AND HANDLING

1. Description: Radioactive tritium gas is contained in the following mortar components: M67 Sight Unit and M58/M59 Aiming Post Lights. Control of this radioactive materiel is mandated by Federal Regulation.
2. Lost or Stolen: Immediately report any suspected lost or damaged items to your Radiation Safety Officer (RSO). If your local Radiation Safety Officer cannot be reached, contact the TACOM-RI Safety Office during regular duty hours at DSN 793-2965/4594, or (309) 782-2965/4594. After duty hours, contact the Staff Duty Office through the operator at DSN 793-6001, Com (309) 782-6001.
3. Procedures for Handling Damaged Tritium Lamps: The following procedures shall be followed when a tritium lamp contained in a mortar component is broken or does not show illumination.
 - a. If the tritium lamp is broken, cracked, or there is no illumination, immediately wrap the device in two clear plastic bags, seal with tape, and mark the bag "Broken Tritium Device – Do Not Open". Personnel handling the tritium device should wear impermeable gloves. If gloves are not available, use the inverted bag method in picking up the device. Place the potentially contaminated gloves between the first and second plastic bag prior to sealing.
 - b. If skin contact is made with any device or area potentially contaminated with tritium, wash immediately (within 3 minutes) with nonabrasive soap and cold water for at least 1 minute.

-
- c. Notify your local RSO immediately to report the incident. Contact the base safety office or your NBC officer for the name and telephone number of the local RSO.

LOCAL RSO: _____ TELEPHONE: _____

- d. Broken tritium sources indoors may result in tritium contamination of the areas, such as work bench table tops, ceilings, floors, etc. Personnel need to inform other persons to vacate the immediate area and secure the immediate area from entry until the RSO has determined the extent of contamination. This can only be determined by the RSO performing a wipe test survey of the potentially contaminated work surfaces/areas.
- e. Your local RSO will perform a leak test on the damaged device and related work area by performing wipe tests to determine the extent of tritium contamination. If wipe test results are in excess of 1,000 disintegrations per minute (DPM), decontaminate the area per guidance provided by the TACOM-RI license RSO. The local RSO will perform another wipe test after decon to be certain decontamination was successful.
- f. Additional guidance for safe handling and maintenance is located in TM 9-254, General Maintenance Procedures for Fire Control Materiel.
- g. Spare parts to include modules containing tritium lamps must be stored in the shipping container, as received, until installation into the mortar component. Storage of radioactive items is required to be in a secured, well-ventilated area that is designated by the RSO.

NOTE

Due to expired shelf life, not all non-illuminated devices will have evidence of tritium contamination, but will still be handled as if they were contaminated.

SAFETY, CARE, AND HANDLING - Continued

4. Handling Precautions Prior to Maintenance: These precautions implement mandatory license requirements for use and maintenance of tritium radio luminous fire control devices used on mortars. This procedure is applicable to all personnel working with tritium devices, including depot and field maintenance levels. Modules containing tritium lamps can be replaced at the field maintenance level. The module secures the tritium lamp. Any repair requiring the removal of the tritium lamp itself from the module is prohibited by TACOM-RI NRC license except at depot level approved facilities. Do not attempt to repair a known broken device until it has been determined by the RSO that the device is free of tritium contamination. It may or may not be economically feasible to repair mortar components.

WARNING

Eating, drinking, or smoking is NOT allowed in tritium device maintenance areas.

NOTE

Level vials are considered to be modules.

- a. Maintenance of mortar components containing tritium fire control involving module replacement ONLY will be performed in a controlled area designated by the installation or mission/unit RSO.
- b. All mortar tritium fire control devices requiring replacement of the tritium lamp(s) contained INSIDE the module will be evacuated to the appropriate Tritium Instrument Repair Facility designated by the TACOM-RI RSO as indicated below. Severely damaged devices must be turned in to your installation or mission RSO immediately for disposal.
- c. Check for illumination prior to maintenance in a low light or darkroom. If the device is not illuminated, do not repair. Wrap the entire device in plastic bag as outlined above and notify your RSO immediately.
- d. Wear protective gloves as noted above.
- e. Perform work in a well-ventilated designated area.
- f. Wash hands immediately (within 3 minutes) with nonabrasive soap and cold water after handling a broken mortar fire control device that contains tritium modules.

-
- g. Mortar components containing radioactive self-luminous vials are identified by means of radioactive warning labels. These labels should not be defaced or removed during maintenance and should be replaced immediately when necessary. Refer to the local RSO or the TACOM-RI RSO for instructions on handling, storage, or disposal.
 - h. When mortar tritium module components are replaced during maintenance, they must be placed into a clear plastic bag, labeled radioactive tritium component, the NSN, and activity present in millicuries. The maintainer must turn in the fire control component immediately to the unit RSO for proper radioactive waste disposal and security.
5. Posting Requirements: In accordance with Title 10 CFR Section 19.11, the following rules and regulations shall be posted in work area where mortar tritium fire control devices are repaired. Copies may be requested or further information obtained by contacting the TACOM-RI LCMC RSO/licensee, ATTN: AMSTA-CS-CZR, Rock Island, IL 61299-7630.

NOTE

Postings e and f (below) may be filed in the installation safety office for review, rather than posting them in the work area.

- a. NRC License (TACOM license no. 12-00722-06).
- b. Standard Operating Procedures specifying maintenance procedures.
- c. NRC Form 3 (May 1999) and Reorganization Act of 1974, Section 206.
- d. Emergency contact information (local RSO and license RSO).
- e. 10CFR Part 19 - Notices, Instructions, and Reports to Workers.
- f. 10CFR Part 20 - Standards for Protection against Radiation.

SAFETY, CARE, AND HANDLING - Continued

6. Approved Depot Level Tritium Instrument Repair Facilities:
 - a. Anniston Army Depot
 - b. Fort Drum, NY
 - c. Fort Stewart, GA
 - d. Fort Bragg, NC
 - e. Fort Lewis, WA
 - f. Schofield Barracks, HI
 - g. MCLB Albany, GA
 - h. MCLB Barstow, CA
 - i. TACOM-RI, Rock Island, IL

SUPPORTING INFORMATION FOR REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT**Common Tools and Equipment**

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE); CTA 50-970, Expendable/Durable Items (Except: Medical, Class V, Repair Parts, and Heraldic Items); CTA 50-909, Field and Garrison Furnishings and Equipment; or CTA 8-100, Army Medical Department Expendable/Durable Items, as applicable to your unit.

Special Tools, TMDE, and Support Equipment

Special tools required for field maintenance are listed in work package (WP) 0053.

Repair Parts

Repair parts are listed and illustrated in the parts information WP 0051 of this manual.

END OF WORK PACKAGE

OPERATOR AND FIELD MAINTENANCE**EQUIPMENT DESCRIPTION AND DATA**

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**Characteristics**

A mortar system that is transported by cargo trailer, M326 Mortar Stowage Kit.

System is emplaced on the ground.

M67 sight unit or Mortar Fire Control System - Dismounted gives indirect fire capability.

Capabilities and Features

Smooth bore barrel is muzzle loaded and has a removable firing pin.

Mortar is capable of delivering various types of cartridges with a variety of fuzes at a rapid rate of fire.

Mortar breaks down into sections that mortar crew can handle or can be transported intact on specially equipped trailer.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

WARNING



Do not use weapon if serial numbers on breech cap and cannon tube do not match or white line on barrel does not align with firing pin when fully assembled.

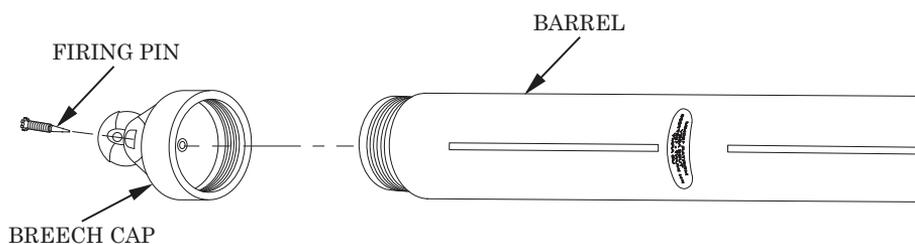


Figure 1. M298 120mm Cannon.

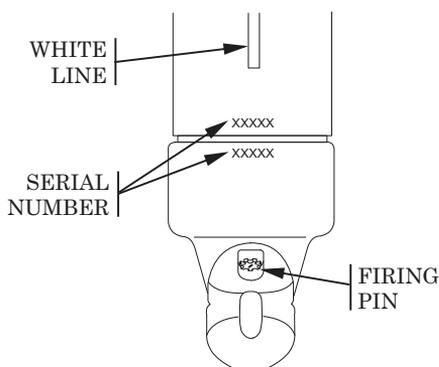


Figure 2. Placement of Serial Numbers.

NOTE

Serial numbers must match. The location shown is the preferred placement but some serial numbers may appear on the ball of the breech cap.

M298 120MM CANNON. Drop fired, smooth bore barrel equipped with a removable firing pin.

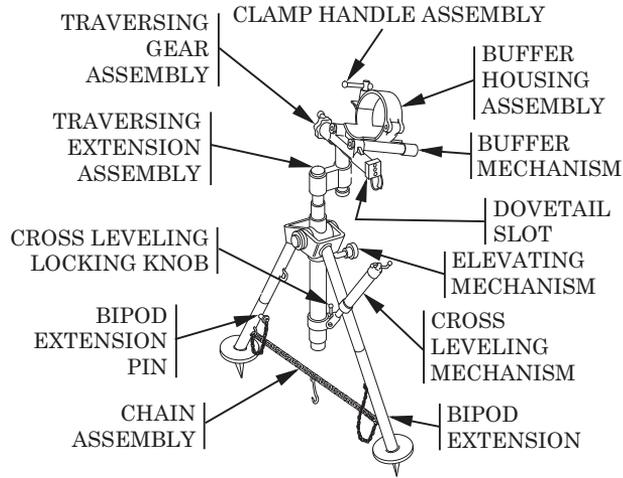


Figure 3. M191 Mortar Mount.

M191 MORTAR MOUNT. For ground mount (with leg extensions). Provides cross-leveling, elevation, and traversing adjustments. Equipped with buffer mechanism and traversing extension assembly. M67 sight unit attaches to bipod's dovetail slot.

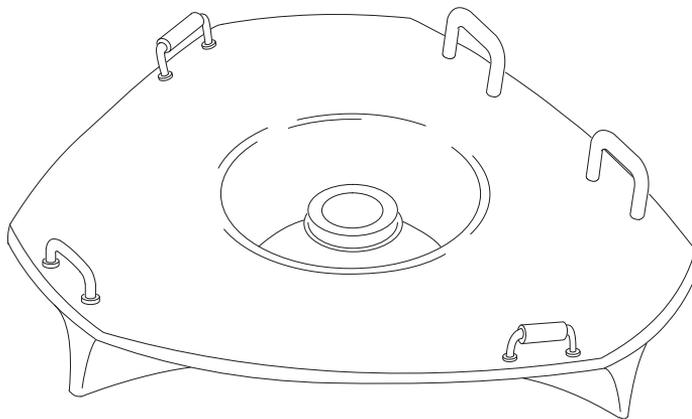


Figure 4. M9 Mortar Baseplate (with M326 Brackets).

M9 MORTAR BASEPLATE (WITH M326 BRACKETS). Provides a stable base for firing for the ground-mounted mortar.

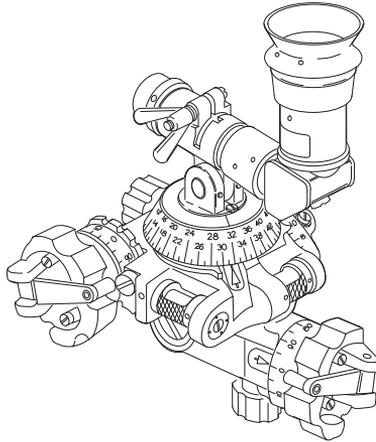
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

Figure 5. M67 Sight Unit.

WARNING

Take care in handling mortar components which contain radioactive tritium H_3 . These components are the M67 sight unit and M58/M59 aiming post lights. If damage occurs, see **WARNING SUMMARY** information in the front of this manual for special handling instructions.

M67 Sight Unit. A sighting device used to lay the mortar in elevation and deflection (azimuth). Attaches to the bipod's dovetail slot.

EQUIPMENT DATA

PHYSICAL CHARACTERISTICS

In firing position	317 lb (144 kg)
Mortar Barrel Assembly	
Weight	110 lb (50 kg)
Length	69 in. (175 cm)
M191 Bipod Assembly	
Weight	68 lb (31 kg)
(with Bipod Leg Extension Assembly)	88 lb (40 kg)
Length	51 in. (130 cm)
Mortar Baseplate, M9 (with M326 Brackets)	136 lb (62 kg)
Sighting Equipment (with M58/M59 aiming post lights).....	4.0 lb (1.8 kg)

ELEVATION - GROUND MOUNTED

Minimum	710 mils
Maximum	1510 mils

TRAVERSE - GROUND MOUNTED

Maximum right or left, using traversing wheel	136 mils
One turn of traversing wheel - 5 mils (approximate)	
With traversing extension	316 mils

ARC OF FIRE

M120A1.....	6400 mils
-------------	-----------

RANGE

Minimum	200 meters
Maximum	7200 meters

RATE OF FIRE

Maximum (for one minute).....	16 rounds
Intensive (sustained indefinitely, with max charge).....	4 rounds/min

END OF WORK PACKAGE

OPERATOR AND FIELD MAINTENANCE**THEORY OF OPERATION**

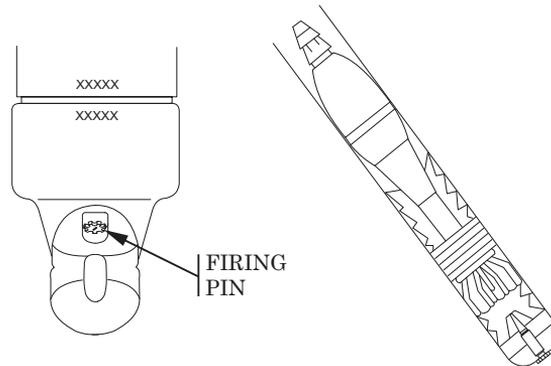
THEORY OF OPERATION

Figure 1. Action of Cartridge in Barrel.

1. Cartridge is fired by dropping a complete round down the barrel and striking firing pin.
2. As cartridge hits firing pin, primer fires cartridge which ignites propellant.
3. Gas from burning propellant pushes projectile out of barrel.

END OF WORK PACKAGE

CHAPTER 2
OPERATOR INSTRUCTIONS
FOR
M120A1 120MM MORTAR

OPERATOR**DESCRIPTION AND USE OF OPERATOR CONTROLS AND INDICATORS**

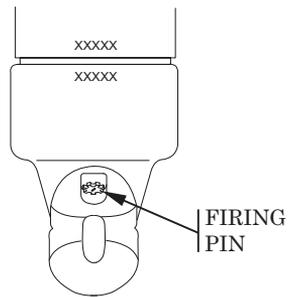
CONTROLS AND INDICATORS**Mortar Barrel Assembly**

Figure 1. Location of Firing Pin.

FIRING PIN. Design of M298 cannon incorporates a removable firing pin.

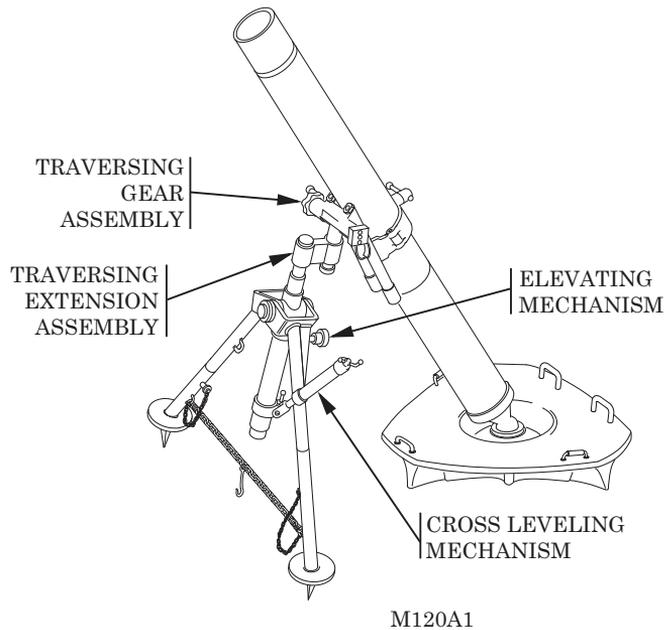
CONTROLS AND INDICATORS - Continued**M191 Bipod Assembly**

Figure 2. Major Components of M191 Bipod Assembly.

CROSS LEVELING MECHANISM. Levels the cross-level cant of weapon system.

ELEVATING MECHANISM. Elevates or lowers mortar.

TRAVERSING GEAR ASSEMBLY. Makes adjustments in traverse.

TRAVERSING EXTENSION ASSEMBLY. Changes mortar azimuth to avoid moving the bipod assembly in the ground-mounted M120A1.

M67 Sight Unit**WARNING**

M67 sight unit contains radioactive tritium (H_3). Exercise care to ensure glass vials are not broken or damaged. If any vial is broken or does not properly illuminate, do not attempt to replace or repair. Notify Radiation Safety Officer (RSO).

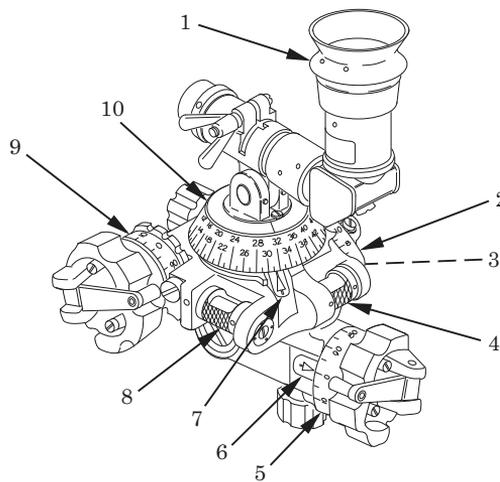


Figure 3. Location of Tritium Illuminated Components.

- 1) Elbow telescope
- 2) Coarse elevation scale
- 3) Coarse elevation index arrow
- 4) Cross level vial
- 5) Fine elevation scale
- 6) Fine elevation index arrow
- 7) Coarse deflection index arrow
- 8) Elevation vial
- 9) Fine deflection scale
- 10) Coarse deflection scale

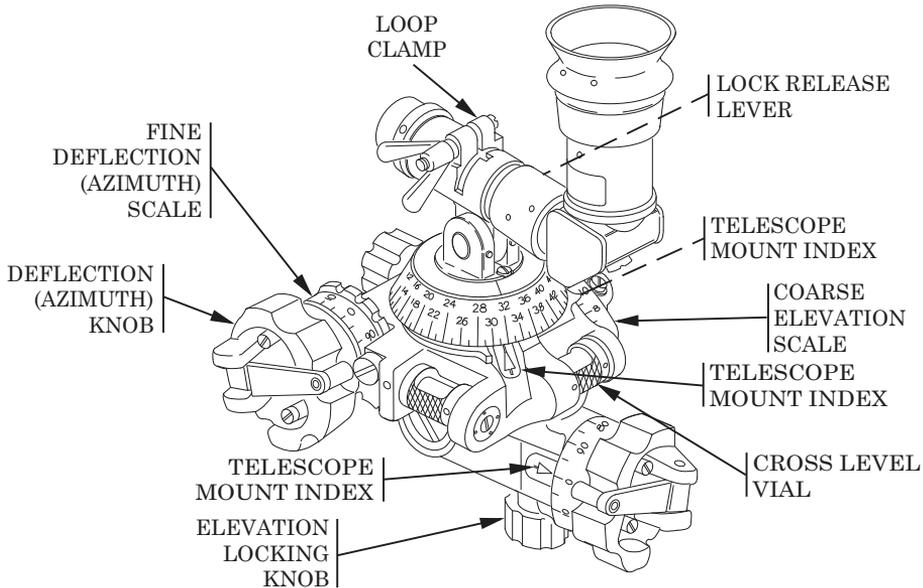
CONTROLS AND INDICATORS - Continued**M67 Sight Unit - Continued**

Figure 4. Sight Unit Controls and Indicators, Part 1.

LOOP CLAMP. Secures elbow telescope to telescope mount.

FINE DEFLECTION (AZIMUTH) SCALE. Indicates from 0 to 100 mils in 1 mil increments.

DEFLECTION (AZIMUTH) KNOB. Rotates deflection mechanism and scales.

CROSS LEVEL VIAL. Indicates level condition of sight unit.

COARSE ELEVATION SCALE. Indicates from 700 to 1600 mils in 100 mil increments.

ELEVATION LOCKING KNOB. Unlocks or locks elevating mechanism and scales.

LOCK RELEASE LEVER. Unlocks or locks elbow telescope pivot.

TELESCOPE MOUNT INDEX. Indicates scale's true position from fixed point.

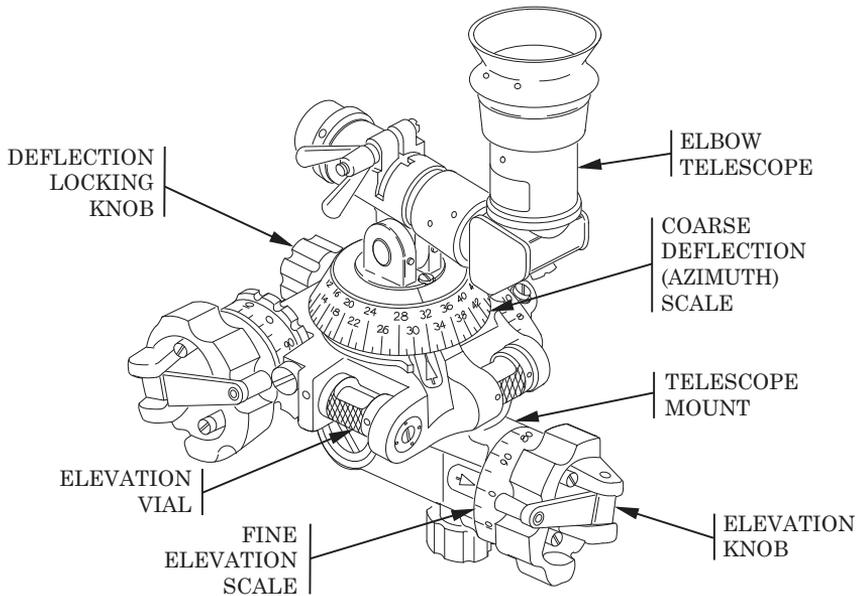


Figure 5. Sight Unit Controls and Indicators, Part 2.

FINE ELEVATION SCALE. Indicates from 0 to 100 mils in 1 mil increments.

ELEVATION KNOB. Rotates elevating mechanism and scale.

TELESCOPE MOUNT. Body of sight unit to which elbow telescope attaches.

ELEVATION VIAL. Indicates level condition of sight unit.

COARSE DEFLECTION (AZIMUTH) SCALE. Indicates from 0 to 6400 mils in 100 mil increments.

DEFLECTION LOCKING KNOB. Locks and unlocks deflection mechanism and scales.

ELBOW TELESCOPE. Mounts to telescope mount providing optical line of sight.

END OF WORK PACKAGE

OPERATOR**OPERATION UNDER USUAL CONDITIONS
EMPLACING THE MORTAR ON THE GROUND (M326 MORTAR STOWAGE KIT)**

INITIAL SETUP:**Materials/Parts**

Sandbags (WP 0060)

References

FM 3-22.90

TM 9-2590-527-13&P

EMPLACEMENT WITH M326 MORTAR STOWAGE KIT**WARNING**

Mortar must be securely fastened to the Mortar Stowage Kit.

Bipod assembly, mortar barrel assembly, and mortar baseplate must be securely connected to each other.

Ensure clamp handle assembly is not loosened more than two turns.

NOTE

The design of the clamp handle assembly will allow some slippage when firing the mortar. When this occurs, loosen clamp handle assembly and slide buffer housing assembly back down to correct location.

The mortar squad consists of five soldiers. See FM 3-22.90.

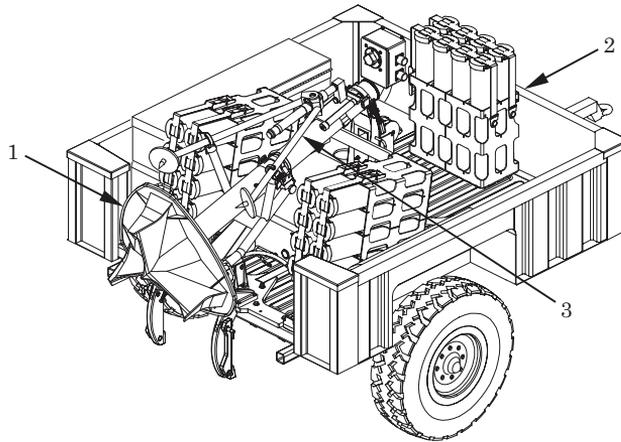
EMPLACEMENT WITH M326 MORTAR STOWAGE KIT - Continued

Figure 1. Mortar Secured by M326 Mortar Stowage Kit.

NOTE

Ensure that the locking handle on the mortar baseplate is facing in the direction of fire.

1. To emplace the mortar, select and prepare a firm, level, horizontal surface for the mortar baseplate and bipod legs, based on direction of intended fire.
2. Position the trailer (2) with the mortar stowage kit in the firing direction.

NOTE

If the first rounds are fired at 800 mils elevation or less, the mortar baseplate must be dug in first.

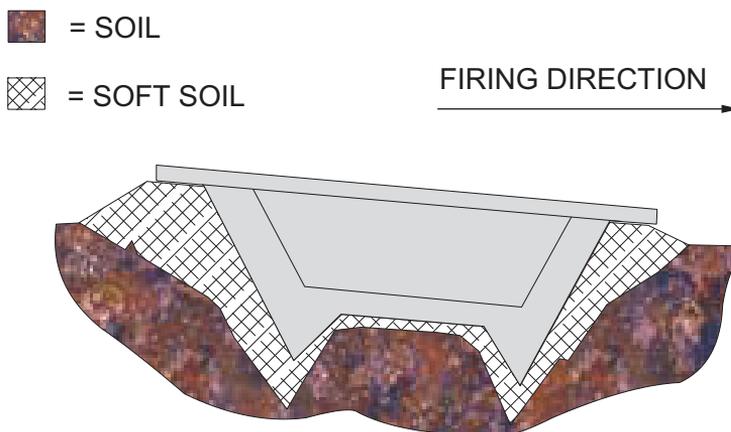


Figure 2. Stabilization of Baseplate.

3. Certain soil or tactical conditions may require mortar baseplate to be dug in and supported with soft soil.
4. When use on hard surface is required, mortar baseplate may be supported with dunnage or sandbags (WP 0060).
5. Operate mortar stowage kit until mortar baseplate (1) reaches the ground. Refer to TM 9-2590-527-13&P.

WARNING

If elevation angle of cannon is not high enough (approximately 55 degrees), the mortar baseplate may slide backward upon first shots. Personnel injury may result.

NOTE

Ensure cannon firing angle is high enough (approximately 55 degrees) to avoid mortar baseplate slippage. Ensure baseplate has been dug in deep enough to allow full range travel of bipod elevating mechanism.

6. Release legs of bipod assembly (3) from mortar stowage kit. Refer to TM 9-2590-527-13&P.

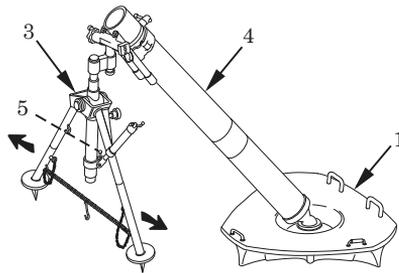
EMPLACEMENT WITH M326 MORTAR STOWAGE KIT - Continued

Figure 3. Ground Emplacement.

7. Remove cannon bracket from mortar barrel assembly (4). Refer to TM 9-2590-527-13&P.
8. Loosen cross leveling locking knob (5), spread legs of bipod assembly (3), and tighten cross leveling locking knob.
9. Slightly tilt mortar baseplate in direction of fire.
10. Complete positioning of mortar barrel assembly (4) and bipod assembly (3) with bipod feet 2 feet from mortar baseplate (1). Ensure that white line on mortar barrel assembly is on top and aligns with firing pin.
11. Move trailer per unit Standard Operating Procedures (SOP).

END OF TASK

END OF WORK PACKAGE

OPERATOR**OPERATION UNDER USUAL CONDITIONS
EMPLACING THE MORTAR ON THE GROUND
(WITHOUT M326 MORTAR STOWAGE KIT)**

INITIAL SETUP:**Materials/Parts**

Sandbags (WP 0060)

ReferencesFM 3-22.90

EMPLACEMENT**WARNING**

Mortar components are heavy. To avoid injury to personnel, use two crew members when moving components.

NOTE

The design of the clamp handle assembly will allow some slippage when firing the mortar. When this occurs, loosen clamp handle assembly and slide buffer housing assembly back down to correct location.

The mortar squad consists of five soldiers. See FM 3-22.90.

EMPLACEMENT - Continued

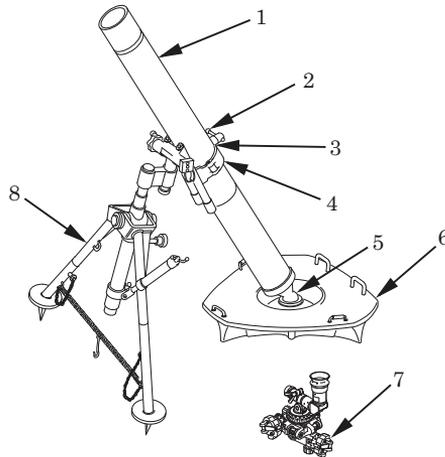


Figure 1. Ground Emplacement.

1. Remove mortar tube, baseplate, and bipod from transporting vehicle.
2. Two crew members place mortar baseplate (6) and M67 sight unit (7) at firing location.

NOTE

If the first rounds are fired at 800 mils elevation or less, the mortar baseplate must be dug in first.

 = SOIL

 = SOFT SOIL

FIRING DIRECTION

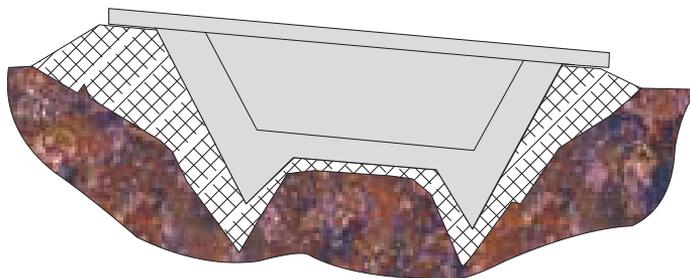



Figure 2. Stabilization of Baseplate.

3. Certain soil or tactical conditions may require mortar baseplate to be dug in and supported with soft soil.
4. When use on hard surface is required, mortar baseplate may be supported with dunnage or sandbags (WP 0060).

WARNING



If elevation angle of cannon is not high enough (approximately 55 degrees), the mortar baseplate may slide backward upon first shots. Personnel injury may result.

NOTE

Ensure cannon firing angle is high enough (approximately 55 degrees) to avoid mortar baseplate slippage. Ensure baseplate has been dug in deep enough to allow full range travel of bipod elevating mechanism.

5. Two crew members carry bipod assembly (8) to firing location, and place bipod feet approximately 2 feet from mortar baseplate (6) in direction of fire.
6. Slightly tilt mortar baseplate in direction of fire.
7. Two crew members carry mortar barrel assembly (1) to mortar baseplate (6). Tilt mortar barrel assembly just slightly with white line down and insert it carefully into the breech cap socket (5). Rotate mortar barrel assembly until white line is on top and lower it onto bipod assembly (8).
8. Slide buffer housing assembly (3) down to lower collar stop (4). Lock buffer housing assembly until clamp handle assembly (2) clicks once.

END OF TASK

END OF WORK PACKAGE

OPERATOR

**OPERATION UNDER USUAL CONDITIONS
PLACING MORTAR INTO ACTION (DISMOUNTED 120MM
MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:

References

TM 9-1230-205-13&P

TM 9-1230-207-13

PLACING MORTAR INTO ACTION

1. Refer to TM 9-1230-205-13&P for installation of Line Replaceable Units (LRUs) of M150 Dismounted 120mm Mortar Fire Control System.

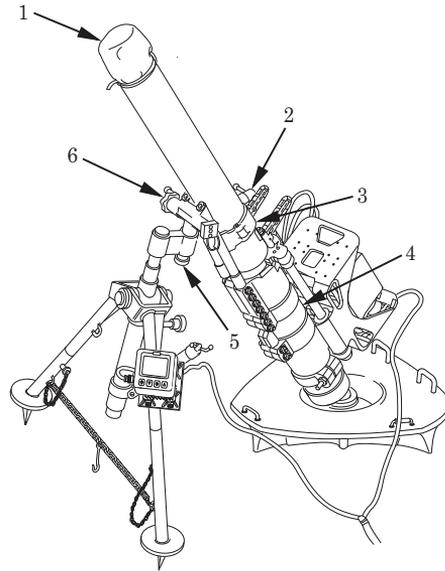
PLACING MORTAR INTO ACTION - Continued

Figure 1. Preparing Mortar for Use.

NOTE

The mortar is emplaced on the ground.

2. Center the traversing extension assembly (5) and traversing gear assembly (6).
3. With one crew member holding the mortar barrel assembly (4), loosen the clamp handle assembly (2) no more than two turns and slide buffer housing assembly (3) down to lower collar stop. Tighten the handle until it clicks once. (Ensure that the white lines on buffer housing assembly and mortar barrel assembly line up.)
4. Remove gun muzzle cover (1).
5. Refer to TM 9-1230-207-13 for initialization of software.

END OF TASK

END OF WORK PACKAGE

OPERATOR**OPERATION UNDER USUAL CONDITIONS
PLACING MORTAR INTO ACTION (WITHOUT DISMOUNTED
120MM MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:

Not Applicable

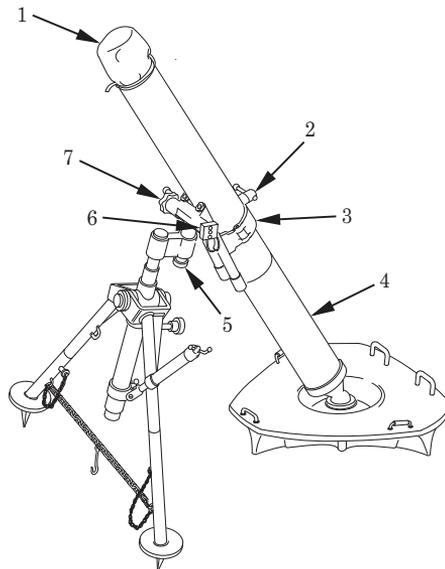
PLACING MORTAR INTO ACTION

Figure 1. Preparing Mortar for Use.

NOTE

The mortar is emplaced on the ground.

1. Center the traversing extension assembly (5) and traversing gear assembly (7).
2. With one crew member holding the mortar barrel assembly (4), loosen the clamp handle assembly (2) no more than two turns and slide buffer housing assembly (3) down to lower collar stop. Tighten the handle until it clicks once. (Ensure that the white lines on buffer housing assembly and mortar barrel assembly line up.)

PLACING MORTAR INTO ACTION - Continued

3. Remove gun muzzle cover (1).
4. Remove dovetail slot cover (6).

END OF TASK

END OF WORK PACKAGE

OPERATOR**OPERATION UNDER USUAL CONDITIONS
INSTALLING M67 SIGHT UNIT (WITHOUT DISMOUNTED
120MM MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:

Not Applicable

INSTALLATION**WARNING**

M67 sight unit contains radioactive tritium (H_3). Exercise care to ensure glass vials are not broken or damaged. If any vial is broken or does not properly illuminate, do not attempt to replace or repair. Notify Radiation Safety Officer (RSO).

INSTALLATION - Continued

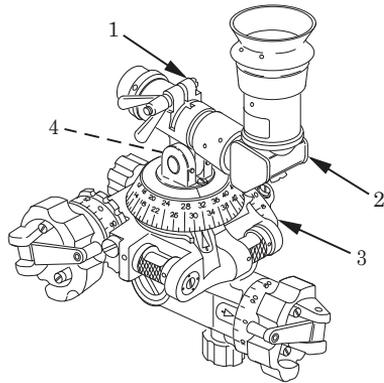


Figure 1. Positioning Elbow Telescope.

NOTE

When not in use, store M67 sight unit in carrying case.

1. Remove M67 sight unit (3) from carrying case.
2. Loosen wing nut on loop clamp (1) and loosen lock release lever (4).
3. Turn and pivot elbow telescope (3) to vertical position as shown. Align indexing lines.
4. Tighten wing nut and lock release lever (4).

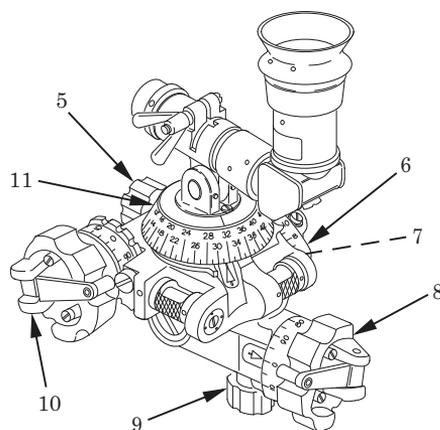


Figure 2. Setting Coarse Elevation and Deflection Scales.

5. Loosen elevation locking knob (9). Rotate elevation knob (8) to align the 1100-mil graduation on coarse elevation scale (6) with coarse elevation index arrow (7).
6. Loosen deflection locking knob (5). Rotate deflection (azimuth) knob (10) to set coarse deflection scale (11) on 3200.

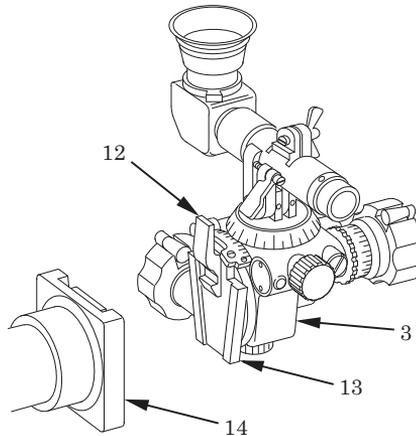


Figure 3. Mounting Sight Unit to Mortar.

7. Press and hold in mortar sight latch (12).
8. Install M67 sight unit (3) by inserting dovetail (13) into dovetail slot (14).
9. Release mortar sight latch (12) when M67 sight unit is fully seated. Ensure M67 sight unit is secure to bipod by pulling up slightly on sight body.

END OF TASK

END OF WORK PACKAGE

OPERATOR**OPERATION UNDER USUAL CONDITIONS
BORESIGHTING (WITHOUT DISMOUNTED 120MM
MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:

Not Applicable

BORESIGHTING**WARNING**

M67 sight unit contains radioactive tritium (H_3). Exercise care to ensure glass vials are not broken or damaged. If any vial is broken or does not properly illuminate, do not attempt to replace or repair. Notify Radiation Safety Officer (RSO).

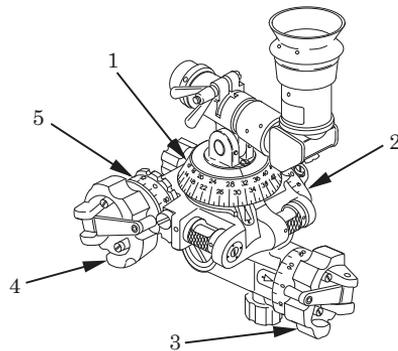
BORESIGHTING - Continued

Figure 1. Indexing Coarse Deflection and Elevation Scales.

1. Check that elevation, traversing, and cross leveling mechanisms are approximately centered.
2. Make a visual check that elbow telescope is roughly parallel to ground.
3. Rotate deflection (azimuth) knob (4) to index coarse deflection scale (1) to 3200 mils.
4. Rotate deflection (azimuth) knob (4) to index fine deflection scale (5) to 0 mils.
5. Rotate elevation knob (3) to index coarse elevation scale (2) to 0800 mils.

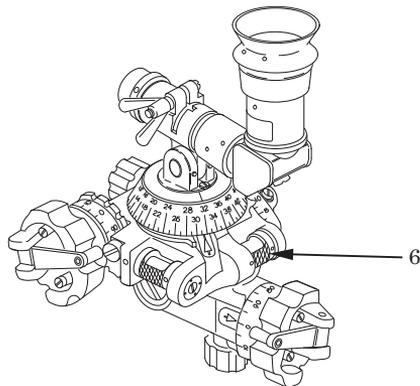


Figure 2. Removal of Cant.

NOTE

Do not use deflection knob on sight unit to remove cant.

6. Remove cant, if present, by turning cross-leveling operating handle on bipod assembly until bubble in cross level vial (6) on sight unit is centered.

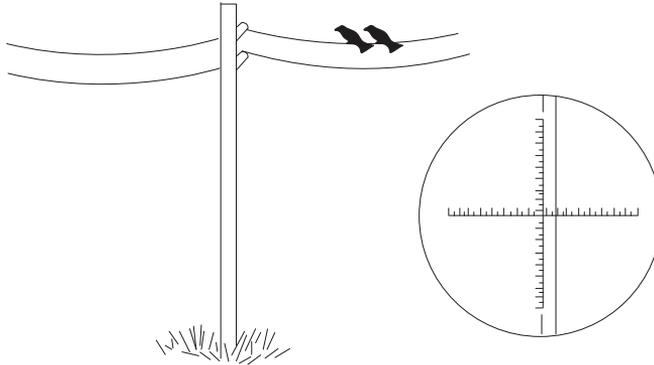


Figure 3. Selection of Aiming Point.

7. Select an aiming point that has a clearly defined vertical line. The aiming point should be as far away as possible and not less than 200 meters.

NOTE

Always sight along left edge of aiming point.

8. Look through elbow telescope and pick out distant aiming point. Move mortar if necessary to place the cross hairs on distant aiming point. Do not use traversing mechanism, but shift mortar to align it on aiming point.
9. Check both level bubbles and adjust if necessary using mortar controls only. You are now ready to boresight.

NOTE

It is important to have mortar barrel assembly in center of traverse at this time.

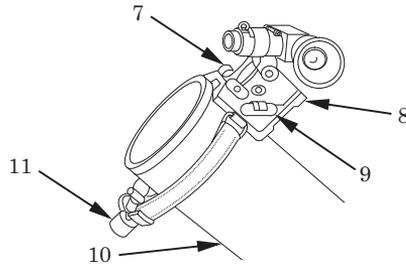
BORESIGHTING - Continued

Figure 4. Installation of Boresight.

10. Remove M45A1 boresight (8) from carrying case and place on top of mortar barrel assembly (10) just below upper step band.

NOTE

The elbow telescope on boresight is not used to set cannon to 800 mils, so its orientation is not important.

Slight movements of boresight may be made by loosening clamp screw and lightly tapping boresight body.

11. Center bubble in boresight cross level vial (7) by rotating boresight (8) slightly around mortar barrel assembly (10) and tightening clamp screw (11).
12. Elevate or depress cannon until bubble in boresight elevation level vial (9) is centered.

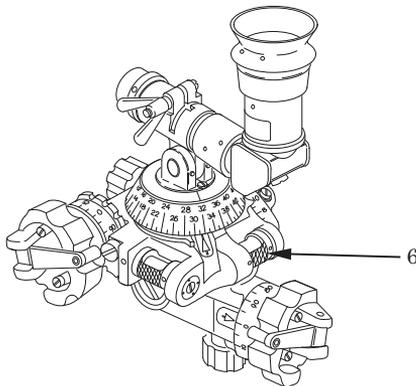


Figure 5. Centering Cross Level Vial Bubble.

13. Check cross level vial (6) on sight unit. Center bubble if necessary and do not disturb the cross-level on boresight. You may have to go back and forth between these two units to get them both centered.
14. Repeat above steps until bubbles in cross level vial of sight unit, cross level vial of boresight, and elevation level vial of boresight are centered.
15. The cannon is now at 800 mils elevation.

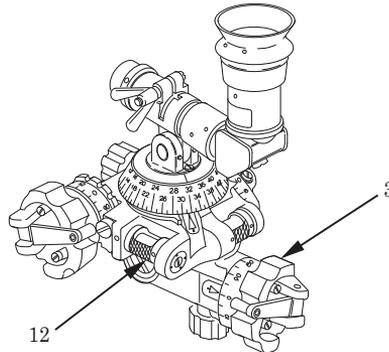


Figure 6. Centering Elevation Vial Bubble.

16. Adjust elevation knob (3) until bubble in elevation vial (12) of sight unit is centered.
17. Check cross level vials on sight unit and boresight to make sure bubbles are still centered. Adjust until bubbles are centered.
18. Check elevation level vial on boresight to ensure that bubble is still centered.
19. Repeat previous steps until all four bubbles are centered.

BORESIGHTING - Continued

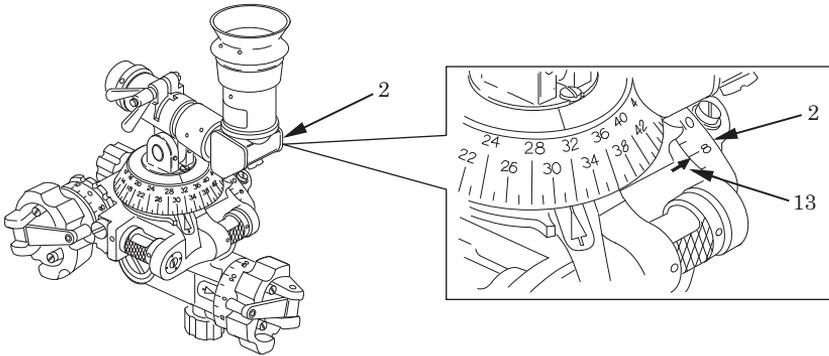


Figure 7. Verification of Reading on Coarse Elevation Scale.

CAUTION

Do not tamper with coarse elevation scale. This could cause damage to scale or sight unit.

- 20. The reading on coarse elevation scale (2) should be 800 mils. (Coarse elevation index arrow (13) should point to 8 on coarse elevation scale.) A difference of ± 20 mils is acceptable. If over 20 mils off, remove and turn in sight unit for corrective maintenance.

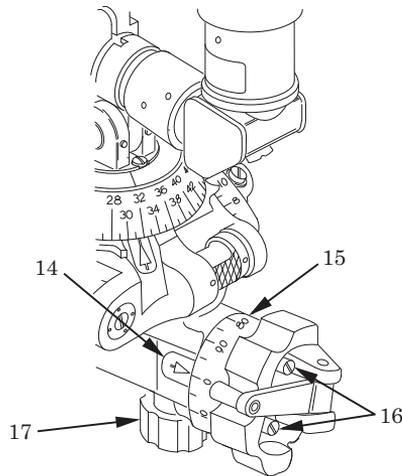


Figure 8. Boresighting for Elevation.

21. The reading on fine elevation scale (15) should be 0 mils. If it isn't, tighten elevation locking knob (17), loosen two screws (16), and slip scale until fine elevation index arrow (14) points to 0 mils. Tighten screws and loosen elevation locking knob.
22. Recheck all level bubbles and adjust as necessary.
23. The mortar is now boresighted for elevation.

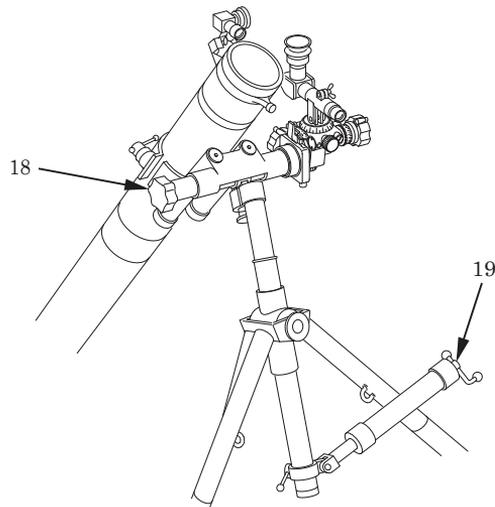


Figure 9. Adjustment of Mortar.

24. Look through boresight elbow telescope and find distant aiming point. Move cross hairs to vertical side of distant aiming point by moving traversing hand crank (18) no more than two turns in either direction from center.
25. Re-level cross level vials on boresight and sight unit by using cross leveling hand crank (19). This step may have to be repeated several times until both boresight and sight unit are cross-leveled.

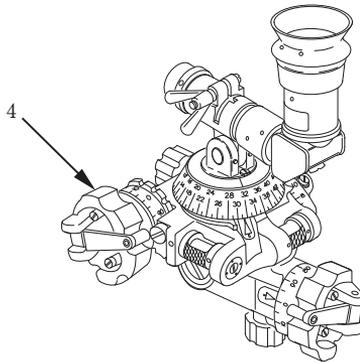
BORESIGHTING - Continued

Figure 10. Adjustment to Distant Aiming Point.

26. Look through sight unit and find distant aiming point. Move cross hairs to show exactly the same vertical side of distant aiming point as shown in boresight. Do this by turning deflection (azimuth) knob (4) on sight unit.
27. Recheck all level bubbles and adjust as necessary.
28. When both elbow telescopes show proper target patterns, proceed to step 29.

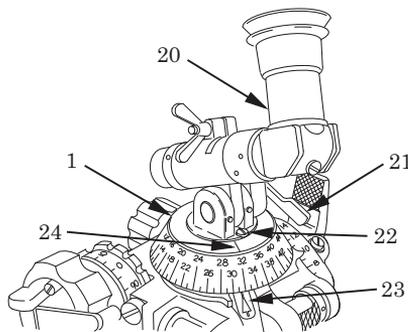


Figure 11. Adjustment of Pointer Dial.

29. The 32 on coarse deflection scale (1) and coarse deflection index arrow (23) should line up (3200 mils). If not, push down on circumference of scale, turn it to 32, and release it.

30. Line on pointer dial (24) should align with 32 on coarse deflection scale (1). If it does not, loosen lock-release lever (21), pivot elbow telescope (20) out of way, and loosen two screws (22) holding pointer dial. Turn pointer dial until line is at 32 and tighten screws.
31. Reposition elbow telescope (20) and tighten lock-release lever (21).

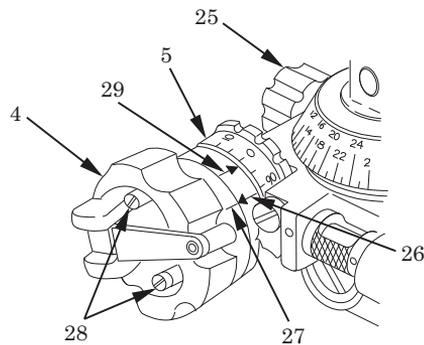


Figure 12. Adjustment of Control Dial.

32. Fine deflection red index arrow (26) should align with red index line of control dial (27), and black index arrow (29) should align with 0 mils. If not, tighten azimuth locking knob (25). Loosen two screws (28) in deflection (azimuth) knob (4).
33. Turn red index line of control dial (27) to align with red index arrow (26).
34. Disengage fine deflection scale (5) and turn to align 0 mils with black index arrow (29).
35. Tighten two screws (28) and loosen azimuth locking knob (25).

NOTE

Weapon is now boresighted. Repeat boresighting procedure if there are any errors.

36. Remove M45A1 boresight and store in carrying case.

END OF TASK

END OF WORK PACKAGE

OPERATOR**OPERATION UNDER USUAL CONDITIONS
EMPLACING AIMING POSTS FOR INDIRECT FIRE
(WITHOUT DISMOUNTED 120MM MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:**References**FM 3-22.90

EMPLACEMENT OF AIMING POSTS**NOTE**

Refer to FM 3-22.90 for alternate laying procedures.

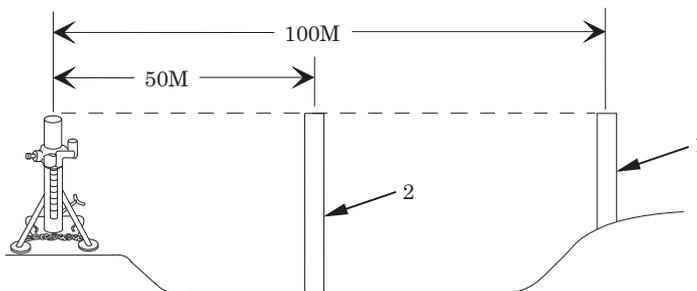


Figure 1. Emplacement of Aiming Posts.

1. Place two sets of assembled aiming posts in the ground at a referred deflection from direction of fire. The far post (1) should be emplaced first, 100 meters from weapon where possible. Emplace near post (2) halfway between far post and weapon.
2. During hours of darkness, place an aiming post light on each post. Light on far post (1) should be visible above the light on near post (2).

END OF TASK**END OF WORK PACKAGE**

OPERATOR**OPERATION UNDER USUAL CONDITIONS
OPERATION OF M67 SIGHT UNIT (WITHOUT DISMOUNTED 120MM
MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:**References**TM 9-1220-243-12&P

SIGHT UNIT OPERATION**WARNING**

M58 and M59 aiming post lights and M67 sight unit contain radioactive tritium (H_3). Exercise care to ensure glass vials are not broken or damaged. If any vial is broken or does not properly illuminate, do not attempt to replace or repair. Notify Radiation Safety Officer (RSO).

NOTE

M14 aiming posts are in position during initial laying procedure. If required, M58 and M59 aiming post lights are used with aiming posts.

Plotting board M16 is a portable instrument used to geometrically compute the range and azimuth to target from mortar. Refer to TM 9-1220-243-12&P for more information about the plotting board.

1. Place deflection received from Fire Direction Center (FDC) on sight unit.
2. Place elevation received from FDC on sight unit.

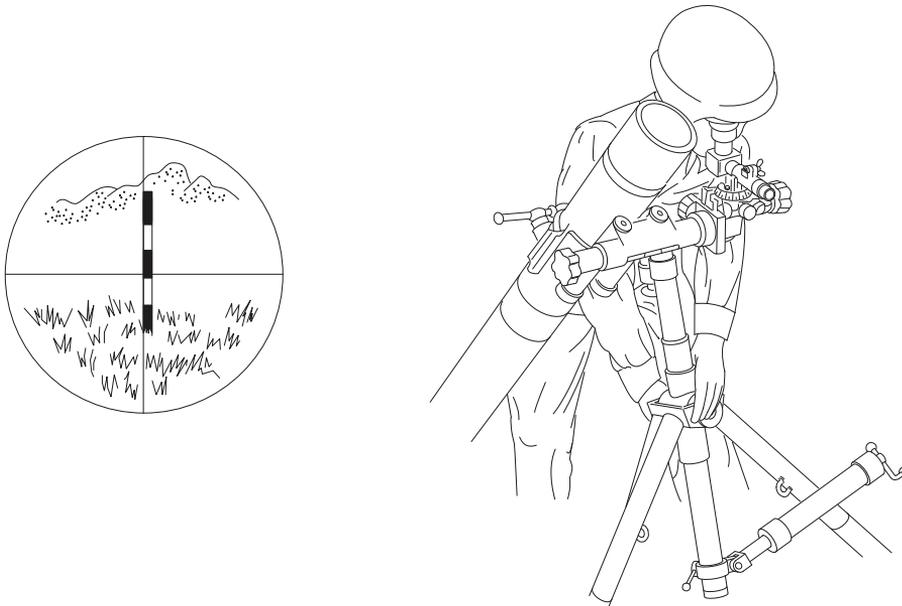
SIGHT UNIT OPERATION - Continued

Figure 1. Adjustment of Cannon and Bipod.

3. If deflection is greater than 75 mils, center mortar cannon on traversing gear and shift bipod assembly to align vertical reticle line of mortar sight on aiming posts ± 20 mils.

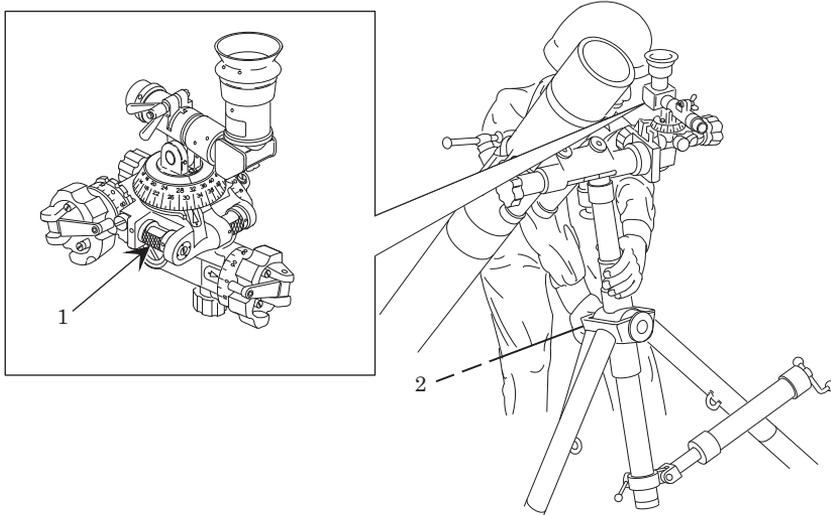


Figure 2. Leveling Elevation Vial Bubble.

4. Turn elevating hand crank (2) to level bubble in elevation vial (1).

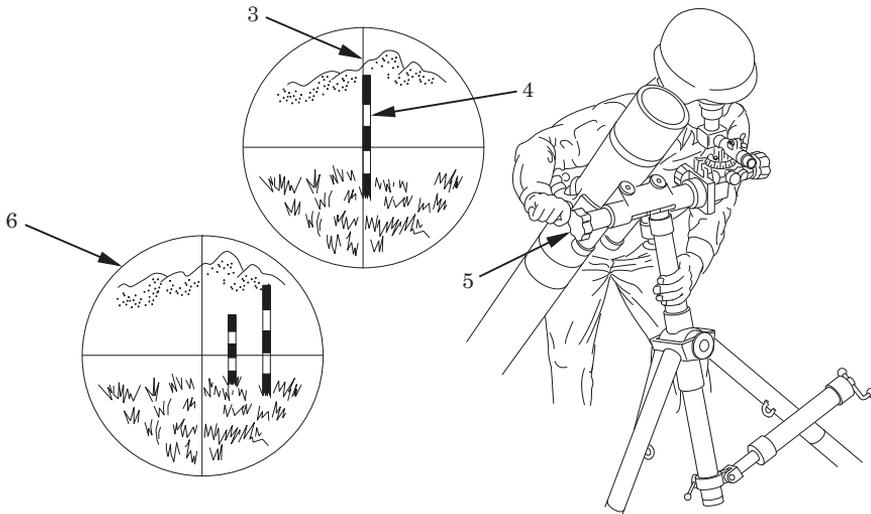


Figure 3. Alignment with Aiming Posts.

5. Look through sight unit, and turn traversing hand crank (5) to realign vertical reticle line (3) on aiming posts (4) or to obtain a correct compensated sight picture (6) (far post in the middle; equidistant between vertical reticle line and posts) if the deflection shift was large.

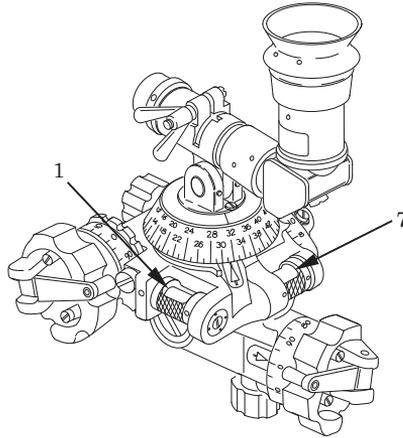
SIGHT UNIT OPERATION - Continued

Figure 4. Verification of Alignment.

6. Check to ensure that sight unit picture is correct. If not, repeat adjustments until a correct sight picture is obtained with the bubbles level in both the elevation vial (1) and the cross level vial (7).

END OF TASK

END OF WORK PACKAGE

OPERATOR**OPERATION UNDER USUAL CONDITIONS
BEFORE FIRING CHECKS (DISMOUNTED 120MM
MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:**References**

FM 3-22.91
TM 9-1230-205-13&P
WP 0005

BEFORE FIRING CHECKS**WARNING**

To prevent premature detonation of cartridge or misdirection of projectile flight, observe firing area. The mortar is NOT SAFE to fire if, at any point in the full range of traverse or elevation, mask or overhead obstructions (i.e., buildings, trees) are found. (In a combat situation it may be necessary to fire from that approximate position; slightly reposition, traverse, and/or elevate the mortar until it clears the obstruction.)

Firing pin must line up with stripe on barrel.

Before firing, wipe dry the cross leveling mechanism's clamping surface on elevating mechanism housing, the clamping surfaces of buffer mechanism, and the exterior surface of barrel with a clean cloth. DO NOT LUBRICATE.

Do not allow the bipod assembly to lean forward (downrange) of a vertical position under any circumstance of elevation setting or positioning of buffer housing assembly on the barrel.

BEFORE FIRING CHECKS - Continued**NOTE**

The first two cartridges fired will be used to settle the mortar baseplate. Elevation should be at least 1100 mils unless baseplate is dug in.

If any type of blockage or obstructions (i.e., buildings, trees) which will impede the trajectory of the round is found during the mask and overhead clearance checks, the Squad Leader will immediately notify the Fire Direction Center of the obstruction and construct a "Safety T" as described in FM 3-22.91.

1. Check for mask and overhead clearance.
 - a. To determine mask clearance, position head against the breech cap and sight along the barrel to see if any obstructions (trees, power lines, etc.) are in front of mortar. Check for obstructions during a full range of traverse.
 - b. To determine overhead clearance, position head against the breech cap and sight along the barrel to see if any obstructions (trees, power lines, etc.) are in front of mortar. Check for obstructions during a full range of elevation.
2. Check mortar barrel assembly to ensure it is locked to mortar baseplate (WP 0005).
3. Check that buffer housing assembly is locked.
4. Check that cross leveling T-handle is hand tight.
5. Check that chain assembly is straight and tight.
6. Check that firing pin is present and fully seated.
7. Ensure gunner's display is secured to mortar bipod assembly and locking handle is hand tight.
8. Check gunner's display cable for proper attachment.
9. Check pointing device for proper attachment of cables.
10. If Electronics Rack (ER) is removed from trailer, ensure ER has been placed on stable foundation.
11. Move Gunner's Display (GD) and Pointing Device (PD) cables away from high traffic areas and ensure cables are not under baseplate.

-
12. Check scribe lines associated with upper barrel clamp and barrel to identify slippage or rotation of barrel clamp on the barrel. If the following conditions exist, barrel clamp adjustment is required. Refer to TM 9-1230-205-13&P.
 - a. If two scribe lines etched across the barrel white center line are visible, clamp slippage greater than 1/16 in. has occurred.
 - b. If scribe line etched on the barrel is not aligned with scribe line etched on upper barrel clamp (muzzle side), clamp rotation has occurred.
 13. Check scribe lines associated with lower barrel clamp and barrel to identify rotation of barrel clamp on the barrel. If scribe line etched on the barrel is not aligned with scribe line etched on lower barrel clamp (breech cap side), clamp rotation has occurred. Barrel clamp adjustment is required. Refer to TM 9-1230-205-13&P.
 14. Install Pointing Device Mount Assembly - Dynamic Quick Release (PDMA -DQR) onto barrel. Refer to TM 9-1230-205-13&P. Verify gap between lower end plate and upper edge of lower clamp is at least 1/16 in. If gap is less than 1/16 in. remove PDMA-DQR and adjust barrel clamps (TM 9-1230-205-13&P) or proceed to operations under unusual conditions (TM 9-1230-205-13&P).

END OF TASK

END OF WORK PACKAGE

OPERATOR**OPERATION UNDER USUAL CONDITIONS
BEFORE FIRING CHECKS (WITHOUT DISMOUNTED
120MM MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:

Not Applicable

BEFORE FIRING CHECKS**WARNING**

Firing pin must line up with stripe on barrel.

Before firing, wipe dry the cross leveling mechanism's clamping surface on elevating mechanism housing, the clamping surfaces of buffer mechanism, and the exterior surface of barrel with a clean cloth. DO NOT LUBRICATE.

Do not allow the bipod assembly to lean forward (downrange) of a vertical position under any circumstance of elevation setting or positioning of buffer housing assembly on the barrel.

CAUTION

Before firing, the sight unit must be firmly attached and the boresight must be removed.

To prevent damage to sight unit, ensure that sight unit is removed before settling the mortar baseplate.

NOTE

The first two cartridges fired will be used to settle the mortar baseplate when ground-emplaced. Elevation should be at least 1100 mils unless baseplate is dug in.

Ensure that deflection and elevation locking knobs on sight unit are tightened before each firing.

BEFORE FIRING CHECKS - Continued

1. Check for mask and overhead clearance.
 - a. To determine mask clearance, position head against the breech cap and sight along the barrel to see if any obstructions (trees, power lines, etc.) are in front of mortar. Check for obstructions during a full range of traverse.
 - b. To determine overhead clearance, position head against the breech cap and sight along the barrel to see if any obstructions (trees, power lines, etc.) are in front of mortar. Check for obstructions during a full range of elevation.
2. Check that mortar barrel assembly is locked to mortar baseplate.
3. Check that buffer housing assembly is locked.
4. Check that cross leveling T-handle is hand tight.
5. Check that chain assembly is straight and tight.
6. Check that firing pin is present and fully seated.

END OF TASK**END OF WORK PACKAGE**

OPERATOR
OPERATION UNDER USUAL CONDITIONS
LOADING AND FIRING

INITIAL SETUP:**Materials/Parts**

Bore cleaning sleeve (WP 0061, item 21)

References

DA Form 2408-4

LOADING AND FIRING**WARNING****HEARING CONSERVATION**

The 120mm mortar poses a significant risk of hearing loss. Hearing loss is a certainty for those not using hearing protection properly. Significant damage can occur even for a single, unprotected exposure. Some individuals are particularly susceptible to noise, and they can only be identified if they report for scheduled hearing checks.

- All 120mm mortar crewmen must be trained in the proper use of both types of hearing protection (see page 0015-2).
- All 120mm mortar crewmen must be checked by appropriate medical personnel to assure proper fit of earplugs.
- An individual (medical, safety, or range personnel), who has evidence of hearing conservation training equivalent to standards of Council for Accreditation in Occupational Hearing Conservation, must ensure proper fit and use of the earplugs before firing.

LOADING AND FIRING - Continued

WARNING**HEARING CONSERVATION**

Crews can fire the 120mm Battalion Mortar System with double hearing protection using the following matrix:

<u>Charge Zone</u>	<u>Quadrant Elevation</u>	<u>Allowable Number of Rounds per Day</u>
		<u>Ground</u>
0, 1, 2	1422 and below	100*
3, 4	1215 and below	100*

The double hearing protection must consist of any approved earplug and either: 1) a Combat Vehicle Crewman (CVC) helmet; or 2) a Communication Aural Protective System/Artillery Communication Aural Protective System (CAPS/ACAPS) with Personnel Armored System for Ground Troops (PASGT) helmet.

*Ground-mounted units can fire 25 rounds per day with single hearing protection and head positions no higher than 0.8 meters above the ground.

WARNING**LOADING AND FIRING HAZARD**

The mortar blast may cause bodily injury, as well as hearing loss. Crew members and all personnel within 5 meters of the M120A1 mortar must wear double hearing protection when firing. All personnel within 200 meters must wear hearing protection.

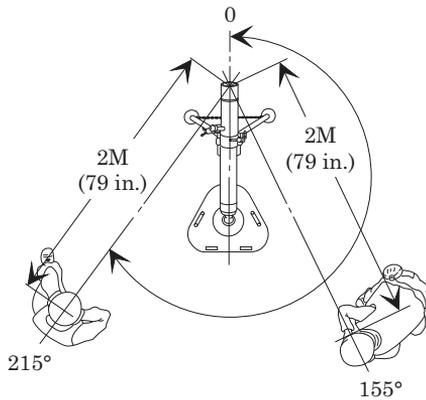


Figure 1. Head Positions of Crew Members.

WARNING



LOADING AND FIRING HAZARD

Gunner and Assistant Gunner's heads must be away and below muzzle blast (no higher than 1.2 meters above ground) during all loading and firing operations. See Figure 1.

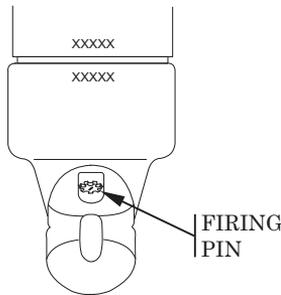


Figure 2. Location of Firing Pin.

WARNING



LOADING AND FIRING HAZARD

Do not drop a cartridge down the cannon tube with the firing pin removed. See Figure 2. Firing pin must line up with stripe on barrel.

LOADING AND FIRING - Continued**WARNING****LOADING AND FIRING HAZARDS**

The exterior surface of the barrel must be wiped free of lubrication in the area of the buffer housing assembly prior to firing. If this portion is not dry, the buffer housing assembly may move excessively on the barrel during firing.

Do not allow the bipod assembly to lean forward (downrange) of a vertical position under any circumstance of elevation setting or positioning of buffer housing assembly on the barrel.

The mortar crew must have adequate cover for protection from fragments when firing to ranges of 600 meters or less.

Firing ammunition in a heavily lubricated bore can result in hangfires or failures to fire. Short rounds may occur if water or excessive oil is in the barrel during firing.

Heavy rainfall may prematurely explode point detonating (PD) and proximity fuzes.

Do not try to force a cartridge down the barrel.

Do not assemble or use a cartridge unless authorized.

Cannon bore is required to be dry-swab cleaned after every fire mission or ten rounds fired (approximately).

The normal time required for a round to drop down the barrel is 2 to 3 seconds. If a longer drop time is noticed, the barrel should be dry-swabbed before firing is resumed to reduce the chance of misfire.

During rapid and sustained rates of fire, there is a possibility of residual flame and cook offs. Rapid and sustained rates of fire are 16 and 4 rounds per minute. If a cookoff occurs, the crew should wait 10 minutes for the weapon to cool, swab the barrel, and resume firing.

Buffer housing assembly may slip along barrel. Weapon barrel elevation and cant should be checked frequently and adjusted as necessary to ensure expected flight of round and to avoid injury of friendly personnel.

WARNING**AMMUNITION HAZARDS**

Handle explosive ammunition and components containing explosives with utmost care. Do not drop, drag, throw, tumble, or strike packaged or unpackaged ammunition or related components.

Do not fire unpackaged ammunition that has been dropped. These will be returned to the Ammunition Supply Point (ASP) as unserviceable. If an M930 or M983 Illum Cartridge has been dropped, do not attempt to retrieve the cartridge for 10 minutes. Personnel retrieving the cartridge must be sure that the fuze and fin ends of the cartridge are pointed away from their bodies in the event that the cartridge separates. The cartridge is to be placed in the dud pit and destroyed by Explosive Ordnance Disposal (EOD).

Do not fire packaged M57, M68, or M91 cartridges that have been dropped from a height greater than 1 meter. These cartridges will be returned to the ASP as unserviceable.

Ammunition exposed directly to sunlight, or in unventilated containers, enclosures, shelters, freight cars, closed vehicles, and similar structures exposed to direct sunlight, may reach temperatures exceeding upper storage limits. Avoid exposure of ammunition and related components to direct sunlight.

Do not fire ammunition in temperatures above +145 °F (+63 °C) or below -28 °F (-33 °C).

At temperatures exceeding 111.4 °F (44.1 °C) (melting point of White Phosphorus (WP)), store and transport WP rounds in a vertical position (nose up) to prevent voids in the WP.

Do not store ammunition under trees or next to towers or other structures that attract lightning.

When burning excess increments:

- Burning area must be at least 100 meters from the nearest mortar position, parked vehicles, and ammunition piles.
- Burning area shall be cleared of all dead grass or brush within 30 meters.

LOADING AND FIRING - Continued

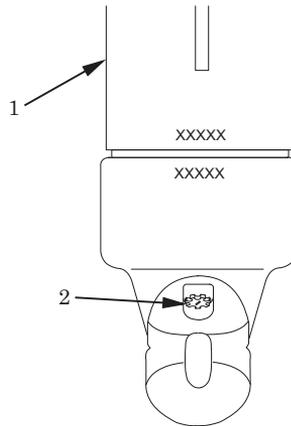


Figure 3. Seating of Firing Pin.

1. Make sure firing pin (2) on breech assembly end of barrel (1) is fully seated.

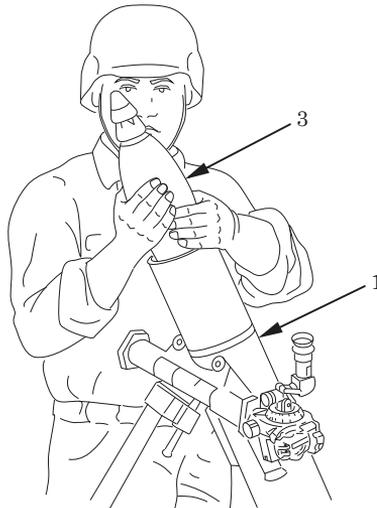


Figure 4. Dropping Cartridge.

CAUTION

To prevent damage to sight unit, ensure that sight unit is removed before settling the mortar baseplate.

NOTE

Dry swab barrel after every ten rounds fired, except when firing charge 1 at elevations of 1000 mils and below, when barrel will be dry swabbed after every five rounds. Do not use any cleaner or lubricants. Use clean bore cleaning sleeve (WP 0061, item 21) only.

2. Grasp cartridge (3) near center of body with both hands.
3. Insert fin-end of cartridge (3) into barrel (1) beyond narrow part of cartridge body.

WARNING**LOADING AND FIRING HAZARD**

To avoid injury, do not bring hands over muzzle of barrel while releasing cartridge.

4. Upon command, "FIRE", release cartridge (3) into barrel (1). Assume proper head and body positions before cartridge slides down barrel, strikes firing pin, and fires.
5. After a firing session has been completed, enter the cartridges fired on DA Form 2408-4 (no entry is necessary in columns e, g, and h).

END OF TASK**END OF WORK PACKAGE**

OPERATOR**OPERATION UNDER USUAL CONDITIONS
MISFIRE PROCEDURES (DISMOUNTED 120MM
MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:**Tools and Special Tools**

- Breech cap removal tool (WP 0059, Table 2, item 4)
- Firing pin gage (WP 0059, Table 2, item 14)
- Firing pin wrench (WP 0059, Table 2, item 29)
- Hand hammer (WP 0059, Table 2, item 16)
- Rubber mallet (WP 0059, Table 2, item 20)

Materials/Parts

- Aircraft grease (GA) (WP 0061, item 13)
-

MISFIRE PROCEDURES**WARNING**

Serious injury or death may result from misfire. Cookoff may result in an unexpected blast with the crew improperly positioned. Another cartridge dropped on top of a misfired cartridge may result in detonation of both propelling charges, both fuzes, and both main charges, rupturing the barrel. The cartridge may detonate while removing the misfire.

WARNING

If striking the barrel with rubber mallet does not cause the cartridge to fire during a misfire and the mortar is hot, wait until the mortar is cool enough to handle with bare hands. If the mortar is cool at the time of the misfire, wait 1 minute before removing the cartridge. Water or snow applied to the outside of the barrel can be used for cooling. This is to avoid an accident from possible delayed action of the ignition cartridge.

MISFIRE PROCEDURES - Continued**WARNING**

Cables running between electronics rack, gunner's display, Pointing Device Mount Assembly - Dynamic Quick Release (PDMA-DQR), and trailer pose a tripping hazard.

NOTE

A misfire is a failure of the cartridge to fire after cartridge is dropped into mortar barrel assembly. Misfires may be caused by defective ammunition, a damaged firing pin, or an obstruction in bore that prevents cartridge from sliding down and striking firing pin.

Lower the cannon to its lowest elevation, leaving 0.25 in. (0.64 cm) of inner elevating sleeve exposed. When depressing the elevation using elevating hand wheel, ensure that no metal to metal contact is made.

1. When a misfire occurs, any member of the crew immediately announces "MISFIRE".

NOTE

The Squad Leader alerts the Fire Direction Center (FDC) of the misfire, using voice or digital means.

During combat situations, all crewmembers remain with the mortar.
During peacetime live fire exercises, proceed to step 2.

2. All crewmembers, except the Gunner, move at least 100 meters to the rear of the mortar.

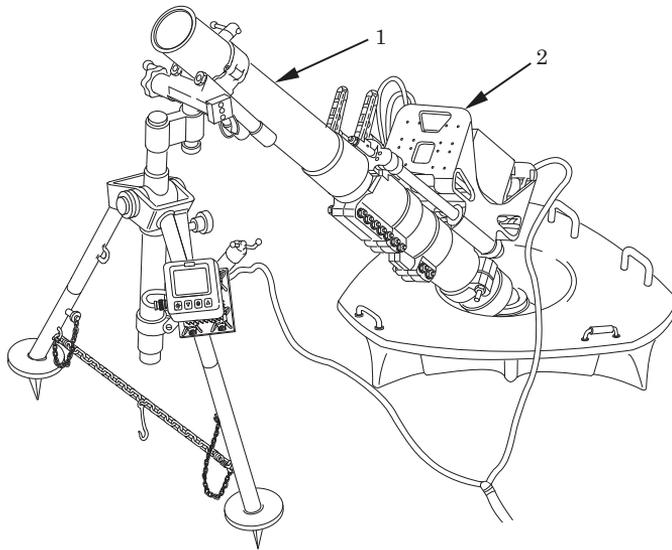


Figure 1. M120A1 Mortar with Dismounted 120mm Mortar Fire Control System Components.

WARNING



Ensure cross-leveling T-handle is as tight as physically possible so barrel will not fall on personnel.

3. Gunner stands to the left rear of the mortar and strikes barrel (1) above PDMA-DQR (2) several times with rubber mallet (WP 0059, Table 2, item 20). If the cartridge fails to fire after striking barrel with mallet, Gunner joins the rest of crew and waits 1 minute. If the cartridge fires, the crew swabs barrel and re-lays mortar.

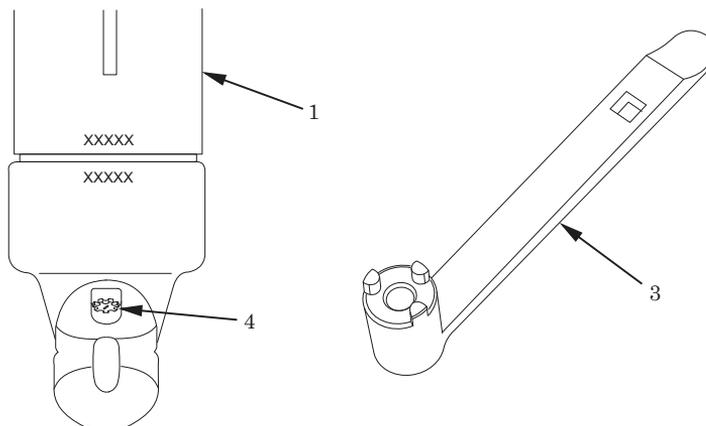
MISFIRE PROCEDURES - Continued

Figure 2. Location of Firing Pin.

WARNING

If mortar is hot, avoid serious burns by waiting until barrel is cool enough to touch with bare hands.

If operating in MOPP IV gear/environment, don leather gloves over chemical-resistant gloves to protect hands from burns.

4. After waiting 1 minute, Gunner and Squad Leader return to mortar and check to see if mortar is cool enough to handle. Gunner checks barrel (1) for heat using bare hands. Starting at muzzle, lightly touch barrel every few inches with fingertips and move down to breech cap. If barrel is too hot, crew uses some means (water or snow on exterior of barrel) or elapsed time to cool barrel before attempting to remove misfire.
5. When mortar is cool enough to handle, Gunner performs the following steps:
 - a. Gunner depresses barrel (1) to its lowest elevation, leaving 0.25 in. (0.64 cm) of inner elevating sleeve showing. When depressing the elevation using elevating hand wheel, ensure that no metal to metal contact is made.
 - b. Using firing pin wrench (3) (WP 0059, Table 2, item 29), Gunner removes firing pin (4) by turning firing pin wrench in counterclockwise direction.

- c. After removal of firing pin (4), Gunner shouts, "Firing pin is removed."
- d. Gunner hands firing pin (4) to Squad Leader.
- e. Section Leader physically confirms that firing pin (4) has been removed.

WARNING



Keep head and body away from front of mortar when removing a misfire.

Do not stand directly behind mortar when removing a misfire.

Do not open buffer housing assembly when removing a misfire. Failure to comply could cause collapse of the mortar system.

6. Gunner calls rest of crew forward.

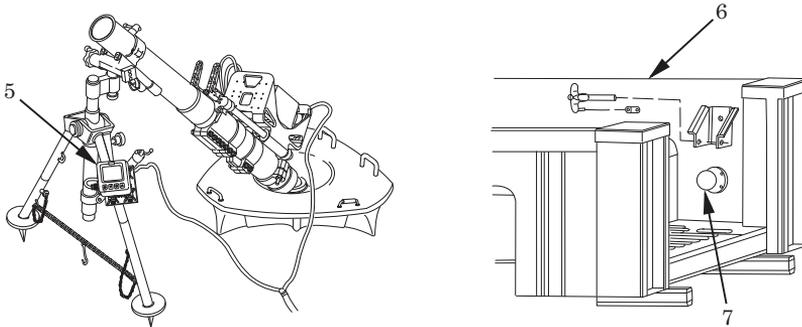


Figure 3. Stowage of Gunner's Display.

7. Gunner removes gunner's display (5) and stows it on flange ball (7) located in trailer (6). If sight unit is used, Gunner locks last deflection data on sight unit using locking knob and places sight unit in carrying case.

MISFIRE PROCEDURES - Continued

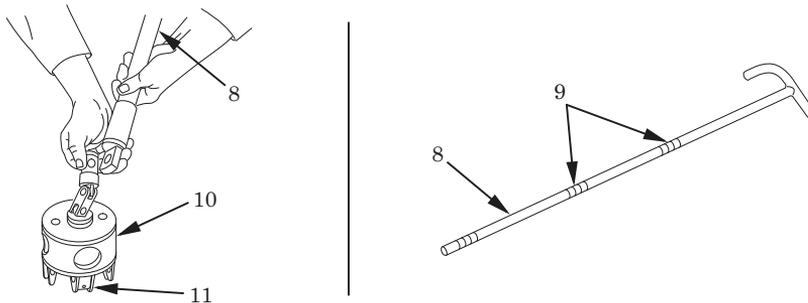


Figure 4. Cartridge Extractor and Artillery Cleaning Staff Assembly.

NOTE

Squad Leader directly supervises and confirms all actions of Assistant Gunner.

8. Assistant Gunner inspects catches (11) on cartridge extractor (10) to ensure they are the latest configuration. There should be a 1/8 in. (0.32 cm) hole in the face of the catch. The hole indicates that the catch is the latest configuration. Assistant Gunner inspects cartridge extractor and makes sure that cartridge extractor catches are free of burrs, wear, or rust/corrosion that would impair function.
9. Assistant Gunner will test each cartridge extractor catch (11) to ensure free operation and that each catch will snap positively into original position. **If the cartridge extractor fails to meet inspection standards, cartridge extractor is non-mission capable.** Do not use cartridge extractor. If cartridge extractor is non-mission capable, proceed to step 27 and follow the barrel tip method to remove misfired cartridge.
10. Assistant Gunner makes sure artillery cleaning staff assembly section sleeves (9) are fully extended and tightly locked, so that staff assembly will not extend or retract. If section sleeves cannot be tightly locked, artillery cleaning staff assembly (8) is non-mission capable. Do not use artillery cleaning staff assembly. Proceed to step 27 and follow the barrel tip method to remove misfired cartridge.
11. Assistant Gunner attaches cartridge extractor (10) securely to extended artillery cleaning staff assembly (8).
12. Assistant Gunner rotates artillery cleaning staff assembly (8) until cartridge extractor (10) is secure against artillery cleaning staff assembly.

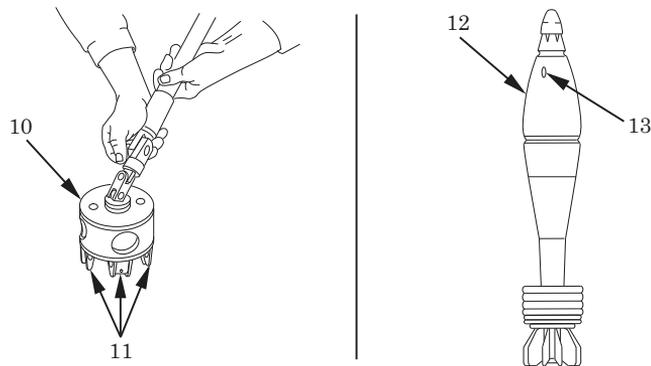


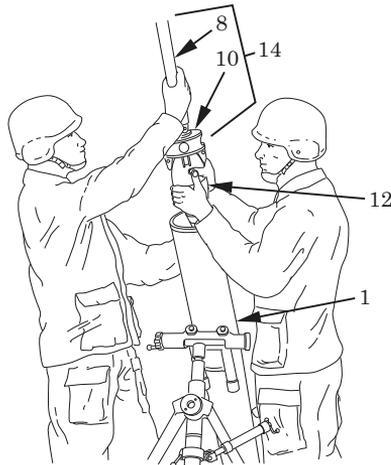
Figure 5. Grasp of Cartridge with Cartridge Extractor.

WARNING



To avoid serious injury, do not stand in front of or behind barrel. When removing cartridge, do not touch primer and do not stand directly in front of barrel.

13. Before inserting cartridge extractor (10), Assistant Gunner ensures that barrel has been lowered to its lowest elevation, leaving 0.25 in. (0.64 cm) of inner elevating sleeve showing.
14. Insert cartridge extractor (10) into muzzle of barrel, hand to hand, until it rests on cartridge (12) and will not descend any further.
15. Slowly rotate cartridge extractor (10) until spring-loaded extractor catches (11) grasp cartridge (12). A metallic click may be heard or resistance felt when extractor catches latch into grooves (13) on cartridge body.
16. Continue rotating cartridge extractor (10) 1/4 turn. The resistance of extractor should become much heavier when cartridge extractor latches onto cartridge (12).
17. If extra resistance is not felt, cartridge extractor (10) has not successfully connected to cartridge (12). Repeat steps 15 and 16. If resistance is still not felt, remove cartridge extractor assembly from barrel and proceed to step 27.

MISFIRE PROCEDURES - Continued

M120A1

Figure 6. Removal of Cartridge with Cartridge Extractor Assembly.

WARNING

When removing the cartridge, do not touch the primer and do not stand directly in front of barrel.

NOTE

Due to the weight of the round, Gunner may assist during the entire extraction process.

18. If resistance is felt, relax grip on the artillery cleaning staff assembly (8) momentarily. Then, without rotating, slowly pull the staff assembly slightly to ensure cartridge (12) is grasped. If cartridge is connected, continue with next step. If cartridge is not grasped, remove cartridge extractor assembly (14) and proceed to step 27.

19. With Gunner's hands held ready at the muzzle, Assistant Gunner withdraws cartridge (12) straight out of barrel (1) hand to hand with cartridge extractor (10).
20. Gunner grasps body of cartridge (12) as it comes from barrel (1).

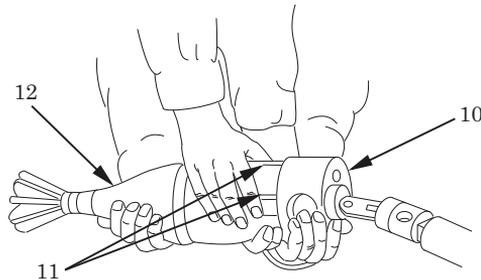


Figure 7. Release of Cartridge.

21. Ammo Bearer will assist in releasing cartridge (12) from cartridge extractor (10). (Do not place cartridge on ground when removing cartridge extractor.) Gunner holds cartridge horizontally while Ammo Bearer releases extractor by depressing four extractor catches (11) simultaneously.

NOTE

If primer has been dented on two consecutive misfired rounds, perform steps 31 through 36 before returning mortar to service.

22. Gunner inspects cartridge (12), to see if primer has been dented, and gives cartridge to Ammo Bearer. Ammo Bearer attempts to replace the safety wire (if applicable), places cartridge in the dud pit, and tags cartridge. The safety officer notifies Explosive Ordnance Disposal (EOD). The crew swabs barrel (1) and re-lays mortar.

MISFIRE PROCEDURES - Continued**NOTE**

If the extractor assembly is unserviceable or fails to attach to misfired round, perform barrel tip method (steps 27 through 30). If extractor assembly attached to round but round cannot be removed, perform stuck round method (steps 23 through 26).

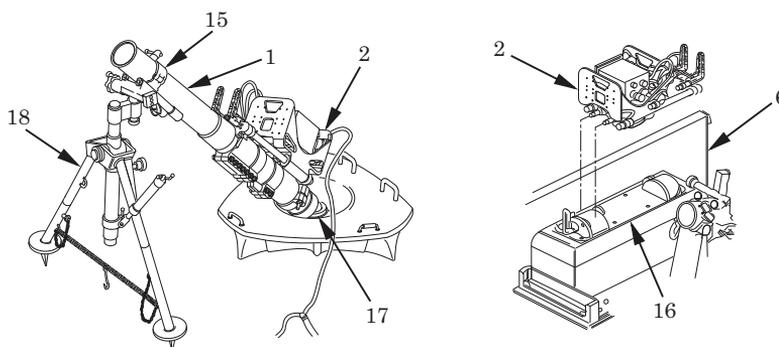


Figure 8. Removal of Barrel from Bipod Assembly.

Stuck Round Method**WARNING**

To avoid serious injury, do not stand in front of or behind barrel while removing PDMA-DQR.

23. Gunner and Assistant Gunner remove PDMA-DQR (2) and place it on storage rack (16) of trailer (6).
24. Gunner holds barrel (1) near muzzle and Assistant Gunner holds bipod assembly (18). Ammo Bearer opens buffer housing assembly (15) and Assistant Gunner lowers bipod assembly to the ground.
25. Gunner and Ammo Bearer turn barrel (1) until the white line is in down position and carefully remove barrel from breech cap socket (17).
26. Keeping barrel horizontal and pointing in the direction of fire, Gunner and Ammo Bearer lift barrel (with cartridge extractor still attached to cartridge). They will carry the barrel to the dud pit and tag barrel. The safety officer will notify Explosive Ordnance Disposal (EOD).

Barrel Tip Method**WARNING**

To avoid serious injury, do not stand in front of or behind barrel while removing PDMA-DQR.

27. Gunner and Assistant Gunner remove PDMA-DQR (2) and place it on storage rack (16) of trailer (6).
28. Gunner holds barrel (1) near muzzle and Assistant Gunner holds bipod assembly (18). Ammo Bearer opens buffer housing assembly (15) and Assistant Gunner lowers bipod assembly to the ground.
29. Assistant Gunner will then place the meaty portions of his thumbs over edges of the muzzle, grasping barrel with his fingers.

WARNING

When removing the cartridge, do not touch the primer and do not stand directly in front of barrel.

NOTE

If primer has been dented on two consecutive misfired rounds, perform steps 31 through 36 before returning mortar to service.

30. At Assistant Gunner's command, Ammo Bearer will lift cannon's breech cap assembly with assistance from Gunner causing cartridge to slide down to Assistant Gunner's hands. Assistant Gunner will then remove cartridge, inspect it to see if primer has been dented, attempt to replace the safety wire (if applicable), place cartridge in the dud pit, and tag cartridge. The safety officer will notify Explosive Ordnance Disposal (EOD). The crew swabs barrel (1) and re-lays mortar.

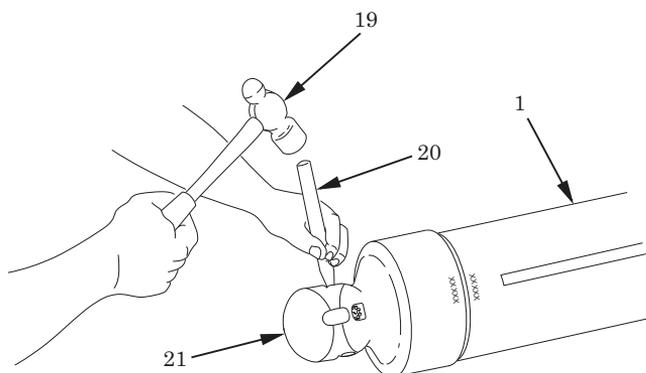
MISFIRE PROCEDURES - Continued**Breech Cap Removal**

Figure 9. Removal of Breech Cap.

31. Remove barrel (1) from bipod assembly (18) and breech cap socket (17). Place barrel on stable surface.
32. Assistant Gunner and Ammo Bearer will stabilize barrel (1). Gunner inserts breech cap removal tool (20) (WP 0059, Table 2, item 4) into cross bore of breech cap. Tap the end of tool with hammer (19) (WP 0059, Table 2, item 16) to turn in counterclockwise direction. Unscrew and remove breech cap assembly (21) from barrel. Gunner will wipe any debris from inner part of breech cap.

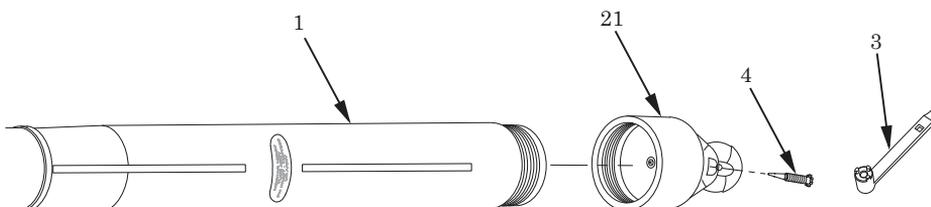


Figure 10. Installation of Firing Pin.

33. Gunner inspects firing pin housing on breech cap assembly (21) and removes any existing dirt or debris. Gunner replaces firing pin (4) by hand, ensuring that threads are aligned. Rotate firing pin in a clockwise direction until hand tight; then tighten with firing pin wrench (3) (WP 0059, Table 2, item 29).

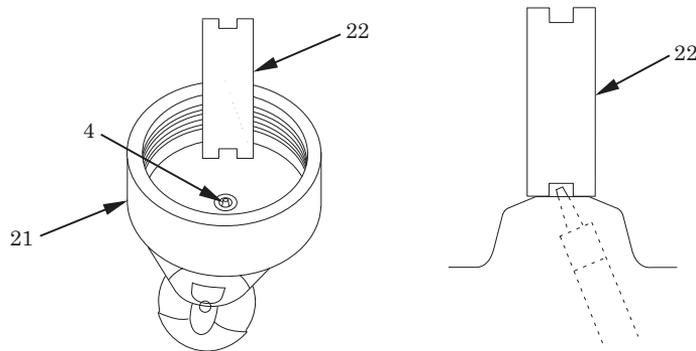


Figure 11. Measurement of Firing Pin Protrusion.

34. Measure protrusion of firing pin (4) using firing pin gage (22) (WP 0059, Table 2, item 14). Firing pin must protrude above MIN and pass below MAX cutouts. Replace firing pin if defective. Check protrusion of new firing pin.
35. Using a wiping rag, Gunner cleans inner threads of breech cap assembly (21) and outer threads of barrel (1). Gunner applies light coat of grease (GA) (WP 0061, item 13) to threads of breech cap assembly and installs breech cap on barrel. Tighten breech cap by using breech cap removal tool in breech cap cross bore; back off 1/4 turn and, using a snapping motion, tighten breech cap. White stripe on barrel must line up with firing pin (4). Actions of crew are confirmed by both Squad Leader and Section Leader.
36. Return mortar barrel assembly to service.

END OF TASK

END OF WORK PACKAGE

OPERATOR**OPERATION UNDER USUAL CONDITIONS
MISFIRE PROCEDURES (WITHOUT DISMOUNTED 120MM
MORTAR FIRE CONTROL SYSTEM, M150)**

INITIAL SETUP:**Tools and Special Tools**

- Breech cap removal tool (WP 0059, Table 2, item 4)
- Firing pin gage (WP 0059, Table 2, item 14)
- Firing pin wrench (WP 0059, Table 2, item 29)
- Hand hammer (WP 0059, Table 2, item 16)

Materials/Parts

- Aircraft grease (GA) (WP 0061, item 13)
-

MISFIRE PROCEDURES**WARNING**

Serious injury or death may result from misfire. Cookoff may result in an unexpected blast with the crew improperly positioned. Another cartridge dropped on top of a misfired cartridge may result in detonation of both propelling charges, both fuzes, and both main charges, rupturing the barrel. The cartridge may detonate while removing the misfire.

WARNING

If kicking the barrel does not cause the cartridge to fire during a misfire and the mortar is hot, wait until the mortar is cool enough to handle with bare hands. If the mortar is cool at the time of the misfire, wait 1 minute before removing the cartridge. Water or snow applied to the outside of the barrel can be used for cooling. This is to avoid an accident from possible delayed action of the ignition cartridge.

MISFIRE PROCEDURES - Continued**NOTE**

A misfire is a failure of the cartridge to fire after cartridge is dropped into mortar barrel assembly. Misfires may be caused by defective ammunition, a damaged firing pin, or an obstruction in bore that prevents cartridge from sliding down and striking firing pin.

Lower the cannon to its lowest elevation, leaving 0.25 in. (0.64 cm) of inner elevating sleeve exposed. When depressing the elevation using elevating hand wheel, ensure that no metal to metal contact is made.

1. When a misfire occurs, any member of the crew immediately announces "MISFIRE".
2. All crewmembers, except the Gunner, move at least 100 meters to the rear of the mortar.

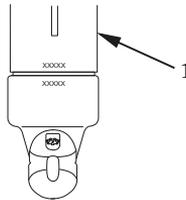


Figure 1. Mortar Barrel Assembly.

WARNING

Ensure cross-leveling T-handle is as tight as physically possible so barrel will not fall on personnel.

3. Gunner stands to left or right rear of mortar and strikes barrel (1) several blows with the heel of his boot. If the cartridge fails to fire after kicking barrel, Gunner joins the rest of crew and waits 1 minute.

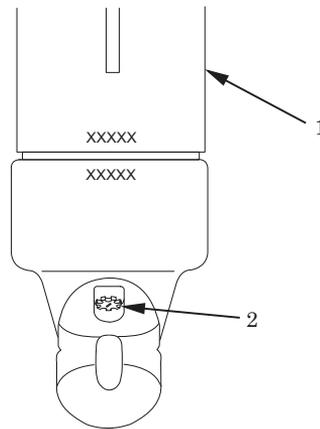


Figure 2. Location of Firing Pin.

WARNING



If mortar is hot, avoid serious burns by waiting until barrel is cool enough to touch with bare hands.

If operating in MOPP IV gear/environment, don leather gloves over chemical-resistant gloves to protect hands from burns.

4. After waiting 1 minute, Gunner and Squad Leader return to mortar and check to see if mortar is cool enough to handle. Gunner checks barrel (1) for heat using bare hands. Starting at muzzle, lightly touch barrel every few inches with fingertips and move down to breech cap. If barrel is too hot, crew uses some means (water or snow on exterior of barrel) or elapsed time to cool barrel before attempting to remove misfire.
5. When mortar is cool enough to handle, Gunner does following steps:
 - a. Gunner depresses barrel (1) to its lowest elevation, leaving 0.25 in. (0.64 cm) of inner elevating sleeve showing. When depressing the elevation using elevating hand wheel, ensure that no metal to metal contact is made.
 - b. Using firing pin wrench (WP 0059, Table 2, item 29), Gunner removes firing pin (2) by turning firing pin wrench in counterclockwise direction.
 - c. After removal of firing pin (2), Gunner shouts, "Firing pin is removed."

MISFIRE PROCEDURES - Continued

- d. Gunner hands firing pin (2) to Squad Leader.
- e. Section Leader physically confirms that firing pin (2) has been removed.

WARNING

Keep head and body away from the front of the mortar when removing a misfire.

Do not stand directly behind mortar when removing a misfire.

Do not open buffer housing assembly when removing a misfire. Failure to comply could cause collapse of the mortar system.

6. Gunner calls rest of crew forward.
7. Gunner locks data on sight unit using the locking knob on last deflection and places sight unit in carrying case. Squad Leader confirms actions of Gunner.

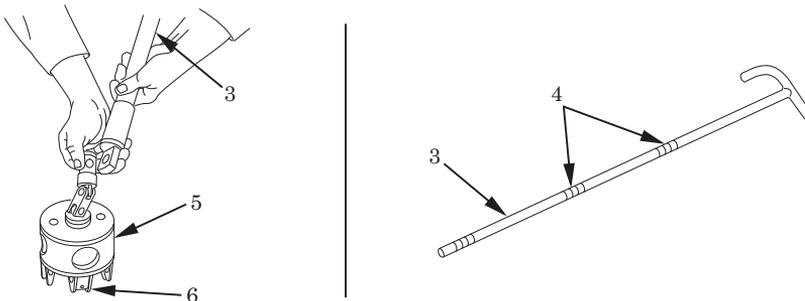


Figure 3. Cartridge Extractor and Artillery Cleaning Staff Assembly.

8. Assistant Gunner inspects catches (6) on cartridge extractor (5) to ensure they are the latest configuration. There should be a 1/8 in. (0.32 cm) hole in the face of the catch. The hole indicates that the catch is the latest configuration. Assistant Gunner inspects cartridge extractor and makes sure that cartridge extractor catches are free of burrs, wear, or rust/corrosion that would impair function. Assistant Gunner will test each cartridge extractor catch to ensure free operation and that each catch will snap positively into original position. **If the cartridge extractor fails to meet inspection standards, cartridge extractor is non-mission capable.** Do not use cartridge extractor. Proceed to step 29 and follow the barrel tip method to remove misfired cartridge. Squad Leader confirms actions of Assistant Gunner.

-
9. Assistant Gunner makes sure artillery cleaning staff assembly section sleeves (4) are all tightly locked, so that staff assembly will not extend or retract. If section sleeves cannot be tightly locked, artillery cleaning staff assembly (3) is non-mission capable. Do not use artillery cleaning staff assembly. Proceed to step 29 and follow the barrel tip method to remove misfired cartridge. Squad Leader confirms actions of Assistant Gunner.
 10. Assistant Gunner attaches cartridge extractor (5) securely to extended artillery cleaning staff assembly (3). Squad Leader confirms actions of Assistant Gunner.
 11. Assistant Gunner rotates artillery cleaning staff assembly (3) until cartridge extractor (5) is secure against artillery cleaning staff assembly.
 12. Before inserting cartridge extractor (5), Assistant Gunner ensures that barrel has been lowered to its lowest elevation, leaving 0.25 in. (0.64 cm) of inner elevating sleeve showing.

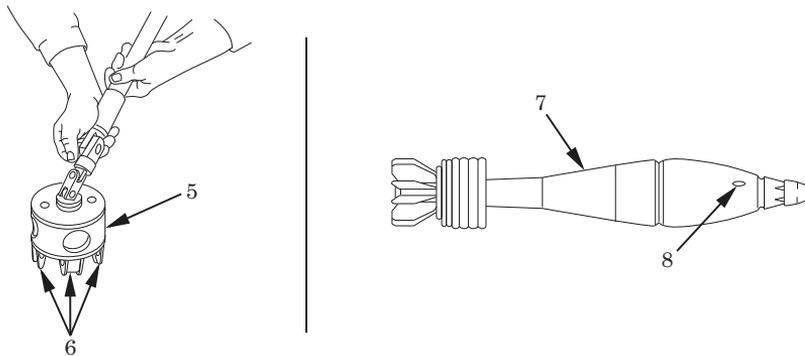
MISFIRE PROCEDURES - Continued

Figure 4. Grasp of Cartridge with Cartridge Extractor.

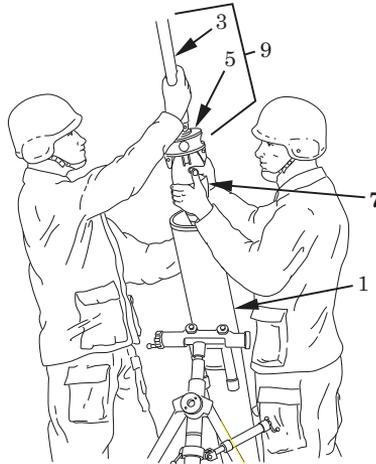
WARNING

To avoid serious injury, do not stand in front of or behind barrel. When removing cartridge, do not touch primer and do not stand directly in front of barrel.

13. Insert cartridge extractor (5) into muzzle of barrel hand to hand until it rests on cartridge (7) and will not descend any further.
14. Slowly rotate cartridge extractor (5) until spring-loaded extractor catches (6) grasp cartridge (7). A metallic click may be heard or resistance felt when extractor catches latch into grooves (8) on cartridge body.
15. Continue rotating cartridge extractor (5) 1/4 turn. The resistance of extractor should become much heavier when cartridge extractor latches onto cartridge (7).
16. If extra resistance is not felt, cartridge extractor (5) has not successfully connected to the cartridge (7). Repeat steps 14 and 15. If resistance is still not felt, remove cartridge extractor assembly from barrel and proceed to step 29.

NOTE

If cartridge is grasped, perform steps 17 through 28. If cartridge cannot be grasped, perform steps 29 through 32. If cartridge is grasped but cannot be removed, perform steps 18, 29, 30, and 33.



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Figure 5. Removal of Cartridge with Cartridge Extractor Assembly.

WARNING

When removing the cartridge, do not touch the primer and do not stand directly in front of barrel.

NOTE

Due to the weight of the round, Gunner may assist during the entire extraction process.

17. If resistance is felt, relax grip on the artillery cleaning staff assembly (3) momentarily. Then, without rotating, slowly pull the staff assembly slightly to ensure cartridge (7) is grasped. If cartridge is not grasped, remove cartridge extractor assembly (9) and proceed to step 29. If cartridge is connected, continue with next step.
18. Assistant Gunner loosens sleeve on artillery cleaning staff assembly (3), depresses ball bearing spring lock, slowly lowers upper staff section into lower staff section, and tightens sleeve.

MISFIRE PROCEDURES - Continued

19. With Gunner's hands held ready at the muzzle, Assistant Gunner withdraws cartridge (7) straight out of barrel (1) with cartridge extractor (5). If cartridge cannot be withdrawn, proceed to step 29.
20. Gunner grasps body of cartridge (7) as it comes from barrel (1).

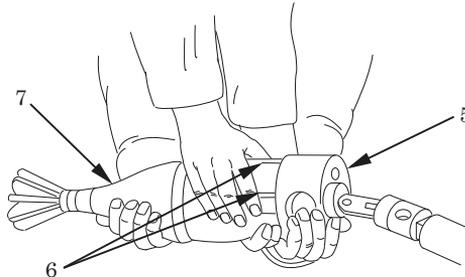


Figure 6. Release of Cartridge.

21. Ammo Bearer will assist in releasing cartridge (7) from cartridge extractor (5). (Do not place cartridge on ground when removing cartridge extractor.) Gunner holds cartridge horizontally while Ammo Bearer releases extractor by depressing four extractor catches (6) simultaneously.
22. Gunner inspects cartridge (7), to see if primer has been dented, and gives cartridge to Ammo Bearer. Ammo Bearer attempts to replace the safety wire (if applicable), places cartridge in the dud pit, and tags cartridge. The safety officer notifies Explosive Ordnance Disposal (EOD).

NOTE

If primer has been dented, perform steps 23 through 26 before continuing with step 27. If primer has not been dented, proceed to step 27.

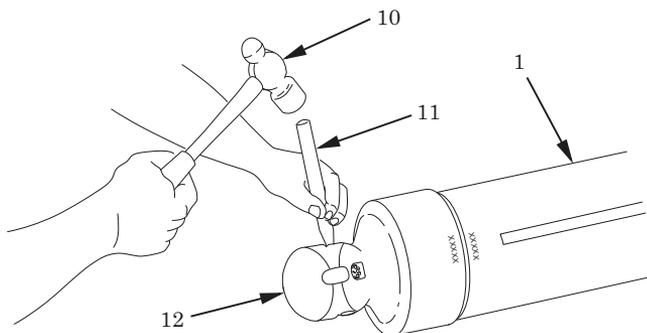


Figure 7. Removal of Breech Cap.

23. Assistant Gunner and Ammo Bearer will stabilize barrel (1). Gunner inserts breech cap removal tool (11) (WP 0059, Table 2, item 4) into cross bore of breech cap. Tap the end of tool with hammer (10) (WP 0059, Table 2, item 16) to turn in counterclockwise direction. Unscrew and remove breech cap assembly (12) from barrel. Gunner will wipe any debris from inner part of breech cap.

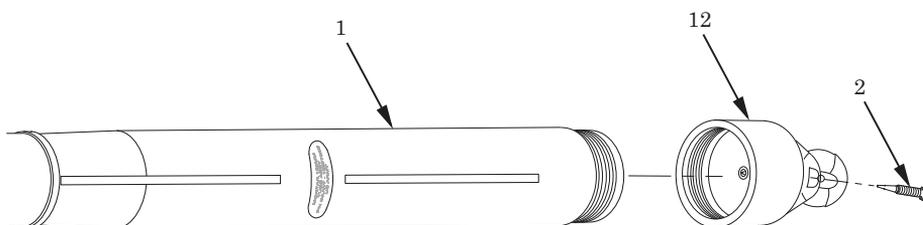


Figure 8. Installation of Firing Pin.

24. Gunner inspects firing pin housing on breech cap assembly (12) and removes any existing dirt or debris. Gunner replaces firing pin (2) by hand, ensuring that threads are aligned. Rotate firing pin in a clockwise direction until hand tight; then tighten with firing pin wrench (WP 0059, Table 2, item 29).

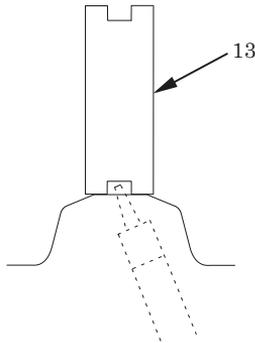
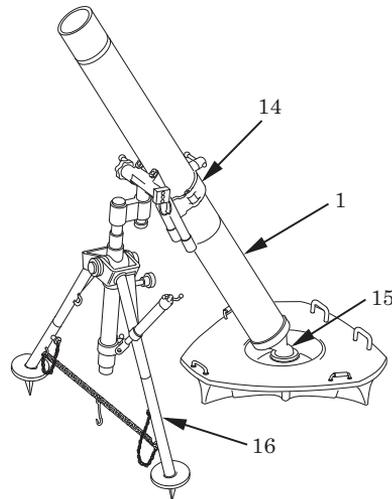
MISFIRE PROCEDURES - Continued

Figure 9. Measurement of Firing Pin Protrusion.

25. Measure protrusion of firing pin (2) using firing pin gage (13) (WP 0059, Table 2, item 14). Firing pin must protrude above MIN and pass below MAX cutouts. Replace firing pin if defective. Check protrusion of new firing pin.
26. Using a wiping rag, Gunner cleans inner threads of breech cap assembly (12) and outer threads of barrel (1). Gunner applies light coat of grease (GA) (WP 0061, item 13) to threads of breech cap assembly and installs breech cap on barrel. Tighten by using breech cap removal tool in breech cap cross bore. White stripe on barrel must line up with firing pin (2). Actions of crew are confirmed by both Squad Leader and Section Leader.
27. Swab the barrel (1).
28. Re-lay the mortar.

NOTE

If the extractor assembly is unserviceable or fails to attach to misfired round, perform barrel tip method (steps 29 through 32). If extractor assembly attached to round but round cannot be removed, perform stuck round method (steps 33 through 35).



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Figure 10. Removal of Barrel from Bipod Assembly.

Barrel Tip Method

29. Gunner holds barrel (1) near muzzle and Assistant Gunner holds bipod assembly (16). Ammo Bearer opens buffer housing assembly (14) and Assistant Gunner lowers bipod assembly to the ground.
30. Gunner and Ammo Bearer turn barrel (1) until the white line is in down position and carefully remove barrel from breech cap socket (15).
31. Assistant Gunner will then place the meaty portions of his thumbs over edges of the muzzle, grasping barrel with his fingers.

MISFIRE PROCEDURES - Continued**WARNING**

When removing the cartridge, do not touch the primer and do not stand directly in front of barrel.

32. At Assistant Gunner's command, Ammo Bearer will lift the cannon's breech cap assembly with assistance from Gunner causing cartridge to slide down to Assistant Gunner's hands. Assistant Gunner will then remove the cartridge, inspect it to see if primer has been dented, attempt to replace the safety wire (if applicable), place cartridge in the dud pit, and tag cartridge. The safety officer will notify Explosive Ordnance Disposal (EOD).

Stuck Round Method

33. Gunner holds barrel (1) near muzzle and Assistant Gunner holds bipod assembly (16). Ammo Bearer opens buffer housing assembly (14) and Assistant Gunner lowers bipod assembly to the ground.
34. Gunner and Ammo Bearer turn barrel (1) until the white line is in down position and carefully remove barrel from breech cap socket (15).
35. Keeping barrel horizontal and pointing in direction of fire, Gunner and Ammo Bearer lift barrel (with cartridge extractor still attached to cartridge). They will carry barrel to the dud pit and tag barrel. The safety officer will notify Explosive Ordnance Disposal (EOD).

END OF TASK**END OF WORK PACKAGE**

OPERATOR**OPERATION UNDER USUAL CONDITIONS
RETRIEVING MORTAR FROM GROUND (M326 MORTAR STOWAGE KIT)**

INITIAL SETUP:**References**

TM 9-1230-205-13&P

TM 9-2590-527-13&P

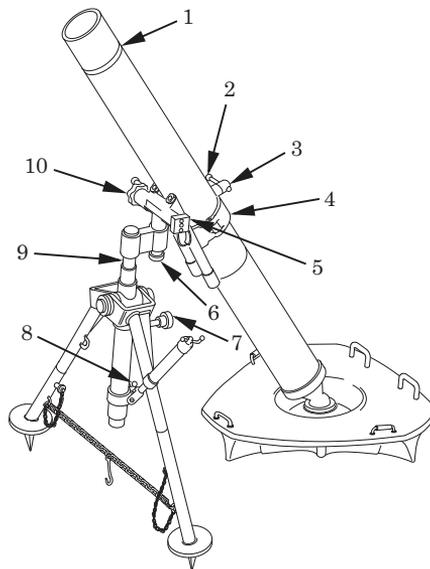
RETRIEVAL WITH M326 MORTAR STOWAGE KIT

Figure 1. Preparation of Mortar for Retrieval.

1. If equipped with Dismounted 120mm Mortar Fire Control System, remove and stow Line Replaceable Units (LRUs) of system. Refer to TM 9-1230-205-13&P. If equipped with sight unit, remove M67 sight unit and stow it in its case.
2. Replace dovetail slot cover (5).
3. If used, retrieve M14 aiming posts and M58 and M59 aiming post lights and stow them in case.
4. Center traversing extension assembly (6) and traversing gear assembly (10).

RETRIEVAL WITH M326 MORTAR STOWAGE KIT - Continued

5. Lower barrel using elevation hand crank (7) until 4 in. (10 cm) or four fingers of inner elevating sleeve (9) is exposed.
6. Loosen clamp handle assembly (3) no more than two turns and slide buffer housing assembly (4) to white line (1) near muzzle. Match white line on buffer housing assembly with white line down barrel. Tighten clamp handle assembly until it clicks once. Continue turning manual control handle (2) until it is parallel to barrel.
7. Loosen cross leveling locking knob (8).
8. Position mortar stowage kit to retrieve mortar system.
9. Attach mortar stowage kit to mortar system and operate mortar stowage kit. Refer to TM 9-2590-527-13&P.

END OF TASK**END OF WORK PACKAGE**

OPERATOR**OPERATION UNDER USUAL CONDITIONS
TAKING MORTAR OUT OF ACTION (WITHOUT M326 MORTAR STOWAGE KIT)**

INITIAL SETUP:

Not Applicable

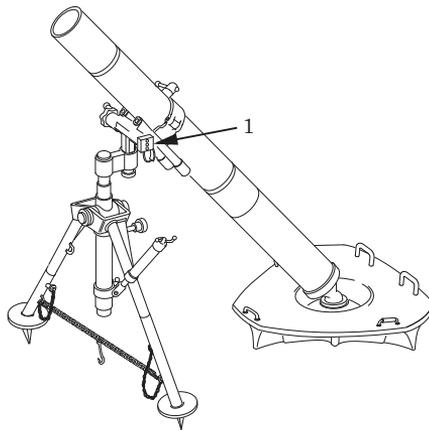
DISPLACEMENT OF MORTAR

Figure 1. Replacement of Dovetail Slot Cover.

1. Remove M67 sight unit and stow it in its case.
2. Replace dovetail slot cover (1).
3. Retrieve M14 aiming posts and M58 and M59 aiming post lights and stow them in case.

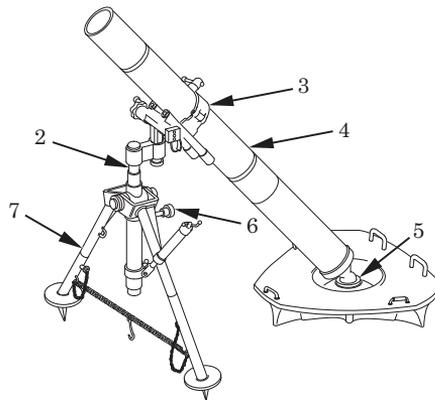
DISPLACEMENT OF MORTAR - Continued

Figure 2. Disassembly of Mortar.

4. Lower elevation to expose 0.25 in. (0.64 cm) of inner elevating sleeve (2) using hand crank (6).
5. One crew member holds mortar barrel assembly (4) near muzzle and one crew member holds bipod assembly (7). Another crew member opens buffer housing assembly (3).
6. Two crew members turn mortar barrel assembly (4) until white line is in down position and carefully remove mortar barrel assembly from breech cap socket (5) and bipod assembly (7).

WARNING

Mortar components are heavy. To avoid injury to personnel, use two crew members when moving components into storage location.

END OF TASK**END OF WORK PACKAGE**

OPERATOR**OPERATION UNDER UNUSUAL CONDITIONS
UNUSUAL ENVIRONMENT/WEATHER,
NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION PROCEDURES,
SECURITY MEASURES FOR ELECTRONIC DATA,
COMMUNICATION DEGRADED MODE, EMERGENCY PROCEDURES**

INITIAL SETUP:**Materials/Parts**

General purpose lubricating oil (GPL) (WP 0061, item 14)
Sandbags (WP 0060)

References

FM 3-11.4
FM 3-11.5
FM 7-90
FM 9-207
FM 31-70
FM 31-71
TM 9-1230-207-13

UNUSUAL ENVIRONMENT/WEATHER**Extreme Cold Weather**

Keep ammunition covered and M67 sight unit and M45A1 boresight in protective carrying cases when situations permit. Do not move fire control instruments directly from cold to warm areas.

Use arctic lubricant in continuous subzero environments.

If using Dismounted 120mm Mortar Fire Control System, Fire Control Computer (FCC) may require additional time to power-up when operating in extreme cold weather environment.

Refer to FM 9-207, FM 31-70, and FM 31-71 for operation in cold climates.

Hot

Lubricate mortar barrel assembly, bipod assembly, and mortar baseplate frequently with general purpose lubricating oil (GPL) (WP 0061, item 14), paying particular attention to all hidden surfaces, such as bore, firing pin, and similar places where corrosion might occur. Clean, wipe dry, and restore oil film after handling. Keep equipment and ammunition covered when situations permit.

UNUSUAL ENVIRONMENT/WEATHER - Continued**Hot and Dry**

Clean and oil the bore of barrel more frequently than usual. Keep equipment covered when situations permit.

Hot, Damp, and Salty Atmosphere

1. When mortar is being fired, clean and lubricate the bore and exposed metal surface more frequently than required for normal service and keep covers in place as often as firing conditions permit.
2. When mortar is not being used, cover unpainted surfaces with a film of GPL (WP 0061, item 14) and keep all covers in place.
3. Minimize exposure of fire control instruments to water and high humidity.

Sand

1. Clean and lubricate mortar frequently.
2. Before beginning an action in sandy areas, remove lubricant from machined surfaces of mortar barrel assembly and other exposed lubricated parts.
3. Clean and lubricate all exposed parts after action is over.

Mud

Firing on very soft ground will require ground preparation (e.g., sandbags).

Frozen Ground

1. Use sandbags (WP 0060) to settle mortar baseplate.
2. Use tripods to support the M14 aiming posts.
3. Refer to FM 31-70, FM 31-71, and FM 9-207 for operation on frozen ground.

Fording

1. Disassemble weapon into major components and cover the components carefully to protect from water splashes.
2. Watch carefully for water seepage into all parts. This could contaminate the lubricant.
3. If immersion occurs, notify field maintenance to schedule disassembly and lubrication of weapon and fire control instruments by support maintenance.

END OF TASK**NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION PROCEDURES**

The following items must be discarded if contaminated by a chemical agent.

Nomenclature	NSN
Bag, Tools & Spare	8105-01-286-6307
Bag, Tools & Roll	8105-01-320-0962
Cover, Fire Control	1240-01-043-7502
Cover, Sight Unit Adapter	1015-01-285-0141
Gun, Grease	4930-01-030-0304
Hammer, Hand	5120-00-061-8546
Oiler, Hand	4930-00-537-8977
Screwdriver, Crosstip	5120-00-820-2995
Screwdriver, Flat Tip	5120-00-010-7914

Refer to FM 3-11.4, FM 3-11.5, and FM 7-90 for decontamination procedures.

END OF TASK

NOTE

The remaining tasks are applicable when Dismounted 120mm Mortar Fire Control System is in use.

SECURITY MEASURES FOR ELECTRONIC DATA**Change of Classification****NOTE**

Clear Data is used to effectively lower the security classification of the Mortar Fire Control System (MFCS) software to **UNCLASSIFIED**. It takes approximately 2 hours to complete Clear Data, depending on the speed of the computer.

To clear data, click **Clear Data** on the MFCS Maintenance screen. After 2 hours, the classification will be reset and the computer will shut down.

Deletion of Data

In the event of emergencies (i.e., imminent capture, etc.), perform the following procedures.

CAUTION

Pressing Ctrl-K-L will erase all Mortar Fire Control System data and software.

NOTE

In Version 5.0 software, Ctrl-K-L will erase MFCS software including the database but not the entire maintenance module. When attempting next log in, MFCS Maintenance screen will appear but the Soldier Machine Interface (SMI) will be erased.

1. Press key combination Ctrl-K-L.
2. Two boxes will appear to allow operator verification of choice to erase software. At each box, operator has choice to continue by clicking OK or to cancel operation by clicking CANCEL.
3. If software is erased, software must be reloaded onto the Fire Control Computer (FCC).

END OF TASK

COMMUNICATION DEGRADED MODE

If conducting operations in a field environment and, as the Fire Direction Center (FDC) or Gun/FDC, communications are lost with the gun squad/section/platoon, missions can still be conducted using the "wire communications" system.

To conduct wire communications with the guns, it will be necessary to run commo wire from the binding posts of the guns' Fire Control Computer (FCC) to the binding posts of the FDC's FCC. The FDC's FCC, along with the guns' FCCs, will need to change the data in the Setup Channel A tab to facilitate the wire settings. Ensure that both the FDC and the guns have the same data (i.e., IP Addresses, Modulation, Device Type, Net Usage, Number of Stations, Rank, etc.).

END OF TASK**EMERGENCY PROCEDURES**

If a gun is required to function as Gun/FDC, instructions for operation can be found in TM 9-1230-207-13.

If Gunner's Display (GD) or Defense Advanced GPS Receiver (DAGR) fails, Dismounted 120mm Mortar Fire Control System remains operable through information supplied by FCC.

If Enhanced Power Distribution Assembly (EPDA), Pointing Device (PD), or FCC fails, Dismounted 120mm Mortar Fire Control System is inoperable. Notify FDC. If directed by FDC, standard mode of operation (i.e., M67 sight unit, aiming posts, M16 plotting board, etc.) can be followed.

END OF TASK**END OF WORK PACKAGE**

CHAPTER 3

OPERATOR
TROUBLESHOOTING PROCEDURES
FOR
M120A1 120MM MORTAR

OPERATOR
TROUBLESHOOTING INDEX

GENERAL

The troubleshooting index lists the common malfunctions which operator may find during the operation or maintenance of the M120A1 120mm mortar or its components. Operator should perform the tests/inspections and corrective actions in the order listed.

This manual cannot list all malfunctions that may occur, all the tests and inspections needed to find the fault, nor all the corrective actions needed to correct the fault. If the equipment malfunction is not listed or is not corrected by listed corrective actions, notify next line supervisor.

MALFUNCTION/SYMPATOM INDEX

<u>Symptom</u>	<u>Work Package - Page</u>
Binding in cross leveling mechanism.....	WP 0022-3
Buffer housing assembly won't close properly.....	WP 0022-2
Buffer mechanism binds or won't return.....	WP 0022-2
Difficulty in elevating or depressing.....	WP 0022-3
Difficulty in positioning traversing extension assembly.....	WP 0022-3
Difficulty in traversing	WP 0022-2
Failure to fire	WP 0022-1
Firing pin is difficult to remove or seat	WP 0022-2
M67 sight unit controls do not operate	WP 0022-3
M67 sight unit won't attach and lock to bipod assembly	WP 0022-4
No or low illumination in M58 and M59 aiming post lights and M67 sight unit	WP 0022-4
Poor visibility in M67 sight unit lens.....	WP 0022-5

END OF WORK PACKAGE

 OPERATOR

 OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES

INITIAL SETUP:**Materials/Parts**

Wiping rag (WP 0061, item 20)

References

WP 0016
 WP 0017
 WP 0025
 WP 0026

TROUBLESHOOTING PROCEDURES

Table 1. Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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1. **FAILURE TO FIRE.**

WARNING

Follow misfire procedures in WP 0016 or WP 0017 to remove cartridge before doing troubleshooting.

Step 1. Check for dirty bore or foreign matter in base of barrel.

Clean barrel (WP 0025).

Step 2. Check for proper firing pin protrusion (WP 0016).

Replace firing pin if defective (WP 0026).

Step 3. Check for defective ammunition.

Follow unit Standard Operating Procedures (SOP).

TROUBLESHOOTING PROCEDURES - Continued
Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
2. FIRING PIN IS DIFFICULT TO REMOVE OR SEAT.		
	Step 1. Check for dirt or grit.	Remove and clean firing pin (WP 0026). Inspect threads. Lubricate and check function.
	Step 2. Verify firing pin still won't seat.	Notify field maintenance.
3. BUFFER MECHANISM BINDS OR WON'T RETURN.		
	Step 1. Extend buffer mechanism cylinders and check for dirt or grit.	Clean thoroughly.
	Step 2. Check for damage (bent internal wrenching bolt, etc.) or excess grease.	Notify field maintenance.
4. BUFFER HOUSING ASSEMBLY WON'T CLOSE PROPERLY.		
	Step 1. Check for dirt or grit.	Clean thoroughly. Lightly oil threads.
	Step 2. Check for stripped threads or damaged barrel collar.	Notify field maintenance.
5. DIFFICULTY IN TRAVERSING.		
	Step 1. Check for dirt or grit.	Clean thoroughly.
	Step 2. Check for damage (dents, etc.) to traversing gear housing.	Notify field maintenance.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

6. DIFFICULTY IN POSITIONING TRAVERSING EXTENSION ASSEMBLY.

Check for dirt or grit.

Clean thoroughly and lubricate.

7. BINDING IN CROSS LEVELING MECHANISM.

Check for dirt or grit.

Clean thoroughly and lubricate.

8. DIFFICULTY IN ELEVATING OR DEPRESSING.

Step 1. Check for dirt or grit.

Clean thoroughly.

Step 2. Check for damage (bent elevating sleeve, etc.).

Notify field maintenance.

9. M67 SIGHT UNIT CONTROLS DO NOT OPERATE.

Step 1. Check for dirt and grit.

Clean thoroughly with clean wiping rag (WP 0061, item 20).

Step 2. Check for damage.

Notify field maintenance.

TROUBLESHOOTING PROCEDURES - Continued
Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
--------------------	---------------------------	--------------------------

- 10. NO OR LOW ILLUMINATION IN M58 AND M59 AIMING POST LIGHTS AND M67 SIGHT UNIT.**

WARNING



Radioactive material is used in the M58 and M59 aiming post lights and M67 sight unit. Radiation leakage may occur if M58 and M59 aiming post lights or M67 sight unit are broken or damaged. If exposed to a broken or damaged M58 or M59 aiming post light or M67 sight unit, see medical personnel.

Check for broken or cracked lenses or improper illumination of tritium-lit sources.

Notify Radiation Safety Officer (RSO).

- 11. M67 SIGHT UNIT WON'T ATTACH AND LOCK TO BIPOD ASSEMBLY.**

Step 1. Check dovetail slot for nicks and burrs.

Notify field maintenance.

Step 2. Check dovetail slot for dirt.

Remove dirt. Be careful not to scratch or nick metal surfaces.

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

12. POOR VISIBILITY IN M67 SIGHT UNIT LENS.

Step 1. Check lens for cracks or breaks.

Notify field maintenance.

Step 2. Check lens for moisture.

Place M67 sight unit in a warm area to see if moisture clears. Don't apply heat directly to sight lens.

END OF TASK**END OF WORK PACKAGE**

CHAPTER 4

OPERATOR
MAINTENANCE INSTRUCTIONS
FOR
M120A1 120MM MORTAR

OPERATOR**PREVENTIVE MAINTENANCE CHECKS AND SERVICES INTRODUCTION
GENERAL, EXPLANATION OF COLUMN ENTRIES**

GENERAL

Preventive Maintenance Checks and Services (PMCS) (WP 0024) must be performed by the operator to be sure the mortar is in good operating condition and ready for its primary mission.

To ensure maximum operational readiness, it is necessary that the mortar be inspected at regular intervals so that any defects can be discovered and corrected before serious damage or failure occurs. Any maintenance problems that are beyond operator authorization will be referred to Field Maintenance for correction.

Always observe the WARNINGS and CAUTIONS before and during operation. A WARNING means someone could be hurt. A CAUTION means equipment could be damaged. If the equipment fails to operate, troubleshoot. Report any deficiencies using the proper forms. See DA PAM 750-8.

EXPLANATION OF COLUMN ENTRIES

The INTERVAL column tells you when to do the check or service in the PROCEDURE column. BEFORE checks and services are performed prior to the mortar leaving its containment area or performing its mission. DURING checks begin when the mortar is being used and AFTER checks and services begin when the mortar is taken out of its mission mode or is returned to its containment area.

The ITEM TO BE CHECKED OR SERVICED column tells you the component of the mortar to be checked. The amount of time required is indicated in the MAN-HOUR column.

When recording results of PMCS, entries in the PMCS ITEM NO. column will be used for the TM Item No. column on DA Form 5988-E, Equipment Inspection and Maintenance Worksheet - Electronic, or DA Form 2404, Equipment Inspection and Maintenance Worksheet.

The EQUIPMENT NOT READY/AVAILABLE IF column indicates deficiencies which must be corrected before the mortar can be operated.

END OF WORK PACKAGE

OPERATOR

**PREVENTIVE MAINTENANCE CHECKS AND SERVICES,
INCLUDING LUBRICATION INSTRUCTIONS
PREVENTIVE MAINTENANCE INSPECTION, LUBRICATION INSTRUCTIONS**

INITIAL SETUP:

Materials/Parts

- Aircraft grease (GA) (WP 0061, item 13)
- Dry cleaning solvent (WP 0061, item 22)
- General purpose lubricating oil (GPL) (WP 0061, item 14)
- Lens paper (WP 0061, item 16)
- Optical lens cleaning compound (WP 0061, item 7)
- Rifle bore cleaning compound (RBC) (WP 0061, item 8)
- Weapons lubricating oil (LAW) (WP 0061, item 15)
- Wiping rag (WP 0061, item 20)

References

- DA Form 2408-4
- TB 43-180
- WP 0004
- WP 0020

PREVENTIVE MAINTENANCE INSPECTION

**Table 1. Preventive Maintenance Checks and Services
for M120A1 120mm Mortar.**

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
1	Before		DA Form 2408-4	Check to see if weapon has been borescoped and pullover gaged within the past 180 days and/or every 500 rounds after initial 3000 rounds have been fired.	Weapon has not been borescoped and pullover gaged within the past 180 days and/or every 500 rounds after initial 3000 rounds have been fired.

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

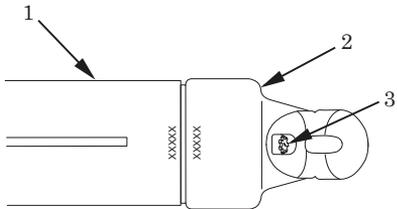
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
2	Before		Mortar Barrel Assembly	 <p>Check for cracks, rust, and loose, missing, dented, or damaged parts on barrel (1).</p> <p>Verify breech cap (2) is not loose.</p> <p>Verify firing pin (3) is aligned with white line on barrel (1) when fully assembled.</p> <p>Verify serial number on barrel (1) matches serial number on breech cap (2).</p> <p style="text-align: center;">NOTE</p> <p>Firing pin protrusion gage readings should be taken AT LEAST quarterly by the user. Refer to TB 43-180 for annual calibration requirements.</p>	<p>Barrel has bulges, cracks, or loose, missing, dented, or damaged parts.</p> <p>Breech cap is loose.</p> <p>Firing pin does not align with white line on barrel.</p> <p>Serial number on barrel does not match serial number on breech cap.</p>

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
3	Before		Bipod Assembly	<p>Check breech assembly for bulges, dents, and visible cracks. Check for evidence of gas leakage around firing pin (3) or breech cap (2) (visible discoloration).</p> <p style="text-align: center;">WARNING</p> <p style="text-align: center;"></p> <p>The exterior surface of the barrel must be wiped free of lubrication prior to firing or the buffer housing assembly may move on the barrel. Firing ammunition in a heavily lubricated or wet bore can result in hangfires, failure to fire, or short rounds.</p> <p>Check bipod for cracks, broken welds, rust, and loose, missing, or damaged parts.</p>	<p>Barrel shows evidence of gas leakage around firing pin or breech cap (visible discoloration).</p> <p>Bipod has cracks, broken welds, or loose, missing, or damaged parts.</p>

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

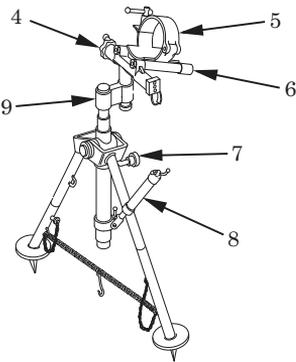
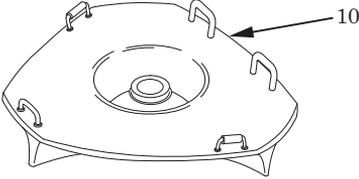
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
3 (Cont)	Before (Cont)		Bipod Assembly (Cont)	 <p>Check that buffer housing assembly (5) operates properly and holds barrel securely.</p> <p>Verify that traversing gear assembly (4), elevating mechanism (7), cross leveling mechanism (8), and traversing extension assembly (9) operate smoothly and without binding through entire range of travel.</p> <p>Test function of buffer mechanism (6) by pulling down on both housing tubes at the same time; they should return to the original position when released.</p>	<p>Buffer housing assembly is inoperative or doesn't hold barrel securely.</p> <p>Traversing gear assembly, elevating mechanism, cross leveling mechanism, or traversing extension assembly is binding or inoperative.</p> <p>Buffer mechanism is binding or inoperative.</p>

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
4	Before		Mortar Baseplate, M9	 <p>Check socket of mortar baseplate (10) for broken edges, cracks, or corrosion.</p> <p>Check mortar baseplate (10) for cracks or broken welds.</p>	<p>Socket edge is broken, cracked, or rusty.</p> <p>Mortar baseplate has cracks or broken welds.</p>
5	Before		M67 Sight Unit	<p>WARNING</p>  <p>RADIATION HAZARD - TRITIUM GAS (H₃)</p> <p>Check for proper illumination of tritium-lit sources (WP 0004) in a darkened area. If any source is not illuminated, notify Radiation Safety Officer (RSO).</p>	<p>Any source is not illuminated.</p>

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

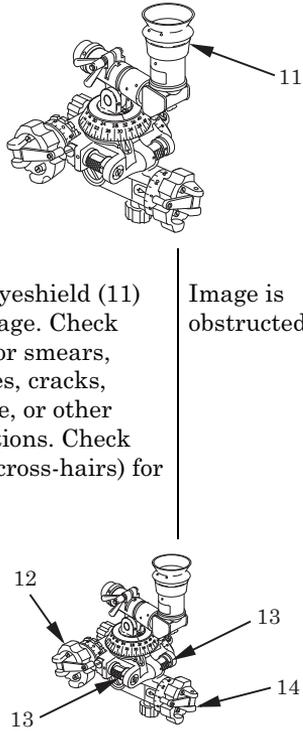
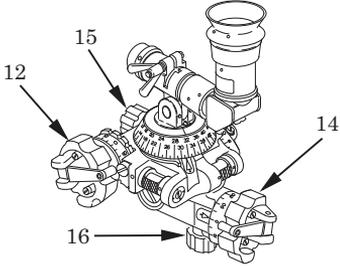
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
5 (Cont)	Before (Cont)		M67 Sight Unit (Cont)	 <p>Check eyeshield (11) for damage. Check lenses for smears, scratches, cracks, moisture, or other obstructions. Check reticle (cross-hairs) for clarity.</p> <p>Verify that level vials (13) are not cracked, broken, or loose in mountings; cover must not be missing.</p>	<p>Image is obstructed.</p> <p>Vials are cracked, broken, or loose in mounting.</p>

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
				<p>Check rotation of the elevation knob (14) and deflection (azimuth) knob (12) over entire range of movement. Motion must be smooth and even.</p> <p>Check all index lines and scales. They must be clear and distinct.</p>  <p>Check that deflection (azimuth) knob (12) and elevation knob (14) stay in position while deflection locking knob (15) and elevation locking knob (16) are being tightened.</p>	<p>Rotation of knobs is excessively binding or uneven.</p> <p>Scales and index lines cannot be read.</p> <p>Deflection (azimuth) knob and/or elevation knob slip while locking knobs are being tightened.</p>

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

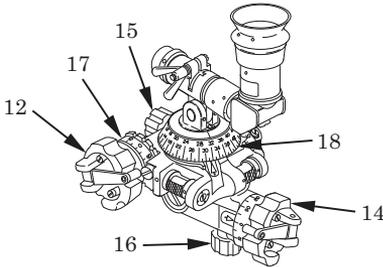
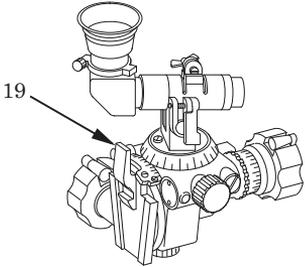
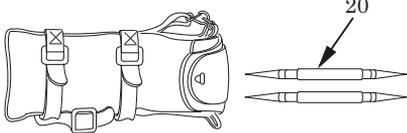
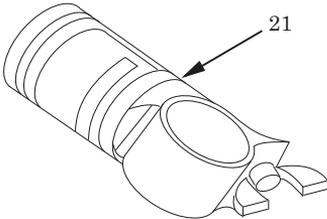
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
5 (Cont)	Before (Cont)		M67 Sight Unit (Cont)	 <p>With deflection locking knob (15) and elevation locking knob (16) tightened, check for free movement of elevation knob (14) and deflection (azimuth) knob (12).</p> <p>Check that coarse deflection scale (18) and azimuth control dial (17) rotate freely when depressed and return to position under spring tension when released.</p>	<p>Azimuth knob or elevation knob moves more than ± 1.0 mil when locked.</p> <p>Dials do not return to position under spring tension or scales move freely when not depressed.</p>

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
				 <p>Check mortar sight latch (19) for looseness and cracks. Also check that latch secures sight unit to mortar.</p> <p>Check that mounting surfaces are free of nicks and burrs.</p> <p>Check M67 sight unit for missing or damaged radiation warning, data plate, or other parts.</p>	<p>Mortar sight latch is broken and/or does not secure sight unit.</p> <p>Nicks and burrs prevent proper seating in dovetail slot.</p> <p>Radiation warning or data plate is missing, or radiation warning, data plate, or other parts is/are damaged.</p>

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

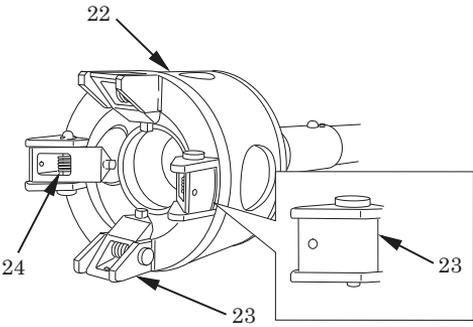
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
6	Before		M14 Aiming Post, Driving Stakes, and Case	 <p>Check for completeness and that mating surfaces are clean, free of paint, and fit properly.</p> <p>Check that driving stakes (20) are not bent or broken.</p>	<p>Mating surfaces do not fit properly.</p> <p>Driving stakes are bent or broken.</p>
7	Before		M58 and M59 Aiming Post Lights	<p>WARNING</p>  <p>RADIATION HAZARD - TRITIUM GAS (H₃)</p> 	

**Table 1. Preventive Maintenance Checks and Services
for M120A1 120mm Mortar - Continued.**

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
				<p>Check aiming post lights (21) for proper illumination in a darkened area. If they are damaged or not illuminated, notify Radiation Safety Officer (RSO).</p> <p>Check aiming post lights (21) for missing or damaged radiation warning, data plate, or other parts.</p> <p>Check for evidence of tampering (aiming post lights are factory sealed and no disassembly is authorized or required).</p>	<p>Items are damaged or not illuminated.</p> <p>Radiation warning or data plate is missing, or radiation warning, data plate, or other parts is/are damaged.</p> <p>Evidence of tampering is present.</p>

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
8	Before		Cartridge Extractor	 <p>Inspect catches (23) of cartridge extractor (22) to ensure they are the latest configuration. There should be a 1/8 in. (0.32 cm) hole in the face of the catch. The hole indicates that catch is latest configuration.</p>	<p>If any or all of four catches do not have this hole, cartridge extractor is older configuration and should not be used. Immediately turn-in any non-conforming cartridge extractor for repair or replacement.</p>

**Table 1. Preventive Maintenance Checks and Services
for M120A1 120mm Mortar - Continued.**

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
				Inspect catches (23) of cartridge extractor (22) for burrs, wear, or heavy rust/corrosion that would impair function. Test release of spring (24) on each of the four cartridge extractor catches. Each catch must snap positively into original position after being retracted and released.	Cartridge extractor catches have burrs, wear, or heavy rust/corrosion which impairs function. Catches cannot be retracted. Catches do not snap positively into original position after release. Immediately turn-in any non-conforming cartridge extractors for repair or replacement.

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

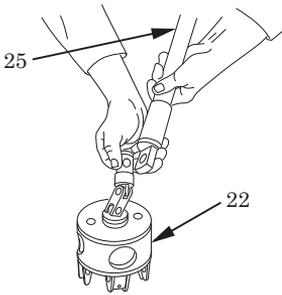
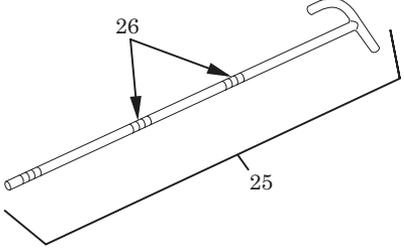
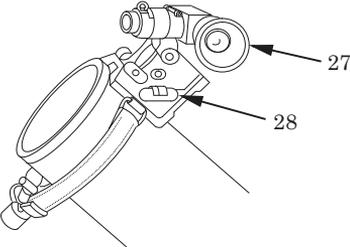
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
8 (Cont)	Before (Cont)		Cartridge Extractor (Cont)	 <p>Attach cartridge extractor (22) to artillery cleaning staff assembly (25).</p>	<p>Cartridge extractor does not attach firmly and completely to artillery cleaning staff assembly. Immediately turn-in any non-conforming cartridge extractor assembly for repair or replacement.</p>

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
9	Before		Artillery Cleaning Staff Assembly	 <p>Fully extend and lock sleeves (26) of artillery cleaning staff assembly (25).</p>	<p>Section sleeves cannot be tightly locked. Immediately turn-in any non-conforming artillery cleaning staff assembly for repair or replacement.</p>
10	Before		M45A1 Boresight	 <p>Check eyeshield (27) for damage. Check lenses and windows for smears, scratches, cracks, or other obstructions.</p> <p>Level vials (28) must not be cracked, broken, or loose in mounting.</p>	<p>Image is obstructed.</p> <p>Vials are cracked, broken, or loose in mounting.</p>

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

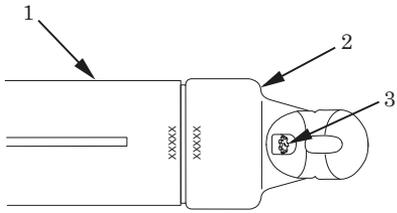
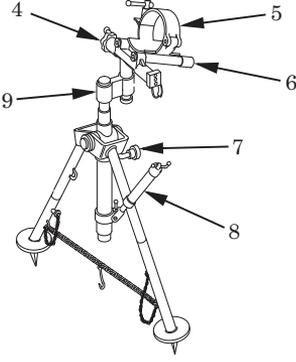
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
11	During		Mortar Barrel Assembly	 <p>Verify breech cap (2) is not loose.</p> <p>Verify firing pin (3) is aligned with white line on barrel (1).</p> <p>Check breech assembly for bulges, dents, and visible cracks. Check for evidence of gas leakage around firing pin (3) or breech cap (2) (visible discoloration).</p>	<p>Breech cap is loose.</p> <p>Firing pin does not align with white line on barrel.</p> <p>Barrel shows evidence of gas leakage around firing pin or breech cap (visible discoloration).</p>

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
12	During		Bipod Assembly	 <p>Check that buffer housing assembly (5) operates properly and holds barrel securely.</p> <p>Verify that traversing gear assembly (4), elevating mechanism (7), cross leveling mechanism (8), and traversing extension assembly (9) operate smoothly and without binding through entire range of travel.</p>	<p>Buffer housing assembly is inoperative or doesn't hold barrel securely.</p> <p>Traversing gear assembly, elevating mechanism, cross leveling mechanism, or traversing extension assembly is binding or inoperative.</p>

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

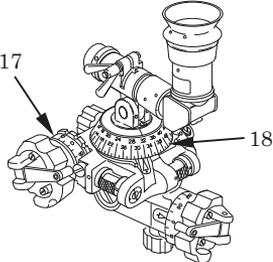
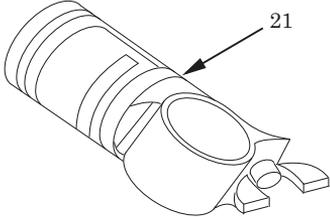
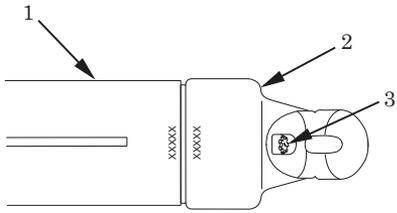
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
13	During		M67 Sight Unit	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  <p>RADIATION HAZARD - TRITIUM GAS (H₃)</p> </div> <p>Check for proper illumination of tritium-lit sources (WP 0004) during hours of darkness. If any source is not illuminated, notify Radiation Safety Officer (RSO).</p> <div style="text-align: center;">  </div> <p>Check that coarse deflection scale (18) and azimuth control dial (17) rotate freely when depressed and return to position under spring tension when released.</p>	<p>Any source is not illuminated.</p> <p>Dial scales slip during firing.</p>

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
14	During		M58 and M59 Aiming Post Lights	<p style="text-align: center;">WARNING</p> <p style="text-align: center;"></p> <p style="text-align: center;">RADIATION HAZARD - TRITIUM GAS (H₃)</p> <p style="text-align: center;"></p> <p>Check aiming post lights (21) for proper illumination during hours of darkness at 50 and 100 meters. If they are damaged or not illuminated, notify Radiation Safety Officer (RSO).</p>	Items are damaged or not illuminated.
15	After		DA Form 2408-4	Update DA Form 2408-4 to reflect day's firing. Ensure that all standards for borescoping and pullover gaging have not been exceeded.	DA Form 2408-4 has not been updated and/or standards for borescoping and pullover gaging have been exceeded.

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
16	After		Mortar Barrel Assembly	 <p>Verify breech cap (2) is not loose.</p> <p>Verify firing pin (3) is aligned with white line on barrel (1).</p> <p>Check breech assembly for bulges, dents, and visible cracks. Check for evidence of gas leakage around firing pin (3) or breech cap (2) (visible discoloration).</p>	<p>Breech cap is loose.</p> <p>Firing pin does not align with white line on barrel.</p> <p>Barrel shows evidence of gas leakage around firing pin or breech cap (visible discoloration).</p>

**Table 1. Preventive Maintenance Checks and Services
for M120A1 120mm Mortar - Continued.**

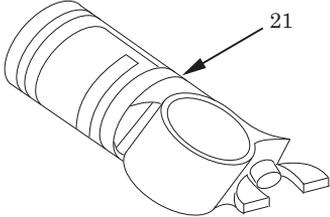
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
17	After		Bipod Assembly	<p>Use rifle bore cleaning compound (RBC) (WP 0061, item 4) to thoroughly clean bore of barrel (1) after firing and two consecutive days thereafter. After firing, the breech assembly shall be disassembled for cleaning and the sealing surfaces inspected for pits, corrosion, or damage.</p> <p align="center">NOTE</p> <p>For nonfiring periods, barrel is cleaned and lubricated on a weekly basis.</p> <p>Clean and lubricate exposed bearing surfaces with general purpose lubricating oil (WP 0061, item 14).</p>	

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
18	After		M67 Sight Unit	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  <p>RADIATION HAZARD - TRITIUM GAS (H₃)</p> </div> <p>Check for proper illumination of tritium-lit sources (WP 0004) in a darkened area. If any source is not illuminated, notify Radiation Safety Officer (RSO).</p> <p style="text-align: center;">CAUTION</p> <p>Do not allow solvents or cleaning fluids to contact M67 sight unit.</p> <p>Clean lenses and vial windows with optical lens cleaning compound (WP 0061, item 7). Wipe clean with lens paper (WP 0061, item 16). Clean plastic scales and sight body with clean wiping rag (WP 0061, item 20).</p>	Any source is not illuminated.

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
19	After		M58 and M59 Aiming Post Lights	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  <p>RADIATION HAZARD - TRITIUM GAS (H₃)</p> </div> <div style="text-align: center;">  </div> <p>Check aiming post lights (21) for proper illumination in a darkened area. If they are damaged or not illuminated, notify Radiation Safety Officer (RSO).</p> <p>Wipe aiming post lights with clean wiping rag (WP 0061, item 20).</p>	<p>Items are damaged or not illuminated.</p>

NOTE

For any painting requirements, notify field level maintenance.

END OF TASK

LUBRICATION INSTRUCTIONS

Lubrication Procedures

WARNING



DRY CLEANING SOLVENT

1. Clean parts with dry cleaning solvent (WP 0061, item 22). Dry before lubricating. Apply lubricants sparingly. Too much oil or grease will damage equipment. Instructions contained herein are mandatory.

WARNING



To avoid slippage and possible collapse of mortar system, wipe dry the cross leveling mechanism's clamping surface on elevating mechanism housing, the clamping surfaces of buffer mechanism, and the exterior surface of the barrel with a clean cloth before firing. **DO NOT LUBRICATE.**

CAUTION

To avoid equipment damage in extreme conditions, see WP 0020, Operation under Unusual Conditions, for additional lubrication instructions.

NOTE

General purpose lubricating oil (GPL) (WP 0061, item 14) is the prime lubricant. Weapons lubricating oil (LAW) (WP 0061, item 15) may be used for continuous sub-zero environments.

Rifle bore cleaning compound (RBC) (WP 0061, item 8) is used on the bore.

Aircraft grease (GA) (WP 0061, item 13) is the grease that is used.

2. Immediately after firing, and for two consecutive days thereafter, clean the barrel bore with RBC (WP 0061, item 8). After the third cleaning, wipe dry and lightly coat with GPL (WP 0061, item 14). Clean weekly with RBC, wipe dry, and lubricate with GPL.

-
3. Lubricate all visible unpainted surfaces and parts with a light coat of GPL (WP 0061, item 14).
 4. Move the traversing gear assembly through its full range of movement and lubricate unpainted surface with a light coat of GPL (WP 0061, item 14).
 5. Fully extend the elevating mechanism and lubricate the unpainted surface with a light coat of GPL (WP 0061, item 14).
 6. Fully extend the cross leveling mechanism and lubricate the unpainted surface with a light coat of GPL (WP 0061, item 14).
 7. M191 mortar mount must be sent to field maintenance for complete service and lubrication semiannually.
 8. The cartridge extractor assembly must be sent to field maintenance for complete inspection, lubrication, and service semiannually.

LUBRICATION INSTRUCTIONS - Continued**Lubricating Points**

RBC in bore only

GPL, unless otherwise marked

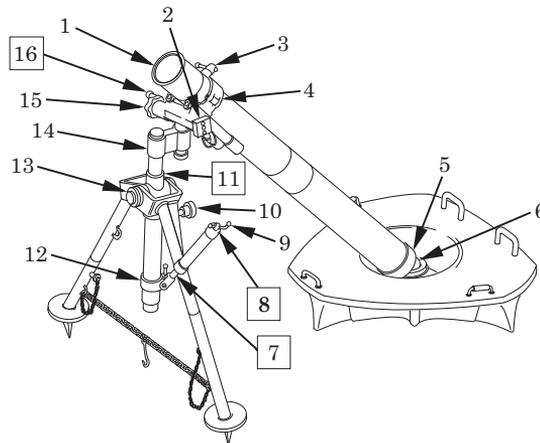
 GAA

Figure 1. M120A1 120mm Mortar.

(D - Daily, W - Weekly)

1. Barrel bore (RBC after firing and for two days)
2. Sight dovetail slot (D)
3. Clamp handle assembly (D)
4. Buffer housing assembly (D)
5. Firing pin (W)
6. Breech cap threads and mortar baseplate socket (W)
7. Cross leveling eye bracket (D)
8. Cross leveling screw (W)
9. Cross leveling hand crank (W)
10. Elevating hand crank (W)
11. Elevating screw (W)
12. Cross leveling loop clamp (D)
13. Bipod hinges (W)
14. Traversing extension assembly (W)
15. Traversing hand crank (W)
16. Traversing screw (W)

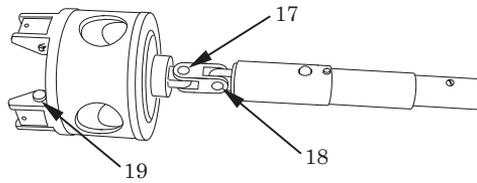


Figure 2. Cartridge Extractor.

(D - Daily, W - Weekly)

GPL, unless otherwise marked

GAA

- 17. Hinge pin (W)
- 18. Hinge pin (W)
- 19. Catch pins (4) (W)

END OF TASK

END OF WORK PACKAGE

OPERATOR

**MORTAR BARREL ASSEMBLY MAINTENANCE
CLEANING**

INITIAL SETUP:**Tools and Special Tools**

Artillery cleaning brush (WP 0059, Table 2, item 5)

Artillery cleaning brush (WP 0059, Table 2, item 6)

Materials/Parts

Abrasive cloth (WP 0061, item 9)

Bore cleaning sleeve (WP 0061, item 21)

General purpose lubricating oil (GPL) (WP 0061, item 14)

Rifle bore cleaning compound (RBC) (WP 0061, item 8)

CLEANING**CAUTION**

To avoid equipment damage, use abrasive cloth (WP 0061, item 9) for minor deburring and to remove minor corrosion from unpainted surfaces. Do not use on sealing surfaces between breech cap and barrel.

NOTE

Cleaning the barrel bore is accomplished with the use of a cleaning rod and brush. A bore cleaning sleeve (WP 0061, item 21) wrapped around the bristle surface is employed to fine clean and lubricate.

If required, stiff bristle artillery cleaning brush (WP 0059, Table 2, item 6) is provided for the removal of residue buildup, prior to cleaning.

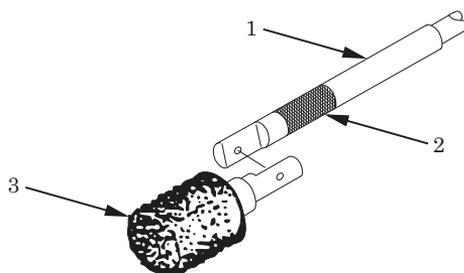
CLEANING - Continued

Figure 1. Attachment of Cleaning Brush.

1. Extend cleaning rod (1) until fully deployed and attach cleaning brush (3) by pulling back locking sleeve (2), mating brush with rod, and releasing locking sleeve.

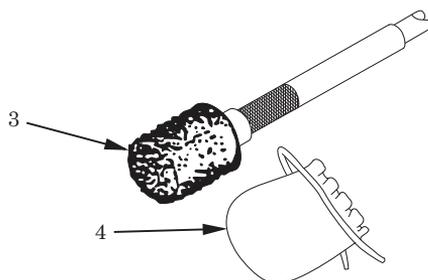


Figure 2. Use of Bore Cleaning Sleeve.

2. Apply RBC (WP 0061, item 8) to cleaning brush (3) (WP 0059, Table 2, item 5) for initial cleaning; then follow with bore cleaning sleeve (4) (WP 0061, item 21) saturated with same cleaning compound. Insert cleaning brush in barrel and thoroughly scrub all surfaces with push-pull action for the entire length of barrel. Ensure that firing pin (raised in fire position) is thoroughly cleaned during the process (cleaning brush is tipped with center brush which provides rotary cleaning surface). Ensure that all RBC which has settled around the firing pin is removed.
3. Place a new bore cleaning sleeve (4) (WP 0061, item 21) on cleaning brush (3). Dry swab bore thoroughly. Inspect bore for cleanliness.

WARNING

Firing a round with cleaning fluid, rain water, or excess oil left in barrel results in discharge of heavy black smoke, and will result in the projectile falling short of its expected range, or could cause misfire.

NOTE

Immediately after firing and for the next two days, thoroughly clean with RBC (WP 0061, item 8), making sure that all surfaces are well coated. Do not wipe dry. On third day after firing, clean with RBC, wipe dry, and lightly coat with GPL (WP 0061, item 14). Clean weekly with RBC. Wipe dry and lubricate with GPL when weapon is not being fired.

4. Dry swab cleaning of the cannon bore is required after every fire mission or every 10 rounds fired (approximately).

END OF TASK**END OF WORK PACKAGE**

OPERATOR**BREECH ASSEMBLY MAINTENANCE
REPAIR OR REPLACEMENT**

INITIAL SETUP:**Tools and Special Tools**

- Breech cap removal tool (WP 0059, Table 2, item 4)
- Firing pin gage (WP 0059, Table 2, item 14)
- Firing pin wrench (WP 0059, Table 2, item 29)
- Hand hammer (WP 0059, Table 2, item 16)

Materials/Parts

- Aircraft grease (GA) (WP 0061, item 13)
- Dry cleaning solvent (WP 0061, item 22)

References

- TB 43-180
-

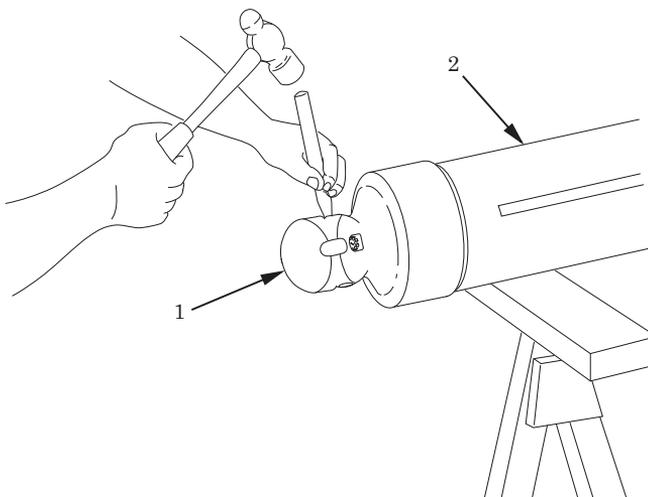
REPAIR OR REPLACEMENT

Figure 1. Removal of Breech Cap.

1. Insert breech cap removal tool (WP 0059, Table 2, item 4) into cross bore of breech cap (1). Tap the end of tool with hand hammer (WP 0059, Table 2, item 16) counterclockwise and unscrew the breech assembly from barrel (2).

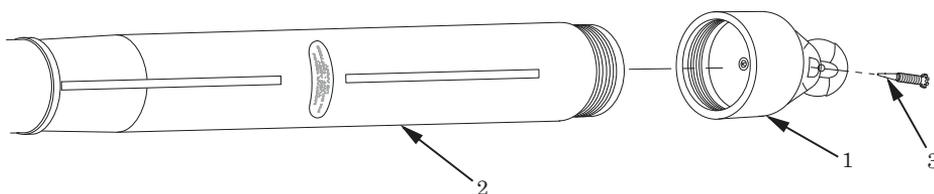
REPAIR OR REPLACEMENT - Continued

Figure 2. Repair of Breech Cap Assembly.

2. Using firing pin wrench (WP 0059, Table 2, item 29), remove firing pin (3).

WARNING

DRY CLEANING SOLVENT

3. Clean parts using dry cleaning solvent (WP 0061, item 22).
4. Inspect firing pin (3). Replace as necessary.
5. Carefully inspect the sealing surfaces on barrel (2) and breech cap (1) for nicks, scratches, gouges, or evidence of leakage. Inspect threads. Return matched barrel and breech cap to field maintenance if defects are found.
6. Install firing pin (3) until properly seated.

NOTE

The user is required to perform firing pin protrusion gaging at least quarterly. Evacuation of the firing pin gage to the TMDE shop for calibration per TB 43-180 is required annually.

7. Use firing pin gage (WP 0059, Table 2, item 14) to check firing pin protrusion. Protrusion gage is a go/no go gage. Firing pin must protrude above MIN and pass below MAX cut outs. Replace firing pin if defective. Check protrusion of new firing pin.
8. Apply a light coat of GAA (WP 0061, item 13) to breech cap threads and install breech cap (1) on barrel (2). Tighten by using breech cap removal tool in breech cap cross bore. White stripe on barrel must line up with firing pin (3).

END OF TASK**END OF WORK PACKAGE**

CHAPTER 5

FIELD
TROUBLESHOOTING PROCEDURES
FOR
M120A1 120MM MORTAR

FIELD MAINTENANCE
TROUBLESHOOTING INDEX

GENERAL

The troubleshooting index lists the common malfunctions which maintainer may find during the maintenance of the M120A1 120mm mortar or its components. Field maintenance should perform the tests/inspections and corrective actions in the order listed.

This manual cannot list all malfunctions that may occur, all the tests and inspections needed to find the fault, nor all the corrective actions needed to correct the fault. If the equipment malfunction is not listed or is not corrected by listed corrective actions, notify next line supervisor.

MALFUNCTION/SYMPTOM INDEX

NOTE

This malfunction/symptom index can only be used as a general reference to troubleshooting. Troubleshoot the mortar in the order shown by the steps. Always do the functional test first in order to verify the symptom. After repair, repeat the functional test to verify proper function.

Refer to TM 9-1000-202-14, Evaluation of Cannon Tubes, for borescope and pullover gaging requirements.

<u>Symptom</u>	<u>Work Package - Page</u>
BASIC ISSUE ITEMS	
Artillery cleaning staff assembly cannot be fully extended and locked in position; lower staff section sleeve does not snap into extended, locked position after retracting evenly	WP 0028-4
Cartridge extractor fails to grasp cartridge	WP 0028-5
M191 MORTAR MOUNT	
Backlash in cross leveling mechanism exceeds 1/8 turn	WP 0028-4
Backlash in elevating mechanism exceeds 1/8 turn	WP 0028-3
Backlash in traversing gear assembly exceeds 1/8 turn	WP 0028-3
Buffer mechanism does not function or hangs out of battery	WP 0028-2
Difficulty in cross-leveling weapon	WP 0028-4
Difficulty in elevating weapon	WP 0028-3
Difficulty in rotating traversing extension assembly	WP 0028-3
Difficulty in traversing weapon	WP 0028-3

MALFUNCTION/SYMP TOM INDEX - Continued

M298 120MM CANNON

Cartridge fails to slide down M298 120mm cannon	WP 0028-2
M298 120mm cannon jumps out of mortar baseplate when firing	WP 0028-1

END OF WORK PACKAGE

**FIELD MAINTENANCE
TROUBLESHOOTING PROCEDURES**

INITIAL SETUP:

Tools and Special Tools

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

References

- TM 9-1000-202-14
- WP 0025
- WP 0032
- WP 0033
- WP 0034
- WP 0036
- WP 0037
- WP 0039
- WP 0040
- WP 0041
- WP 0042

TROUBLESHOOTING PROCEDURES

Table 1. Troubleshooting Procedures.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

M298 120MM CANNON

1. M298 120MM CANNON JUMPS OUT OF MORTAR BASEPLATE WHEN FIRING.

Step 1. Inspect mortar baseplate socket rim. It must not be damaged.

If damaged, replace M9 mortar baseplate (WP 0032).

Step 2. Inspect breech cap ball. It must not be damaged.

If damaged, replace M298 120mm cannon (WP 0033).

TROUBLESHOOTING PROCEDURES - Continued
Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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M298 120MM CANNON - Continued
2. CARTRIDGE FAILS TO SLIDE DOWN M298 120MM CANNON.

Step 1. Inspect cannon tube bore for dirt or debris.

Clean cannon tube with borebrush assembly (WP 0025).

Step 2. Inspect cannon tube per TM 9-1000-202-14.

If damaged, replace M298 120mm cannon (WP 0033).

M191 MORTAR MOUNT
3. BUFFER MECHANISM DOES NOT FUNCTION OR HANGS OUT OF BATTERY.
NOTE

The bipod assembly may hang out of battery due to improper installation. Do not allow the bipod assembly to lean forward (downrange) of a vertical position under any circumstance of elevation setting or positioning of buffer housing assembly on the barrel.

Step 1. With both hands, pull buffer housing assembly sharply to the rear and release. Repeat three times. Buffer mechanism should retract completely.

If buffer mechanism fails to retract completely, go to step 2.

Step 2. Disassemble and inspect for broken/failed helical compression spring or bent internal wrenching bolt. Inspect for excess grease.

Replace damaged parts. Remove excess grease (WP 0037).

Step 3. Disassemble and inspect for curved or damaged internal wrenching bolts, sleeve bushings, or mechanical drive housings.

Replace faulty components (WP 0037).

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

4. DIFFICULTY IN TRAVERSING WEAPON.

Step 1. Check for lubrication.

Clean and lubricate traversing gear assembly.

Step 2. Disassemble traversing gear assembly. Inspect all parts for damage.

Replace faulty components (WP 0039).

5. BACKLASH IN TRAVERSING GEAR ASSEMBLY EXCEEDS 1/8 TURN.

Check for backlash through entire range of motion. It must not exceed 1/8 turn (45 degrees).

Adjust backlash in traversing gear assembly (WP 0039).

6. DIFFICULTY IN ELEVATING WEAPON.

Step 1. Check for lubrication.

Clean and lubricate elevating mechanism.

Step 2. Disassemble elevating mechanism. Inspect all parts for damage.

Replace faulty components (WP 0034).

7. BACKLASH IN ELEVATING MECHANISM EXCEEDS 1/8 TURN.

Check for backlash through entire range of motion. It must not exceed 1/8 turn (45 degrees).

Adjust backlash in elevating mechanism (WP 0034).

8. DIFFICULTY IN ROTATING TRAVERSING EXTENSION ASSEMBLY.

Inspect for worn operating parts.

Replace worn parts (WP 0040).

TROUBLESHOOTING PROCEDURES - Continued

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
--------------------	---------------------------	--------------------------

M191 MORTAR MOUNT - Continued

9. DIFFICULTY IN CROSS-LEVELING WEAPON.

Step 1. Check for lubrication.

Clean and lubricate cross leveling mechanism.

Step 2. Disassemble cross leveling mechanism. Inspect all parts for damage.

Replace faulty components (WP 0036).

10. BACKLASH IN CROSS LEVELING MECHANISM EXCEEDS 1/8 TURN.

Check for backlash through entire range of motion. It must not exceed 1/8 turn (45 degrees).

Adjust backlash in cross leveling mechanism (WP 0036).

BASIC ISSUE ITEMS

11. ARTILLERY CLEANING STAFF ASSEMBLY CANNOT BE FULLY EXTENDED AND LOCKED IN POSITION; LOWER STAFF SECTION SLEEVE DOES NOT SNAP INTO THE EXTENDED, LOCKED POSITION AFTER RETRACTING EVENLY.

Inspect artillery cleaning staff assembly.

Repair artillery cleaning staff assembly (WP 0041).

Table 1. Troubleshooting Procedures - Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

12. CARTRIDGE EXTRACTOR FAILS TO GRASP CARTRIDGE.

Inspect cartridge extractor for sharp, unbroken tabs on the catches. The springs forcing the catches to grasp the cartridge must return the catches to their innermost positions sharply.

Repair cartridge extractor (WP 0042).

END OF TASK**END OF WORK PACKAGE**

CHAPTER 6

**FIELD
MAINTENANCE INSTRUCTIONS
FOR
M120A1 120MM MORTAR**

FIELD MAINTENANCE**SERVICE UPON RECEIPT
SERVICE UPON RECEIPT OF MATERIEL, INSTALLATION INSTRUCTIONS**

INITIAL SETUP:**Tools and Special Tools**

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

References

AR 735-11-2
DA Form 2408-4
DA PAM 750-8
SF 361
SF 364
TM 9-1000-202-14
WP 0004
WP 0024
WP 0059

SERVICE UPON RECEIPT OF MATERIEL**Unpacking**

When a new or reconditioned weapon is received, be aware of any shipping damage to packaging materiel. Report any damage on SF 364, Report of Discrepancy (ROD), as prescribed in AR 735-11-2. Retain packaging materiel for future use.

WARNING

Inspect cannon tube to make sure it is empty. Keep live ammunition out of the area during maintenance operations.

Remove the mortar from shipping container. Check cannon tube to ensure that it is clear of obstructions.

Remove M67 sight unit from shipping container. Check for damaged or missing parts; see WP 0004.

Remove basic issue items from shipping container. Check for missing items; see WP 0059.

SERVICE UPON RECEIPT OF MATERIEL - Continued**Checking Unpacked Equipment**

Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 361, Transportation Discrepancy Report.

Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with applicable service instructions (e.g., for Army instructions, see DA PAM 750-8).

Check to see whether the equipment has been modified.

Check that serial numbers on cannon tube and breech cap match.

Ensure that Weapons Record Data, DA Form 2408-4, is present. Refer to TM 9-1000-202-14.

END OF TASK**INSTALLATION INSTRUCTIONS****NOTE**

Wipe excess oil or preservatives from cannon tube.

Clean and lubricate all items; see WP 0024. Assemble major subassemblies to ensure proper assembly and operation. Mark and match mortar mount to a specific cannon tube (i.e., stencil, stamp, paint) to facilitate and confirm scheduled service on assembly.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**PREVENTIVE MAINTENANCE CHECKS AND SERVICES INTRODUCTION
GENERAL, EXPLANATION OF COLUMN ENTRIES**

GENERAL

Preventive Maintenance Checks and Services (PMCS) (WP 0031) must be performed by the maintainer to be sure the mortar is in good operating condition and ready for its primary mission.

To ensure maximum operational readiness, it is necessary that the mortar be inspected at regular intervals so that any defects can be discovered and corrected before serious damage or failure occurs. Any maintenance problems that are beyond field maintenance authorization will be referred to Depot for correction.

Always observe the WARNINGS and CAUTIONS before and during operation. A WARNING means someone could be hurt. A CAUTION means equipment could be damaged. If the equipment fails to operate, troubleshoot. Report any deficiencies using the proper forms. See DA PAM 750-8.

EXPLANATION OF COLUMN ENTRIES

The INTERVAL column tells you when to do the check or service in the PROCEDURE column. BEFORE checks and services are performed prior to the mortar leaving its containment area or performing its mission. DURING checks begin when the mortar is being used and AFTER checks and services begin when the mortar is taken out of its mission mode or is returned to its containment area.

The ITEM TO BE CHECKED OR SERVICED column tells you the component of the mortar to be checked. The amount of time required is indicated in the MAN-HOUR column.

When recording results of PMCS, entries in the PMCS ITEM NO. column will be used for the TM Item No. column on DA Form 5988-E, Equipment Inspection and Maintenance Worksheet - Electronic, or DA Form 2404, Equipment Inspection and Maintenance Worksheet.

The EQUIPMENT NOT READY/AVAILABLE IF column indicates deficiencies which must be corrected before the mortar can be operated.

END OF WORK PACKAGE

FIELD MAINTENANCE

**PREVENTIVE MAINTENANCE CHECKS AND SERVICES,
INCLUDING LUBRICATION INSTRUCTIONS
PREVENTIVE MAINTENANCE INSPECTION, LUBRICATION INSTRUCTIONS**

INITIAL SETUP:

Tools and Special Tools

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

Materials/Parts

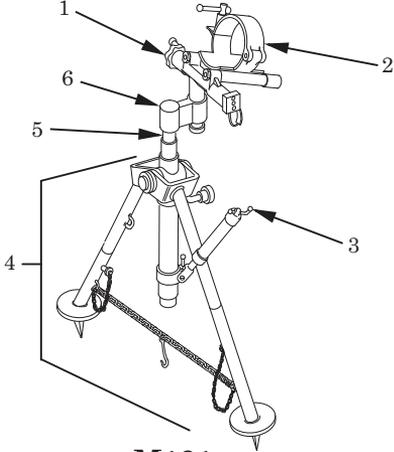
Semiannual Service Direct Support Parts Kit, 5911365

References

DA Form 2408-4

PREVENTIVE MAINTENANCE INSPECTION

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
1	Semi-annually		DA Form 2408-4	Check to see if weapon has been borescoped and pullover gaged within the past 180 days and/or every 500 rounds after initial 3000 rounds have been fired.	Weapon has not been borescoped and pullover gaged within the past 180 days and/or every 500 rounds after initial 3000 rounds have been fired.
2	Semi-annually		M191 Mortar Mount	 <p style="text-align: center;">M191</p> <p>Check M191 mortar mount leg assembly (4) for cracks, broken welds, rust, and loose, missing, or damaged parts.</p>	M191 mortar mount leg assembly has cracks, broken welds, or loose, missing, or damaged parts.

**Table 1. Preventive Maintenance Checks and Services
for M120A1 120mm Mortar - Continued.**

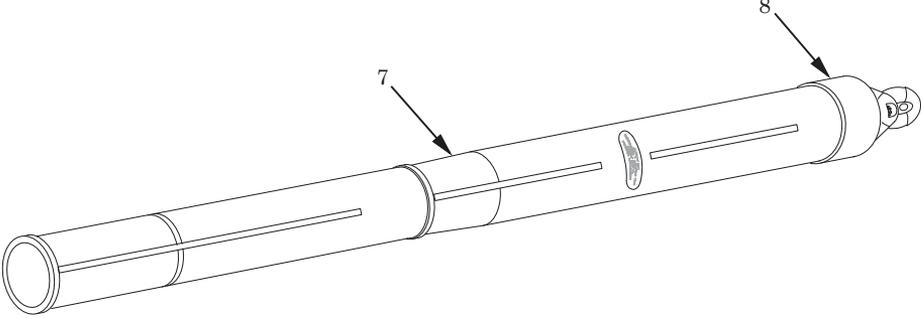
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
				<p>Traversing gear assembly (1), traversing extension assembly (6), and elevating mechanism (5) must operate smoothly and without binding throughout entire range of travel.</p> <p>Buffer mechanism (2) must retract completely with buffing action when pulled to the rear.</p> <p>Cross leveling mechanism (3) must operate smoothly and without binding through the entire range of travel.</p>	<p>Traversing gear assembly and/or elevating mechanism are inoperative or binding.</p> <p>Buffer mechanism does not completely retract with buffing action when pulled to the rear.</p> <p>Cross leveling mechanism binds or does not operate in a smooth manner through entire range of travel.</p>

PREVENTIVE MAINTENANCE INSPECTION - Continued

**Table 1. Preventive Maintenance Checks and Services
for M120A1 120mm Mortar - Continued.**

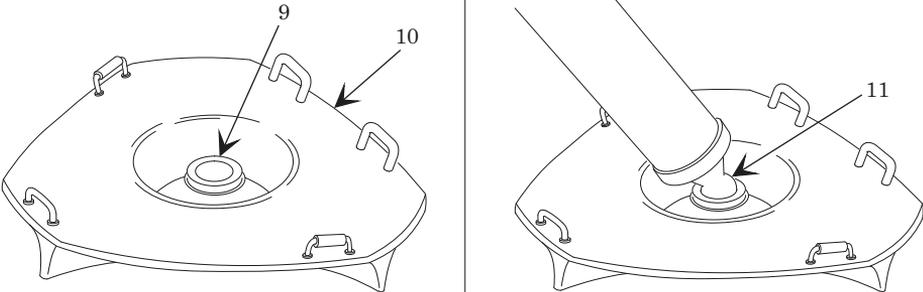
Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
2 (Cont)	Semi-annually (Cont)		M191 Mortar Mount (Cont)	Disassemble mortar mount to allow complete cleaning, inspection, and lubrication of each part. Use Semiannual Service Direct Support Parts Kit for servicing. <p style="text-align: center;">NOTE</p> For maintenance tracking purposes ONLY, a bipod serial number can be stamped on underside of buffer housing.	Operational efficiency is reduced by any repairable deficiency.

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
3	Semi-annually		M298 120mm Cannon	 <p>Check cannon tube (7) and breech assembly (8) for unusual wear and/or damage.</p> <p>Check mating surfaces of cannon tube (7) and breech assembly (8) for cleanliness and gas-tight seal.</p>	<p>Cannon tube and/or breech assembly have cracks, dents, bulges, or other unusual wear.</p> <p>Mating surfaces of cannon tube and/or breech assembly are not clean or do not seal.</p>

PREVENTIVE MAINTENANCE INSPECTION - Continued

Table 1. Preventive Maintenance Checks and Services for M120A1 120mm Mortar - Continued.

Item No.	Interval	Man-Hour	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/ Available If:
4	Semi-annually		Mortar Baseplate	 <p>The diagram shows two views of a mortar baseplate. The left view shows the baseplate with a central socket (9) and the baseplate itself (10). The right view shows a breech cap ball (11) being inserted into the socket. Arrows point to each component with their respective numbers.</p> <p>Check mortar baseplate (10) and socket (9) for physical damage, deformation, corrosion, or cracks.</p> <p>Check socket (9) and ensure breech cap ball (11) rotates freely without sticking or binding.</p>	<p>Mortar baseplate and/or socket is damaged, deformed, cracked, or corroded.</p> <p>Breech cap ball does not rotate freely or sticks or binds in socket.</p>

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**M120A1 120MM MORTAR MAINTENANCE
INSPECTION - ACCEPTANCE AND REJECTION CRITERIA, REPAIR OR REPLACEMENT**

INITIAL SETUP:**Tools and Special Tools**

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

Materials/Parts

Abrasive cloth (WP 0061, item 9)

References

TM 9-1240-409-24&P
WP 0026
WP 0033
WP 0034
WP 0051

Equipment Conditions

Mortar disassembled (WP 0019)
Mortar components resting on ground, bench, or floor
Pointing Device Mount Assembly - Dynamic Quick Release and barrel clamps removed
from cannon tube (TM 9-1230-205-13&P)

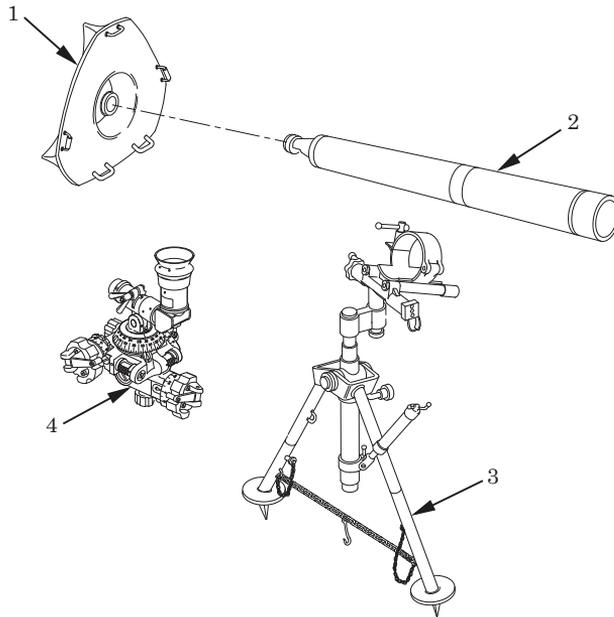
INSPECTION - ACCEPTANCE AND REJECTION CRITERIA


Figure 1. M120A1 120mm Mortar Components.

1. Inspect for physical damage, deformation, corrosion, and cracks in M9 mortar baseplate (1). Remove corrosion using abrasive cloth (WP 0061, item 9). If the socket for the M298 120mm cannon is deformed, perform step 2.
2. Using a breech assembly removed from a cannon tube (WP 0026), check socket functioning. Ensure breech assembly can be inserted into the socket of the M9 mortar baseplate (1). Ensure breech cap ball rotates freely. Ensure baseplate only allows removal of breech assembly when it is correctly positioned.
3. See WP 0033 for inspection criteria for M298 120mm cannon (2).
4. See WP 0034 for inspection criteria for M191 mortar mount (3).
5. Refer to TM 9-1240-409-24&P for inspection criteria for M67 sight unit (4).

END OF TASK

REPAIR OR REPLACEMENT

1. If the M9 mortar baseplate is cracked or the socket is deformed so that it cannot function, replace baseplate as authorized by WP 0051.
2. See WP 0033 for repair or replacement of M298 120mm cannon.
3. See WP 0034 for repair or replacement of M191 mortar mount.
4. See WP 0051 for repair or replacement of M67 sight unit.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**M298 120MM CANNON MAINTENANCE
INSPECTION - ACCEPTANCE AND REJECTION CRITERIA,
REPAIR OR REPLACEMENT, PAINTING, FOLLOW-ON MAINTENANCE**

INITIAL SETUP:**Tools and Special Tools**

Accessory Outfit for Pullover Gages (SC 4931-95-A12)
Borescope, Cannon Bore Inspecting, M3, 11584701
Breech cap removal tool (WP 0059, Table 2, item 4)
Cannon Bore Erosion Gage Set, 12901228
Firing pin gage (WP 0059, Table 2, item 14)
Firing pin wrench (WP 0059, Table 2, item 29)
Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

Materials/Parts

Abrasive cloth (WP 0061, item 9)

References

DA Form 2408-4
TB 43-180
TM 9-1000-202-14
TM 9-1230-205-13&P
TM 9-4933-274-23&P
TM 9-6650-235-13&P
WP 0026
WP 0051

Equipment Conditions

M298 120mm cannon removed from M191 mortar mount (WP 0019)
Pointing Device Mount Assembly - Dynamic Quick Release and barrel clamps removed
from cannon tube (TM 9-1230-205-13&P)

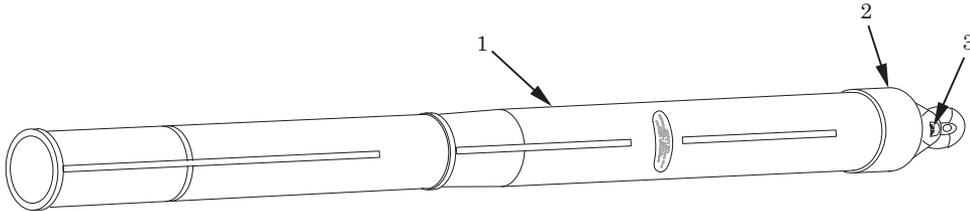
INSPECTION - ACCEPTANCE AND REJECTION CRITERIA

Figure 1. M298 120mm Cannon.

WARNING

Dented cannon tubes must be replaced as they are unsafe for firing.

1. Examine cannon tube (1) for burrs, dents, cracks, wear, fouling, corrosion, and deformities.
2. Inspect breech assembly (2) for signs of gas leakage (visible discoloration) around cannon tube (1).

WARNING

Firing pin must line up with stripe on barrel for safe firing.

NOTE

For removal of firing pin, see WP 0026.

Firing pin gage must be evacuated to TMDE annually for calibration per TB 43-180.

3. Check that white lines on barrel are visible, that white lines align with firing pin (3) on breech assembly (2), and that cannon/breech assembly fit is tight.
4. Inspect firing pin (3) for proper operation and firing pin protrusion.

5. Borescope and use cannon bore erosion gage set or pullover gage on cannon tube according to instructions in TM 9-1000-202-14. Refer to TM 9-6650-235-13&P for borescope operation. Refer to TM 9-4933-274-23&P for use of cannon bore erosion gage set. Record readings on DA Form 2408-4.
6. Determine if bore meets or exceeds condemnation limit of 4.761 in. (120.929 mm).

END OF TASK

REPAIR OR REPLACEMENT

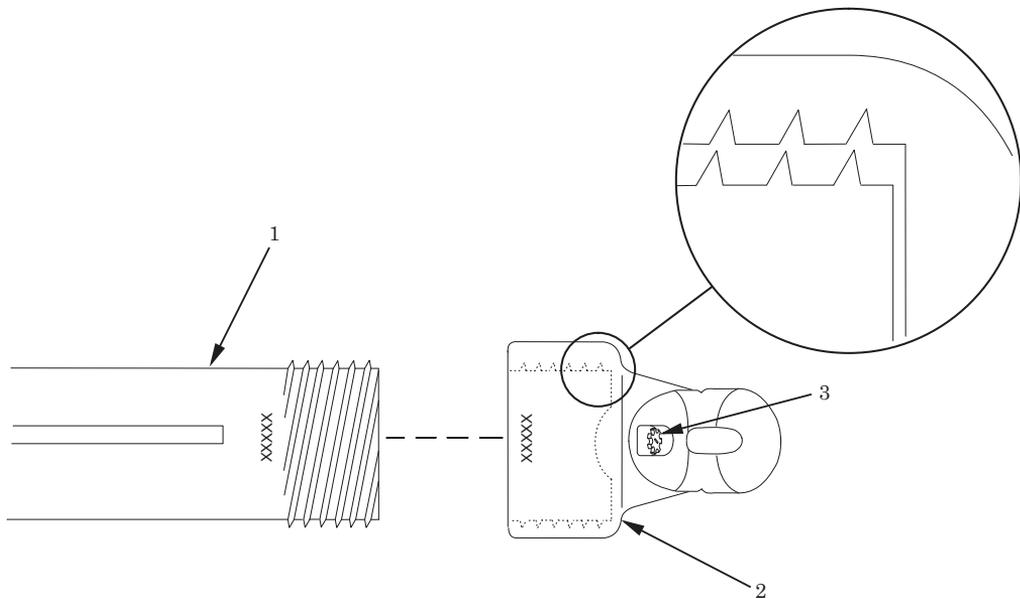


Figure 2. Cannon Tube and Breech Assembly.

CAUTION

Sealing surfaces of cannon tube and breech assembly are lapped as a matched set at manufacture. Do not use abrasives.

1. Using abrasive cloth (WP 0061, item 9), remove burrs ONLY from the exterior of the cannon tube (1) and breech assembly (2).
2. If cannon tube meets or exceeds condemnation limits, replace M298 120mm cannon as authorized by WP 0051.

END OF TASK

PAINTING**NOTE**

If white lines on barrel are not easily visible, perform the following steps.

1. Acquire a high temperature white paint through local purchase.
2. If possible, touch-up white lines on cannon by following previously-painted locations. If visibility of lines does not allow this, proceed with following steps.
3. Ensuring alignment with breech cap firing pin (3) and 70 mm from top of breech cap (2), measure/paint a line 10 mm in width and approximately 290 mm in length.
4. Measure and leave unpainted a length of 100 mm.
5. From this point, measure/paint a second line 10 mm in width to lower stop band of cannon tube (1).
6. From muzzle end of cannon tube (1) and aligned with painted lines at breech end, measure/paint a third line 10 mm in width and 600 mm in length.
7. From muzzle end of cannon tube (1) measure distance of 250 mm. At that point, paint a line 10 mm in width around cannon tube.

END OF TASK**FOLLOW-ON MAINTENANCE**

If cannon tube is to be returned to service with Dismounted 120mm Mortar Fire Control System, refer to TM 9-1230-205-13&P for installation of barrel clamps.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**M191 MORTAR MOUNT AND M121 ELEVATING MECHANISM MAINTENANCE
INSPECTION OF INSTALLED ITEMS, DISASSEMBLY, REPAIR OR REPLACEMENT,
LUBRICATION, ASSEMBLY, TEST AND INSPECTION**

INITIAL SETUP:**Tools and Special Tools**

Block, depth, 12901137
Drill, 3 mm, ANSI-B94.11M
Drill, 4 mm, ANSI-B94.11M
Guide, drill, 12901136
Guide, drill, 12944228
Guide, drill, 12944229
Guide, drill, 12944230
Guide, drill, 12944231
Guide, drill, 12944232
Guide, drill, 12944233
Guide, drill, 12944234
Jaws, 40 mm, 12577339
Reamer, hand, 6 mm, 12901131
Semiannual Service Direct Support Parts Kit, 5911365
Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)
Tap, 4 mm, ANSI-B-94.9
Tap, 5 mm, ANSI-B-94.9
Tap, 6 mm, ANSI-B-94.9-1987
Wrench, 16 mm, 73-208, ANSI-B107.9
Wrench, 24 mm, ANSI-B107.9
Wrench, hook, 52/55, 12577463
Wrench, hook, 58/62, 12577464
Wrench, key, 2 mm, B18.3.2M
Wrench, key, 2.5 mm, ANSI-B18.3.2M
Wrench, key, 3 mm, ANSI-B18.3.2M
Wrench, spanner, adjustable, 12576998
Wrench, spanner, WS-89, 12577344
Wrench, spanner, WS-93, 12577346

INITIAL SETUP - Continued:**Materials/Parts**

Abrasive cloth (WP 0061, item 9)
Adhesive (WP 0061, item 1)
Aircraft grease (GA) (WP 0061, item 13)
General purpose lubricating oil (GPL) (WP 0061, item 14)
Grooved pin, DOD-P-63464/1A-0
Preformed packing, 12577319
Pressure sensitive adhesive tape (WP 0061, item 24)
Spring pin, DIN1481-3X18-B2D (2)
Spring pin, DIN1481-3X16-B2D
Thread locking compound (WP 0061, item 27)

References

TM 9-1015-250-10
WP 0039
WP 0051

Equipment Conditions

M191 mortar mount removed from cannon tube and baseplate (WP 0019)

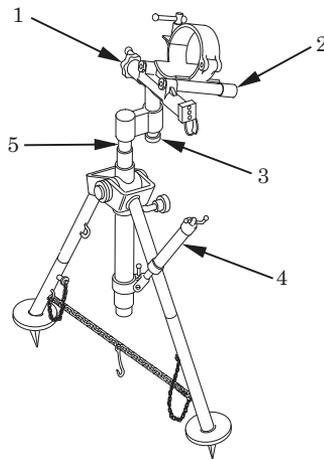
INSPECTION OF INSTALLED ITEMS

Figure 1. Inspection of M191 Mortar Mount.

-
1. Inspect for physical damage, deformation, and corrosion. Remove any burrs or nicks.
 2. With both hands, pull buffer housing assembly (2) to the rear and release. Repeat three times. Buffer housing assembly should retract completely with no excess free movement.
 3. Operate traversing gear assembly (1) through entire range and check backlash. It must travel smoothly and evenly. Backlash must not exceed 1/8 turn (45 degrees).
 4. Operate elevating mechanism (5) through entire range, checking backlash at least three times. It must travel smoothly and evenly. Backlash must not exceed 1/8 turn (45 degrees).
 5. Operate cross leveling mechanism (4) through entire range, checking backlash at least three times. It must travel smoothly and evenly. Backlash must not exceed 1/8 turn (45 degrees).
 6. Operate traversing extension assembly (3) for proper functioning in all three positions.

DISASSEMBLY

WARNING

Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

CAUTION

Parts were drilled for straight pins and setscrews when they were assembled. To line up holes for pins or screws, parts must be put back exactly as they were assembled. Mark before disassembly.

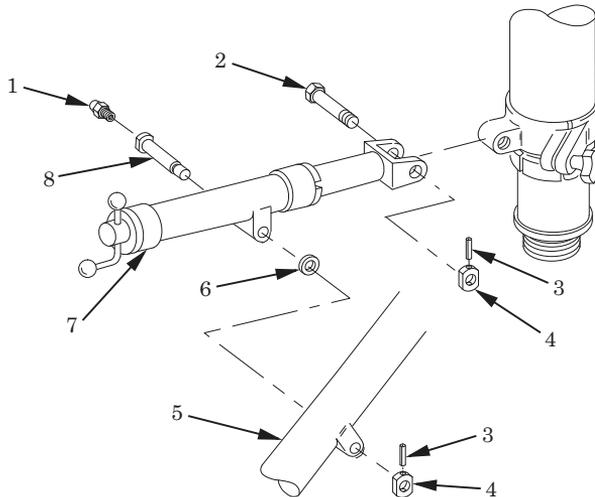


Figure 2. Removal of Cross Leveling Mechanism.

- Using punch, remove two spring pins (3) from two nuts (4). Discard spring pins. Unscrew and remove nuts using 16 mm wrench and adjustable wrench. Withdraw pivot shaft (8) and remove flat washer (6), while holding cross leveling mechanism (7). Withdraw shoulder bolt (2) and remove cross leveling mechanism from mortar mount leg (5). If damaged, remove lubrication fitting (1) from pivot shaft.

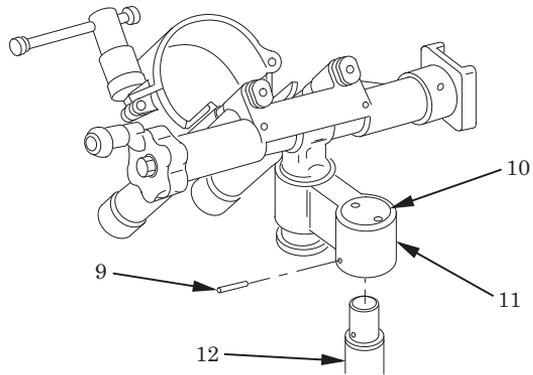


Figure 3. Removal of Grooved Pin.

2. Mark relative position of traversing extension housing (11), inner elevating sleeve (12), and machine bushing (10). Place punch at visible end of grooved pin (9). Drive out and discard grooved pin.

DISASSEMBLY - Continued**NOTE**

If grooved pin cannot be driven out using punch, remove traversing extension housing from traversing extension assembly (WP 0039) and perform step 3. If grooved pin can be driven out using punch, proceed to step 4.

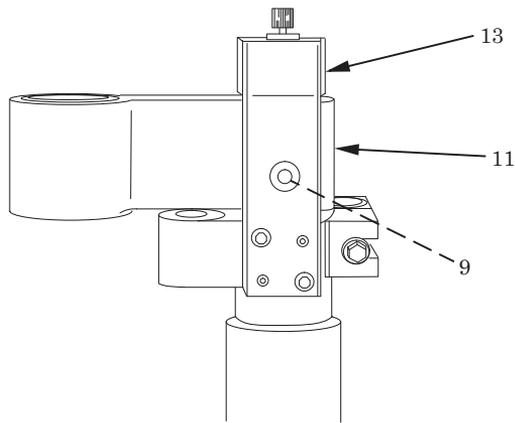


Figure 4. Alternate Removal of Grooved Pin.

CAUTION

Ensure that bushing lines up with grooved pin to prevent damage to equipment.

NOTE

The gage that is included with drill guide #12901136 should not be installed in drill guide during drilling.

3. Install drill guide (13) onto traversing extension housing (11), lining up bushing with grooved pin (9). Use 13/64-in. drill and drill through grooved pin. Drive out remaining portion of grooved pin using punch.

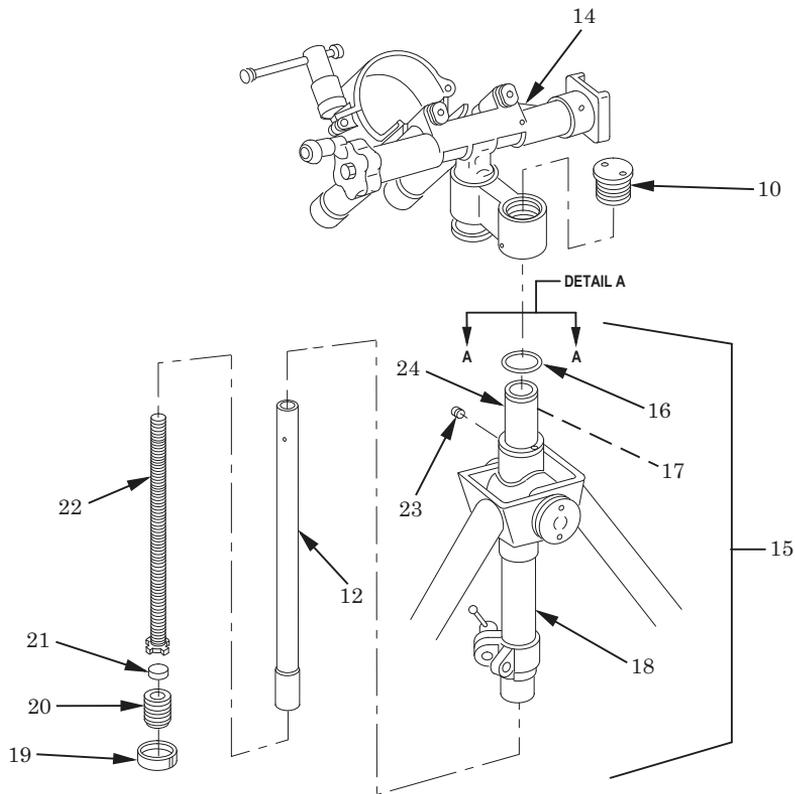


Figure 5. Removal of Elevating Screw.

4. Unscrew and remove machine bushing (10) with adjustable spanner wrench. Remove elevating mechanism (15) from traversing extension and traversing gear assemblies (14). Remove and discard preformed packing (16).
5. Using 52/55 hook wrench, release round nut (19). Unscrew machine plug (20) using WS-93 spanner wrench. Push inner elevating sleeve (12), together with elevating screw (22) and thrust washer bearing (21), through bottom opening of elevating mechanism (15). Separate inner elevating sleeve, elevating screw, and thrust washer bearing.
6. Mark relative positions of mechanical drive housing (24) and main elevating housing (18) to ensure identical reassembly. Remove setscrew (23), using 2.5 mm key wrench. Using 58/62 hook wrench, remove mechanical drive housing.
7. Remove and inspect preformed felt (17) for serviceability. Ensure sufficient grease is present to prevent water entry into main elevating housing (18).

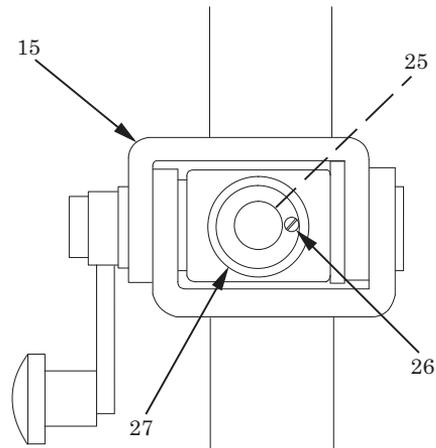
DISASSEMBLY - Continued**DETAIL A**

Figure 6. Removal of Setscrew.

8. Looking down into elevating mechanism (15), mark relative position of bevel gear (27) to outer elevating sleeve (25) and remove setscrew (26) using 2 mm key wrench.
9. Lay mortar mount on workbench with hand crank up. Insert WS-89 spanner wrench into the bottom of the main elevating housing (18) until it is seated. Turning the wrench turns the hand crank. Lodge the handle of the wrench, or a pipe extension attached to the wrench, against the right leg of the mortar mount (the leg without the bracket for the cross leveling mechanism).
10. Holding the wrench against mortar mount leg, tap the hand crank firmly clockwise with a plastic hammer until the crank turns freely. Continue turning crank by hand until there is no pressure on the wrench braced against the mortar mount leg.

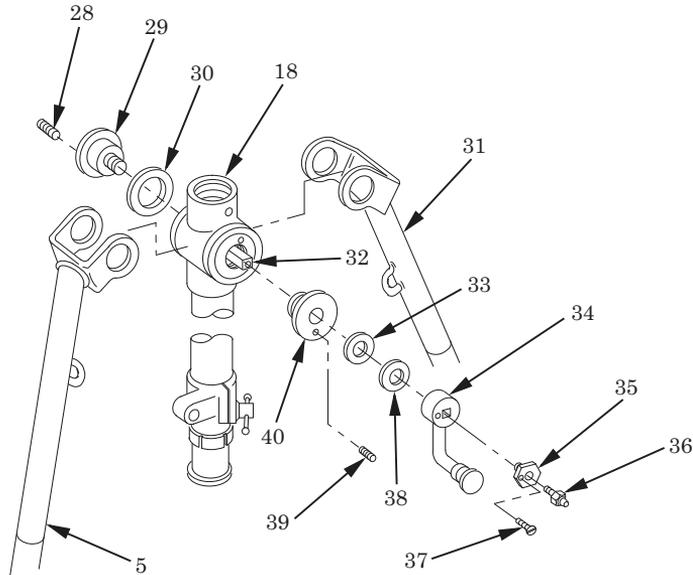


Figure 7. Removal of Mortar Mount Legs.

11. If damaged, remove lubrication fitting (36) from machine screw (35). Mark relative position of screw (37) in machine screw (35) and hand crank (34). Remove screw. Unscrew machine screw with 24 mm wrench and remove hand crank, spring washer (38), and flat washer (33). Notice orientation of spring washer for reassembly (concave down) and discard if damaged.

NOTE

To aid in reassembly, note position of setscrew hole.

12. Remove setscrew (39) with 2.5 mm key wrench. Unscrew and remove machine bushing (40) using adjustable spanner wrench.
13. Remove setscrew (28) using 3 mm key wrench. Unscrew and remove protective plug (29) using adjustable spanner wrench. Remove flat washer (30) by sliding it out from between mortar mount legs. Notice positions of flat washer and each leg to main elevating housing.
14. Push sleeve nut (32) into housing and remove left and right mortar mount legs (5 and 31), left leg (5) first.

DISASSEMBLY - Continued

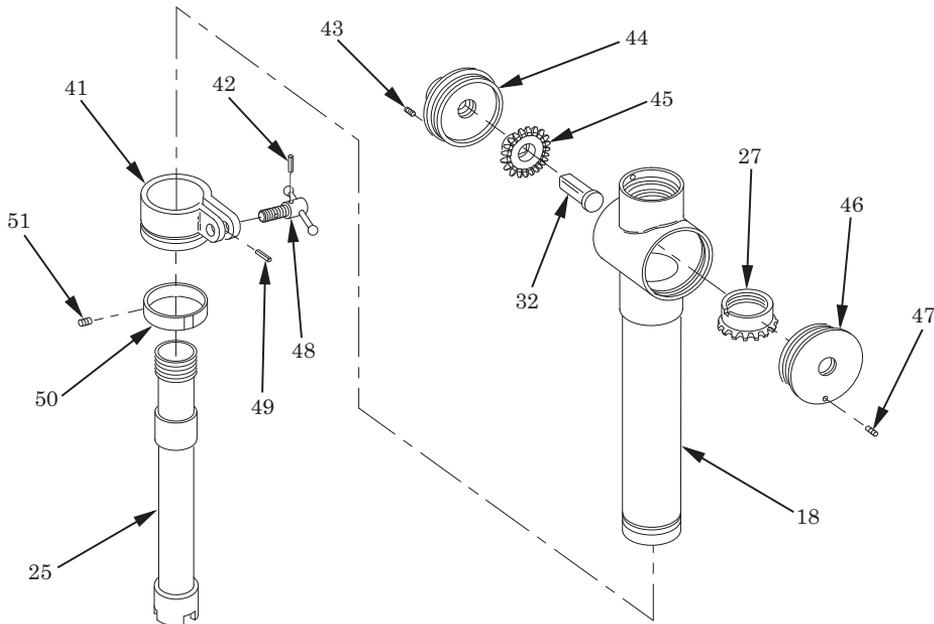


Figure 8. Removal of Outer Elevating Sleeve and Bevel Gears.

15. Mark relative positions of setscrews (47 and 43) in mechanical drive housings (46 and 44) to main elevating housing (18). Using 2.5 mm key wrench, remove setscrews. Using adjustable spanner wrench, remove mechanical drive housings. Remove bevel gear (45) together with sleeve nut (32).
16. Unscrew outer elevating sleeve (25) and pull it down to stop. Remove bevel gear (27).
17. Push upwards and remove outer elevating sleeve (25) through the top opening of main elevating housing (18).
18. Mark relative position of round nut (50) and main elevating housing (18). Using 2.5 mm key wrench, release setscrew (51). Unscrew and remove round nut, using 58/62 hook wrench. Loosen and slide off loop clamp (41).

WARNING

Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

19. Using punch, drive out spring pin (49) and remove handle assembly (48). Discard spring pin.
20. If damaged, drive out grooved pin (42) from handle assembly (48). Discard grooved pin.

END OF TASK**REPAIR OR REPLACEMENT**

1. Inspect for physical damage, burrs, cracks, deformation, and corrosion. Remove burrs and corrosion using abrasive cloth (WP 0061, item 9).
2. Replace defective parts as authorized by WP 0051.
3. For repair of major assemblies of mortar mount, see WP 0035 through WP 0040.

END OF TASK**LUBRICATION**

Coat threads of shaft of pivot shaft, shaft of shoulder bolt, elevating screw, thrust washer bearing, bevel gears, and mechanical drive housings with GA grease (WP 0061, item 13). Apply a light coat of GPL (WP 0061, item 14) to all unpainted surfaces.

END OF TASK

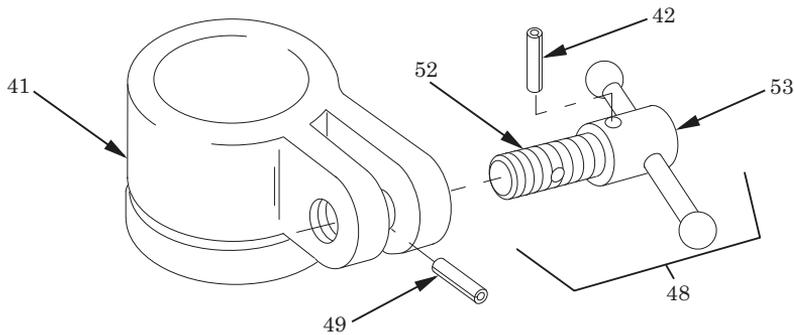
ASSEMBLY

Figure 9. Installation of Handle Assembly.

WARNING

Flying metal chips may cause injury to you or other workers nearby.
Anytime metal strikes metal (hammer, punch, or pin), chips may fly.
Protect others with screens. Wear eye protection and be careful.

1. If removed, install new grooved pin (42) to assemble bolt (52) and bushing (53) of handle assembly (48).
2. Install handle assembly (48) on loop clamp (41) and secure with new spring pin (49).

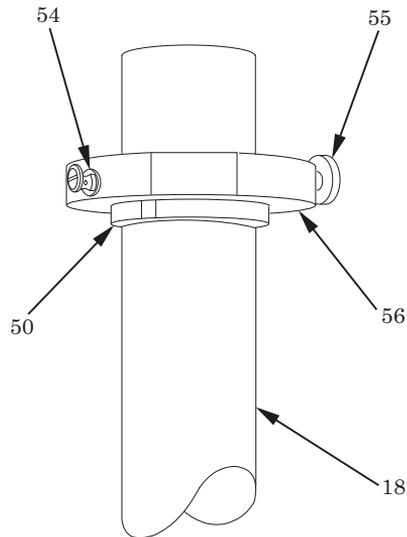


Figure 10. Drilling of Hole in Round Nut.

WARNING



Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

NOTE

If round nut or main elevating housing is new, perform steps 3 through 9. If installing previously matched component parts, proceed to step 10.

3. Screw on round nut (50) to stop.
4. Place open side of drill guide #12944230 (56) over round nut (50). Secure drill guide by tightening locking head screw (55).
5. Install 9/64-in. bushing (54) into drill guide.
6. Set the depth of 9/64-in. drill using depth block and tape. Drill to exact depth.

ASSEMBLY - Continued

7. Remove 9/64-in. bushing and install #19 drill bushing.
8. Set the depth of #19 drill using depth block and tape. Drill to exact depth.
9. Remove drill guide (56) and tap a 5 mm hole to depth. Remove round nut (50).

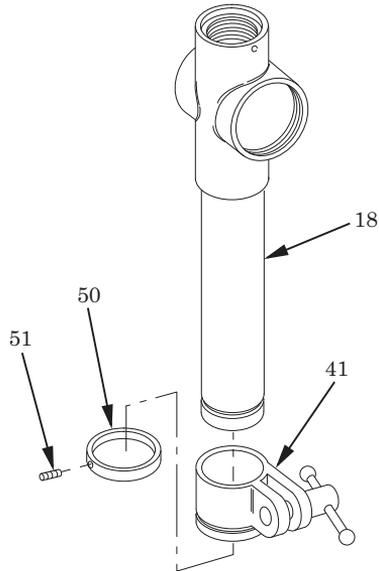


Figure 11. Installation of Loop Clamp.

WARNING

SEALING COMPOUND

10. Slide loop clamp (41) onto main elevating housing (18). Screw on round nut (50) with 58/62 hook wrench to assembled position. Apply thread locking compound (WP 0061, item 27) to setscrew (51) and secure using 2.5 mm key wrench.

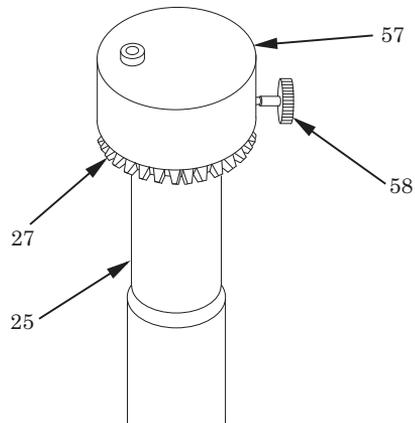


Figure 12. Drilling of Hole in Outer Elevating Sleeve.

WARNING

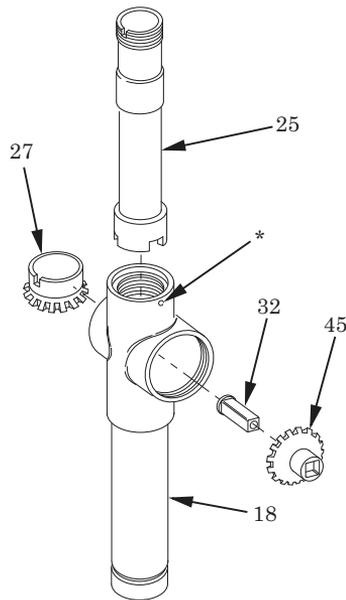


Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

NOTE

If bevel gear or outer elevating sleeve is new, perform steps 11 through 13. If installing previously matched component parts, proceed to step 14.

11. Thread bevel gear (27) onto outer elevating sleeve (25) by hand as tight as possible.
12. Place drill guide #12944228 (57) on bevel gear (27) and tighten locking head screw (58).
13. Set the depth of #30 drill using depth block and tape. Drill to exact depth. Remove drill guide (57) and tap a 4 mm thread 0.25 in. (0.64 cm) deep. Mark relative position of bevel gear (27) to outer elevating sleeve (25). Remove bevel gear.

ASSEMBLY - Continued

*Note position of setscrew hole in housing to bevel gear (45).

Figure 13. Installation of Bevel Gears.

14. Insert outer elevating sleeve (25) into top opening of main elevating housing (18) and push down to stop. Place bevel gear (27) in position. Using WS-89 spanner wrench, screw outer elevating sleeve into bevel gear. Slide outer elevating sleeve with bevel gear upward until it stops. Place bevel gear (45) together with sleeve nut (32) into main elevating housing, meshing bevel gears.
15. Ensure that outer elevating sleeve (25) moves freely in main elevating housing (18).

WARNING

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

NOTE

If mechanical drive housing (44) is new, perform steps 16 through 20. If mechanical drive housing (46) is new, perform steps 21 through 25. If main elevating housing (18) is new, perform steps 16 through 25. If installing previously matched component parts, proceed to step 26.

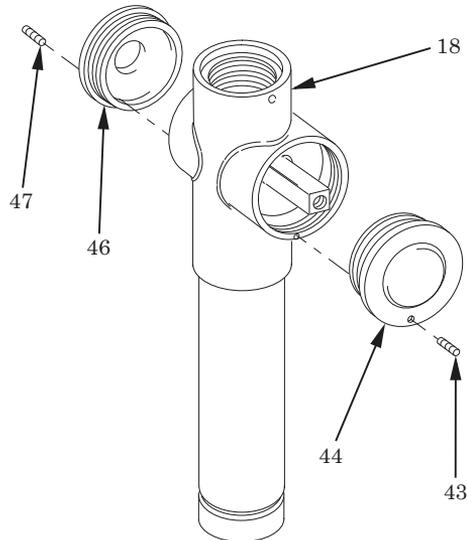


Figure 14. Alignment of Mechanical Drive Housings.

16. Install mechanical drive housing (44). Tighten using adjustable spanner wrench.

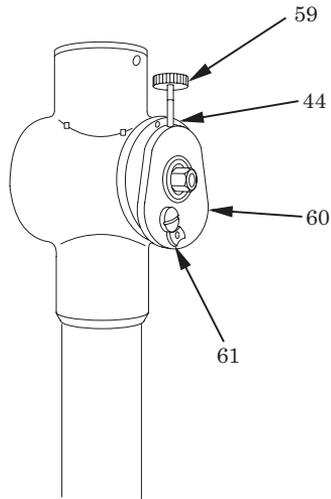
ASSEMBLY - Continued

Figure 15. Drilling of Hole in Mechanical Drive Housing.

17. Place drill guide #12944234 (60) on mechanical drive housing (44) and tighten locking head screw (59).
18. Install 9/64-in. drill bushing (61) and set the depth of 9/64-in. drill using depth block and tape. Drill to exact depth.
19. Remove 9/64-in. drill bushing and install a #19 drill bushing.

WARNING**SEALING COMPOUND**

20. Set the depth of #19 drill using depth block and tape. Drill to exact depth. Remove drill guide (60) and tap a 5 mm hole to depth. Apply thread locking compound (WP 0061, item 27) to setscrew (43) and secure with 2.5 mm key wrench.

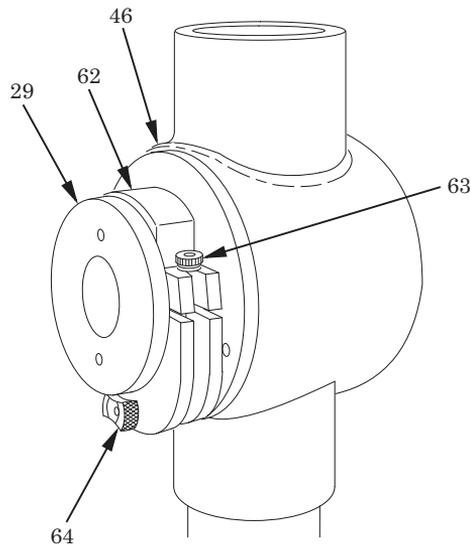


Figure 16. Drilling of Hole in Second Mechanical Drive Housing.

21. Install mechanical drive housing (46). Tighten using adjustable spanner wrench and install protective plug (29).
22. Place drill guide #12944233 (62) on protective plug (29) and tighten locking head screw (63).
23. Install 9/64-in. bushing (64) and set depth of 9/64-in. drill using depth block and tape. Drill to exact depth.
24. Remove 9/64-in. drill bushing and install #19 drill bushing.

WARNING



SEALING COMPOUND

25. Set depth of #19 drill using depth block and tape. Drill to exact depth. Remove drill guide (62) and protective plug (29). Tap a 5 mm hole to depth. Apply adhesive (WP 0061, item 1) to setscrew (47) and secure with 2.5 mm key wrench. Proceed to step 27.

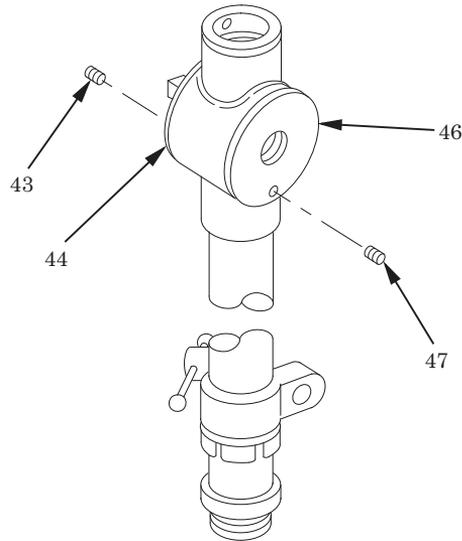
ASSEMBLY - Continued

Figure 17. Installation of Mechanical Drive Housings.

WARNING

SEALING COMPOUND

26. Install mechanical drive housing (44) to assembled location using adjustable spanner wrench. Apply thread locking compound (WP 0061, item 27) to setscrew (43) and secure with 2.5 mm key wrench. Screw on mechanical drive housing (46) to assembled position using adjustable spanner wrench. Apply adhesive (WP 0061, item 1) to setscrew (47) and secure with 2.5 mm key wrench.

WARNING

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

NOTE

If protective plug or mechanical drive housing (44) is new, perform steps 27 through 32. If machine bushing (40) or mechanical drive housing (46) is new, perform steps 33 through 37. If installing previously matched component parts, proceed to step 38.

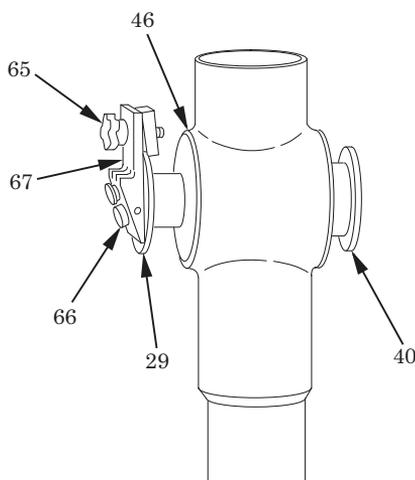


Figure 18. Drilling of Hole in Protective Plug.

27. Install protective plug (29).
28. Place drill guide #12944229 (67) on protective plug (29) and secure with knob (65).
29. Insert 4 mm drill bushing (66) into drill guide (67). Set depth of 4 mm drill using depth block and tape. Drill to exact depth.
30. Leaving drill guide (67) in place, remove protective plug (29) from mechanical drive housing (46).
31. Insert #10 drill bushing into drill guide (67) and, using #10 drill, drill through protective plug (29).
32. Remove drill guide (67) and tap a 6 mm thread through protective plug (29).

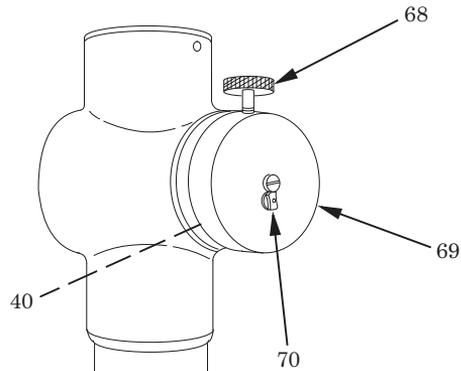
ASSEMBLY - Continued

Figure 19. Drilling of Hole in Machine Bushing.

33. Screw on machine bushing (40) using adjustable spanner wrench.
34. Place drill guide #12944231 (69) on machine bushing (40) and tighten with locking head screw (68).
35. Install 9/64-in. drill bushing (70) into drill guide (69); set 9/64-in. drill using depth block and tape. Drill to exact depth. Remove 9/64-in. drill bushing and install #19 drill bushing.
36. Set depth of #19 drill using depth block and tape. Drill to exact depth.
37. Remove drill guide (69) and tap a 5 mm hole to depth. Remove machine bushing (40).

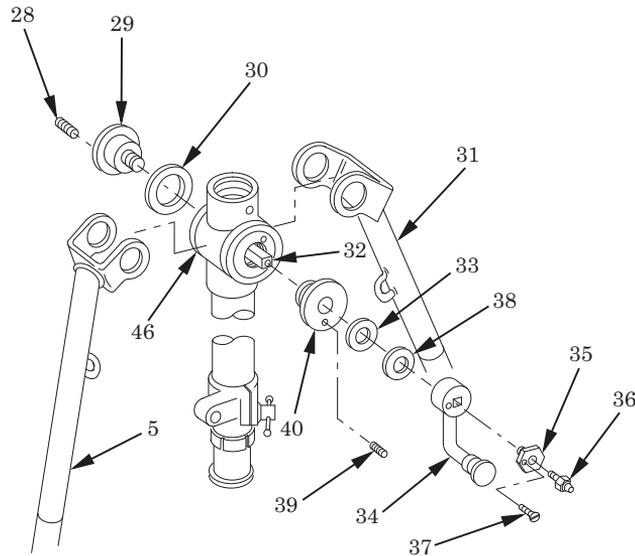


Figure 20. Assembly of Mortar Mount Legs to Elevating Mechanism.

WARNING



SEALING COMPOUND

NOTE

Verify chain assembly is not twisted prior to reassembly of mortar mount legs.

Assemble right mortar mount leg first on back side (without hand crank) of elevating mechanism; then left mortar mount leg (leg with cross-leveling bracket) with mechanical drive housing.

To aid in reassembly, note the position of main elevating housing's setscrew hole to specific mortar mount legs and protective plug/machine bushing.

38. Put right mortar mount leg (31) and left mortar mount leg (5) on elevating mechanism. Install flat washer (30) by sliding it between mechanical drive housing (46) and left mortar mount leg. Using adjustable spanner wrench, install protective plug (29) to assembled position. Apply thread locking compound (WP 0061, item 27) and secure with setscrew (28), using 3 mm key wrench. Attach chain assembly, if previously removed.

ASSEMBLY - Continued

39. Install machine bushing (40), tighten with adjustable spanner wrench to assembled position, apply thread locking compound (WP 0061, item 27), and secure with setscrew (39) using 2.5 mm key wrench.
40. Install flat washer (33), spring washer (38) (concave side towards flat washer), and hand crank (34), and connect with machine screw (35). Secure with screw (37). If removed, install new lubrication fitting (36).

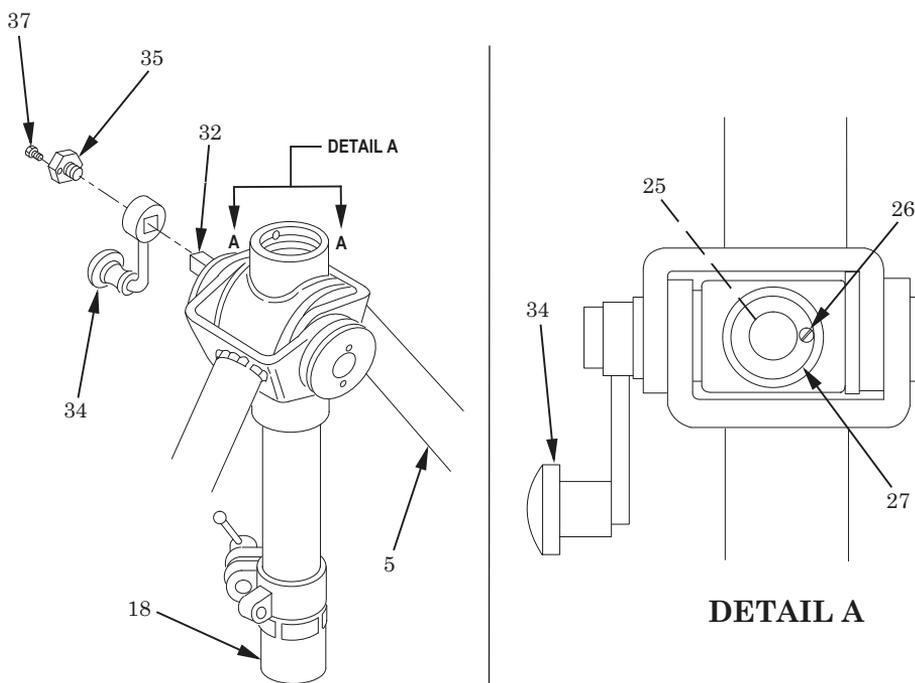


Figure 21. Alignment of Bevel Gear and Adjustment of Hand Crank.

41. Make sure the bevel gears are lined up and mesh. Install WS-89 spanner wrench into bottom of main elevating housing (18). While holding hand crank (34), turn the wrench clockwise until tight.

WARNING

SEALING COMPOUND

NOTE

Tapping elevating hand crank in a counterclockwise direction with a plastic hammer may be necessary to properly align outer elevating sleeve and bevel gear.

42. Lay mortar mount on bench with elevating hand crank (34) up. Brace WS-89 spanner wrench against left mortar mount leg (5) (with cross leveling mechanism bracket) of the mortar mount. A pipe over handle of the wrench may help brace it against mortar mount leg. Tighten outer elevating sleeve (25) into bevel gear (27) until thread of setscrew (26, Detail A) in outer elevating sleeve and bevel gear line up. Apply thread locking compound (WP 0061, item 27) and install setscrew, using 2 mm key wrench.
43. To adjust tension of hand crank (34), remove screw (37) and machine screw (35). Lift hand crank from sleeve nut (32) and rotate 90 degrees clockwise to tighten or 90 degrees counterclockwise to loosen. Repeat as needed. If hand crank is new, assemble machine screw and hand crank to correct tension position. Mark hand crank through hole in machine screw. Remove machine screw and drill 4 mm hole to 3 mm depth in hand crank. Re-install machine screw. Apply thread locking compound (WP 0061, item 27) to screw (37) and secure.

ASSEMBLY - Continued**WARNING**

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

NOTE

If mechanical drive housing (24) or main elevating housing (18) is new, perform steps 44 through 50. If installing previously matched component parts, proceed to step 51.

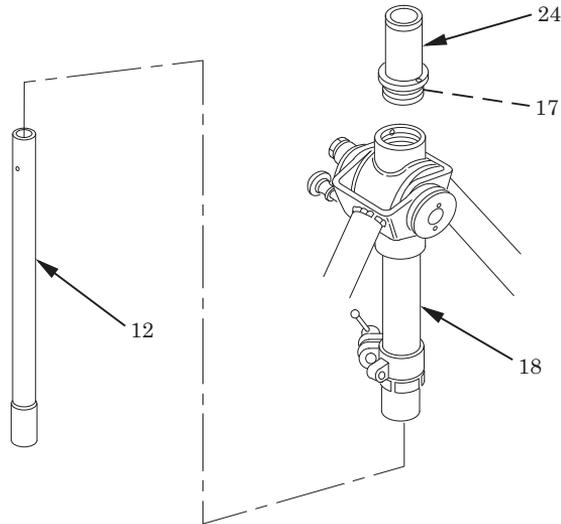


Figure 22. Installation of Mechanical Drive Housing.

44. Before drilling, remove inner elevating sleeve (12) from main elevating housing (18) if installed. Refer to disassembly step 5. Remove preformed felt (17) from mechanical drive housing (24).
45. Install mechanical drive housing (24) and tighten using 58/62 hook wrench.

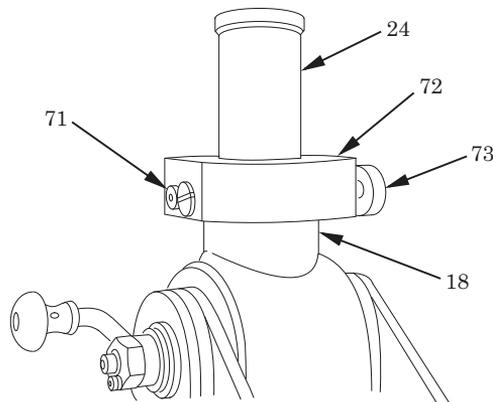


Figure 23. Drilling of Hole in Mechanical Drive Housing.

46. Place drill guide #12944232 (72) on mechanical drive housing (24) and tighten locking head screw (73).
47. Install 9/64-in. drill bushing (71) into drill guide.
48. Drill a 9/64-in. hole through mechanical drive housing (24) and main elevating housing (18).
49. Remove 9/64-in. drill bushing and install #19 drill bushing. Set depth of #19 drill using depth block and tape. Drill to exact depth.
50. Remove drill guide (72) and tap a 5 mm hole to depth. Remove mechanical drive housing (24).

ASSEMBLY - Continued

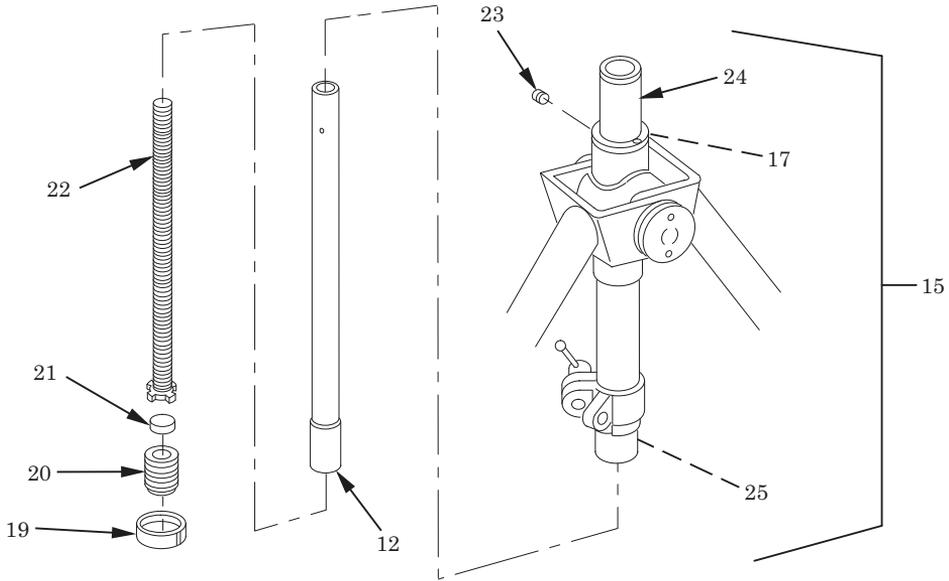


Figure 24. Installation of Elevating Screw.

WARNING



SEALING COMPOUND

51. Pack preformed felt (17) with GA grease (WP 0061, item 13). Install preformed felt in mechanical drive housing (24). Using 58/62 hook wrench, install mechanical drive housing until setscrew holes line up. Apply thread locking compound (WP 0061, item 27) and install setscrew (23).

NOTE

It will be necessary to prevent inner elevating sleeve from turning to ensure gears are meshed.

52. Install elevating screw (22) into inner elevating sleeve (12) and insert both into bottom of elevating mechanism (15). Ensure that spline of elevating screw meshes with grooves of outer elevating sleeve (25). Inner elevating sleeve must protrude from the top of the mechanical drive housing (24).
53. Ensure that inner elevating sleeve (12) moves freely in outer elevating sleeve (25) and elevating screw (22) moves freely in inner elevating sleeve.
54. Install thrust washer bearing (21) and machine plug (20) until tight, using WS-93 spanner wrench. Back off machine plug so that elevating mechanism operates freely. Install round nut (19) using 52/55 hook wrench.

ASSEMBLY - Continued**WARNING**

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

NOTE

If inner elevating sleeve, traversing extension housing, or machine bushing (10) is new, or pin removed from traversing extension housing was of tapered design, perform steps 55 through 58. If installing previously matched component parts, proceed to step 59.

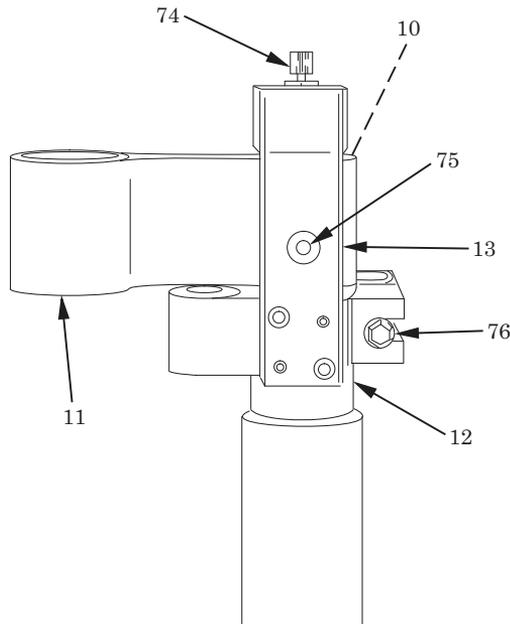


Figure 25. Drilling of Hole in Traversing Extension Housing.

55. Assemble traversing extension housing (11) onto inner elevating sleeve (12) and screw on machine bushing (10).

NOTE

A gage is included with drill guide #12901136 (13) to set the drill bushing (75) to the correct height using the socket head capscrew (74) as a stop. Tighten locking head capscrew (76).

Remove traversing nut from traversing extension housing to aid in drilling.

56. Place drill guide #12901136 (13) on traversing extension housing (11) and to the inner elevating sleeve (12), locating from the top of the traversing extension housing.

NOTE

If replacing the old design tapered pin with a new grooved pin, drill a new hole offset 45 degrees from old hole.

57. Using 13/64-in. drill, drill through traversing extension housing (11).
58. Remove drill guide (13) and, using 6 mm hand reamer, ream the hole.

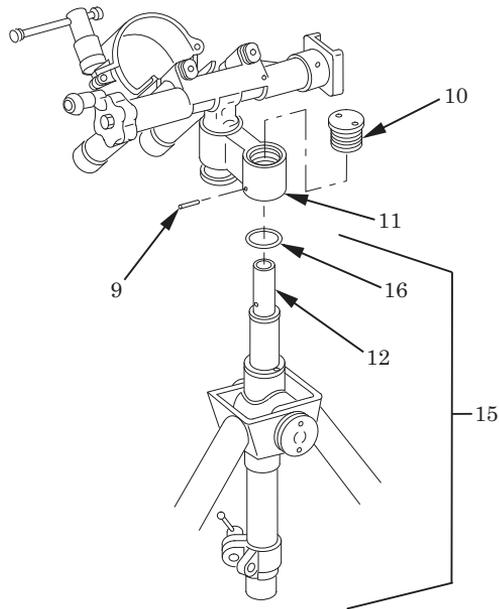
ASSEMBLY - Continued

Figure 26. Assembly of Elevating Mechanism and Traversing Extension Assembly.

59. Install new preformed packing (16) on inner elevating sleeve (12). Install elevating mechanism (15) into traversing extension housing (11). Turn and align correct holes in traversing extension housing and elevating mechanism. Screw on machine bushing (10) with adjustable spanner wrench to assembled position. Install new grooved pin (9).

NOTE

If cross leveling mechanism binds or cannot be assembled, check location of flat washer, the orientation and part number of loop clamp, and mortar mount legs.

If pivot shaft, shoulder bolt, or nuts are new, perform step 60. If installing previously matched component parts, proceed to step 61.

WARNING

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

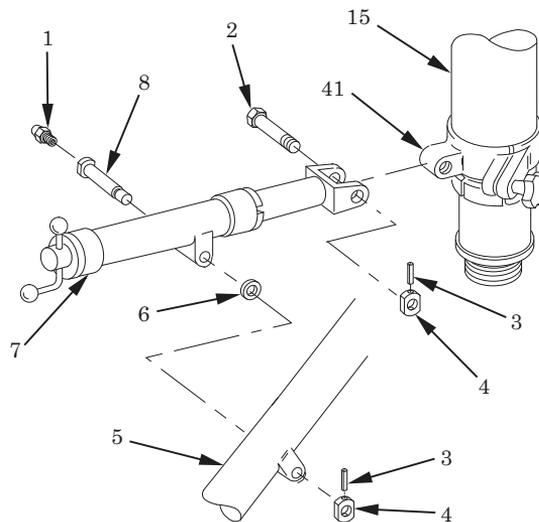


Figure 27. Installation of Cross Leveling Mechanism.

60. Install nuts (4) on pivot shaft (8) and on shoulder bolt (2). Using 3mm drill, drill holes for spring pin. Remove two nuts.
61. Align holes in cross leveling mechanism (7) and left mortar mount leg (5). Install pivot shaft (8) and flat washer (6). Install shoulder bolt (2) connecting cross leveling mechanism to elevating mechanism (15). Screw on two nuts (4) to assembled position with 16 mm wrench and adjustable wrench and secure with two new spring pins (3). If removed, install new lubrication fitting (1) to pivot shaft.

END OF TASK

TEST AND INSPECTION

Check proper operation of elevating mechanism, traversing gear assembly, and cross leveling mechanism. Check proper engagement of traversing extension plunger in all three positions. Check proper folding of legs without excessive play. Check backlash in elevating mechanism. It must be less than 1/8 turn (45 degrees).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

**M191 BIPOD LEG ASSEMBLY, BIPOD LEG EXTENSION ASSEMBLY,
AND CHAIN ASSEMBLY MAINTENANCE
INSPECTION - ACCEPTANCE AND REJECTION CRITERIA, REPAIR OR REPLACEMENT**

INITIAL SETUP:

Tools and Special Tools

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

Materials/Parts

Abrasive cloth (WP 0061, item 9)

References

WP 0034

WP 0051

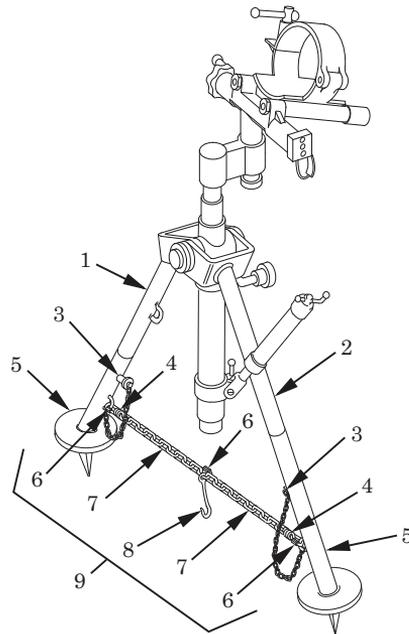
INSPECTION - ACCEPTANCE AND REJECTION CRITERIA


Figure 1. M191 Mortar Mount.

1. Inspect chain assembly (9) for damage and missing parts.
2. Inspect two mortar mount leg sections (5) for physical damage, deformation, and corrosion. Inspect two locking pin assemblies (3) for damage.
3. Inspect left mortar mount leg (2) and right mortar mount leg (1) for dents, burrs, broken welds, and corrosion.

END OF TASK

REPAIR OR REPLACEMENT

1. If damaged or missing, replace rings (6), hook (8), chains (7), and springs (4) as authorized by WP 0051.
2. Using abrasive cloth (WP 0061, item 9), remove any burrs or nicks from left mortar mount leg (2), right mortar mount leg (1), or mortar mount leg sections (5).
3. If damaged or missing, replace mortar mount leg sections (5) and locking pin assemblies (3) as authorized by WP 0051.
4. If damaged or missing, replace left mortar mount leg (2) and right mortar mount leg (1) as authorized by WP 0051. See WP 0034 for disassembly and assembly instructions.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**CROSS LEVELING MECHANISM MAINTENANCE
DISASSEMBLY, REPAIR OR REPLACEMENT, LUBRICATION,
ASSEMBLY, TEST AND INSPECTION**

INITIAL SETUP:**Tools and Special Tools**

Countersink, 90-degree, GGG-C-613
Drill, 2 mm, ANSI-B94.11M
Drill, 4 mm, ANSI-B94.11M
Guide, drill, 12944236
Jaw adapter 12577341 (MS-132)
Reamer, hand, 4 mm, 12901130
Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)
Tap, 3 mm, ANSI-B94.11M
Tap, 4 mm, ANSI-B94.9
Wrench, 19 mm, B107.9
Wrench, hook, 40/42, 12577461
Wrench, key, 1.5 mm, B18.3.2M
Wrench, spanner, 34 mm, 12577338

Materials/Parts

Abrasive cloth (WP 0061, item 9)
Aircraft grease (GA) (WP 0061, item 13)
General purpose lubricating oil (GPL) (WP 0061, item 14)
Spring pin, D63477/8-135P
Thread locking compound (WP 0061, item 27)

References

WP 0043
WP 0051

Equipment Conditions

Cross leveling mechanism removed from M191 mortar mount and elevating mechanism
(WP 0034)

DISASSEMBLY**CAUTION**

Parts were drilled for straight pins and setscrews when they were assembled. To line up holes for pins or screws, parts must be put back exactly as they were assembled. Mark before disassembly.

Parts were drilled and reamed for spring pins when they were assembled. To line up holes in proper order, parts must be put back exactly as they were assembled. Mark before disassembly. See general maintenance instructions (WP 0043).

NOTE

The cross leveling mechanism is most easily worked on in a vise. Clamp the jaws firmly onto mechanical drive housing pivot shaft lug. This provides excellent support to remove/install cross leveling parts.

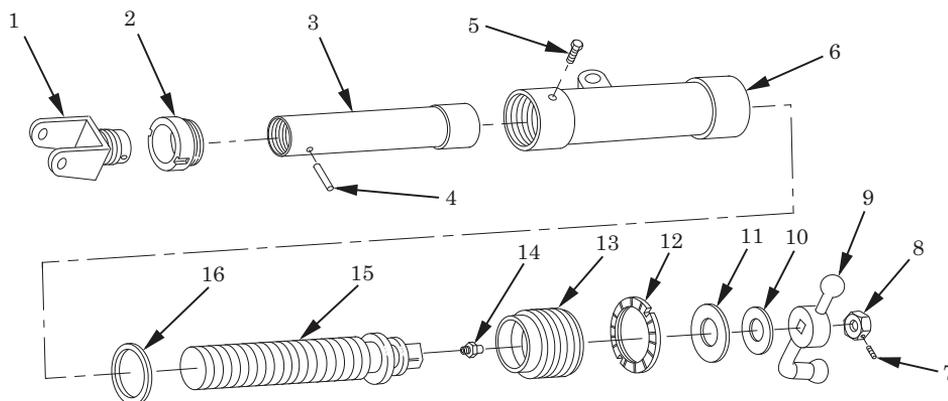


Figure 1. Disassembly of Cross Leveling Mechanism.

1. Mark relative position of hexagon plain nut (8) and cross leveling screw (15). Remove setscrew (7) with 1.5 mm key wrench. Unscrew hexagon plain nut with 19 mm wrench, and remove hand crank (9), spring tension washer (10), and flat washer (11). Note concave side of spring tension washer is down. Discard spring tension washer if damaged.
2. Loosen serrated nut (12) with 40/42 hook wrench and remove machine bushing (13) and serrated nut with 34 mm spanner wrench.
3. Remove cross leveling screw (15) together with flat washer (16). Remove lubrication fitting (14), if damaged.

4. Mark relative position of mechanical drive housing (6) and machine bushing (2). Remove screw (5). Using 40/42 hook wrench, loosen machine bushing.
5. Slide out housing sleeve (3) with attached parts.

WARNING



Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

NOTE

Perform step 6 only if repair is needed.

6. Mark relative position of eye bracket (1) and housing sleeve (3). Place housing sleeve in vise using MS-132 jaw adapter. Remove spring pin (4) using punch. Unscrew and remove eye bracket. Loosen and remove machine bushing (2). Discard spring pin.

END OF TASK

REPAIR OR REPLACEMENT

1. Inspect for bends, corrosion, cracks, burrs, and wear. Remove corrosion and burrs using abrasive cloth (WP 0061, item 9).
2. Replace defective items as authorized by WP 0051.

END OF TASK

LUBRICATION

Lubricate threads of cross leveling screw, using GA grease (WP 0061, item 13). Using GPL (WP 0061, item 14), lightly oil housing sleeve and all unpainted surfaces.

END OF TASK

ASSEMBLY**WARNING**

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

NOTE

If mechanical drive housing or machine bushing is new, perform steps 1 through 9. If installing previously matched component parts, proceed to step 10.

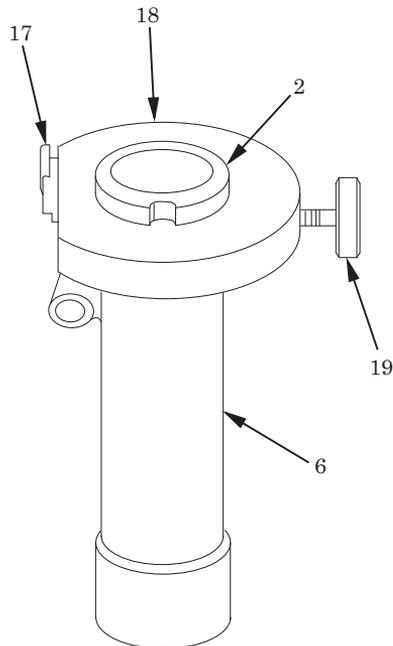


Figure 2. Drilling of Holes in Housing and Bushing.

1. Place drill guide #12944236 (18) on mechanical drive housing (6) with surface mark "x" on drill guide facing machine bushing end.
2. Assemble machine bushing (2) into mechanical drive housing (6) and tighten with 40/42 hook wrench.

-
3. With drill guide (18) flush against machine bushing (2), tighten locking head screw (19).
 4. Insert 9/64-in. drill bushing (17) into drill guide (18).
 5. Drill a 9/64-in. hole through mechanical drive housing (6) and machine bushing (2). Remove machine bushing.
 6. Insert #19 drill bushing into drill guide (18).
 7. Drill a #19 hole through mechanical drive housing (6). Remove drill guide (18).
 8. Using 90-degree countersink, countersink to screw head size in mechanical drive housing (6).
 9. Tap a 4 mm hole through machine bushing (2).

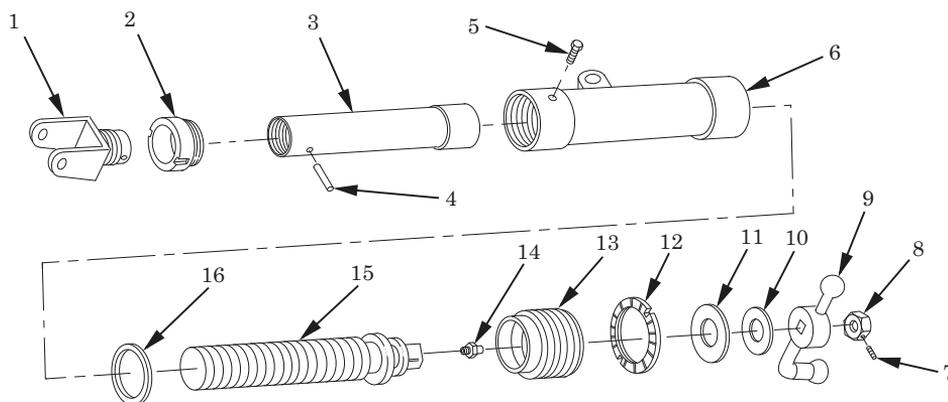
ASSEMBLY - Continued

Figure 3. Assembly of Cross Leveling Mechanism.

WARNING

Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

10. Install machine bushing (2) with 40/42 hook wrench onto mechanical drive housing (6). Put thread locking compound (WP 0061, item 27) on screw (5) and secure.

NOTE

If housing sleeve is new, perform steps 11 through 14. If eye bracket is new, perform steps 12 through 14. If installing previously matched component parts, proceed to step 15.

11. Mark relative position of existing spring pin hole on yoke of eye bracket (1).
12. Screw eye bracket (1) to assembled position on housing sleeve (3). Place MS-132 jaw adapter around housing sleeve and secure in vise.

NOTE

The location marked on housing sleeve in step 13 should be 90 degrees from any existing hole in either the housing sleeve or eye bracket.

13. Measure 25 mm (0.98 in.) from bottom of yoke of eye bracket (1). Mark location on housing sleeve (3), using scratch awl.

WARNING

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

14. Using 4 mm drill, bore a hole at the marked location completely through housing sleeve (3) and eye bracket (1). Remove eye bracket from housing sleeve.
15. Slide housing sleeve (3) into mechanical drive housing (6). Screw eye bracket (1) to assembled position. Ream 4 mm hole in housing sleeve. Install new spring pin (4). Check for free movement.
16. Install new lubrication fitting (14), if removed. Put flat washer (16) on cross leveling screw (15) and install cross leveling screw into housing sleeve (3). Use thread locking compound (WP 0061, item 27) on serrated nut (12) and machine bushing (13). Using 34 mm spanner wrench, install machine bushing with serrated nut. Adjust machine bushing to allow cross leveling screw to turn freely. Secure by turning serrated nut with 40/42 hook wrench. Check for free movement of cross leveling screw in housing sleeve and ensure there is minimal end play.
17. Put flat washer (11) and spring tension washer (10) (concave side towards flat washer) on cross leveling screw (15). Install hand crank (9). If installing new hexagon plain nut (8), drill 2 mm hole through one side of nut, centered in any hex flat. Tap 3 mm threads into drilled hole. Secure hexagon plain nut with 19 mm wrench. Install setscrew (7) with 1.5 mm key wrench. Adjust tightness so that hand crank turns freely.

END OF TASK**TEST AND INSPECTION**

Check proper operation of cross leveling mechanism in both directions. Check that backlash is less than 1/8 turn (45 degrees).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**BUFFER MECHANISM MAINTENANCE
DISASSEMBLY, REPAIR OR REPLACEMENT, LUBRICATION,
ASSEMBLY, TEST AND INSPECTION**

INITIAL SETUP:**Tools and Special Tools**

Drill, 4 mm, ANSI-B94.11M
Guide, drill, 12901135
Semiannual Service Direct Support Parts Kit, 5911365
Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)
Tap, 6 mm, ANSI-B94.9-1987
Wrench, 19 mm, B107.9
Wrench, box, WS-86, 12577343
Wrench, box, WS-95, 12577348
Wrench, key, 3 mm, ANSI-B18.3.2M
Wrench, retainer, 12901134
Wrench, retainer, 12944242

Materials/Parts

Abrasive cloth (WP 0061, item 9)
Aircraft grease (GA) (WP 0061, item 13)
General purpose lubricating oil (GPL) (WP 0061, item 14)
Lockwasher, MS35338-44 (2)
Preformed packing, 12577319 (2)
Thread locking compound (WP 0061, item 27)

Personnel Required

Two

References

WP 0051

Equipment Conditions

Buffer mechanism removed from M191 mortar mount (WP 0034)

DISASSEMBLY**CAUTION**

Be careful when using WS-95 or WS-86 spanner wrenches to prevent slippage. Make sure wrenches are securely attached to avoid breaking tool edges.

Parts were drilled for straight pins and setscrews when they were assembled. To line up holes for pins or screws, parts must be put back exactly as they were assembled. Mark before disassembly.

Do not exchange parts between sides of buffer mechanism. Mark parts as they are disassembled.

NOTE

The maintenance procedure is identical for both sides of the buffer mechanism. Repeat the following procedure for the other side.

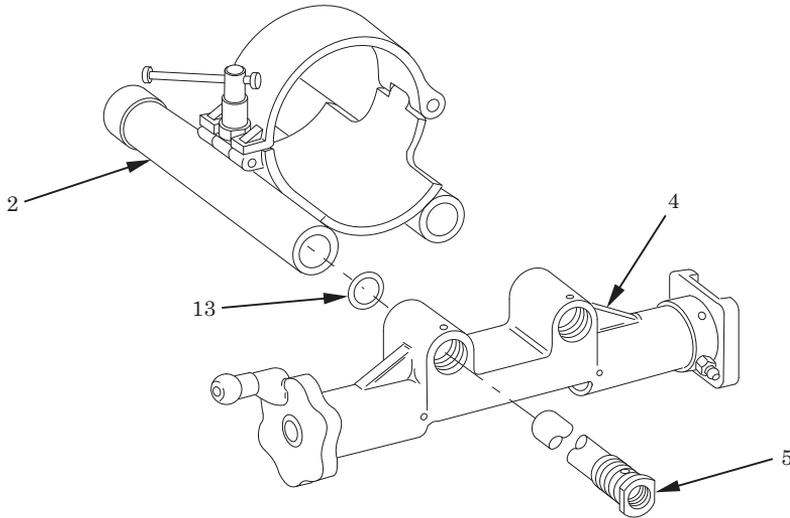


Figure 1. Disassembly of Buffer Mechanism.

1. Mark relative positions of machine plug (10), mechanical drive housing (5), and traversing gear housing assembly (4). Using 3 mm key wrench, remove setscrew (3). Using screwdriver, remove slotted screw (8) and lockwasher (9). Discard lockwasher. Unscrew machine plug using WS-95 box wrench and retainer wrench, 12901134.

WARNING



The buffer mechanism operates under spring tension. Use extreme caution when removing spring.

2. One soldier holds buffer mechanism with top of wrenching bolts pointing into table (hexagon plain nuts up). Using 19 mm wrench, remove hexagon plain nut (1). Unscrew wrenching bolt (11) from buffer housing assembly (2), using 17 mm socket and ratchet to release helical spring (7). Keep control of the wrenching bolt until helical spring is totally extended. Slide sleeve bushing (12), helical spring, and sleeve spacer (6) from mechanical drive housing (5).
3. Loosen mechanical drive housing (5) using WS-86 box wrench and retainer wrench, 12944242, and separate from buffer housing assembly (2). Remove mechanical drive housing from traversing gear housing assembly (4). Remove and discard preformed packing (13).

END OF TASK

REPAIR OR REPLACEMENT

1. Inspect for burrs. Repair by removing burrs using abrasive cloth (WP 0061, item 9).
2. Inspect for thread damage. Restore threads.
3. Check for free movement of mechanical drive housing in buffer housing assembly. Replace mechanical drive housing if not moving freely or if wrench edges are broken.
4. Replace machine plug if wrench edges are broken.
5. Check both helical springs for equal free length within 19/32 inch (15 mm). The total resting length of each spring must not be less than 17.0 inches (43.2 cm). Replace both springs if either condition is not met.
6. Replace defective items as authorized by WP 0051.

END OF TASK

LUBRICATION**CAUTION**

To avoid damage to assembly, do not pack buffer cylinders with grease.

Apply GA grease (WP 0061, item 13) on helical springs, wrenching bolts, sleeve bushings, and sleeve spacers. Apply a light coat of GPL (WP 0061, item 14) to all unpainted surfaces.

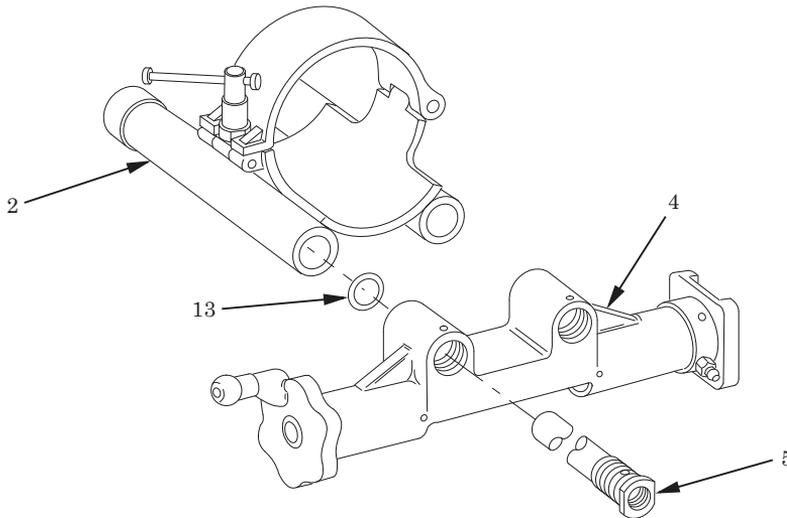
END OF TASK**ASSEMBLY**

Figure 2. Assembly of Buffer Housing and Traversing Gear Housing.

NOTE

The maintenance procedure is identical for both sides of the buffer mechanism; therefore, repeat the following procedure for the other side. Do not mix parts between sides.

The buffer mechanism is most easily worked on in a vise. Clamp the jaws firmly onto the buffer housing assembly. This arrangement provides excellent support to install the helical spring.

1. Secure buffer mechanism in a vise. Screw mechanical drive housing (5) into traversing gear housing assembly (4) until snug. Install new preformed packing (13) onto mechanical drive housing.

CAUTION

To avoid broken edges on mechanical drive housing, apply wrench firmly.

2. Guide mechanical drive housing (5) into the buffer housing assembly (2). Tighten mechanical drive housing with WS-86 box wrench and retainer wrench, 12944242, to assembled position.

WARNING

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

NOTE

If mechanical drive housing, traversing gear housing assembly, or machine plug is new, perform steps 3 through 9. If installing previously matched component parts, proceed to step 10.

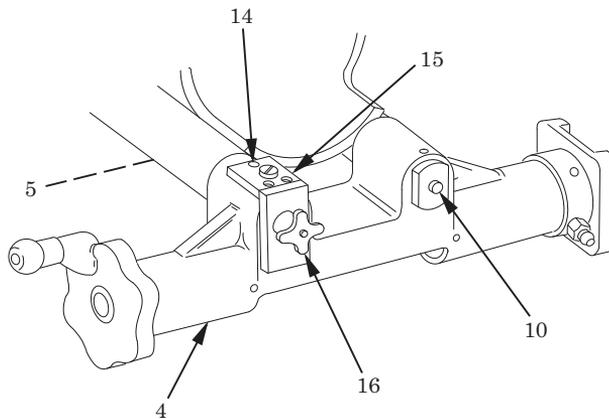


Figure 3. Drilling of Holes in Housings and Machine Plug.

3. Place drill guide #12901135 (15) onto traversing gear housing assembly (4) and tighten knob (16).
4. Install 4 mm drill bushing (14) into drill guide (15).
5. Drill a 4 mm hole through traversing gear housing assembly (4) and mechanical drive housing (5). Remove drill guide (15) and install machine plug (10) using WS-95 box wrench and retainer wrench, 12901134. Tighten until snug.

ASSEMBLY - Continued

6. Using the 4 mm drilled hole as a guide, drill a 4 mm hole through machine plug (10).
7. Remove machine plug (10) and again place drill guide (15) onto traversing gear housing assembly (4) and mechanical drive housing (5).
8. Install #10 bushing into drill guide (15). Drill through traversing gear housing assembly (4) and mechanical drive housing (5), using #10 drill.
9. Remove drill guide (15) and tap a 6 mm hole.

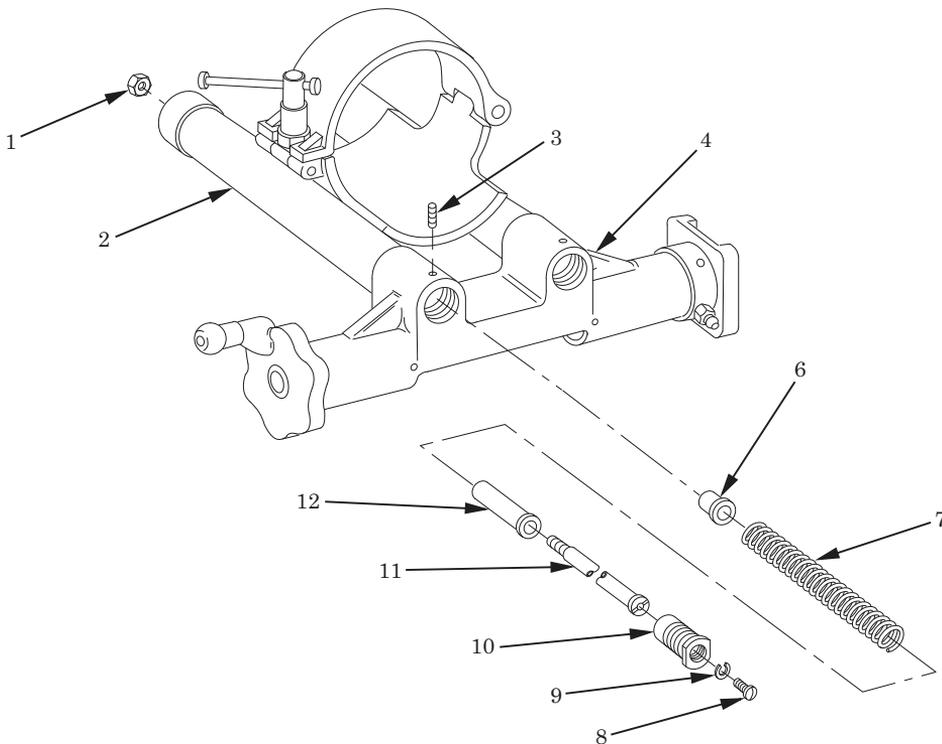


Figure 4. Installation of Helical Spring.

WARNING

The buffer mechanism operates under spring tension. Use extreme caution when installing helical spring.

10. Install sleeve spacer (6) and helical spring (7) into buffer housing assembly (2) as shown. Assemble sleeve bushing (12) and wrenching bolt (11), and insert through helical spring into buffer housing assembly. Firmly grasp ratchet and 17 mm socket and CAREFULLY turn wrenching bolt so it protrudes from the buffer housing assembly. Install hexagon plain nut (1).

WARNING

SEALING COMPOUND

11. Screw machine plug (10) to assembled position with WS-95 box wrench and retainer wrench, 12901134. Apply thread locking compound (WP 0061, item 27) to setscrew (3) and install in traversing gear housing assembly (4), using 3 mm key wrench. Do not overtighten. Remove retainer wrench and WS-95 box wrench. Install new lockwasher (9) and slotted screw (8).
12. Remove longitudinal play between buffer housing assembly (2) and traversing gear housing assembly (4). Screw wrenching bolt (11) toward traversing gear housing assembly until spring tension is removed. Screw bolt back until resistance begins. Hold bolt in place and lock by tightening hexagon plain nut (1) with 19 mm wrench.

END OF TASK**TEST AND INSPECTION**

Extend buffer mechanism. It must return to the original position when released.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**BUFFER HOUSING ASSEMBLY AND CLAMP HANDLE ASSEMBLY MAINTENANCE
DISASSEMBLY, REPAIR OR REPLACEMENT, LUBRICATION,
ASSEMBLY, TEST AND INSPECTION**

INITIAL SETUP:**Tools and Special Tools**

Block, depth, 12901137
Guide, drill, 12944237
Semiannual Service Direct Support Parts Kit, 5911365
Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)
Tap, 5 mm, ANSI-B94.9
Torque wrench, 12901100
Torque wrench adapter, 12577342
Wrench, key, 2.5 mm, ANSI-B18.3.2M

Materials/Parts

Abrasive cloth (WP 0061, item 9)
Aircraft grease (GA) (WP 0061, item 13)
General purpose lubricating oil (GPL) (WP 0061, item 14)
Headless grooved pin, D63464/1-06026
Pressure sensitive adhesive tape (WP 0061, item 24)
Spring pin, DIN2093-A28
Thread locking compound (WP 0061, item 27)

References

WP 0043
WP 0051

Equipment Conditions

Buffer housing assembly removed from buffer mechanism (WP 0037)

DISASSEMBLY**WARNING**

Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

CAUTION

Parts were drilled and reamed for spring pins when they were assembled. To line up holes in proper order, parts must be put back exactly as they were assembled. Mark before disassembly. See general maintenance instructions (WP 0043).

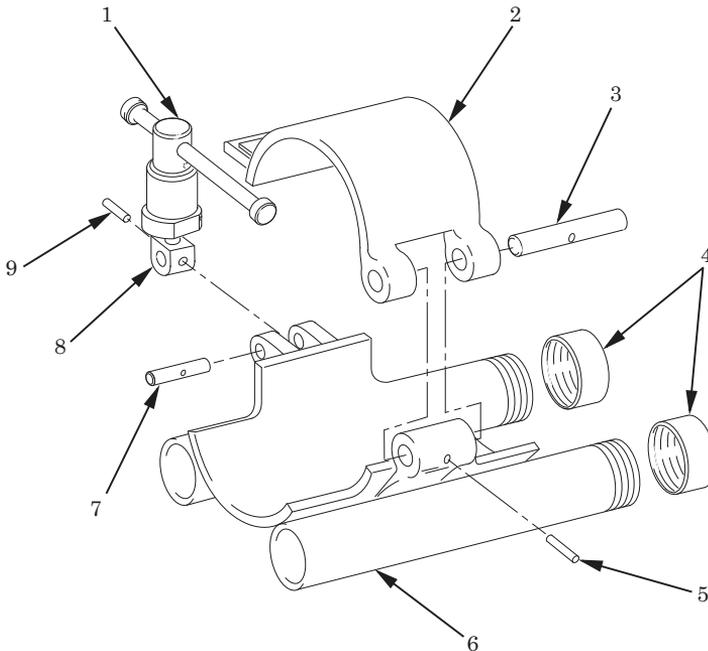


Figure 1. Disassembly of Buffer Housing Assembly.

1. Mark relative position of barrel collar (2) and headless straight pin (3). Drive spring pin (5) from barrel collar with punch. Discard spring pin.
2. Extract headless straight pin (3) and remove barrel collar (2) from buffer housing (6). If damaged, remove two protective caps (4).

3. Mark relative position of eye bolt (8) and headless straight pin (7). Drive spring pin (9) from headless straight pin with punch. Discard spring pin.
4. Extract headless straight pin (7) and remove eye bolt (8) together with clamp handle assembly (1).

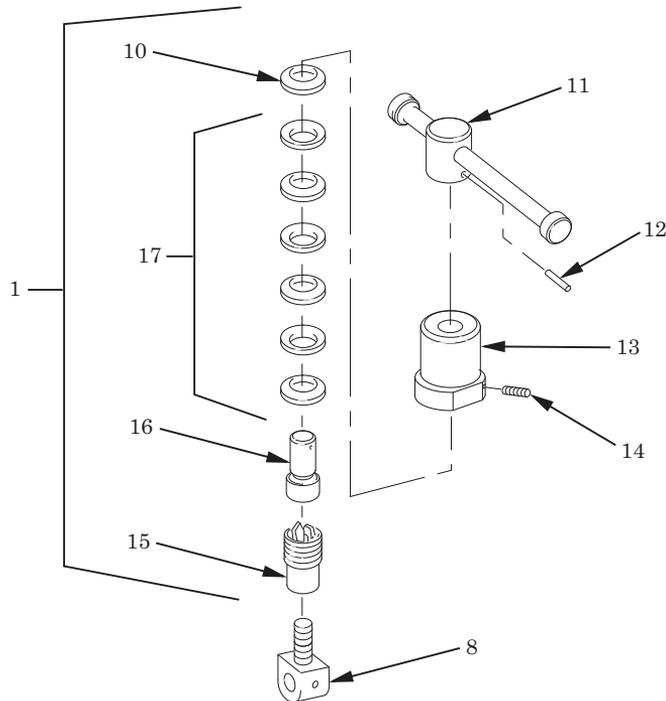


Figure 2. Disassembly of Clamp Handle Assembly.

5. Mark relative position of round nut (15) and sleeve nut (13).
6. Unscrew and separate the clamp handle assembly (1) from eye bolt (8).
7. Remove setscrew (14) with 2.5 mm key wrench. Hold round nut (15) in vise and unscrew and separate sleeve nut (13) from round nut using 15-in. adjustable wrench.
8. Mark relative position of manual control handle (11) and half clutch (16). Drive headless grooved pin (12) from manual control handle with punch. Remove manual control handle, half clutch, flat washer (10), and six spring tension washers (17). Note position of spring tension washers during removal. Discard headless grooved pin and discard spring tension washers if damaged.

END OF TASK

REPAIR OR REPLACEMENT

1. Inspect for burrs. Repair by removing burrs using abrasive cloth (WP 0061, item 9).
2. Replace defective parts as authorized by WP 0051.

END OF TASK**LUBRICATION**

Apply a light coat of GA grease (WP 0061, item 13) on spring tension washers. Apply GPL (WP 0061, item 14) to all unpainted surfaces.

END OF TASK

ASSEMBLY**WARNING**

Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

CAUTION

Parts were drilled and reamed for spring pins when they were assembled. To line up holes in proper order, parts must be put back exactly as they were disassembled.

NOTE

Hole for headless grooved pin will need to be drilled out to 6 mm if manual control handle is new or was previously machined for tapered pin.

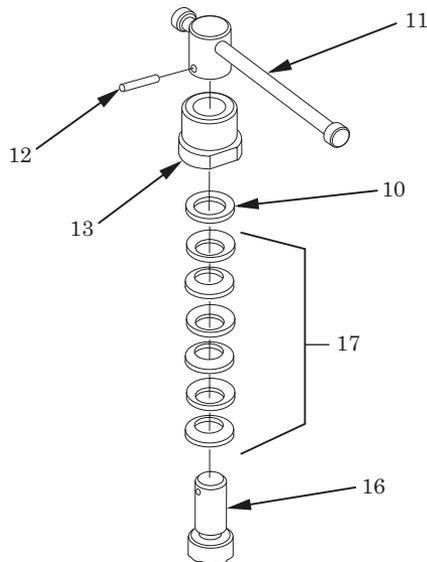


Figure 3. Assembly of Handle and Spring Tension Washers.

1. Install six spring tension washers (17) concave-to-concave on half clutch (16). Install flat washer (10), sleeve nut (13), and manual control handle (11) on half clutch. Install new headless grooved pin (12) into manual control handle and half clutch.

ASSEMBLY - Continued**NOTE**

If sleeve nut or round nut is new, perform steps 2 through 7. If installing previously matched component parts, proceed to step 8.

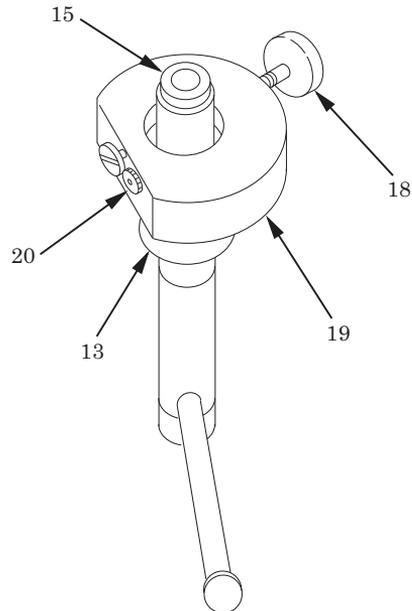


Figure 4. Drilling of Hole in Sleeve Nut.

2. Assemble sleeve nut (13) with round nut (15). Using torque wrench and torque wrench adapter, turn until slippage is 18 to 22 ft-lb (24 to 30 N-m).
3. Place drill guide #12944237 (19) on sleeve nut (13) and tighten locking head screw (18).
4. Insert 9/64-in. drill bushing (20) into drill guide (19).
5. Set depth of 9/64-in. drill using depth block and tape. Drill to exact depth.
6. Remove round nut (15) and 9/64-in. drill bushing (20). Insert #19 drill bushing and, using #19 drill, drill through sleeve nut (13).
7. Remove drill guide (19) and tap a 5 mm hole through sleeve nut (13).

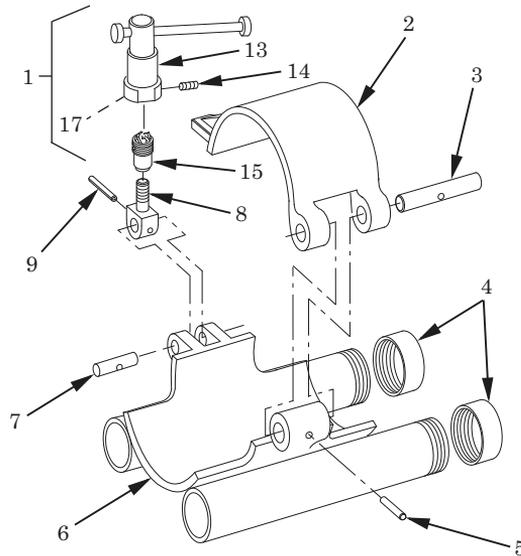


Figure 5. Assembly of Buffer Housing Assembly and Clamp Handle Assembly.

WARNING



SEALING COMPOUND

8. Install round nut (15) into sleeve nut (13). Using torque wrench and torque wrench adapter, turn until slippage is 18 to 22 ft-lb (24 to 30 N-m). If torque cannot be obtained, replace six spring tension washers (17) and recheck torque. Apply thread locking compound (WP 0061, item 27) to setscrew (14) and secure with 2.5 mm key wrench.
9. Screw eye bolt (8) into clamp handle assembly (1) as shown.
10. Install headless straight pin (7) through eye bolt (8) and buffer housing (6). Secure with new spring pin (9).
11. Install headless straight pin (3) through barrel collar (2) and buffer housing (6). Secure with new spring pin (5).
12. If removed, install two new protective caps (4).

END OF TASK

TEST AND INSPECTION

Check proper operation of clamp handle assembly.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**TRAVERSING GEAR ASSEMBLY AND
TRAVERSING GEAR HOUSING ASSEMBLY MAINTENANCE
DISASSEMBLY, REPAIR OR REPLACEMENT, LUBRICATION,
ASSEMBLY, TEST AND INSPECTION**

INITIAL SETUP:**Tools and Special Tools**

Block, depth, 12901137
Drill, 2 mm, B94.11M
Guide, drill, 12944235
Jaws adapter, 12577340
Semiannual Service Direct Support Parts Kit, 5911365
Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)
Tap, 2.5 mm, ANSI-B94.9
Wrench, 8 mm, ANSI B107.9-1978
Wrench, 11 mm/13 mm, ANSI B107.9-1978
Wrench, hook, 45/50, 12577462
Wrench, key, 1.27 mm, GGG-K-275
Wrench, key, 2.5 mm, ANSI-B18.3.2M
Wrench, spanner, 31 mm, 12577337
Wrench, spanner, 34 mm, 12577338

Materials/Parts

Abrasive cloth (WP 0061, item 9)
Aircraft grease (GA) (WP 0061, item 13)
General purpose lubricating oil (GPL) (WP 0061, item 14)
Pressure sensitive adhesive tape (WP 0061, item 24)
Self-locking nut, DIN985-M8-A4C
Thread locking compound (WP 0061, item 27)

References

WP 0051

Equipment Conditions

Traversing gear assembly removed from buffer mechanism (WP 0037)
Traversing extension assembly removed from traversing gear mechanism (WP 0040)

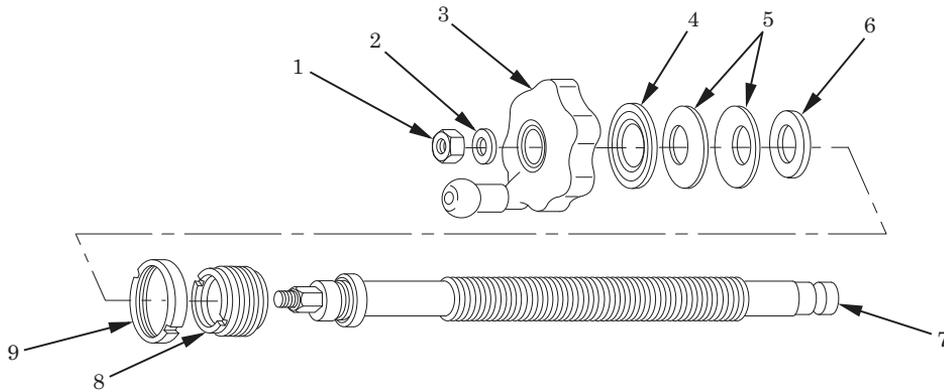
DISASSEMBLY

Figure 1. Removal of Handle and Traversing Screw.

1. Using 13 mm wrench, remove and discard self-locking nut (1). Remove flat washer (2), hand crank (3), beveled washer (4), two spring tension washers (5), and flat washer (6). Discard spring tension washers if damaged.
2. Using 45/50 hook wrench, loosen round plain nut (9) and remove machine bushing (8) using 34 mm spanner wrench.
3. Unscrew and remove traversing screw (7).

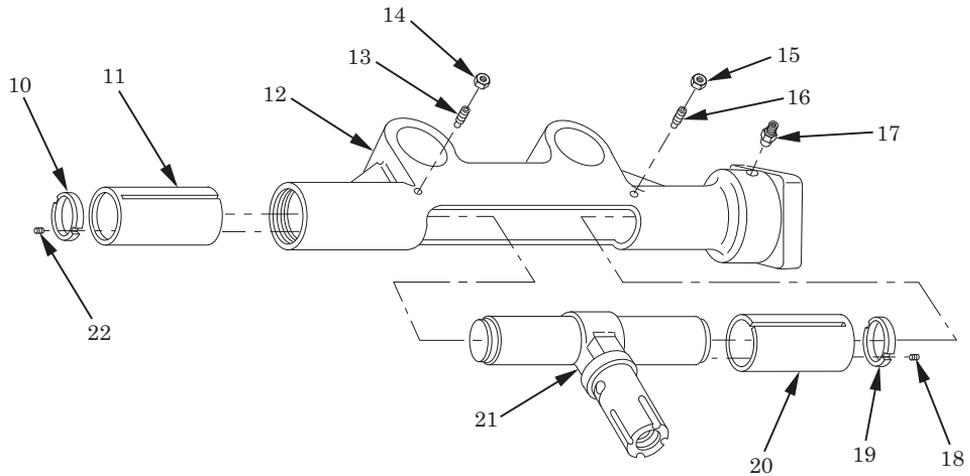


Figure 2. Disassembly of Traversing Gear Housing Assembly.

CAUTION

Parts were drilled for straight pins and setscrews when they were assembled. To line up holes for pins or screws, parts must be put back exactly as they were assembled. Mark before disassembly.

4. Mark relative position of round plain nut (10) and traversing nut (21). Using 1.27 mm key wrench, remove setscrew (22) from round plain nut and traversing nut. Using 31 mm spanner wrench, remove round plain nut and sleeve bushing (11).
5. Using 8 mm wrench, loosen two hexagon plain nuts (14) and (15). Using 2.5 mm key wrench, remove two setscrews (13) and (16) together with hexagon plain nuts.
6. Remove traversing nut (21) together with sleeve bushing (20) from traversing gear housing assembly (12). Mark relative position of round plain nut (19) and traversing nut. Remove setscrew (18) using 1.27 mm key wrench. Remove round plain nut using 31 mm spanner wrench. Separate sleeve bushing from traversing nut.
7. If damaged, remove lubrication fitting (17) from traversing gear housing assembly (12).

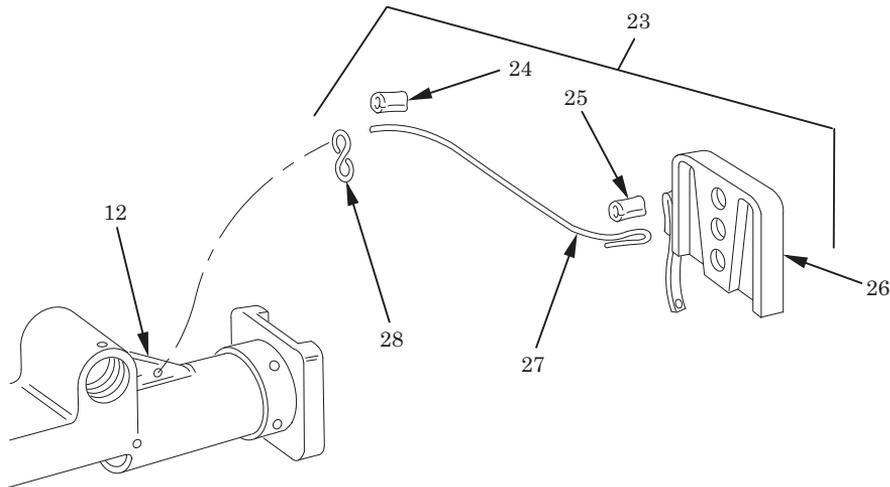
DISASSEMBLY - Continued

Figure 3. Disassembly/Assembly of Sightunit Adapter Cover.

8. Bend chain hook (28) to remove sightunit adapter cover (23) from traversing gear housing assembly (12).
9. Remove chain hook (28) and swaging sleeve (24) from jacketed wire rope (27).
10. Remove swaging sleeve (25) and jacketed wire rope (27) from cover (26).

END OF TASK**REPAIR OR REPLACEMENT**

1. Inspect for thread damage. Restore threads.
2. Inspect for burrs, cracks, and corrosion or wear. Remove burrs and corrosion using abrasive cloth (WP 0061, item 9).
3. Inspect sightunit adapter cover for damage or wear.
4. Replace defective parts as authorized by WP 0051.

END OF TASK

LUBRICATION

Lubricate internal threads using GA grease (WP 0061, item 13). Apply a light coat of GPL (WP 0061, item 14) to all unpainted surfaces.

END OF TASK**ASSEMBLY**

1. Install jacketed wire rope (27) on cover (26) and secure with swaging sleeve (25).
2. Install swaging sleeve (24) and chain hook (28) on jacketed wire rope (27).
3. Install sightunit adapter cover (23) on traversing gear housing assembly (12) and secure by bending chain hook (28).

ASSEMBLY - Continued

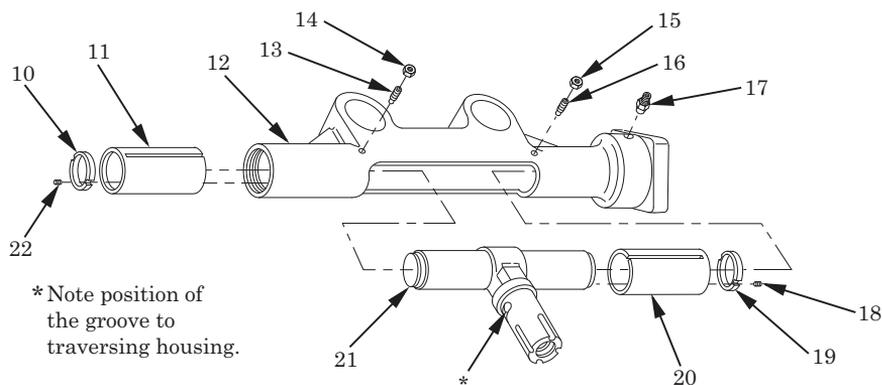


Figure 4. Assembly of Traversing Gear Housing Assembly.

WARNING



Drilling of metal is a hazard. Flying metal chips can become embedded in the eyes and skin. Wear safety glasses. Seek medical assistance at once if injury occurs.

NOTE

If traversing nut or round plain nuts are new, perform steps 4 through 7. If installing previously matched component parts, proceed to step 8.

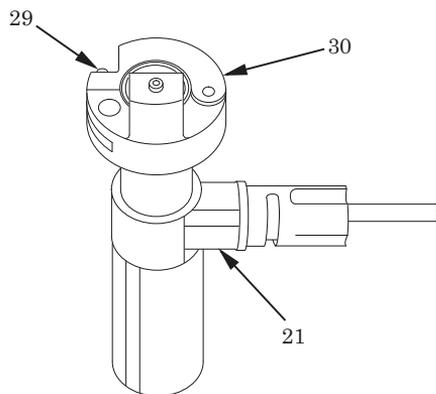


Figure 5. Drilling of Holes in Round Plain Nut and Traversing Nut.

4. Install round plain nut (10) or (19) on traversing nut (21) using 31 mm spanner wrench and tighten.
5. Place drill guide #12944235 (30) on traversing nut (21), making sure the bushing side of drill guide is in contact with round plain nut (10) or (19). Secure with locking screw (29).
6. Set depth of 2 mm drill using depth block and tape. Drill to exact depth.
7. Remove drill guide (30) and tap a 2.5 mm hole to depth. Remove round plain nut (10) or (19).
8. If removed, install lubrication fitting (17).

WARNING

SEALING COMPOUND

9. Put sleeve bushing (20) onto traversing nut (21). Using 31 mm spanner wrench, screw on round plain nut (19) to assembled position. Apply thread locking compound (WP 0061, item 27) and secure with setscrew (18) using 1.27 mm key wrench.
10. Install assembled traversing nut (21) and sleeve bushing (20) into traversing gear housing assembly (12), with groove of sleeve bushing aligned with setscrew hole on traversing gear housing assembly. Apply thread locking compound (WP 0061, item 27) and install setscrew (16), using 2.5 mm key wrench. To ensure smooth movement of sleeve bushing, tighten setscrew, release 1/4 turn, and lock with hexagon plain nut (15), using 8 mm wrench.
11. Put sleeve bushing (11) through end of traversing gear housing assembly (12) onto traversing nut (21). Screw on round plain nut (10) to assembled position and secure with setscrew (22). Apply thread locking compound (WP 0061, item 27) and secure traversing nut in traversing gear housing assembly with setscrew (13), using 2.5 mm key wrench. To ensure smooth movement of sleeve bushing, tighten setscrew, release 1/4 turn, and lock with hexagon plain nut (14), using 8 mm wrench. Check sleeve bushings (20) and (11) for free movement in traversing gear housing assembly.

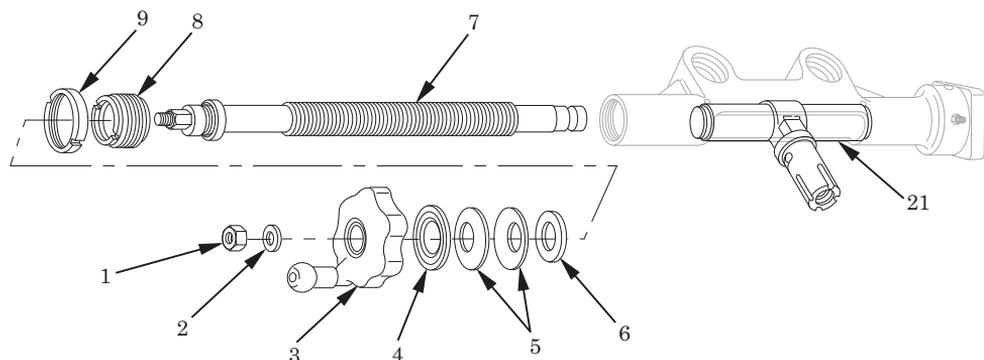
ASSEMBLY - Continued

Figure 6. Installation of Traversing Screw and Handle.

WARNING**SEALING COMPOUND**

12. Install traversing screw (7) into traversing nut (21). Check for the extent of free movement. The maximum longitudinal free play should not exceed 0.012 in. (0.305 mm). Apply thread locking compound (WP 0061, item 27) to round plain nut (9) and machine bushing (8). Install machine bushing and round plain nut. Tighten using 34 mm spanner wrench. Release 1/4 turn and adjust machine bushing until end play is eliminated. Secure round plain nut using 45/50 hook wrench. The maximum allowed backlash for the traversing screw is 1/8 turn (45 degrees).
13. Install flat washer (6), two spring tension washers (5), beveled washer (4) (bevel side towards hand crank), hand crank (3), and flat washer (2). Secure with new self-locking nut (1) using 13 mm wrench. Adjust to permit free rotation with no end play.

END OF TASK**TEST AND INSPECTION**

Turn hand crank in both directions. Check for free movement. Backlash should not exceed 1/8 turn of crank (45 degrees).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE**TRAVERSING EXTENSION ASSEMBLY MAINTENANCE
DISASSEMBLY, REPAIR OR REPLACEMENT, LUBRICATION,
ASSEMBLY, TEST AND INSPECTION**

INITIAL SETUP:**Tools and Special Tools**

Drill, 3 mm, B94.11M

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

Wrench, key, 6 mm, ANSI-B18.3.2M

Wrench, spanner, 4 mm, 12577336

Materials/Parts

Aircraft grease (GA) (WP 0061, item 13)

General purpose lubricating oil (GPL) (WP 0061, item 14)

Spring pin, DIN1481-3X16-B2D

Thread locking compound (WP 0061, item 27)

References

WP 0051

Equipment Conditions

Traversing extension assembly installed on traversing gear mechanism with elevating mechanism removed (WP 0034)

DISASSEMBLY**WARNING**

Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

CAUTION

Parts were drilled and reamed for spring pins when they were assembled. To line up holes in proper order, parts must be put back exactly as they were assembled. Mark before disassembly.

Suddenly released springs may cause lost parts.

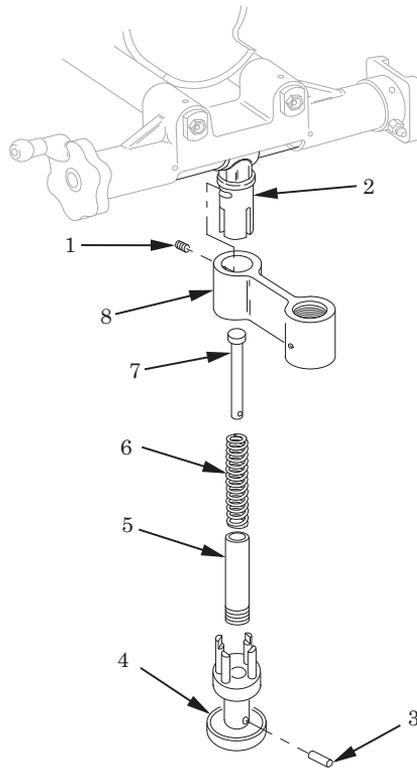


Figure 1. Disassembly of Traversing Extension Assembly.

1. Remove spring pin (3) and pull out knob (4). Discard spring pin.
2. Using 6 mm key wrench, loosen and remove setscrew (1). Pull off traversing extension housing (8). Using 4 mm spanner wrench, remove helical compression spring retainer (5) from traversing nut (2) and pull out helical compression spring (6) and headed straight pin (7).

END OF TASK**REPAIR OR REPLACEMENT**

1. Inspect for wear, burrs, cracks, and corrosion.
2. Replace damaged or defective parts as authorized by WP 0051.

END OF TASK**LUBRICATION**

Apply GA grease (WP 0061, item 13) to traversing extension housing, helical compression spring, and headed straight pin. Apply GPL (WP 0061, item 14) to all unpainted surfaces.

END OF TASK

ASSEMBLY

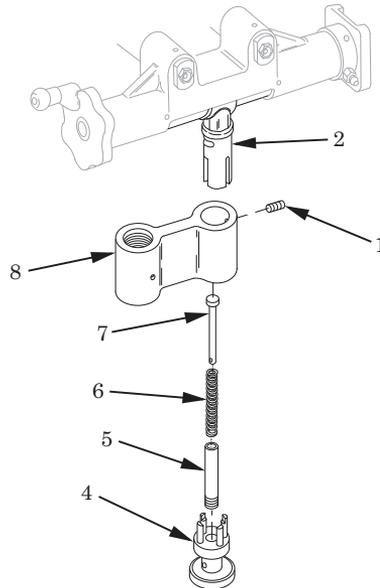


Figure 2. Drilling of Hole in Knob.

1. Install headed straight pin (7), helical compression spring (6), and helical compression spring retainer (5) into traversing nut (2) using 4 mm spanner wrench.

WARNING

Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

WARNING

SEALING COMPOUND

NOTE

If knob is new, perform steps 2, 3, and 5. If knob is original component part, perform steps 4 and 5.

2. Install traversing extension housing (8) onto traversing nut (2). Apply thread locking compound (WP 0061, item 27) and secure with setscrew (1) using 6 mm key wrench.
3. Install knob (4) to assembled position. Drill 3 mm hole in knob. Remove knob.

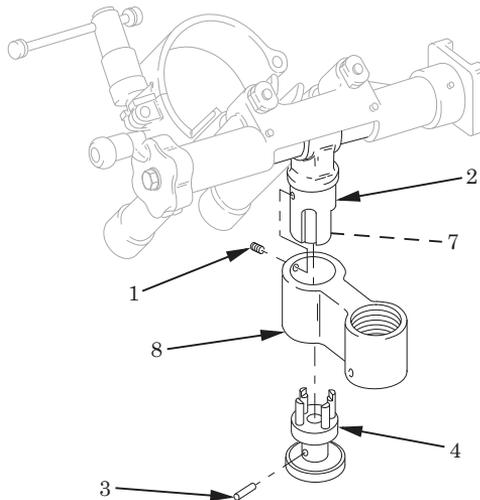
ASSEMBLY - Continued

Figure 3. Installation of Knob.

4. Install traversing extension housing (8) onto traversing nut (2). Apply thread locking compound (WP 0061, item 27) and secure with setscrew (1) using 6 mm key wrench.

NOTE

Before installing spring pin, ensure holes in headed straight pin (7) and knob align.

5. Install knob (4) and secure with new spring pin (3).

END OF TASK**TEST AND INSPECTION**

Check for smooth movement of knob up and down. Check proper engagement of knob in all three positions.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE

**ARTILLERY CLEANING STAFF ASSEMBLY MAINTENANCE
DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY**

INITIAL SETUP:

Tools and Special Tools

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

Materials/Parts

Thread locking compound (WP 0061, item 27)

References

WP 0051

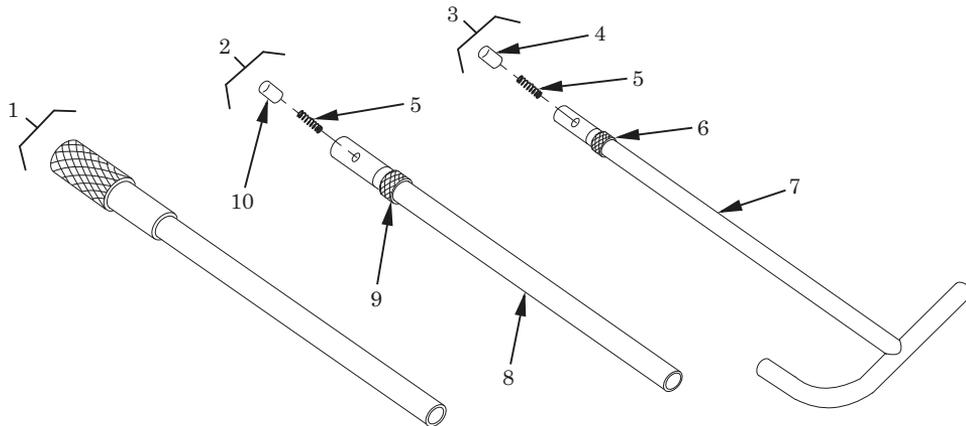
DISASSEMBLY

Figure 1. Separation of Artillery Cleaning Staff Assembly Sections.

1. Unscrew sleeve (9) and separate bottom staff section (1) from center staff section (2) and manual control handle (3). If damaged, remove sleeve.
2. Depress spring cap (4). Unscrew sleeve (6) and separate center staff section (2) from manual control handle (3).
3. Remove spring caps (10) and (4) and helical springs (5) from center staff section tube (8) and manual control handle tube (7).

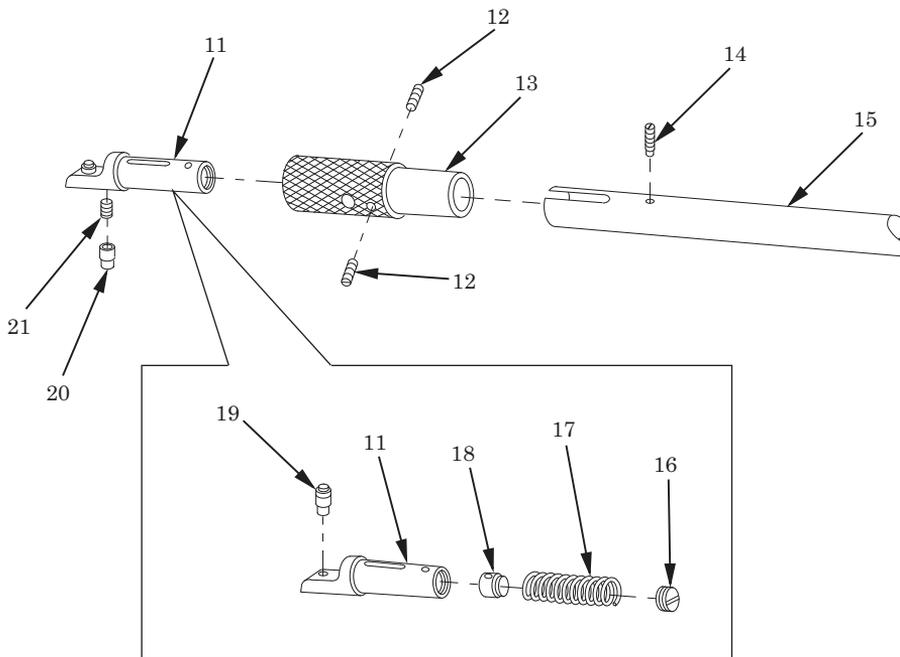


Figure 2. Disassembly of Bottom Cleaning Staff Section.

4. Remove machine screw (14) and separate sleeve (13) and connecting link (11) from bottom staff section tube (15).
5. Remove two machine screws (12). Depress spring cap (20) and separate sleeve (13) and connecting link (11). Remove spring cap and helical spring (21) from connecting link.
6. Mark relative positions of setscrew (16) and connecting link (11) to ensure identical reassembly. Remove setscrew, helical spring (17), and plain barrel nut (18) from connecting link. Remove externally relieved body bolt (19) from connecting link.

END OF TASK

REPAIR OR REPLACEMENT

Replace defective parts as authorized by WP 0051.

END OF TASK

ASSEMBLY

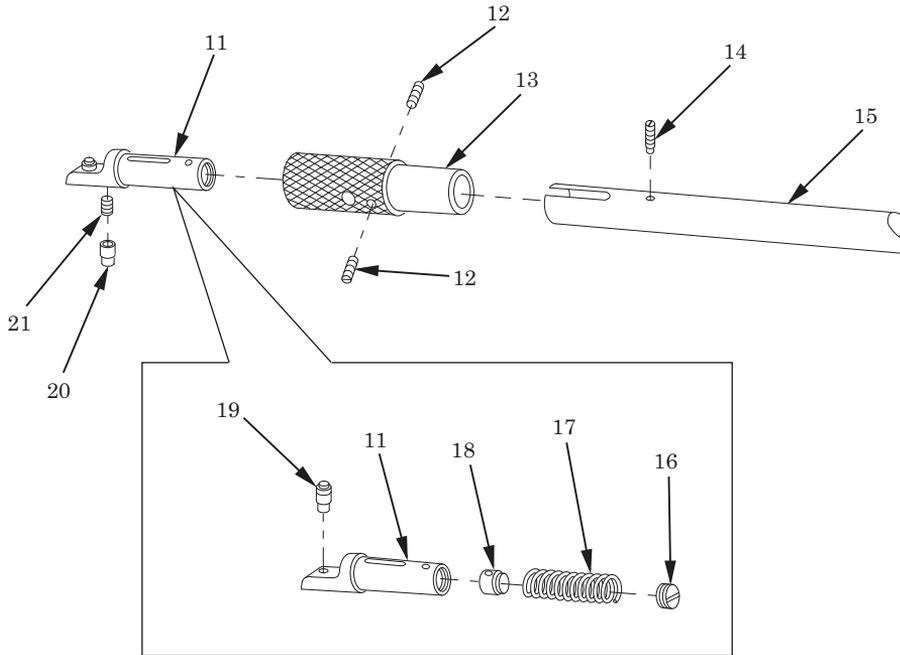


Figure 3. Assembly of Bottom Cleaning Staff Section.

WARNING



SEALING COMPOUND

1. Apply thread locking compound (WP 0061, item 27) to externally relieved body bolt (19) and install into connecting link (11). Install plain barrel nut (18), helical spring (17), and setscrew (16) into connecting link.

NOTE

Ensure holes in plain barrel nut are aligned with slot in connecting link.
 Ensure holes in setscrew and connecting link are aligned.

2. Install helical spring (21) and spring cap (20) into connecting link (11).

3. Insert connecting link (11) into sleeve (13) and secure with two machine screws (12).
4. Insert connecting link (11) and sleeve (13) into bottom staff section tube (15). Ensure holes in connecting link and tube are aligned. Secure with machine screw (14).

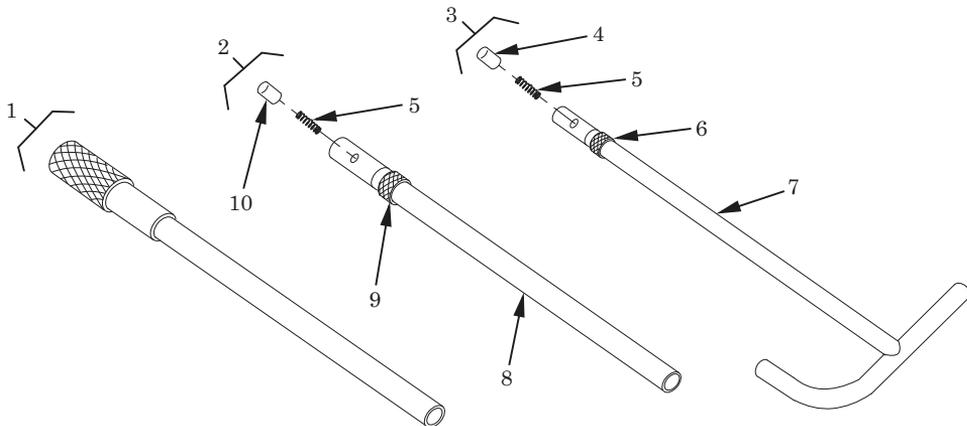


Figure 4. Assembly of Artillery Cleaning Staff Assembly Sections.

5. Install helical springs (5) and spring caps (10) and (4) into center staff section tube (8) and manual control handle tube (7).
6. Depress spring cap (4) on manual control handle (3) and insert into center staff section (2). Tighten sleeve (6).
7. Depress spring cap (10) on center staff section (2). Replace sleeve (9) if removed. Insert into bottom staff section (1). Tighten sleeve.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE

**CARTRIDGE EXTRACTOR MAINTENANCE
DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY, TEST AND INSPECTION**

INITIAL SETUP:

Tools and Special Tools

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

Materials/Parts

Abrasive cloth (WP 0061, item 9)
Cotter pin, 93-162 (4)
Straight pin, 93-208 (2)

References

TM 9-1015-250-10
WP 0043
WP 0051

DISASSEMBLY**WARNING**

Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

CAUTION

Suddenly released helical torsion springs may cause lost parts.

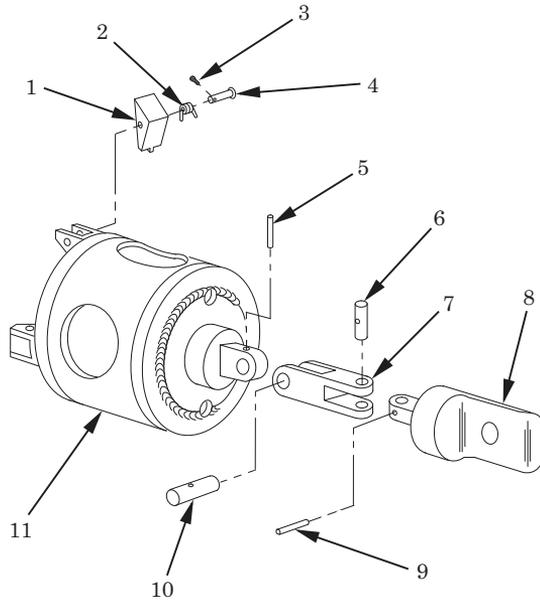


Figure 1. Disassembly/Assembly of Cartridge Extractor.

1. Using pliers, remove cotter pin (3) and discard. Carefully release helical torsion spring (2) by removing headed straight pin (4). Remove helical torsion spring and extractor catch (1). Repeat for other extractor catches.

CAUTION

Parts were drilled and reamed for spring pins when they were assembled. To line up holes in proper order, parts must be put back exactly as they were assembled. Mark before disassembly. See general maintenance instructions (WP 0043).

2. Mark the position of headless straight pins (6) and (10) to the extractor body (11) and rod end connector (8). Carefully remove straight pins (9) and (5), using punch and hammer. Discard straight pins. Remove headless straight pins, releasing rod end connector and rigid connecting plug (7).

END OF TASK

REPAIR OR REPLACEMENT

1. Inspect for burrs, worn parts, and corrosion. Repair by smoothing burrs and removing corrosion using abrasive cloth (WP 0061, item 9).
2. Carefully inspect extractor catches for any wear on the end that grasps the cartridge. If there are any broken edges on the part of the catch that goes into the cartridge, replace the catch as authorized by WP 0051.
3. Replace defective parts as authorized by WP 0051.

END OF TASK

ASSEMBLY

WARNING



Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

1. Put helical torsion spring (2) into extractor catch (1) and position both into extractor body (11). Install headed straight pin (4) and new cotter pin (3). Repeat for other extractor catches.
2. Position rigid connecting plug (7) onto extractor body (11) and insert headless straight pin (10) so hole in headless straight pin aligns with hole in extractor body. Insert new straight pin (5) to secure extractor body and headless straight pin.

ASSEMBLY - Continued

3. Insert rod end connector (8) into rigid connecting plug (7) and insert headless straight pin (6) so hole in headless straight pin aligns with hole in rod end connector. Insert new straight pin (9) into rod end connector and headless straight pin.

END OF TASK**TEST AND INSPECTION**

1. Ensure rod end connector and rigid connecting plug allow free 90 degree bends in four directions.
2. Ensure extractor catches snap positively into original position after being retracted and released.
3. Ensure cartridge extractor will fully engage and secure cartridges until released. Test with Battalion Training Aid (refer to TM 9-1015-250-10).

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
GENERAL MAINTENANCE

INITIAL SETUP:**Tools and Special Tools**

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

References

TM 9-243
TM 43-0139

PINS

Pins are very important to the maintenance of the 120mm mortar. Many of the pins (tapered, straight, or spring) are difficult to remove so as to prevent unauthorized actions. Unauthorized pin removal can cause damage to the weapon system. Become familiar with the following general maintenance instructions, cautions, and warnings when working with any of these pin types.

1. Make sure all holes align before inserting any pin. If all holes are aligned, pin should not be difficult to insert into position.
2. Do not force any pin. Too much force can damage the pin or cause it to flatten out prematurely. If the pin is not fully inserted, it will not function correctly.
3. Spring pins are under pressure. Be careful when removing any spring pin.
4. Straight or tapered pins can be hidden from view by paint finish. Look closely and, if necessary, remove finish to locate straight pin. Touch up paint after installation to prevent any corrosion.
5. Identify the large and small ends when removing tapered pins. Drive the pin out from the smaller end. If the pin must be drilled out, drill from the smaller end as well.
6. When driving out grooved pins, treat as tapered pins. Drive pins out from the opposite side of larger and/or grooved end.

PINS - Continued

7. Before removing any pin, mark how the parts are aligned. (Keep parts and pins that are removed together as a matched set.)

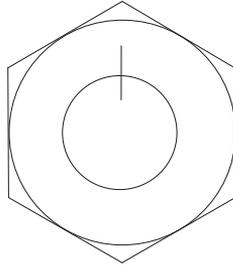
**MARKED**

Figure 1. Marking for Pin Insertion.

8. Mark only the parts that are pin attached. Start in the center of the pin and mark as shown above. Only one line is needed.
9. Straight, tapered, grooved, and spring pins should not be reused unless otherwise noted.

END OF TASK**SETSCREWS**

Setscrews are widely used on the 120mm mortar and serve two basic purposes.

1. Setscrews protect the mortar from vibration when being fired or transported.

2. Setscrews allow for certain weapon system adjustments. See the following maintenance instructions before beginning any maintenance tasks involving setscrews.
 - a. When setscrews are used to secure parts from vibration, mark the location before disassembly.
 - b. When setscrews are used to hold or make adjustments, there is no need to mark locations before disassembly.

NOTE

Before any new setscrew hole is drilled, ensure setscrew will be accessible for all assembly/disassembly actions and will not restrict intended movement of other assemblies.

END OF TASK

DRILLS, TAPS, AND REAMERS

There are numerous drilling, tapping, and reaming procedures throughout the field maintenance tasks. Before performing any of these tasks, become familiar with the handling and use of drills, taps, and reamers. Refer to TM 9-243 for detailed instructions when using any of these tools.

Refer to the following warnings and cautions before beginning any maintenance task involving drilling or tapping procedures.

WARNING



Flying metal chips may cause injury to you or other workers nearby. Anytime metal strikes metal (hammer, punch, or pin), chips may fly. Protect others with screens. Wear eye protection and be careful.

CAUTION

Parts were drilled for straight pins and setscrews when they were assembled. To line up holes for pins or screws, parts must be put back exactly as they were assembled. Mark before disassembly.

Parts were drilled and reamed for tapered pins when they were assembled. To line up holes in proper order, parts must be put back exactly as they were assembled. Mark before disassembly.

Prior to assembly, parts drilled or tapped must be cleaned of all metal filings or chips.

END OF TASK

PAINTING

After completion of the repair of many assemblies, touchup with CARC paint may be required (see Warning Summary). All touchup painting is the responsibility of field maintenance personnel. Refer to TM 43-0139, Painting Instructions for Army Materiel, for all detailed procedures necessary to perform these tasks.

END OF TASK**END OF WORK PACKAGE**

FIELD MAINTENANCE
PREPARATION FOR STORAGE OR SHIPMENT

INITIAL SETUP:**Tools and Special Tools**

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

Materials/Parts

Aircraft grease (GA) (WP 0061, item 13)
Barrier material (WP 0061, item 4)
Cushioning material (WP 0061, item 10)
Dry cleaning solvent (WP 0061, item 22)
General purpose lubricating oil (GPL) (WP 0061, item 14)
Pressure sensitive adhesive tape (WP 0061, item 24)
Pressure sensitive adhesive tape (WP 0061, item 25)
Wiping rag (WP 0061, item 20)

References

DA Form 2408-4
DA Form 2408-9
TB 9-1000-247-34

STORAGE

Store the weapon under cover, in open sheds, or warehouses, whenever possible, and prepare it for storage as follows:

1. Preparation. Remove components and disassemble weapon prior to cleaning and packaging.

WARNING



DRY CLEANING SOLVENT

2. Cleaning and Drying. Clean the weapon, including the bore, with dry cleaning solvent (WP 0061, item 22). Wipe dry using wiping rags (WP 0061, item 20).
3. Preservation. Coat the cannon bore liberally with GPL (WP 0061, item 14). Coat the other painted and unpainted surfaces of the cannon and mount assembly with GA grease (WP 0061, item 13).

END OF TASK

SHIPPING

1. Packaging.
 - a. Wrap the M298 120mm cannon and mortar mount separately in barrier material (WP 0061, item 4) and close securely with 2 in. tape (WP 0061, item 25).
 - b. Preserve and wrap the Basic Issue Items (BII) and other small items in cushioning material (WP 0061, item 10) and place in fiberboard boxes. Close with 2 in. tape (WP 0061, item 24).
 - c. Enclose a copy of DA Form 2408-4, Weapons Record Data, and, when applicable, DA Form 2408-9, Equipment Control Record, in a plastic bag and secure to the wrapped M298 120mm cannon with tape.

-
- d. Include the following information on the inside packaging list:

NATIONAL STOCK NUMBER
PART NUMBER
FEDERAL ITEM NAME
WEIGHT AND CUBE
SERIAL NUMBER

2. Marking. Mark shipping container with the following information:

DESTINATION
WEIGHT AND CUBE

3. Preparation for Shipment of Small Component Items.

- a. If a small breakable component such as a sight unit is the only item being shipped, use fast pack containers. These are available in a wide range of sizes through the GSA catalog.
- b. If the small item is durable metal, apply GPL (WP 0061, item 14) and wrap in barrier material (WP 0061, item 4). Cushion the item and place in a fiberboard box of appropriate size.
4. Additional Instructions. See TB 9-1000-247-34 for further instructions and equipment requirements.

END OF TASK

END OF WORK PACKAGE

FIELD MAINTENANCE**PREEMBARKATION INSPECTION OF MATERIEL
IN UNITS ALERTED FOR OVERSEAS MOVEMENT**

INITIAL SETUP:**Tools and Special Tools**

Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
(SC 9999-01-SKO)

References

TM 9-1000-202-14

WP 0024

WP 0059

GENERAL

This inspection is conducted on materiel in alerted units scheduled for overseas duty to ensure that such materiel will not become unserviceable in a relatively short time. It prescribes a higher percentage of remaining usable life in serviceable materiel to meet a specific need beyond minimum serviceability.

PREINSPECTION POINTS**WARNING**

Before starting an inspection, be sure to clear the weapon. Inspect the bore to be sure it is empty and free from obstruction.

1. Equipment must be considered "ready" under the criteria established in WP 0024.
2. Operator publications applicable to the equipment log book must accompany the equipment. All log book entries must be complete and up-to-date, including those covering any repairs, replacements, or adjustment.

PREINSPECTION POINTS - Continued

3. Weapons must be complete with all items required by applicable Department of the Army publications, including those in the Basic Issue Items list (WP 0059).
4. Disqualified weapons and/or fire control equipment which do not qualify for shipment or issue will be redistributed, repaired, or overhauled, or will become a candidate for cannibalization or other disposition as required by existing regulations.

END OF TASK**INSPECTION POINTS**

1. Care must be exercised to use tools that are suitable for the task to be performed in order to avoid unnecessary mutilation of parts and/or damage to tools.
2. Damaged threads should be repaired by using a thread restorer or by lathe-chasing and by replacing helical inserts.
3. Damaged surfaces should be restored using materials and tools consistent with tolerances of item being restored.
 - a. There are various methods and materials used for removing corrosion. These should be carefully selected so that surfaces being processed will not be damaged beyond serviceability.
 - b. Crocus cloth and fine stones should be used to remove corrosion, burrs, and scores from polished surfaces. Aluminum oxide abrasive cloth, files, or scrapers are permissible where critical dimensions will not be altered by their use.
4. Safety mechanism must function positively. When in the "S" position, the weapon must not fire.
5. All markings must be legible.
6. Complete disassembly of a unit is not always necessary in order to make a required repair or replacement. Good judgment should be exercised to keep disassembly and assembly to a minimum.
7. Exercise caution when removing and installing spring pins and headless grooved pins to prevent damage to the mechanism or component.
8. When assembling a unit, replace all spring pins and headless grooved pins with new pins. Self-locking screws and nuts must be replaced if they were removed.

-
9. Springs that are kinked and/or fail to function properly must be replaced.
 10. During repair the material should be kept clean and lubricated before functioning or testing. Do not over-lubricate. Use as little lubricant as necessary for proper functioning.

END OF TASK**SPECIFIC CRITERIA**

1. Surfaces. A worn or shiny surface is objectionable, from the standpoint of visibility, when it is capable of reflecting light as a mirror does. A weapon with a distinct shine on exterior parts will be rejected for overseas shipment.
2. M298 120mm Cannon.
 - a. Inspect the cannon tube in accordance with TM 9-1000-202-14.
 - b. The cannon tube must have an inside bore diameter between 4.747 in. (120.57 mm) and 4.757 in. (120.83 mm) to be acceptable for overseas shipment.
 - c. Breech assembly must be free of burrs that interfere with assembly to the socket and must be gastight on the cannon tube.
 - d. Firing pin must function properly.
3. M191 Mortar Mount.
 - a. All movable elements must perform smoothly without binding.
 - b. Elevating, cross leveling, and traversing assemblies which bind are not acceptable.
4. M9 Mortar Baseplate.
 - a. M9 mortar baseplate must not be cracked. Minor bends are acceptable.
 - b. Install M298 120mm cannon to M9 mortar baseplate. Check clearance and ease of function.

END OF TASK**END OF WORK PACKAGE**

CHAPTER 7

AMMUNITION
MAINTENANCE INSTRUCTIONS
FOR
M120A1 120MM MORTAR

OPERATOR
AMMUNITION MARKING INFORMATION

INITIAL SETUP:

Not Applicable

AUTHORIZED CARTRIDGES

The following cartridges are authorized to be fired from the M120A1 120mm mortar.

120mm Cartridge: M57 HE
120mm Cartridge: M68 Smoke
120mm Cartridge: M91 Illum
120mm Cartridge: XM929 Smoke
120mm Cartridge: M929 Smoke
120mm Cartridge: M930 Illum
120mm Cartridge: M931 Full Range Practice
120mm Cartridge: M933 HE
120mm Cartridge: M933A1 HE
120mm Cartridge: M934 HE
120mm Cartridge: M934A1 HE
120mm Cartridge: M983 IR Illum

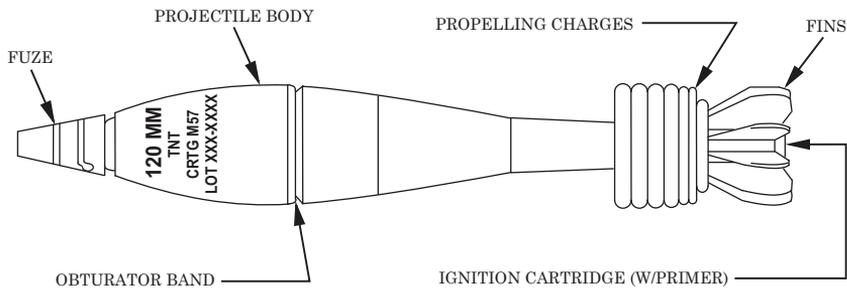
AUTHORIZED CARTRIDGES - Continued**M57 High Explosive (HE) Cartridge**

Figure 1. M57 HE Cartridge.

Type/Use: High explosive/ fragmentation and blast

Identification: Olive drab with yellow markings

Components: M935 point detonating (PD) fuze

Maximum Range: 6300 meters at Charge 8/7200 meters at Charge 10

Remarks: Used against personnel (in open or in bunkers), light vehicles, and light bunkers; weight to 29.00 lb (13.18 kg)

M933 High Explosive (HE) Cartridge

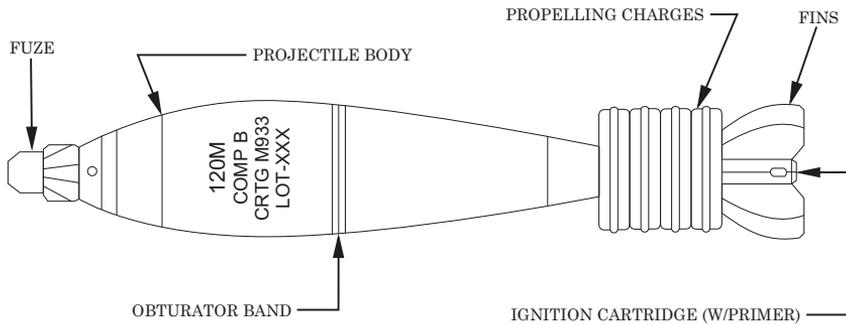


Figure 2. M933 HE Cartridge.

Type/Use: High explosive/ fragmentation and blast

Identification: Olive drab with yellow markings

Components: M745 PD fuze; M230 propelling charge

Maximum Range: 7200 meters at Charge 4

M933A1 High Explosive (HE) Cartridge

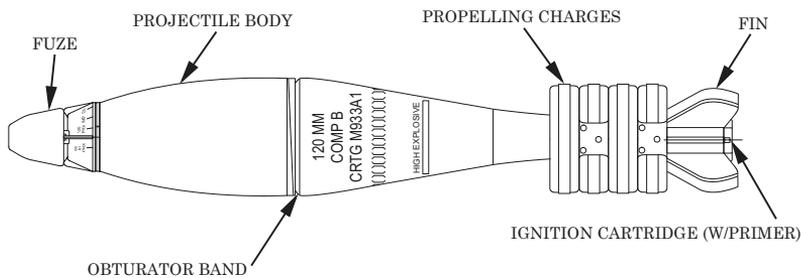


Figure 3. M933A1 HE Cartridge.

Type/Use: High explosive/ fragmentation and blast

Identification: Olive drab with yellow markings

Components: M783 point detonating/delay (PD/DLY) fuze; M234 propelling charge; M1020 ignition charge; M31 fin assembly

Maximum Range: 7200 meters

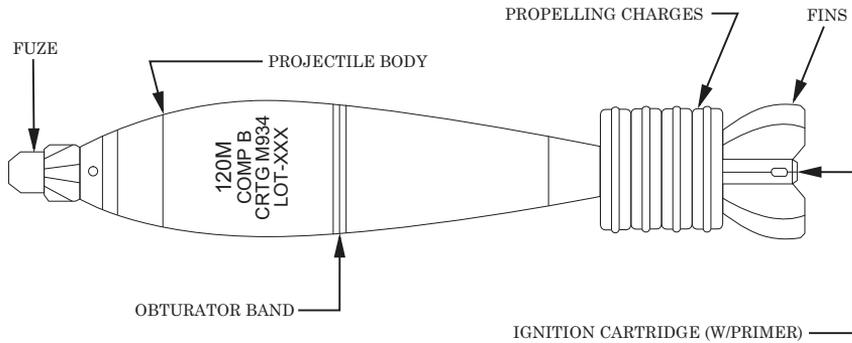
AUTHORIZED CARTRIDGES - Continued**M934 High Explosive (HE) Cartridge**

Figure 4. M934 HE Cartridge.

Type/Use: High explosive/ fragmentation and blast**Identification:** Olive drab with yellow markings**Components:** M734 multi-option fuze; M230 propelling charge**Maximum Range:** 7200 meters at Charge 4

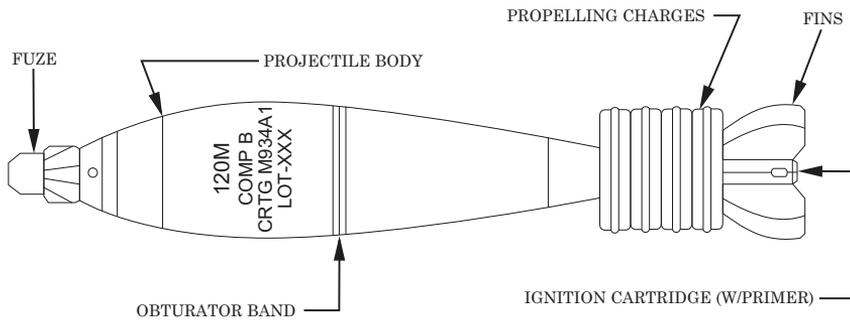
M934A1 High Explosive (HE) Cartridge

Figure 5. M934A1 HE Cartridge.

Type/Use: High explosive/ fragmentation and blast

Identification: Olive drab with yellow markings

Components: M734A1 multi-option fuze; M234 propelling charge

Maximum Range: 7200 meters at Charge 4

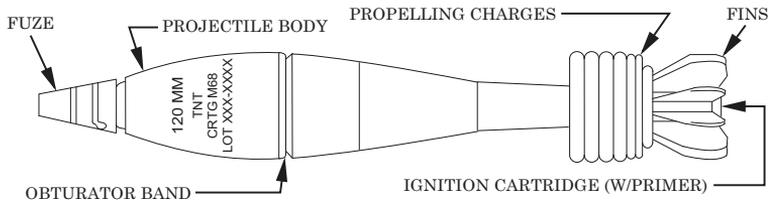
AUTHORIZED CARTRIDGES - Continued
M68 Smoke Cartridge

Figure 6. M68 Smoke Cartridge.

Classification: Smoke, WP (white phosphorus)**Identification:** Light green with red markings**Components:** M935 PD fuze**Maximum Range:** 6300 meters at Charge 8/7200 meters at Charge 10**Remarks:** Used for screening and spotting**WARNING**

At temperatures exceeding 111.4 °F (44.1 °C) (melting point of WP), store and transport WP rounds in a vertical position (nose up) to prevent voids in the WP.

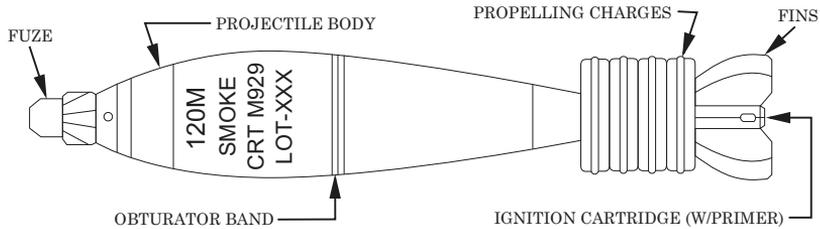
XM929 and M929 Smoke Cartridges

Figure 7. XM929 and M929 Smoke Cartridges.

Type/Use: Smoke, WP (white phosphorus)/ screening and spotting

Identification: Light green with light red markings

Components: M745 PD fuze (XM929) or M734A1 multi-option fuze (M929); M230 propelling charge

Maximum Range: 7200 meters at Charge 4

WARNING

At temperatures exceeding 111.4 °F (44.1 °C) (melting point of WP), store and transport WP rounds in a vertical position (nose up) to prevent voids in the WP.

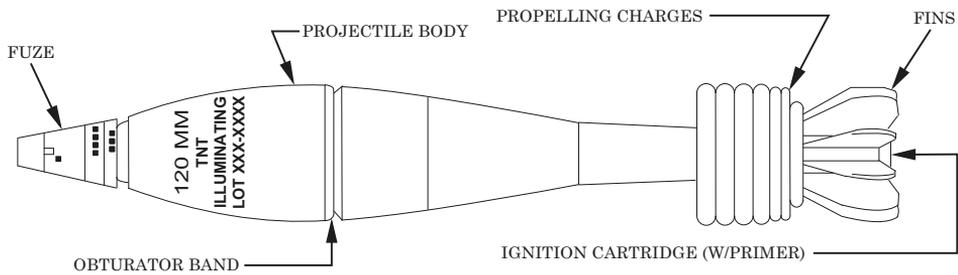
AUTHORIZED CARTRIDGES - Continued
M91 Illumination (Illum) Cartridge

Figure 8. M91 Illum Cartridge.

Type/Use: Illumination**Identification:** White with black markings**Components:** M776 (DM93) mechanical time super quick (MTSQ) fuze**Maximum Range:** 6200 meters at Charge 8/7100 meters at Charge 10**Remarks:** Contains candle and parachute used for illumination (weight to 29.00 lb (13.18 kg)); burn time 45 - 60 sec; candle power 1,000,000

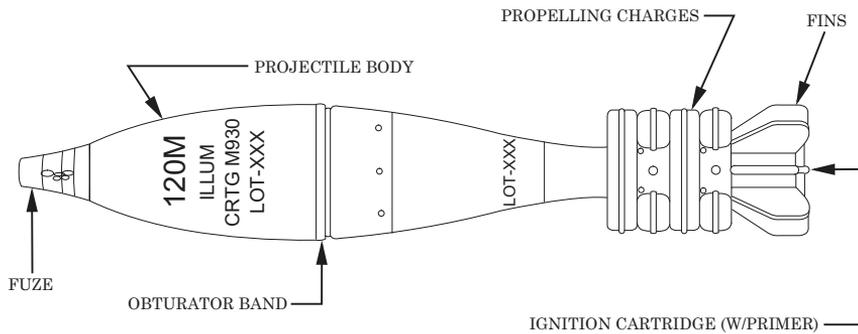
M930 Illumination (Illum) Cartridge

Figure 9. M930 Illum Cartridge.

Type/Use: Illumination

Identification: White with black markings

Components: M776 (DM93) MTSQ fuze; M234 propelling charge

Maximum Range: 6800 meters at Charge 4

Remarks: Burn time 50 - 60 seconds; 1 million candlepower

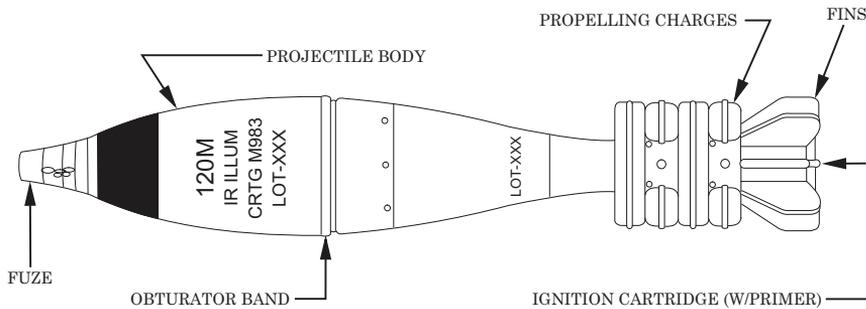
AUTHORIZED CARTRIDGES - Continued**M983 Infrared Illumination (IR Illum) Cartridge**

Figure 10. M983 IR Illum Cartridge.

Type/Use: Infrared illumination/ covert illumination

Identification: White with black markings and orange band

Components: M776 (DM93) MTSQ fuze; M234 propelling charge

Maximum Range: 6800 meters at Charge 4

Remarks: Candle provides infrared illumination, and is intended for use with night vision devices; burn time 50 - 60 seconds

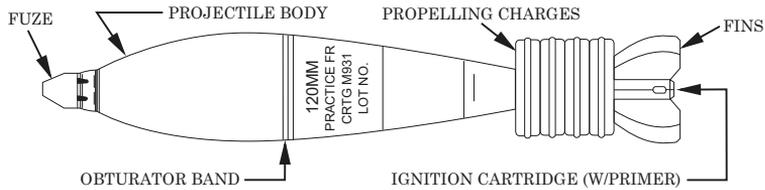
M931 Full Range Practice Cartridge

Figure 11. M931 Full Range Practice Cartridge.

Type/Use: Target practice/ training

Identification: Blue with white markings

Components: M781 PD fuze; M233 propelling charge

Maximum Range: 7200 meters at Charge 4

Remarks: Fuze produces a flash, audible sound, and cloud of smoke upon functioning

Limitations: Do not fire Charges 3 and 4 at elevations higher than 1215 mils. Do not fire cartridge above 110 °F (43.3 °C) or below 0 °F (-17.8 °C).

END OF WORK PACKAGE

OPERATOR

CARE AND HANDLING OF AMMUNITION

INITIAL SETUP:**References**

AR 385-10
AR 385-63
TM 9-1300-200
WP 0015
WP 0048
WP 0049

PREPARATION FOR FIRING

1. Unpack cartridge.
 - a. Remove protective bag and desiccant bags (if any) secured to or covering fin assembly.

NOTE

Examine fin assembly for visible damage or looseness. Examine fuzes and propelling charges for visible damage. Tighten loose fin assemblies (by hand) before firing. Cartridges with damaged (bent) fin assemblies, fuzes, or propelling charges will be turned in to the Ammunition Supply Point (ASP) as unserviceable.

- b. Remove plastic shell/insert assembly (if any) covering propelling charge.

WARNING

M781 fuze may be armed if packing clip is missing or red band on striker is protruding from nose cap. Force applied to the nose of an armed fuze can result in ignition of propelling charge. Do not attempt to fire a cartridge with an armed fuze. Remove cartridge to dud pit without striking nose of fuze.

2. Set fuze for required time or desired type of burst (see WP 0048).

PREPARATION FOR FIRING - Continued**NOTE**

For all cartridges with horseshoe-shaped propellant charge increments, ensure that the propellant charges are positioned so that the open ends of the increments alternate position, as shown here.

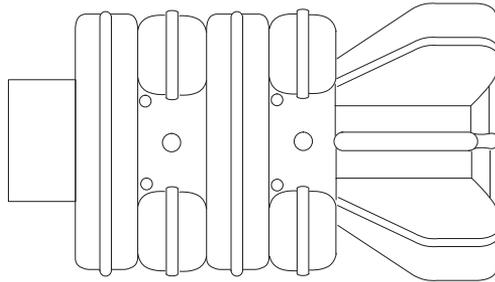


Figure 1. Positioning of Propellant Charges.

3. Adjust propelling charge for desired range (see WP 0049).
4. Remove/pull safety wires/packing clip (just prior to loading and firing cartridge).

END OF TASK

LOADING AND FIRING**WARNING**

Always check mask and overhead clearance before firing.

Point Detonating (PD) and proximity fuzes may prematurely function when fired through extremely heavy rainfall.

Do not fire ammunition in temperatures above +145 °F (+63 °C) or below -28 °F (-33 °C).

Short rounds and misfires may occur if an excessive amount of oil or water is in barrel during firing.

CAUTION

Before loading cartridge, ensure that barrel and cartridge are free of sand, mud, moisture, snow, wax, or other foreign matter.

Ensure that all packing materials (packing stops, supports, and plastic bags) were removed from cartridge.

Any glue or other foreign substance adhering to the cartridge, particularly at or near the obturator band, must be removed. If the substance cannot be removed, the cartridge shall not be fired.

1. Check to ensure that cartridge has proper amount of charge.
2. Remove safety wire/clip (if any) before firing.
3. See WP 0015 for loading and firing instructions.

END OF TASK**FIRING SAFETY PRECAUTIONS**

General safety precautions to be observed during training are prescribed in AR 385-63 and TM 9-1300-200.

For further information about ammunition safety, refer to AR 385-10.

END OF TASK

UNFIRED CARTRIDGES

1. Replace safety wire/clip if removed from fuze.

NOTE

If safety pins cannot be fully re-inserted into fuze, notify Explosive Ordnance Disposal (EOD).

2. Reset fuze (see WP 0048).
3. Re-install propellant increments so that cartridge has a full charge in proper order.

NOTE

M57, M68, and M91 cartridges should have seven propellant increments. The proper order is one brown, two blue, and four white.

Do not mix propelling charge models or lots. Use original increments.

4. Install packing stop. Repack cartridge.

END OF TASK**CARE AND HANDLING OF CARTRIDGES**

1. Do not throw or drop live ammunition.
2. Do not break moisture resistant seal of ammunition containers until cartridges are to be fired.
3. Protect cartridges when removed from ammo container. Protect ammunition from rain and snow. Do not remove plastic shell/insert assembly around propelling charge until propelling charge is to be adjusted. If protective bags were packed with cartridge, cover fin assembly and propelling charge to prevent moisture contamination. Stack cartridges on top of empty ammo boxes or 4 to 6 in. (10 to 15 cm) of dunnage. Cover cartridges with plastic sheets provided.
4. Do not expose cartridges to direct sunlight, extreme temperatures, flame, or other sources of heat.
5. Cartridges shall be shielded from small arms fire.
6. Store WP-loaded cartridges at temperatures below 111.4 °F (44.1 °C) to prevent melting of White Phosphorus (WP) filler. If this is not possible, WP-loaded cartridges must be stored fuze-end up so that WP will resolidify with void space in nose end of cartridge (when temperature returns below 111.4 °F (44.1 °C)). Failure to observe this precaution could result in rounds with erratic flight.

7. Store WP-loaded ammunition separate from other types of ammunition.
8. Notify EOD of leaking WP cartridges. Avoid contact with any leakers.
9. Protect primer of cartridge during handling.
10. Unless performing misfire procedures, do not handle duds.

END OF TASK

END OF WORK PACKAGE

OPERATOR**FUZES**

INITIAL SETUP:

Not Applicable

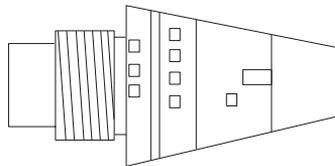
IDENTIFICATION**M776 Mechanical Time Super Quick (MTSQ) Fuze**

Figure 1. M776 MTSQ Fuze.

Functions: Airburst/Impact

Settings: 6 to 52 seconds

Remarks: Fuze has a mechanical arming/timing device, expulsion charge, and safety wire/pin.

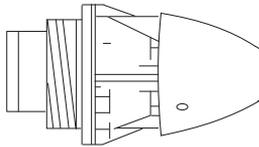
IDENTIFICATION - Continued**M734 Multi-Option Fuze**

Figure 2. M734 Multi-Option Fuze.

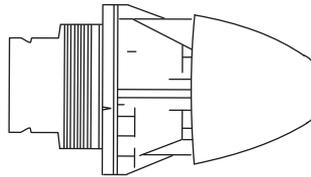
Functions: Proximity/Impact**Settings:** Proximity (PRX), Near Surface Burst (NSB), Impact (IMP), or Delay (DLY)**Remarks:** Fuze is handsettable.**M734A1 Multi-Option Fuze**

Figure 3. M734A1 Multi-Option Fuze.

Functions: Proximity/Impact**Settings:** 60/81 PRX, 120 PRX, IMP, or DLY**Remarks:** Fuze is handsettable. 60/81 PRX setting is not for use on 120mm mortar cartridges, but is for use on 60mm and 81mm mortar cartridges only.

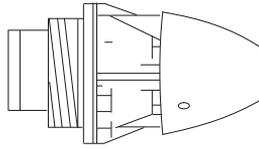
M745 Point Detonating (PD) Fuze

Figure 4. M745 PD Fuze.

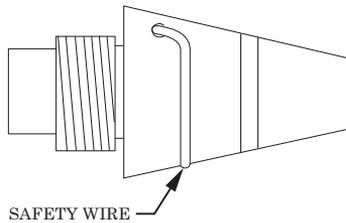
Functions: Impact**Settings:** None**Remarks:** Fuze functions on impact with superquick action only. The markings (PRX, NSB, IMP, and DLY) are dummy settings. Rotation of the fuze head does not alter the function mode.**M935 Point Detonating (PD) Fuze**

Figure 5. M935 PD Fuze.

Functions: Impact**Settings:** Superquick or 0.05 second delay action**Remarks:** Fuze has a safety wire.

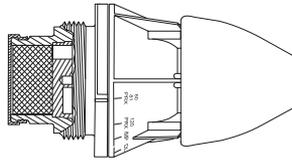
IDENTIFICATION - Continued**M783 Point Detonating/Delay (PD/DLY) Fuze**

Figure 6. M783 PD/DLY Fuze.

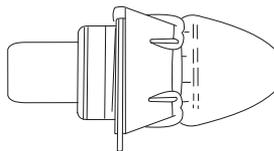
Functions: Impact or Delay**Settings:** IMP, DLY, or PRX**Remarks:** Fuze is handsettable. Setting the fuze on either of the PRX settings will result in a PD functioning.**M781 Practice Fuze**

Figure 7. M781 Practice Fuze.

Functions: Impact**Settings:** Dummy Multi-option PRX, NSB, IMP, or DLY**Remarks:** Fuze has a smoke cartridge and a safety/packing clip. If red band on striker is protruding from nose cap, fuze is in the armed position.

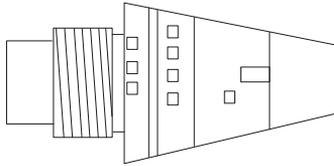
FUZE SETTING**M776 (DM93) Mechanical Time Super Quick (MTSQ) Fuze**

Figure 8. M776 MTSQ Fuze.

1. Rotate head of fuze to the left (counterclockwise direction) until the inverted triangle/index line is aligned with the correct line and number of seconds of the time scale.
2. Use fuze setter to rotate head of fuze.

NOTE

Once the desired setting has been passed, continue counterclockwise to reach the desired setting. Care should be taken to index desired setting in as few rotations as possible.

3. See firing table for correct time setting.
4. Remove fuze safety pin/wire prior to firing.

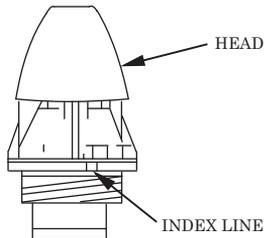
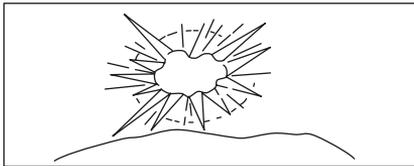
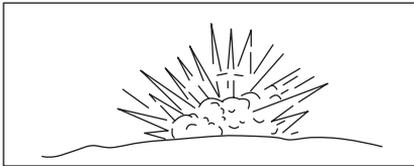
FUZE SETTING - Continued**M734 Multi-Option Fuze**

Figure 9. M734 Multi-Option Fuze.

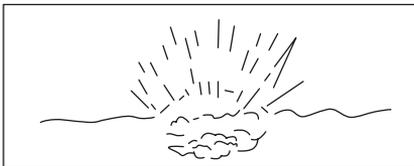
1. Fuzes can be set by hand.
2. Set fuze by rotating fuze head (in clockwise direction) until correct marking (PRX, NSB, IMP, or DLY) is over index line.
3. Next illustration depicts burst types.



PRX - Proximity. The fuze comes set to PRX. Burst height is 3 to 13 ft (1 to 4 m).



NSB - Near Surface (nonjamming). Burst height is 0 to 3 ft (0 to 1 m).



IMP - Impact (SQ)

DLY - Delay (0.050 seconds)

Figure 10. Burst Types.

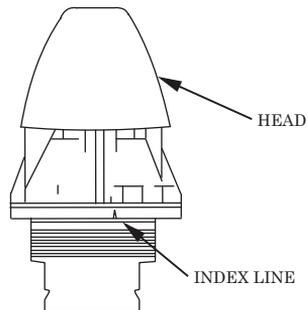
M734A1 Multi-Option Fuze

Figure 11. M734A1 Multi-Option Fuze.

1. Fuzes can be set by hand.
2. Set fuze by rotating fuze head (in clockwise direction) until correct marking (120 PRX, IMP, DLY) is over index line.
3. Burst types are similar to the M734 multi-option fuze.

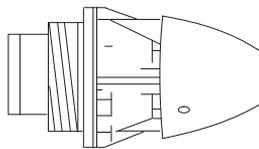
M745 Point Detonating (PD) Fuze

Figure 12. M745 PD Fuze.

1. No setting is required.
2. Fuze functions on impact with superquick action only. Disregard the markings (PRX, NSB, IMP, and DLY) on the fuze head.

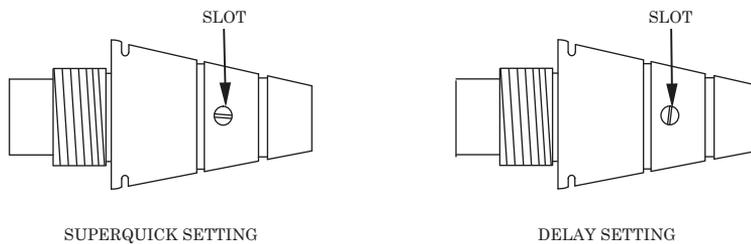
FUZE SETTING - Continued**M935 Point Detonating (PD) Fuze**

Figure 13. M935 PD Fuze.

1. Superquick setting
 - a. These fuzes are shipped preset to function superquick on impact.
 - b. Verify setting prior to firing. Selector slot should be aligned with SQ-mark.
2. Delay setting
 - a. Turn selector slot in clockwise direction until slot is aligned with D-mark.
 - b. Use coin or flat tip screwdriver to change settings.

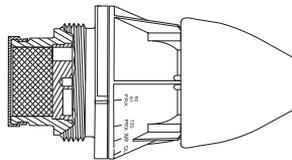
M783 Point Detonating/Delay (PD/DLY) Fuze

Figure 14. M783 PD/DLY Fuze.

1. Fuze will be set by hand.
2. Set fuze by rotating fuze head until correct marking (IMP or DLY) is over the index line.

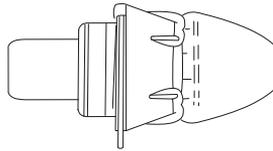
M781 Practice Fuze

Figure 15. M781 Practice Fuze.

1. This fuze only functions superquick on impact.
2. Remove safety/packing clip from fuze just prior to firing.
3. This fuze has dummy multi-option PRX/NSB/IMP/DLY settings (for practice only).

RESETTING FUZES**M776 MTSQ Fuze**

1. Rotate head of fuze (counterclockwise) until safe line (S)/inverted triangle of the time scale is aligned with the index line of the fuze body.
2. Replace safety wires.

M734 Multi-Option Fuze

Rotate fuze head (in counterclockwise direction) until PRX marking is over index line.

M734A1 Multi-Option Fuze

Rotate fuze head (in counterclockwise direction) until 120 PRX marking is over index line.

M745 PD Fuze

No resetting required.

M935 PD Fuze

Align selector slot with SQ-mark.

M783 PD/DLY Fuze

Rotate fuze head (in counterclockwise direction) until 120 PRX marking is over index line.

M781 Practice Fuze

No resetting required.

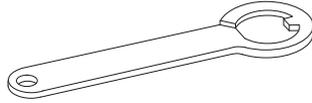
FUZE SETTER

Figure 16. Fuze Setter.

1. Sets DM93/M776 fuze.
2. Always turn wrench counterclockwise.

END OF WORK PACKAGE

OPERATOR
PROPELLING CHARGES

INITIAL SETUP:

Not Applicable

IDENTIFICATION

Table 1. Models of Propelling Charges.

Model Number	Number of Increments	Type of Container	Type of Propellant
N/A (Used on M57, M68, and M91 cartridges)	1 brown 2 blue 4 white	Cloth bags (donut shaped)	M8M sheets (manufactured by Israel Military Ind.)
M230	4	Nitrocellulose/fiber containers (horseshoe shaped)	M45
M233	4	Nitrocellulose/fiber containers (horseshoe shaped)	M47
M234	4	Nitrocellulose/fiber containers (horseshoe shaped)	M47

IDENTIFICATION - Continued

Table 2. Use of Propelling Charges.

Mortar Cartridge	Charge	Make Up of Charge Left on Round
HE, M933, M933A1	0	Ignition cartridge only
HE, M934, M934A1	1	Ignition cartridge and 1 increment
WP, XM929, M929	2	Ignition cartridge and 2 increments
ILLUM, M930	3	Ignition cartridge and 3 increments
IR ILLUM, M983	4	Ignition cartridge and 4 increments
FULL RANGE PRAC, M931		
HE, M57	0	1 brown charge
WP, M68	1	1 brown and 1 blue charge
	2	1 brown and 2 blue charges
	4	1 brown, 2 blue, and 1 white charges
	6	1 brown, 2 blue, and 2 white charges
	8	1 brown, 2 blue, and 3 white charges
	10	1 brown, 2 blue, and 4 white charges
ILLUM, M91	2	1 brown and 2 blue charges
	4	1 brown, 2 blue, and 1 white charges
	6	1 brown, 2 blue, and 2 white charges
	8	1 brown, 2 blue, and 3 white charges
	10	1 brown, 2 blue, and 4 white charges

ADJUSTMENT**WARNING**

Propelling charges are not interchangeable. Do not substitute one model for another. Do not mix lots.

Reposition remaining propellant increments toward rear of fin assembly for most effective ignition and flight of cartridge. Erratic or shortened flight may cause injury to personnel.

1. Cartridges are shipped with a complete propelling charge and primer/ignition cartridge.
2. Use firing table or graphical firing scales (12944306 for M57/M68, 12944305 for M91, 12972496 for M933/M934 HE, 13002218 for M933A1/M934A1 HE, 13011841 for M931 FRPC, 13005827 for M930 Illum, 13005843 for M983 IR Illum, and 12972477 for M929 WP) to determine proper charge for firing.
3. Place excess increments in an empty ammunition box and close the lid. Mark excess increments by lot number. Protect excess increments from accidental ignition by ensuring ammunition box containing excess increments is closed before firing.

UNUSED INCREMENTS**WARNING**

When burning excess increments:

- Burning area must be at least 100 meters from the nearest mortar position, parked vehicles, and ammunition piles.
- Burning area shall be cleared of all dead grass or brush within 30 meters.

NOTE

Check range and unit standard operating procedures (SOP) for disposal of excess increments.

1. Excess increments should be destroyed daily.
2. Destroy increments by burning.
3. Place increments on the ground. Form a row 4 to 6 in. (10 to 15 cm) wide and as long as necessary. Do not pile increments more than 1 to 2 in. (3 to 5 cm) high.
4. End train of increments with a row of single increments, followed by at least a meter of combustible material.
5. Ignite combustible material.
6. Allow ensuing fire to self-extinguish.

END OF WORK PACKAGE

CHAPTER 8

PARTS INFORMATION
FOR
M120A1 120MM MORTAR

FIELD MAINTENANCE**INTRODUCTION TO REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL)**

INTRODUCTION**Scope**

This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of field maintenance of the M120A1 120mm Mortar. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

General

In addition to the Introduction work package, this RPSTL is divided into the following work packages.

1. **Repair Parts List Work Packages.** Work packages containing lists of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. These work packages also include parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Sending units, brackets, filters, and bolts are listed with the component they mount on. Bulk materials are listed by item name in FIG. BULK at the end of the work packages. Repair parts kits are listed separately in their own functional group and work package. Repair parts for reparable special tools are also listed in a separate work package. Items listed are shown on the associated illustrations.
2. **Special Tools List Work Packages.** Work packages containing lists of special tools, special TMDE, and special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in the DESCRIPTION AND USABLE ON CODE (UOC) column). Tools that are components of common tool sets and/or Class VII are not listed.
3. **Cross-Reference Indexes Work Packages.** There are two cross-reference indexes work packages in this RPSTL: the National Stock Number (NSN) Index work package and the Part Number (P/N) Index work package. The National Stock Number Index work package refers you to the figure and item number. The Part Number Index work package refers you to the figure and item number.

INTRODUCTION - Continued

Explanation of Columns in the Repair Parts List and Special Tools List Work Packages

ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration.

SMR CODE (Column (2)). The SMR code containing supply/requisitioning information, maintenance level authorization criteria, and disposition instruction, as shown in the following breakout. This entry may be subdivided into 4 subentries, one for each service.

Table 1. SMR Code Explanation.

<u>Source Code</u>	<u>Maintenance Code</u>	<u>Recoverability Code</u>	
xx	x	xx	
1st two positions: How to get an item.	3rd position: Who can install, replace, or use the item.	4th position: Who can do complete repair* on the item.	5th position: Who determines disposition action on unserviceable items.

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

Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follow:

Source Code

Application/Explanation

PA
PB
PC
PD
PE
PF
PG
PH
PR
PZ

NOTE

Items coded PC are subject to deterioration.

Stock items; use the applicable NSN to requisition/request items with these source codes. They are authorized to the level indicated by the code entered in the third position of the SMR code.

<u>Source Code</u>	<u>Application/Explanation</u>
KD KF KB	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the third position of the SMR code. The complete kit must be requisitioned and applied.
MO- Made at service/ AMC level MF- Made at field/ ASB level MH- Made at below level sustainment level ML- Made at SRA/TASMG MD- Made at depot MG- Navy only	Items with these codes are not to be requisitioned/requested individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the bulk material group work package of the RPSTL. If the item is authorized to you by the third position code of the SMR code, but the source code indicates it is made at higher level, order the item from the higher level of maintenance.
AO- Assembled by service/AMC level AF- Assembled by field/ASB level AH- Assembled by below depot sustainment level AL- Assembled by SRA/TASMG AD- Assembled by depot AG- Navy only	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the third position of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.
XA	Do not requisition an XA-coded item. Order the next higher assembly. (Refer to NOTE below.)
XB	If an item is not available from salvage, order it using the CAGEC and part number.
XC	Installation drawings, diagrams, instruction sheets, field service drawings; identified by manufacturer's part number.
XD	Item is not stocked. Order an XD-coded item through local purchase or normal supply channels using the CAGEC and part number given, if no NSN is available.

NOTE

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 750-1.

INTRODUCTION - Continued**Explanation of Columns in the Repair Parts List and Special Tools List Work Packages - Continued**

Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

Third Position. The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to the following levels of maintenance:

<u>Maintenance Code</u>	<u>Application/Explanation</u>
O*	- Field (Service) level/AMC maintenance can remove, replace, and use the item.
F	- Field/ASB maintenance can remove, replace, and use the item.
H	- Below Depot Sustainment maintenance can remove, replace, and use the item.
L	- Specialized repair activity/TASMG can remove, replace, and use the item.
G	- Afloat and ashore intermediate maintenance can remove, replace, and use the item. (Navy only)
K	- Contractor facility can remove, replace, and use the item.
Z	- Item is not authorized to be removed, replaced, or used at any maintenance level.
D	- Depot can remove, replace, and use the item.

*NOTE - Army may use C in the third position. However, for joint service publications, Army will use O.

Fourth Position. The maintenance code entered in the fourth position tells you whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions).

NOTE

Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.

<u>Maintenance Code</u>	<u>Application/Explanation</u>
O -	Field (Service)/AMC is the lowest level that can do complete repair of the item.
F -	Field/ASB is the lowest level that can do complete repair of the item.
H -	Below Depot Sustainment is the lowest level that can do complete repair of the item.
L -	Specialized repair activity/TASMG is the lowest level that can do complete repair of the item.
D -	Depot is the lowest level that can do complete repair of the item.
G -	Both afloat and ashore intermediate levels are capable of complete repair of the item. (Navy only)
K -	Complete repair is done at contractor facility.
Z -	Nonreparable. No repair is authorized.
B -	No repair is authorized. No parts or special tools are authorized for maintenance of a "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

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

<u>Recoverability Code</u>	<u>Application/Explanation</u>
Z -	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the third position of the SMR code.
O -	Reparable item. When uneconomically repairable, condemn and dispose of the item at the service/AMC level.
F -	Reparable item. When uneconomically repairable, condemn and dispose of the item at the field/ASB level.
H -	Reparable item. When uneconomically repairable, condemn and dispose of the item at the below depot sustainment level.
D -	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item are not authorized below depot level.
L -	Reparable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA) or theater aviation sustainment maintenance group (TASMG).
A -	Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.
G -	Field level repairable item. Condemn and dispose at either afloat or ashore intermediate level. (Navy only)
K -	Reparable item. Condemnation and disposal to be performed at contractor facility.

INTRODUCTION - Continued**Explanation of Columns in the Repair Parts List and Special Tools List Work Packages - Continued**

NSN (Column (3)). The NSN for the item is listed in this column.

CAGEC (Column (4)). The Commercial and Government Entity Code (CAGEC) is a five-digit code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.

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

NOTE

When you use an NSN to requisition an item, the item you receive may have a different part number from the number listed.

DESCRIPTION AND USABLE ON CODE (UOC) (Column (6)). This column includes the following information:

1. The federal item name and, when required, a minimum description to identify the item.
2. Part numbers of bulk materials are referenced in this column in the line entry to be manufactured or fabricated.
3. Hardness Critical Item (HCI). A support item that provides the equipment with special protection from electromagnetic pulse (EMP) damage during a nuclear attack.
4. The statement END OF FIGURE appears just below the last item description in column (6) for a given figure in both the repair parts list and special tools list work packages.

QTY (Column (7)). The QTY (quantity per figure) column indicates the quantity of the item used in the breakout shown on the illustration/figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column instead of a quantity indicates that the quantity is variable and quantity may change from application to application.

Explanation of Cross-Reference Indexes Work Packages Format and Columns

1. National Stock Number (NSN) Index Work Package. NSNs in this index are listed in National Item Identification Number (NIIN) sequence.

STOCK NUMBER Column. This column lists the NSN in NIIN sequence. The NIIN consists of the last nine digits of the NSN. When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number. For example, if the NSN is 5385-01-574-1476, the NIIN is 01-574-1476.

FIG. Column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the repair parts list and special tools list work packages.

ITEM Column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

2. Part Number (P/N) Index Work Package. Part numbers in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

PART NUMBER Column. Indicates the part number assigned to the item.

FIG. Column. This column lists the number of the figure where the item is identified/located in the repair parts list and special tools list work packages.

ITEM Column. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

Special Information

UOC. The UOC appears in the lower left corner of the Description Column heading. Usable on codes are shown as "UOC:..." in the Description Column (justified left) on the first line under the applicable item/nomenclature. Uncoded items are applicable to all models. Identification of the UOCs used in the RPSTL is:

<u>Code</u>	<u>Used On</u>
BU1	M120A1

Fabrication Instructions. Bulk materials required to manufacture items are listed in the bulk material functional group of this RPSTL. Part numbers for bulk materials are also referenced in the Description Column of the line item entry for the item to be manufactured/fabricated. Detailed fabrication instructions for items source coded to be manufactured or fabricated are found in the appropriate maintenance work packages of this manual.

INTRODUCTION - Continued**Explanation of Cross-Reference Indexes Work Packages Format and Columns - Continued**

Index Numbers. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the NSN / Part Number (P/N) index work packages and the bulk material list in the repair parts list work package.

How To Locate Repair Parts

1. When NSN or Part Numbers Are Not Known.

First. Using the table of contents, determine the assembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and lists are divided into the same groups.

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

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

Fourth. Look in the repair parts list work packages for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

2. When NSN Is Known.

First. If you have the NSN, look in the STOCK NUMBER column of the NSN index work package. The NSN is arranged in NIIN sequence. Note the figure and item number next to the NSN.

Second. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

3. When Part Number Is Known.

First. If you have the part number and not the NSN, look in the PART NUMBER column of the part number index work package. Identify the figure and item number.

Second. Look up the item on the figure in the applicable repair parts list work package.

END OF WORK PACKAGE

FIELD MAINTENANCE

**120MM MORTAR, M120A1
12901293**

REPAIR PARTS LIST

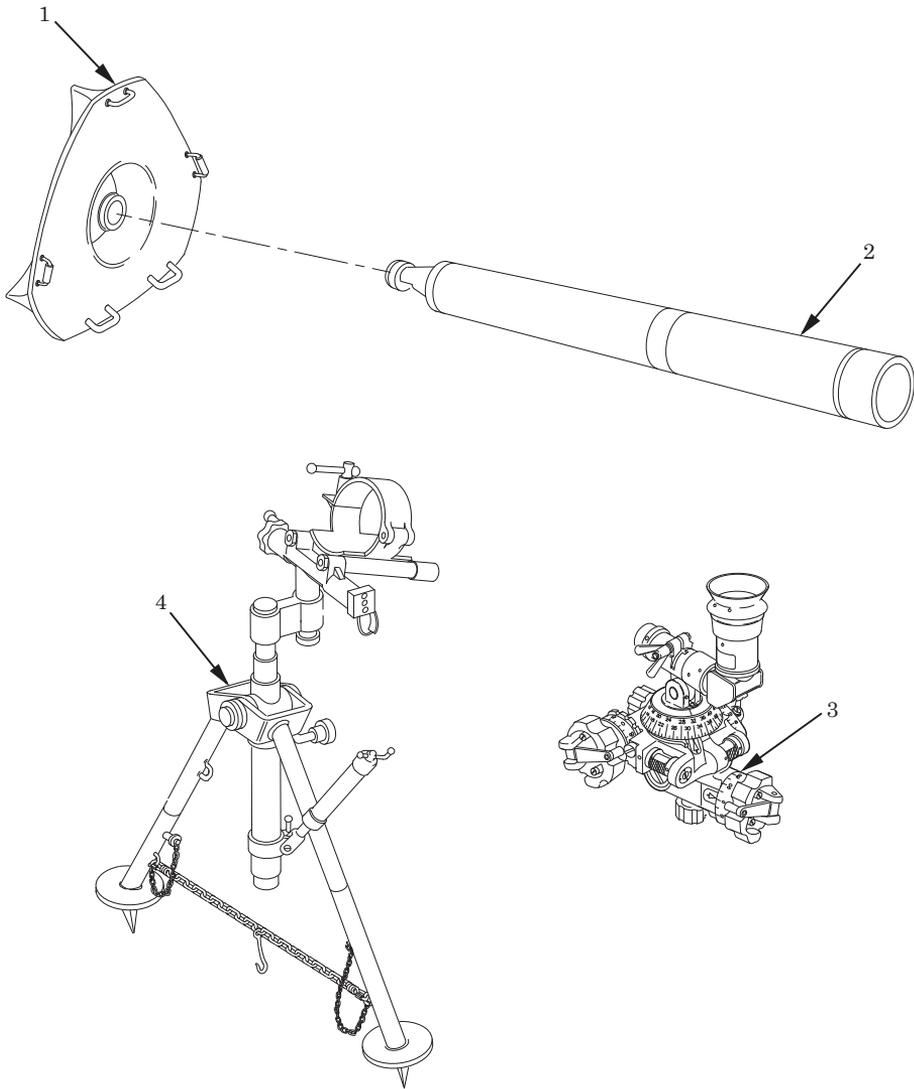


Figure 1. M120A1 120mm Mortar 12901293.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 00						
FIG. 1 120MM MORTAR, M120A1 12901293						
1	PAODD	1015-01-553-2118	1NUW7	12901321	BASEPLATE,MORTAR:M9 (FOR ASSY BREAKDOWN SEE FIG. 2).....	1
					UOC:BU1	
2	PAODD	1015-01-522-2630	1NUW7	12901195	CANNON,120MM:M298 (FOR ASSY BREAKDOWN SEE FIG. 3).....	1
					UOC:BU1	
3	AOODA		19200	9356182	SIGHT UNIT,M67 (FOR ASSY BREAKDOWN SEE FIG. 15).....	1
					UOC:BU1	
4	PAOFF	1015-01-521-1616	19206	12901000	MOUNT,MORTAR:M191 (FOR ASSY BREAKDOWN SEE FIG. 5).....	1
					UOC:BU1	
END OF FIGURE						

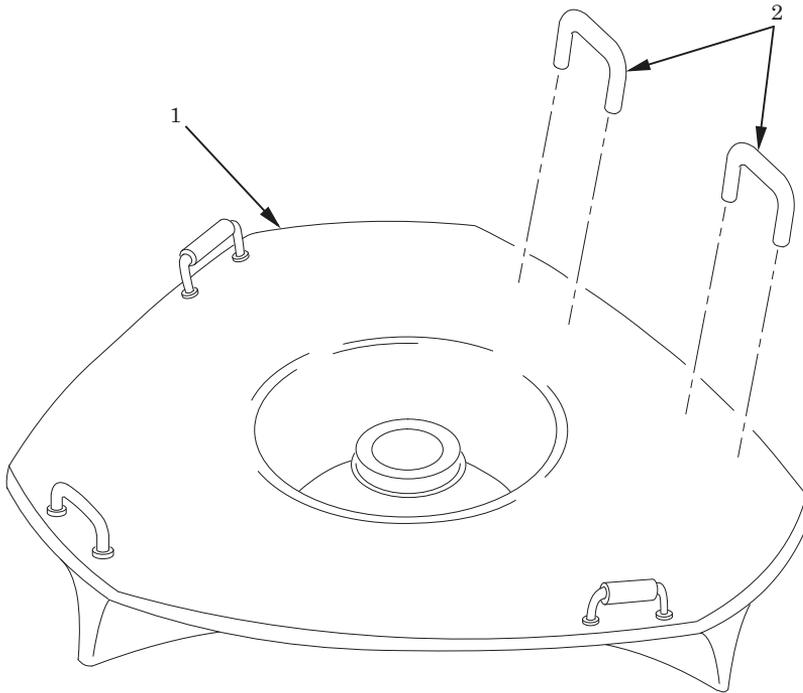


Figure 2. M9 Mortar Baseplate 12901321.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 01	
					FIG. 2 BASEPLATE,MORTAR: M9 12901321	
1	XAODD		19206	12576881	BASEPLATE,MORTAR UOC:BU1	1
2	PADZZ	5340-01-558-8739	1NUW7	12901322	HANDLE,BOW UOC:BU1	2
					END OF FIGURE	

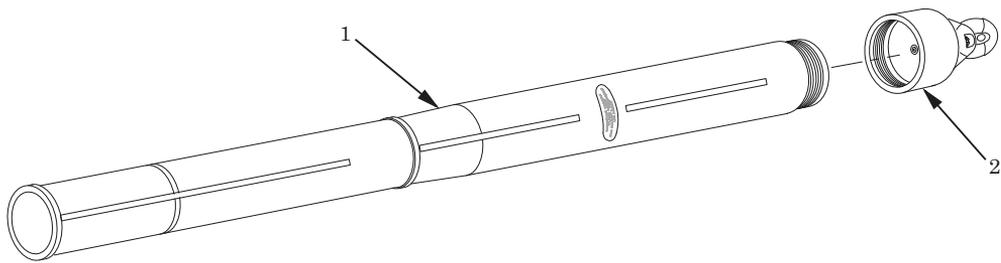


Figure 3. M298 120mm Cannon 12901195.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 02	
					FIG. 3 CANNON, 120MM: M298 12901195	
1	XAFZA		19206	12577299-1	TUBE,CANNON..... UOC:BU1	1
2	XAODD		1NUW7	12901190	BREECH ASSEMBLY (FOR ASSY BREAKDOWN SEE FIG. 4)..... UOC:BU1	1
					END OF FIGURE	

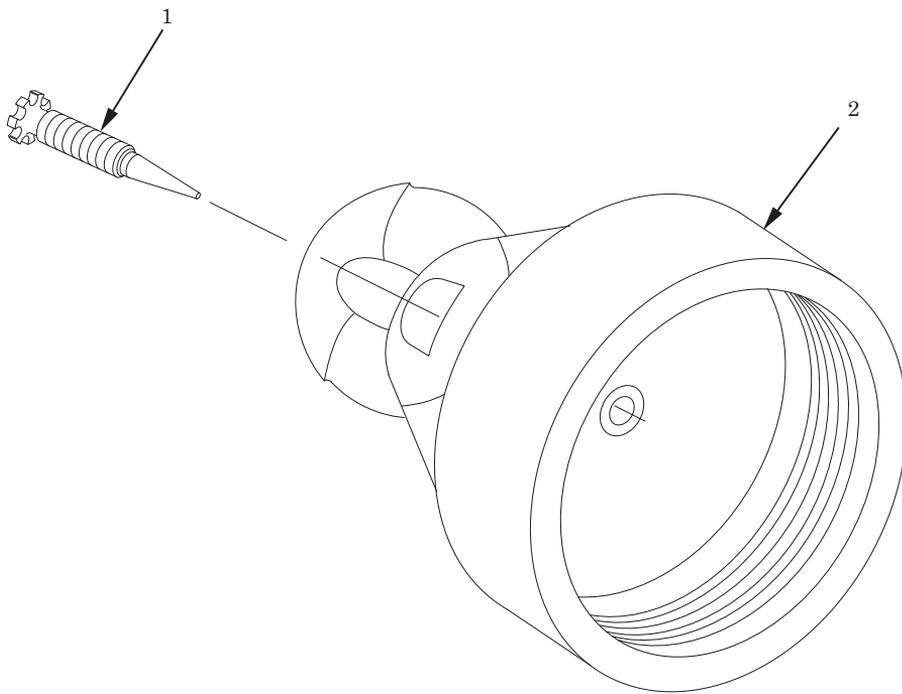


Figure 4. Breech Assembly 12901190.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 0201	
					FIG. 4 BREECH ASSEMBLY 12901190	
1	PACZZ	1015-01-522-0775	1NUW7	12901192	PIN,FIRING..... UOC:BU1	3
2	XACDD		19206	12901191	CAP,BREECH UOC:BU1	1
					END OF FIGURE	

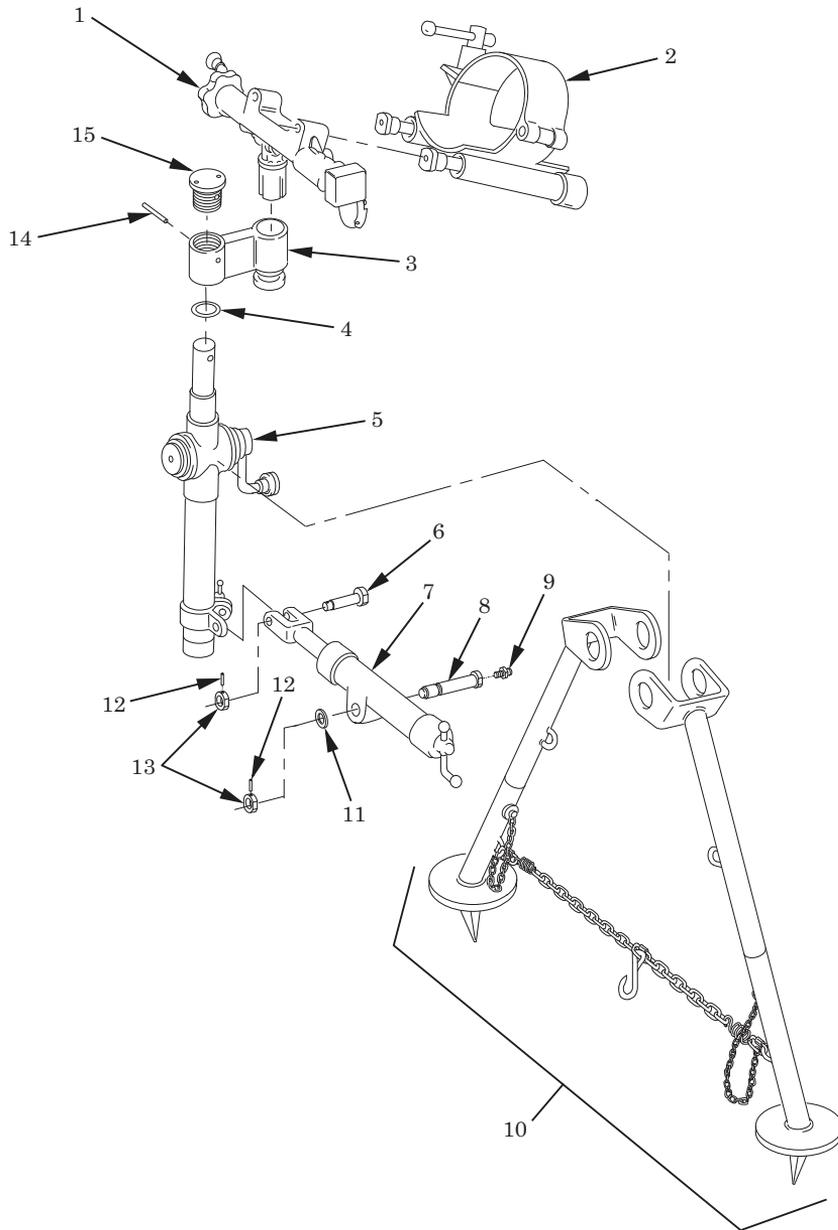


Figure 5. M191 Mortar Mount 12901000.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 03						
FIG. 5 MOUNT, MORTAR: M191 12901000						
1	PAFFF	1015-01-292-5243	19206	12577019	TRAVERSING GEAR ASSEMBLY,MORTAR,120MM (FOR ASSY BREAKDOWN SEE FIG. 12).....	1
					UOC:BU1	
2	PAFFF	1015-01-301-3213	19206	12577113	BUFFER MECHANISM (FOR ASSY BREAKDOWN SEE FIG. 9).....	1
					UOC:BU1	
3	PAFFF	1015-01-387-0583	19206	12901124	TRAVERSING EXTENSION ASSEMBLY (FOR ASSY BREAKDOWN SEE FIG. 14).....	1
					UOC:BU1	
4	PAFZZ	5330-01-286-0463	19206	12577319	PACKING,PREFORMED	1
					UOC:BU1	
5	XAFFF		19206	12900901	ELEVATING MECHANISM, M121 (FOR ASSY BREAK- DOWN SEE FIG. 7).....	1
					UOC:BU1	
6	PAFZZ	5306-01-299-5923	19206	12577060	BOLT,SHOULDER.....	1
					UOC:BU1	
7	PAFFF	1015-01-292-9239	19206	12577039	CROSS LEVELING MECHANISM (FOR ASSY BREAKDOWN SEE FIG. 8).....	1
					UOC:BU1	
8	PAFZZ	4730-01-429-8354	19206	12577050	PIVOT SHAFT.....	1
					UOC:BU1	
9	PAFZZ	4730-00-050-4203	96906	MS15001-1	FITTING,LUBRICATION	1
					UOC:BU1	
10	XDFFF		19206	12900891	BIPOD LEG ASSEMBLY, M121 (FOR ASSY BREAK- DOWN SEE FIG. 6).....	1
					UOC:BU1	
11	PAFZZ	5310-01-286-0475	19206	12577055	WASHER,FLAT.....	1
					UOC:BU1	
12	PAFZZ	5315-01-291-4573	D8286	DIN1481- 3X18-B2D	PIN,SPRING.....	2
					UOC:BU1	
13	PAFZZ	5310-01-292-7757	19206	12577042	NUT,PLAIN,ROUND	2
					UOC:BU1	
14	PAFZZ	5315-01-388-2294	81349	D63464/ 7-06050	PIN,GROOVED,HEADLESS.....	1
					UOC:BU1	
15	PAFZZ	5365-01-304-5517	19206	12577112	BUSHING,MACHINE THREADED.....	1
					UOC:BU1	
END OF FIGURE						

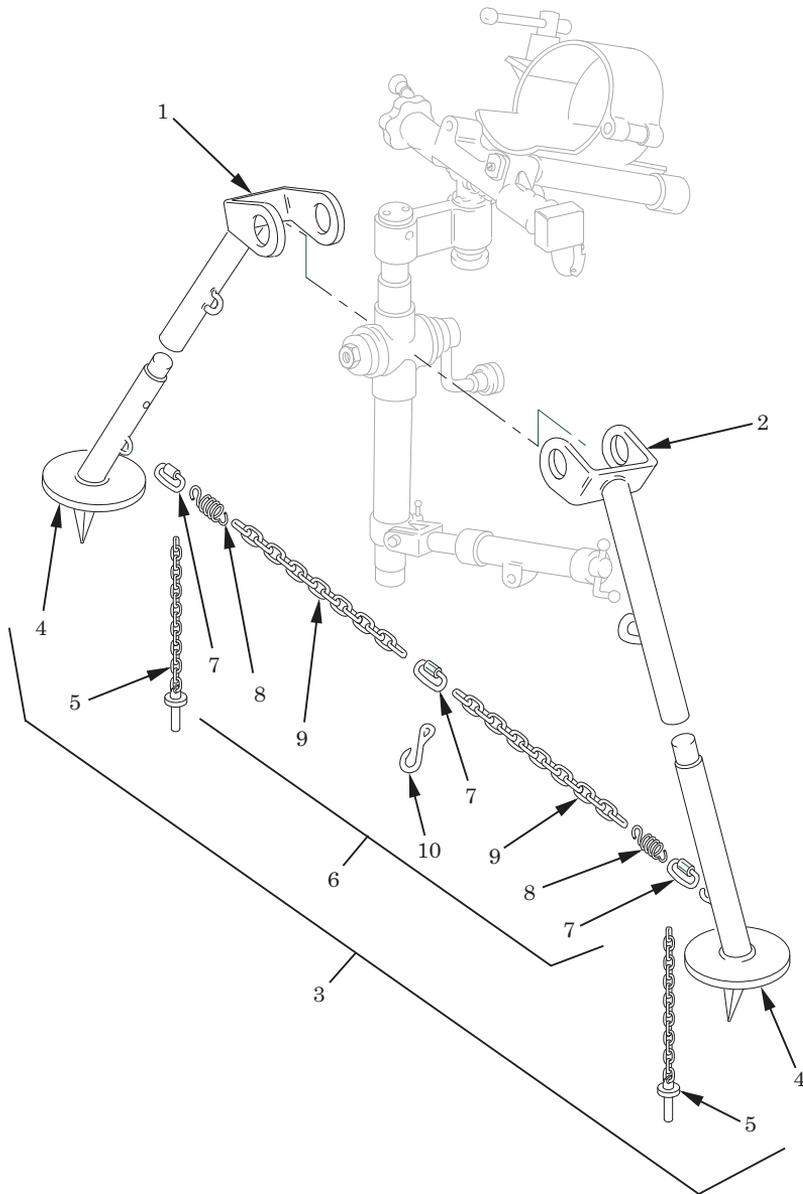
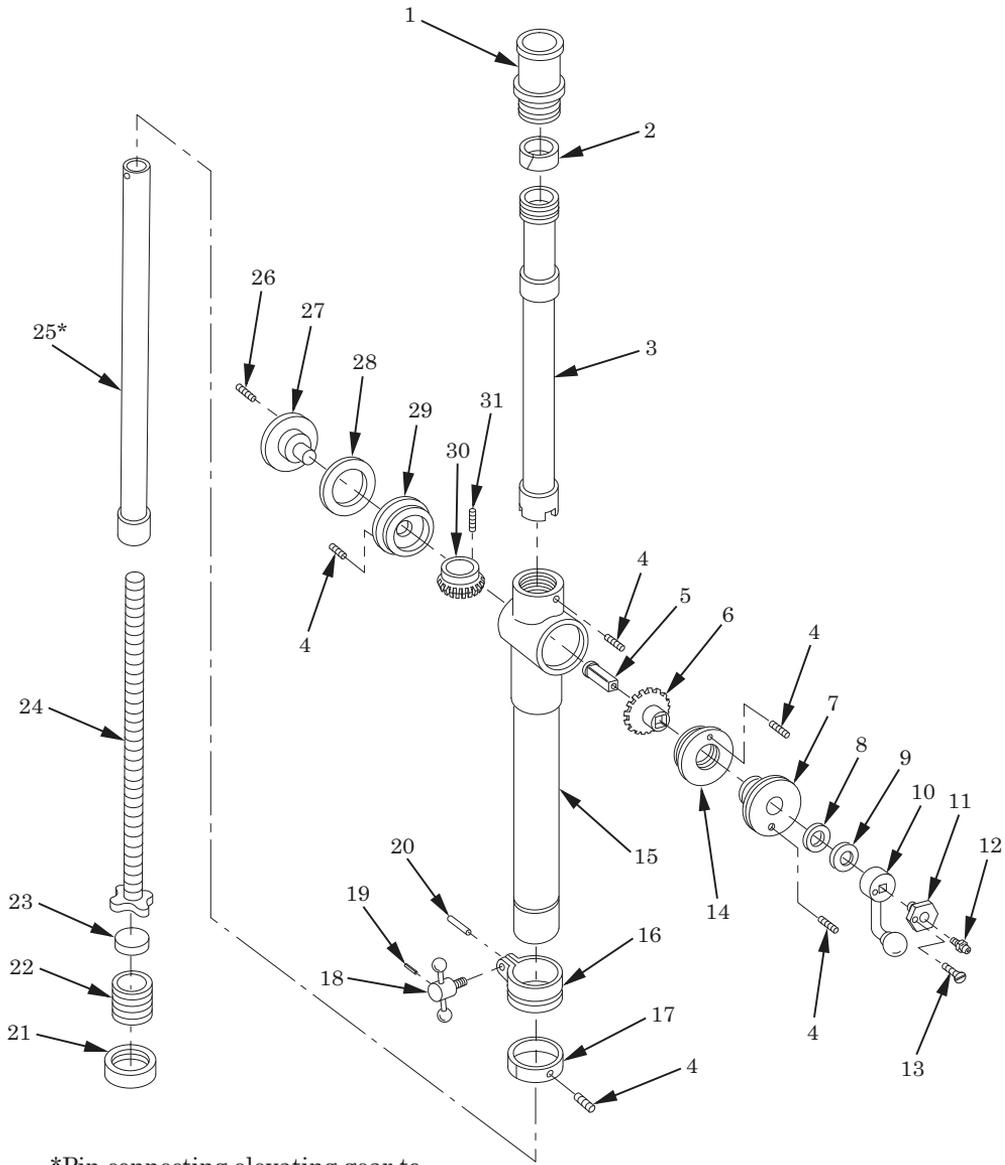


Figure 6. M191 Bipod Leg Assembly 12900891,
Bipod Leg Extension Assembly 12900904,
and Chain Assembly 12901120.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 0301, 030101, AND 03010101	
					FIG. 6 M191 BIPOD LEG ASSEMBLY 12900891, BIPOD LEG EXTENSION ASSEMBLY 12900904, AND CHAIN ASSEMBLY 12901120	
1	PAFZZ	1015-01-298-8501	19206	12900898	LEG,MORTAR MOUNT, RIGHT.....	1
					UOC:BU1	
2	PAFZZ	1015-01-299-8806	19206	12900893	LEG,MORTAR MOUNT, LEFT.....	1
					UOC:BU1	
3	PAOOO	1015-01-292-5242	19206	12900904	BIPOD LEG EXTENSION ASSEMBLY.....	1
					UOC:BU1	
4	PAOZZ	1015-01-312-6330	19206	12900905	.MORTAR MOUNT LEG SECTION.....	2
					UOC:BU1	
5	PAOZZ	5315-01-386-3977	19206	12901110	.PIN ASSEMBLY,LOCKING.....	2
					UOC:BU1	
6	PAOOO	4010-01-388-8355	19206	12901120	.CHAIN ASSEMBLY.....	1
					UOC:BU1	
7	PAOZZ	4010-01-391-3407	19206	12901116	..RING,CONNECTING, ROUND.....	3
					UOC:BU1	
8	PAOZZ	5360-01-476-6489	19206	12577018	..SPRING.....	2
					UOC:BU1	
9	PAOZZ	4010-01-476-6486	19206	12577015	..CHAIN.....	2
					UOC:BU1	
10	PAOZZ	4030-01-332-4568	19206	12577017	..HOOK,CHAIN,S.....	1
					UOC:BU1	
					END OF FIGURE	



*Pin connecting elevating gear to
traversing extension assembly
supplied with traversing extension.

Figure 7. M121 Elevating Mechanism 12900901.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 0302						
FIG. 7 ELEVATING MECHANISM, M121 12900901						
1	PAFZZ	3040-01-303-1341	19206	12577081	HOUSING,MECHANICAL DRIVE.....	1
2	PAFZZ	5330-01-325-9971	19206	12577430	FELT,MECHANICAL PREFORMED.....	1
3	PAFZZ	1015-01-304-0898	19206	12577067	SLEEVE,ELEVATING SCREW,OUTER.....	1
4	PAFZZ	5305-12-313-0952	D8286	DIN915- M5X8-45H	SETSCREW.....	5
5	PAFZZ	5310-01-295-2516	19206	12577100	NUT,SLEEVE.....	1
6	PAFZZ	3020-01-299-8835	19206	12577099	GEAR,BEVEL.....	1
7	PAFZZ	5365-01-304-5518	19206	12577073	BUSHING,MACHINE THREAD.....	1
8	PAFZZ	5310-01-296-6071	19206	12577056	WASHER,FLAT.....	1
9	PAFZZ	5310-12-301-1728	D8286	DIN2093- B31,5-A3	WASHER,SPRING TENSION....	1
10	PAFZZ	5340-01-387-8910	19206	12901118	CRANK,HAND.....	1
11	PAFZZ	5305-01-304-6616	19206	12577087	SCREW,MACHINE THREAD....	1
12	PAFZZ	4730-00-050-4203	96906	MS15001-1	FITTING,LUBRICATION.....	1
13	PAFZZ	5305-01-303-5199	19206	12577066	SCREW,EXTERNALLY RELIEVED BODY.....	1
14	PAFZZ	3040-01-303-1339	19206	12577077	HOUSING,MECHANICAL DRIVE.....	1
15	PAFZZ	1015-01-418-2237	19206	12577095	HOUSING,ELEVATING SCREW,MAIN.....	1
16	PAFZZ	5340-01-295-1827	19206	12900902	CLAMP,LOOP.....	1
17	PAFZZ	5310-01-295-2514	19206	12577094	NUT,PLAIN,ROUND.....	1
18	PAFZZ	5340-01-465-4554	19206	12901169	HANDLE,MANUAL CONTROL.....	1

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
19	PAOZZ	5315-01-518-4181	96906	DOD-P- 63464/1A-0	PIN,GROOVED UOC:BU1	1
20	PAFZZ	5315-01-291-4573	15526	DIN1481- 3X16-B2D	PIN,SPRING..... UOC:BU1	1
21	PAFZZ	5310-01-295-2515	19206	12577079	NUT,PLAIN,ROUND..... UOC:BU1	1
22	PAFZZ	5365-01-302-4156	19206	12577075	PLUG,MACHINE THREAD..... UOC:BU1	1
23	PAFZZ	3120-01-300-9512	19206	12577080	BEARING,WASHER, THRUST UOC:BU1	1
24	PAFZZ	5305-01-302-0072	19206	12577076	SCREW,ELEVATING..... UOC:BU1	1
25	PAFZZ	1015-01-304-0899	19206	12577068	SLEEVE,ELEVATING SCREW,INNER..... UOC:BU1	1
26	PAFZZ	5305-01-286-0466	S3151	93-81	SETSCREW..... UOC:BU1	1
27	PAFZZ	5340-01-295-5384	19206	12577071	PLUG,PROTECTIVE,DUST AND MOISTURE SEAL UOC:BU1	1
28	PAFZZ	5310-01-292-7759	19206	12577083	WASHER,FLAT UOC:BU1	1
29	PAFZZ	3040-01-303-1340	19206	12577084	HOUSING,MECHANICAL DRIVE..... UOC:BU1	1
30	PAFZZ	3020-01-299-9596	19206	12577086	GEAR,BEVEL..... UOC:BU1	1
31	PAFZZ	5305-01-286-0467	S3151	93-742	SETSCREW..... UOC:BU1	1

END OF FIGURE

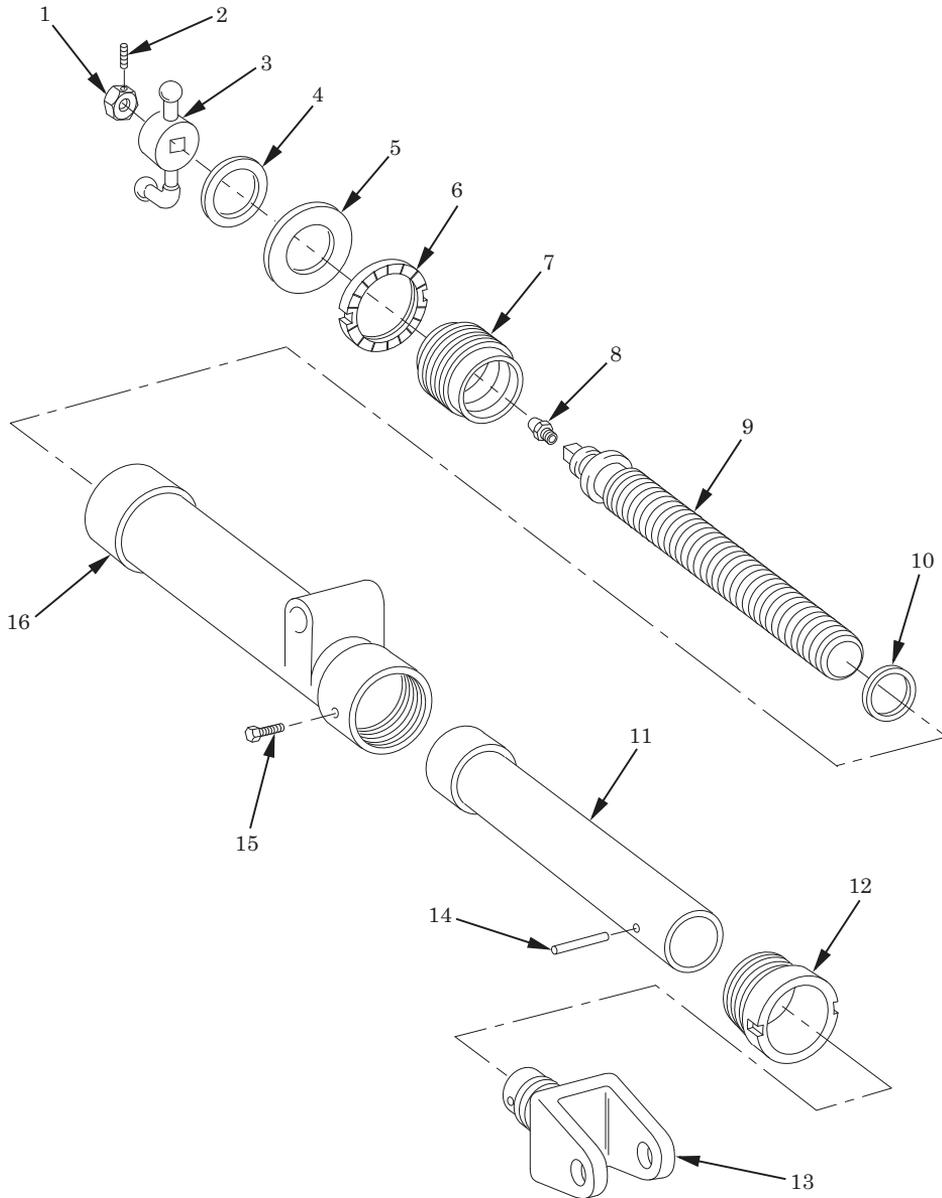


Figure 8. Cross Leveling Mechanism 12577039.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 0303						
FIG. 8 CROSS LEVELING MECHANISM 12577039						
1	PAFZZ	5310-01-285-7374	S3151	93-199	NUT,PLAIN,HEXAGON..... UOC:BU1	1
2	PAFZZ	5305-01-523-3246	I9008	ISO4027- M3X4-45H	SETSCREW UOC:BU1	1
3	PAFZZ	5340-01-388-3742	19206	12901117	CRANK,HAND UOC:BU1	1
4	PAFZZ	5310-12-301-1728	D8286	DIN2093- B31,5-A3	WASHER,SPRING TENSION.... UOC:BU1	1
5	PAFZZ	5310-01-296-6071	19206	12577056	WASHER,FLAT..... UOC:BU1	1
6	PAFZZ	5310-01-539-6127	19206	12901292	NUT,SERRATED UOC:BU1	1
7	PAFZZ	5365-01-305-3144	19206	12577052	BUSHING,MACHINE THREAD UOC:BU1	1
8	PAFZZ	4730-00-050-4203	96906	MS15001-1	FITTING,LUBRICATION UOC:BU1	1
9	PAFZZ	5305-01-301-3212	19206	12577057	SCREW,CROSS LEVELING UOC:BU1	1
10	PAFZZ	5310-01-286-0474	19206	12577051	WASHER,FLAT..... UOC:BU1	1
11	PAFZZ	1015-01-304-9001	19206	12577047	SLEEVE,HOUSING..... UOC:BU1	1
12	PAFZZ	5365-01-301-8242	19206	12577048	BUSHING,MACHINE THREAD UOC:BU1	1
13	PAFZZ	3040-01-302-2648	19206	12577053	BRACKET,EYE, NONROTATING SHAFT..... UOC:BU1	1
14	PAFZZ	5315-01-388-4147	81349	D63477/ 8-135P	PIN,SPRING..... UOC:BU1	1
15	PAFZZ	5305-01-303-9275	19206	12577041	SCREW,EXTERNALLY RELIEVED BODY..... UOC:BU1	1
16	XAFZZ		19206	12577058	HOUSING,MECHANICAL DRIVE..... UOC:BU1	1
END OF FIGURE						

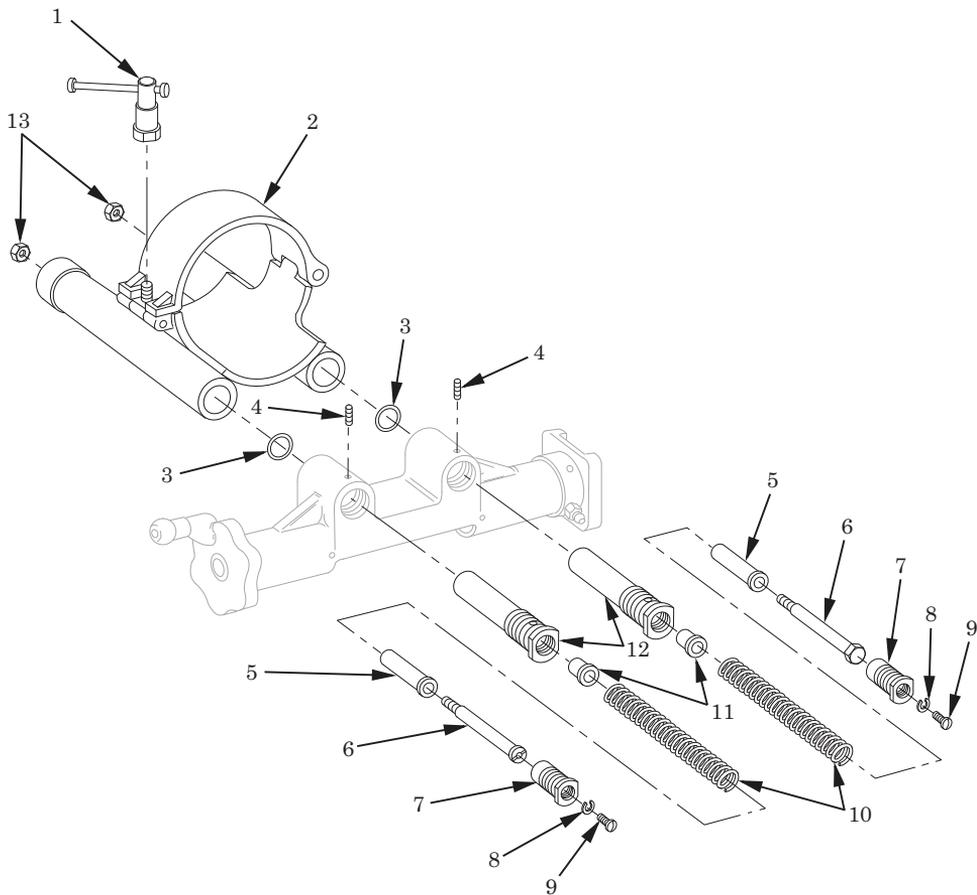


Figure 9. Buffer Mechanism 12577113.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 0304						
FIG. 9 BUFFER MECHANISM 12577113						
1	PAFFF	5340-01-304-6584	19206	12577119	HANDLE ASSEMBLY, CLAMP (FOR ASSY BREAK- DOWN SEE FIG. 11).....	1
2	PAFFF	1015-01-304-6580	19206	12577118	UOC:BU1 BUFFER HOUSING ASSEMBLY (FOR ASSY BREAKDOWN SEE FIG. 10).....	1
3	PAFZZ	5330-01-286-0463	19206	12577319	UOC:BU1 PACKING,PREFORMED	2
4	PAFZZ	5305-01-521-4859	I9008	ISO4028- 10.9-M6X	UOC:BU1 SETSCREW	2
5	PAFZZ	3120-01-300-0897	19206	12577140	UOC:BU1 BUSHING,SLEEVE	2
6	PAFZZ	5306-01-513-3322	19206	12901164	UOC:BU1 BOLT,INTERNAL WRENCHING.....	2
7	PAFZZ	5365-01-292-0955	19206	12577117	UOC:BU1 PLUG,MACHINE THREAD	2
8	PAFZZ	5310-00-582-5965	96906	MS35338- 44	UOC:BU1 WASHER,LOCK.....	2
9	PAFZZ	5305-00-866-0444	96906	MS35366- 76	UOC:BU1 SCREW,SLOTTED MACHINE ..	2
10	PAFZZ	5360-01-292-7778	19206	12577139	UOC:BU1 SPRING,HELICAL COMPRESSION	2
11	PAFZZ	5365-01-286-6308	19206	12577115	UOC:BU1 SPACER,SLEEVE.....	2
12	PAFZZ	3040-01-297-6580	19206	12577114	UOC:BU1 HOUSING,MECHANICAL DRIVE	2
13	PAFZZ	5310-01-286-0444	S3151	93-1386	UOC:BU1 NUT,PLAIN,HEXAGON.....	2
END OF FIGURE						

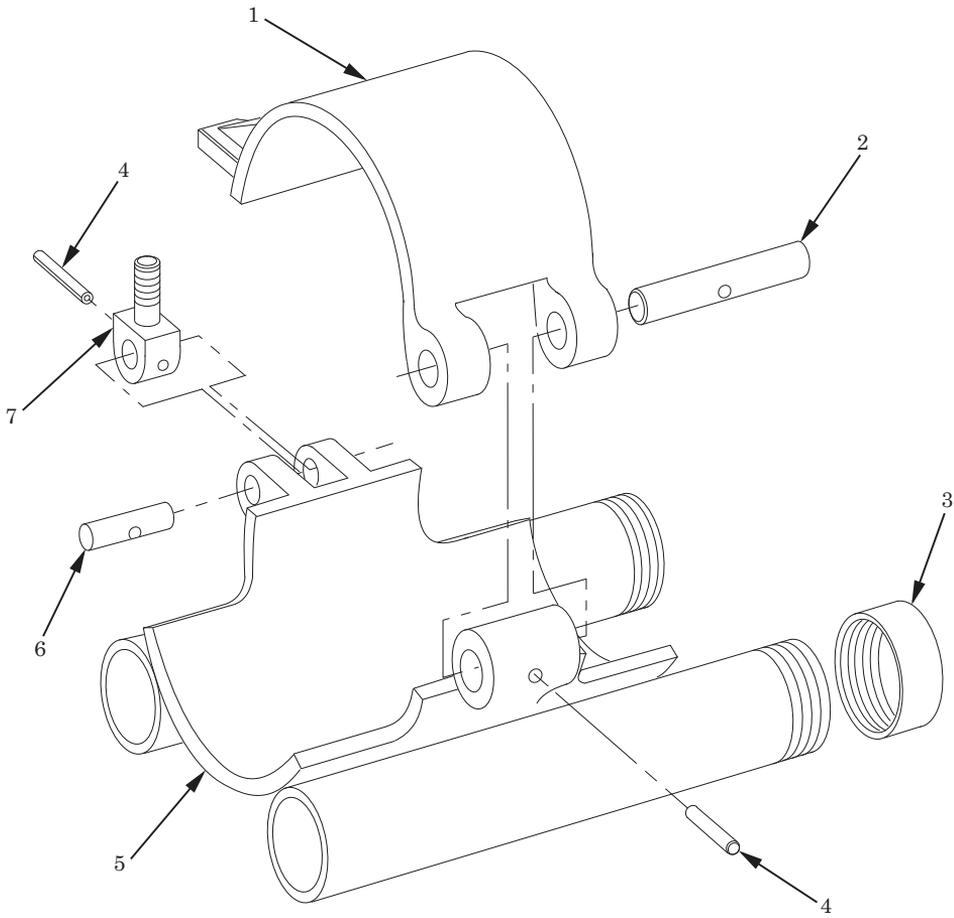


Figure 10. Buffer Housing Assembly 12577118.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 030401	
					FIG. 10 BUFFER HOUSING ASSEMBLY 12577118	
1	PAFZZ	1015-01-301-3214	19206	12577134	COLLAR,SECTION,BARREL UOC:BU1	1
2	PAFZZ	5315-01-386-3481	19206	12901107	PIN.STRAIGHT,HEADLESS UOC:BU1	1
3	PAFZZ	5340-01-301-8241	19206	12577131	CAP,PROTECTIVE, DUST AND MOISTURE SEAL UOC:BU1	2
4	PAFZZ	5315-01-385-6101	81349	D63477/ 1-133C	PIN,SPRING..... UOC:BU1	2
5	XAFZZ		19206	12901132	HOUSING,BUFFER UOC:BU1	1
6	PAFZZ	5315-01-386-3492	19206	12901106	PIN,STRAIGHT,HEADLESS UOC:BU1	1
7	PAFZZ	5306-01-386-3949	19206	12901098	BOLT,EYE UOC:BU1	1
					END OF FIGURE	

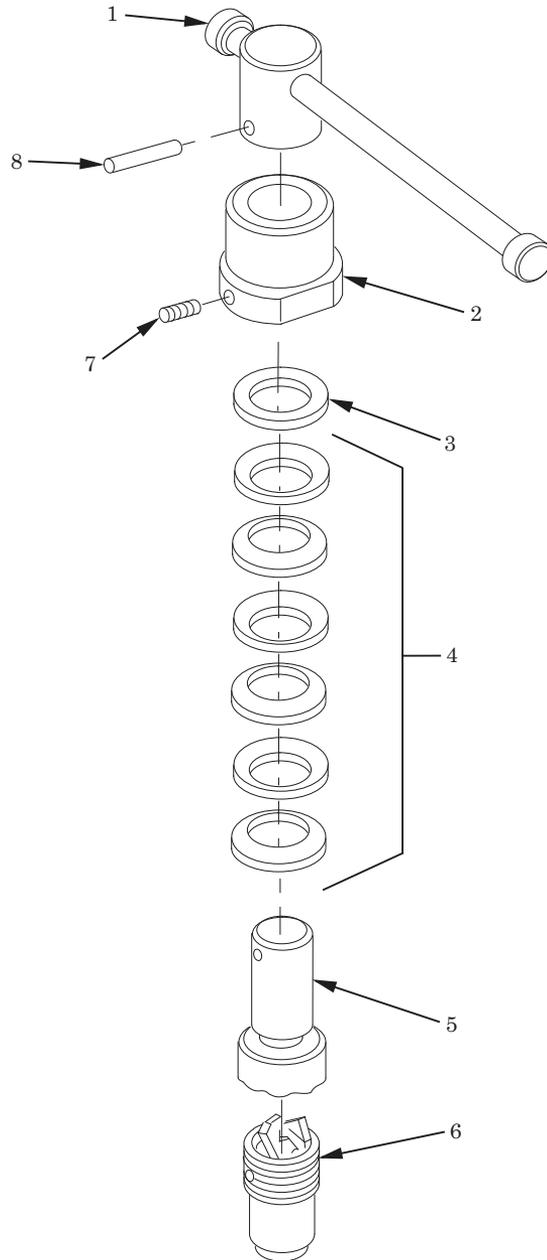


Figure 11. Clamp Handle Assembly 12577119.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 030402						
FIG. 11 CLAMP HANDLE ASSEMBLY 12577119						
1	PAFZZ	5340-01-304-6585	19206	12577126	HANDLE,MANUAL CONTROL.....	1
					UOC:BU1	
2	PAFZZ	5310-01-289-5273	19206	12577122	NUT,SLEEVE.....	1
					UOC:BU1	
3	PAFZZ	5310-01-298-8470	19206	12577125	WASHER,FLAT.....	1
					UOC:BU1	
4	PAFZZ	5310-12-156-4799	D8286	DIN2093- A28	WASHER,SPRING TENSION....	6
					UOC:BU1	
5	PAFZZ	3010-01-299-8855	19206	12577123	CLUTCH,HALF,POSITIVE.....	1
					UOC:BU1	
6	PAFZZ	5310-01-306-1167	19206	12577120	NUT,SELF-LOCKING, ROUND	1
					UOC:BU1	
7	PAFZZ	5305-12-313-0952	D8286	DIN915- M5X8-45H	SETSCREW	1
					UOC:BU1	
8	PAFZZ	5315-01-385-6112	81349	D63464/ 1-06026	PIN,GROOVED,HEADLESS.....	1
					UOC:BU1	
END OF FIGURE						

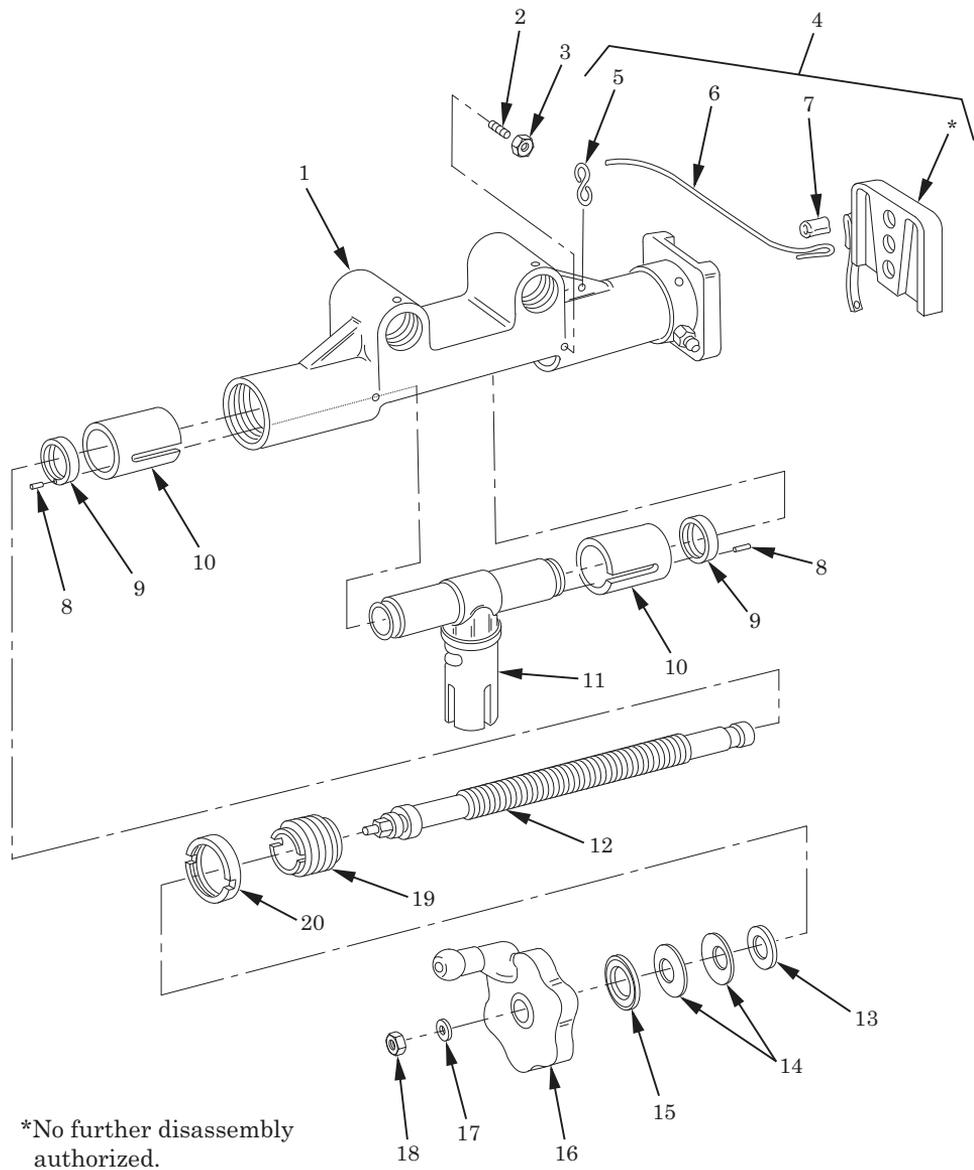


Figure 12. Traversing Gear Assembly 12577019 and Cover, Sightunit Adapter 12576976.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 0305 AND 030501						
FIG. 12 TRAVERSING GEAR ASSEMBLY 12577019 AND COVER, SIGHTUNIT ADAPTER 12576976						
1	PAFDD	1015-01-387-0589	19206	12901123	HOUSING ASSEMBLY, TRAVERSING GEAR (FOR ASSY BREAKDOWN SEE FIG. 13) UOC:BU1	1
2	PAFZZ	5305-01-303-1319	19206	12577038	SETSCREW UOC:BU1	2
3	PAFZZ	5310-01-285-7373	S3151	93-399	NUT,PLAIN,HEXAGON..... UOC:BU1	2
4	PAOOO	1015-01-285-0141	19206	12576976	COVER,SIGHTUNIT ADAPTER UOC:BU1	1
5	PAOZZ	4030-00-948-7315	96906	MS87006- 33	.HOOK,CHAIN,S..... UOC:BU1	1
6	PAOZZ	4010-01-005-4775	81349	MIL-W- 83420/3- 001	.WIRE ROPE,JACKETED UOC:BU1	1
7	PAOZZ	4030-01-114-3894	96906	MS51844- 23	.SWAGING SLEEVE..... UOC:BU1	2
8	PAFZZ	5305-01-521-3873	I9008	ISO4026- M2.5X4-1	SETSCREW UOC:BU1	2
9	PAFZZ	5310-01-304-6532	19206	12577031	NUT,PLAIN,ROUND UOC:BU1	2
10	PAFZZ	3120-01-300-6417	19206	12577032	BUSHING,SLEEVE UOC:BU1	2
11	PAFZZ	5310-01-302-0073	19206	12577036	NUT,TRAVERSING UOC:BU1	1
12	PAFZZ	5305-01-286-0479	19206	12577035	SCREW,TRAVERSING..... UOC:BU1	1
13	PAFZZ	5310-01-285-7403	S3151	93-1387	WASHER,FLAT..... UOC:BU1	1
14	PAFZZ	5310-12-311-3530	D8286	DIN2093- B40-A3P	WASHER,SPRING TENSION.... UOC:BU1	2
15	PAFZZ	5310-01-304-9810	19206	12577020	WASHER,BEVELED UOC:BU1	1
16	PAFZZ	5340-01-304-6597	19206	12577021	CRANK,HAND UOC:BU1	1
17	PAFZZ	5310-01-285-7402	S3151	93-1389	WASHER,FLAT..... UOC:BU1	1

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
18	PAFZZ	5310-01-264-9404	15526	DIN985- M8-A4C	NUT,SELF-LOCKING..... UOC:BU1	1
19	PAFZZ	5365-01-304-5516	19206	12577033	BUSHING,MACHINE THREAD..... UOC:BU1	1
20	PAFZZ	5310-01-304-6531	19206	12577034	NUT,PLAIN,ROUND..... UOC:BU1	1

END OF FIGURE

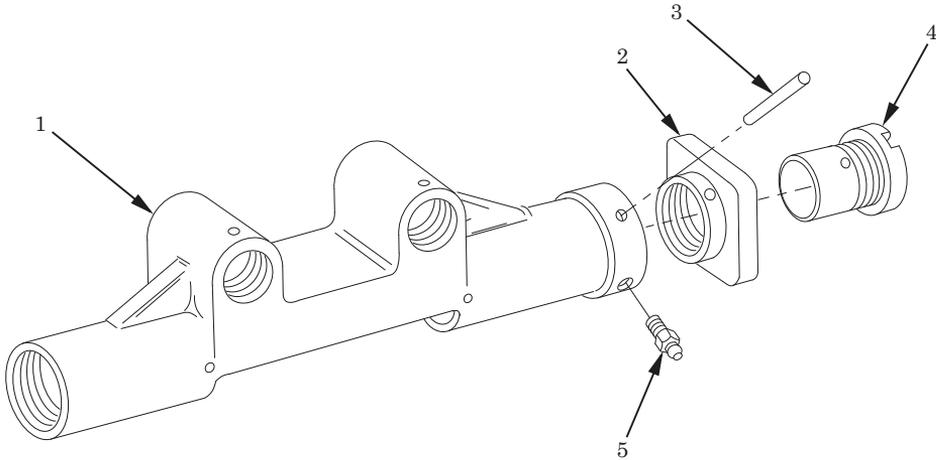


Figure 13. Traversing Gear Housing Assembly 12901123.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 030502						
FIG. 13 TRAVERSING GEAR HOUSING ASSEMBLY 12901123						
1	XADZZ		19206	12901122	HOUSING, TRAVERSING GEAR	1
2	PADZZ	1015-01-285-0140	19206	12577027	ADAPTER, SIGHT UNIT	1
3	PADZZ	5315-01-482-1800	81349	D63464/ 2-06070	PIN, GROOVED	1
4	PADZZ	5365-01-304-5519	19206	12577030	BUSHING, MACHINE THREAD	1
5	PAFZZ	4730-00-050-4203	96906	MS15001-1	FITTING, LUBRICATION	1
END OF FIGURE						

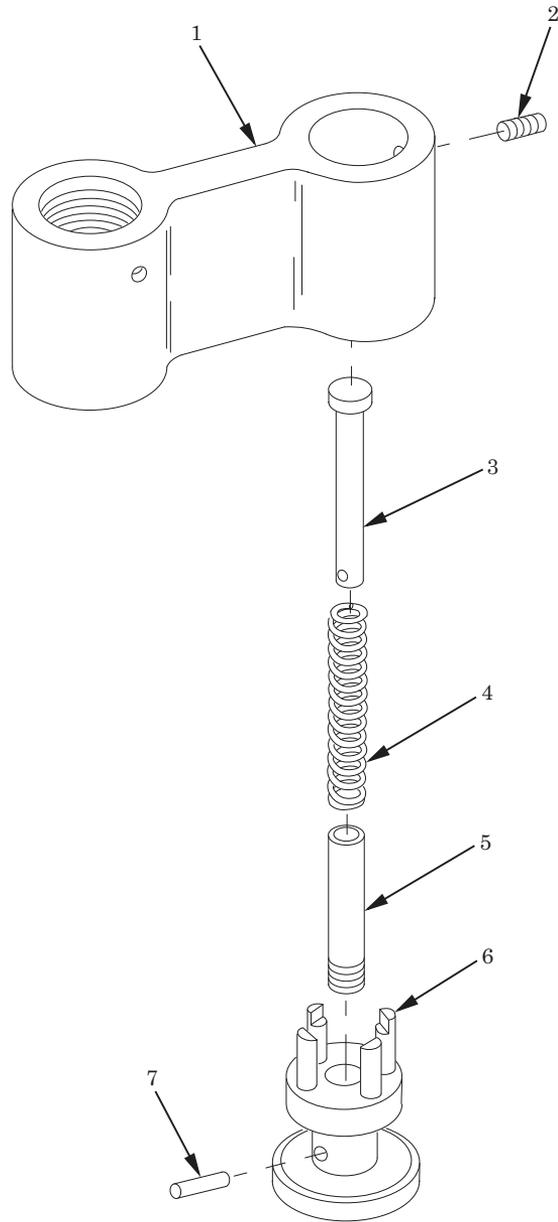


Figure 14. Traversing Extension Assembly 12901124.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 0306						
FIG. 14 TRAVERSING EXTENSION ASSEMBLY 12901124						
1	XAFZZ		19206	12577102	HOUSING, TRAVERSING EXTENSION.....	1
					UOC:BU1	
2	PAFZZ	5305-01-304-6520	19206	12577110	SETSCREW	1
					UOC:BU1	
3	PAFZZ	5315-01-299-5993	19206	12577109	PIN, STRAIGHT, HEADED	1
					UOC:BU1	
4	PAFZZ	5360-01-300-6490	19206	12577111	SPRING, HELICAL COMPRESSION	1
					UOC:BU1	
5	PAFZZ	5340-01-299-6178	19206	12577108	RETAINER, HELICAL COMPRESSION SPRING.....	1
					UOC:BU1	
6	PAFZZ	5355-01-302-4082	19206	12577104	KNOB.....	1
					UOC:BU1	
7	PAFZZ	5315-01-291-4573	S3151	DIN1481- 3X16-B2D	PIN, SPRING.....	1
					UOC:BU1	
END OF FIGURE						

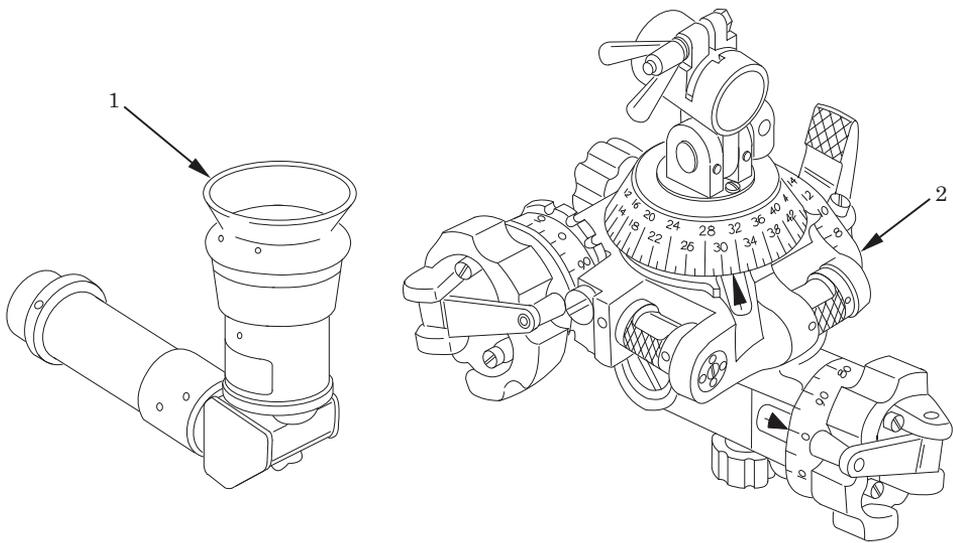


Figure 15. M67 Sight Unit 9356182.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 04	
					FIG. 15 M67 SIGHT UNIT 9356182	
1	PCOOA	6650-01-341-5195	19206	9356181	TELESCOPE, ELBOW, OPTICAL DEVICE (FOR ASSY BREAKDOWN SEE TM 9-1240-409-24&P)..... UOC:BU1	1
2	PCODA	6650-01-340-6082	19200	9356166	MOUNT, TELESCOPE (FOR ASSY BREAKDOWN SEE TM 9-1240-409-24&P)..... UOC:BU1	1
					END OF FIGURE	

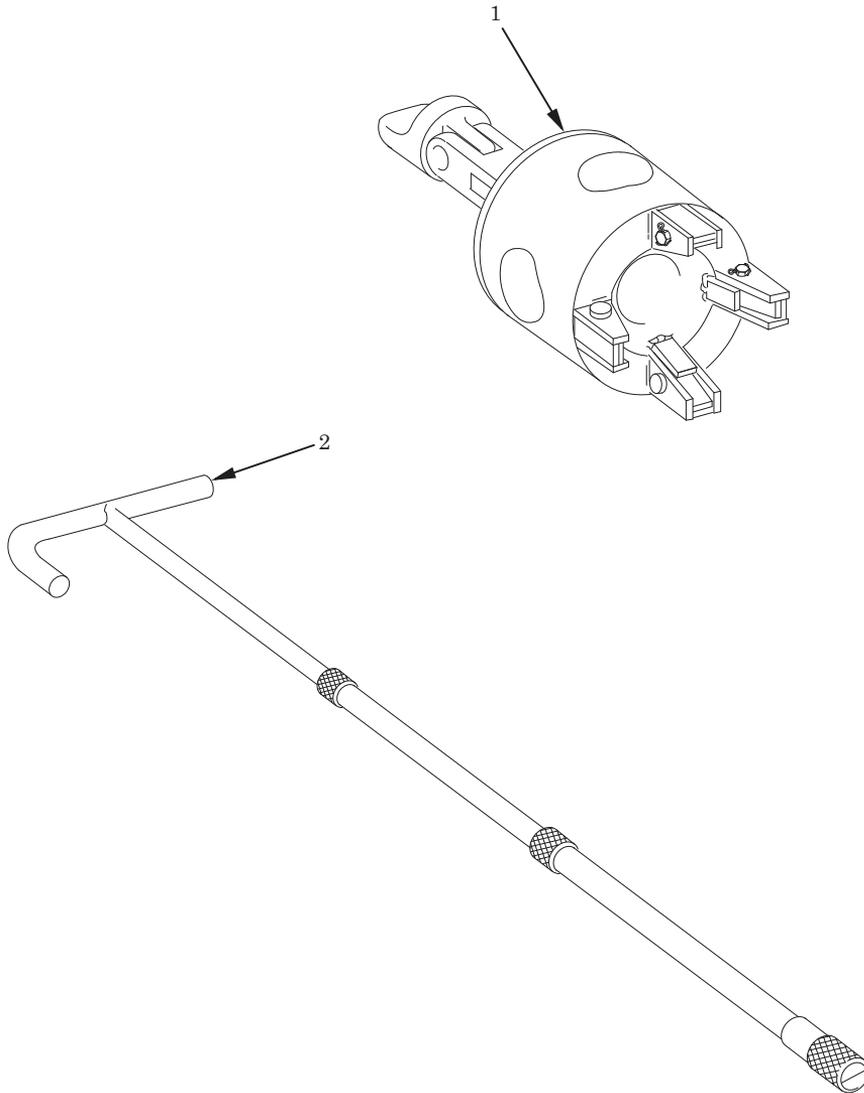


Figure 16. Basic Issue Items (Repair Parts).

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 05						
FIG. 16 BASIC ISSUE ITEMS (REPAIR PARTS)						
1	PACOO	1015-01-433-4471	19206	12901167	EXTRACTOR,CARTRIDGE (FOR ASSY BREAKDOWN SEE FIG. 18).....	1
					UOC:BU1	
2	PACOO	1015-01-292-0966	19206	12576922	STAFF ASSEMBLY,CLEANING, ARTILLERY (FOR ASSY BREAKDOWN SEE FIG. 17).....	1
					UOC:BU1	
END OF FIGURE						

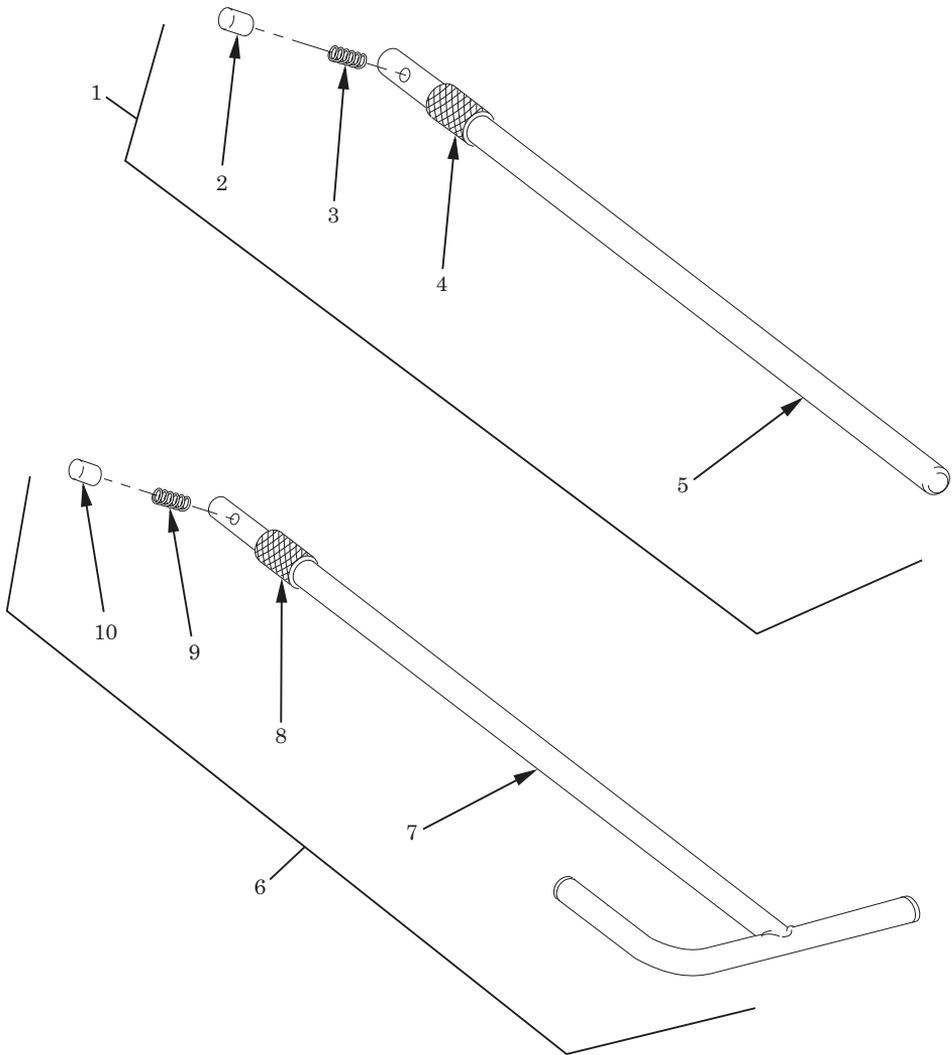


Figure 17. Artillery Cleaning Staff Assembly 12576922;
 Staff Section, Cleaning 12577325;
 Handle, Manual Control 12577326;
 and Staff Section, Cleaning 12577324 (Sheet 1 of 2).

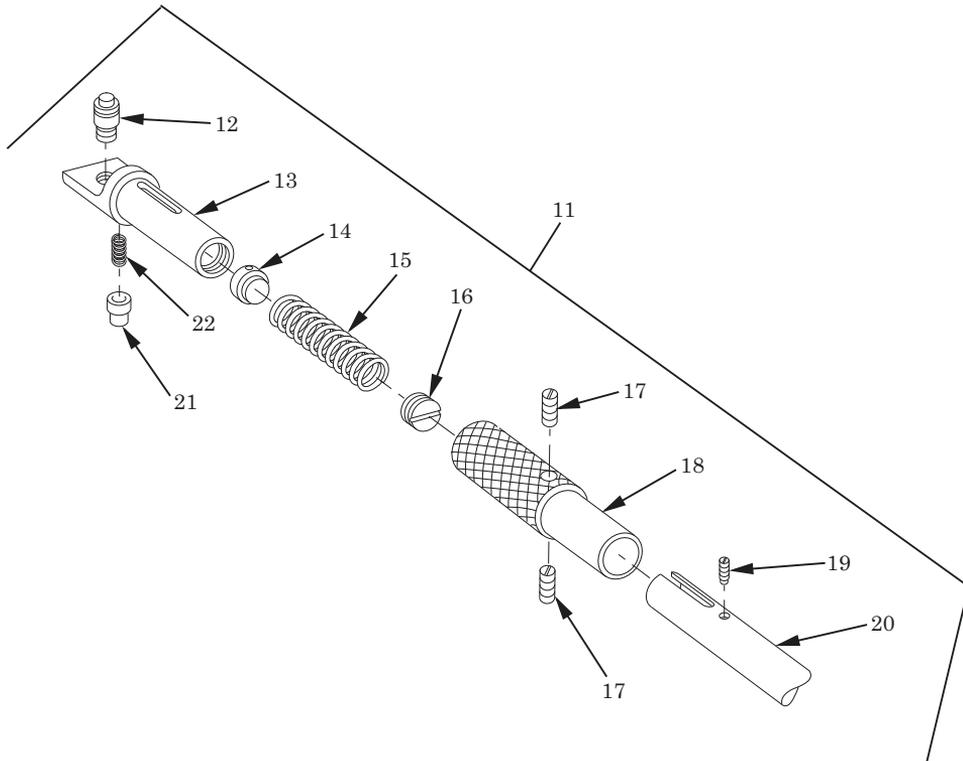


Figure 17. Artillery Cleaning Staff Assembly 12576922;
 Staff Section, Cleaning 12577325;
 Handle, Manual Control 12577326;
 and Staff Section, Cleaning 12577324 (Sheet 2 of 2).

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 0501, 050101, 050102, AND 050103	
					FIG. 17 ARTILLERY CLEANING STAFF ASSEMBLY 12576922; STAFF SECTION, CLEANING 12577325; HANDLE, MANUAL CONTROL 12577326; AND STAFF SECTION, CLEANING 12577324	
1	PAOOO	1015-01-286-0440	19206	12577325	STAFF SECTION, CLEANING.....	1
					UOC:BU1	
2	PAOZZ	1015-01-285-0142	19206	12576937	.CAP,SPRING.....	1
					UOC:BU1	
3	PAOZZ	5360-01-300-9527	19206	12576938	.SPRING,HELICAL, COMPRESSION.....	1
					UOC:BU1	
4	PAOZZ	4710-01-298-8540	19206	12576939	.SLEEVE.....	1
					UOC:BU1	
5	XAOZZ		19206	12576924	.TUBE.....	1
					UOC:BU1	
6	PAOOO	5340-01-286-0441	19206	12577326	HANDLE,MANUAL CONTROL.....	1
					UOC:BU1	
7	XAOZZ		19206	12576925	.HANDLE.....	1
					UOC:BU1	
8	XAOZZ		19206	12576941	.SLEEVE.....	1
					UOC:BU1	
9	PAOZZ	5360-01-300-9527	19206	12576938	.SPRING,HELICAL, COMPRESSION.....	1
					UOC:BU1	
10	PAOZZ	1015-01-285-0142	19206	12576937	.CAP,SPRING.....	1
					UOC:BU1	
11	PAOOO	1015-01-286-0439	19206	12577324	STAFF SECTION, CLEANING.....	1
					UOC:BU1	
12	PAOZZ	5306-01-297-6802	19206	12576929	.BOLT,EXTERNALLY RELIEVED BODY.....	1
					UOC:BU1	
13	PAOZZ	3040-01-320-2729	19206	12576928	.CONNECTING LINK.....	1
					UOC:BU1	
14	PAOZZ	5310-01-319-8987	19206	12576931	.NUT,PLAIN,BARREL.....	1
					UOC:BU1	
15	PAOZZ	5360-01-320-4266	19206	12576933	.SPRING,HELICAL.....	1
					UOC:BU1	

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
16	PAOZZ	5305-01-320-3944	19206	12576934	.SETSCREW..... UOC:BU1	1
17	PAOZZ	5305-01-320-4177	19206	12576932	.SCREW,MACHINE..... UOC:BU1	2
18	PAOZZ	4710-01-321-9862	19206	12576930	.SLEEVE..... UOC:BU1	1
19	PAOZZ	5305-01-320-5788	19206	12576935	.SCREW,MACHINE..... UOC:BU1	1
20	XAOZZ		19206	12576923	.TUBE..... UOC:BU1	1
21	PAOZZ	1015-01-285-0142	19206	12576937	.CAP,SPRING..... UOC:BU1	1
22	PAOZZ	5360-01-300-9527	19206	12576938	.SPRING,HELICAL, COMPRESSION..... UOC:BU1	1

END OF FIGURE

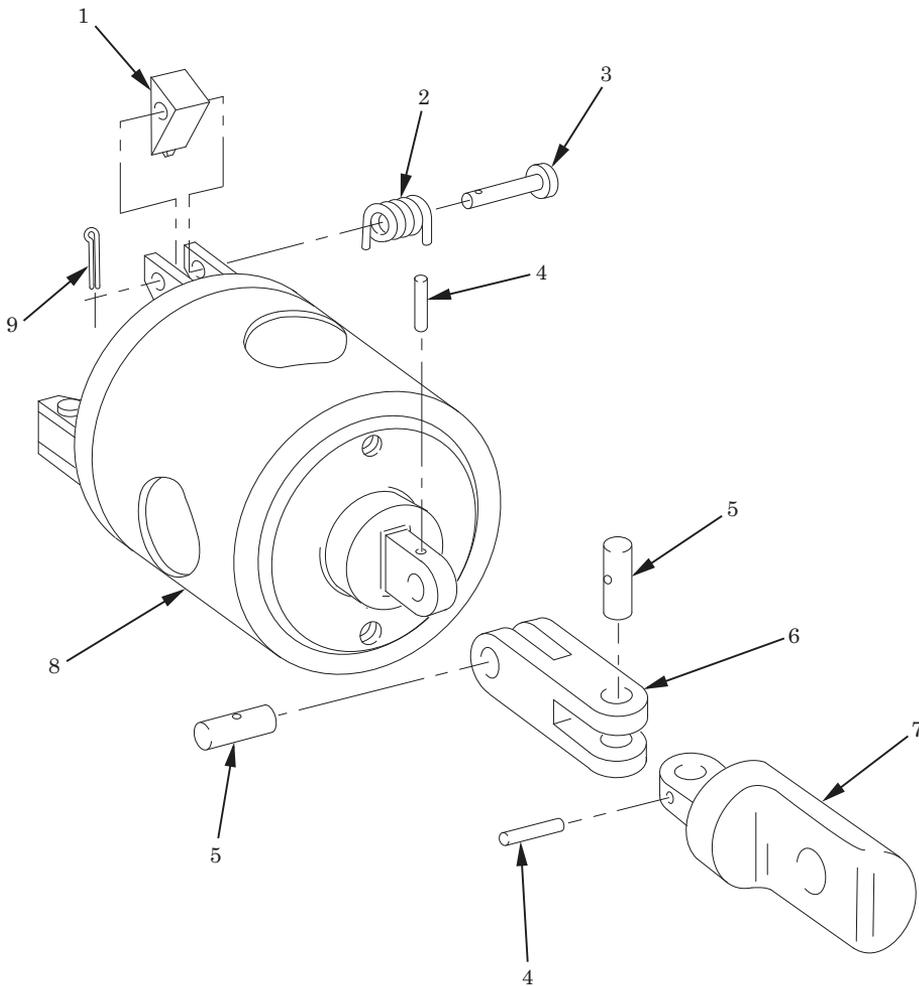


Figure 18. Cartridge Extractor 12901167.

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 0502						
FIG. 18 CARTRIDGE EXTRACTOR 12901167						
1	PAOZZ	1015-01-432-3137	19206	12901166	CATCH,EXTRACTOR..... UOC:BU1	4
2	PAOZZ	5360-01-289-5281	19206	12576952	SPRING,HELICAL TORSION ... UOC:BU1	4
3	PAOZZ	5315-01-286-0445	S3151	93-1277	PIN,STRAIGHT,HEADED UOC:BU1	4
4	PAOZZ	5315-01-294-2094	S3151	93-208	PIN,STRAIGHT,HEADLESS UOC:BU1	2
5	PAOZZ	5315-01-286-0449	S3151	93-1275	PIN,STRAIGHT,HEADLESS UOC:BU1	2
6	PAOZZ	3040-01-292-8926	19206	12576949	RIGID CONNECTING PLUG UOC:BU1	1
7	PAOZZ	5340-01-294-2101	19206	12576951	CONNECTOR,ROD END UOC:BU1	1
8	XAOZZ		19206	12901149	BODY,EXTRACTOR UOC:BU1	1
9	PAOZZ	5315-01-285-0110	S3151	93-162	PIN,COTTER..... UOC:BU1	4
END OF FIGURE						

END OF WORK PACKAGE

FIELD MAINTENANCE

**120MM MORTAR, M120A1
12901293**

KIT PARTS LIST

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 94	
					FIG. KITS REPAIR KITS	
	PAFZZ	1015-01-452-9634		5911365	DIRECT SUPPORT PARTS KIT,SEMIANNUAL SERVICE... UOC:BU1	1
					NUT, SELF- LOCKING (1) 12-18 PART OF KIT P/N 5911365	
					PACKING, PREFORMED (1) 5-4 PART OF KIT P/N 5911365	
					PACKING, PREFORMED (2) 9-3 PART OF KIT P/N 5911365	
					PIN,GROOVED HEADLESS (1) 5-14 PART OF KIT P/N 5911365	
					PIN,SPRING (2) 5-12 PART OF KIT P/N 5911365	
					PIN,SPRING (1) 8-14 PART OF KIT P/N 5911365	
					PIN,SPRING (1) 7-20 PART OF KIT P/N 5911365	
					WASHER,LOCK (2) 9-8 PART OF KIT P/N 5911365	
					END OF FIGURE	

END OF WORK PACKAGE

FIELD MAINTENANCE

**120MM MORTAR, M120A1
12901293**

SPECIAL TOOLS LIST

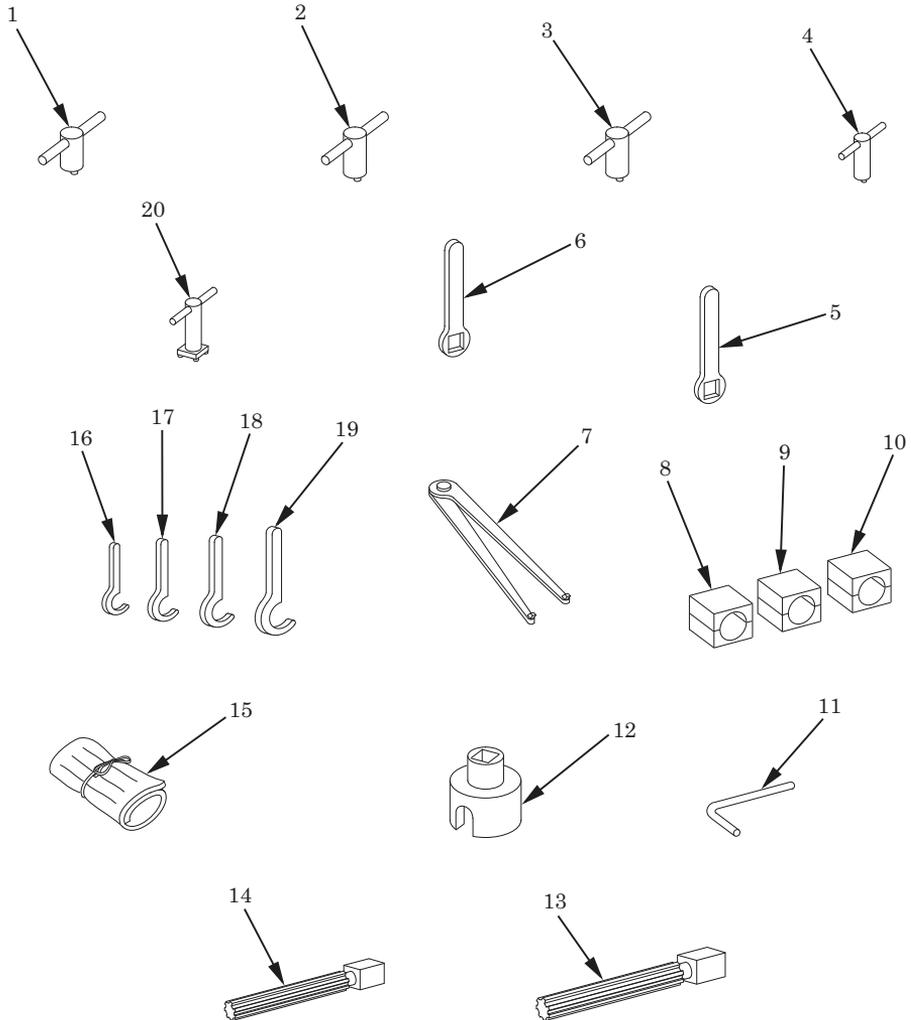


Figure 19. Special Tools (Sheet 1 of 2).

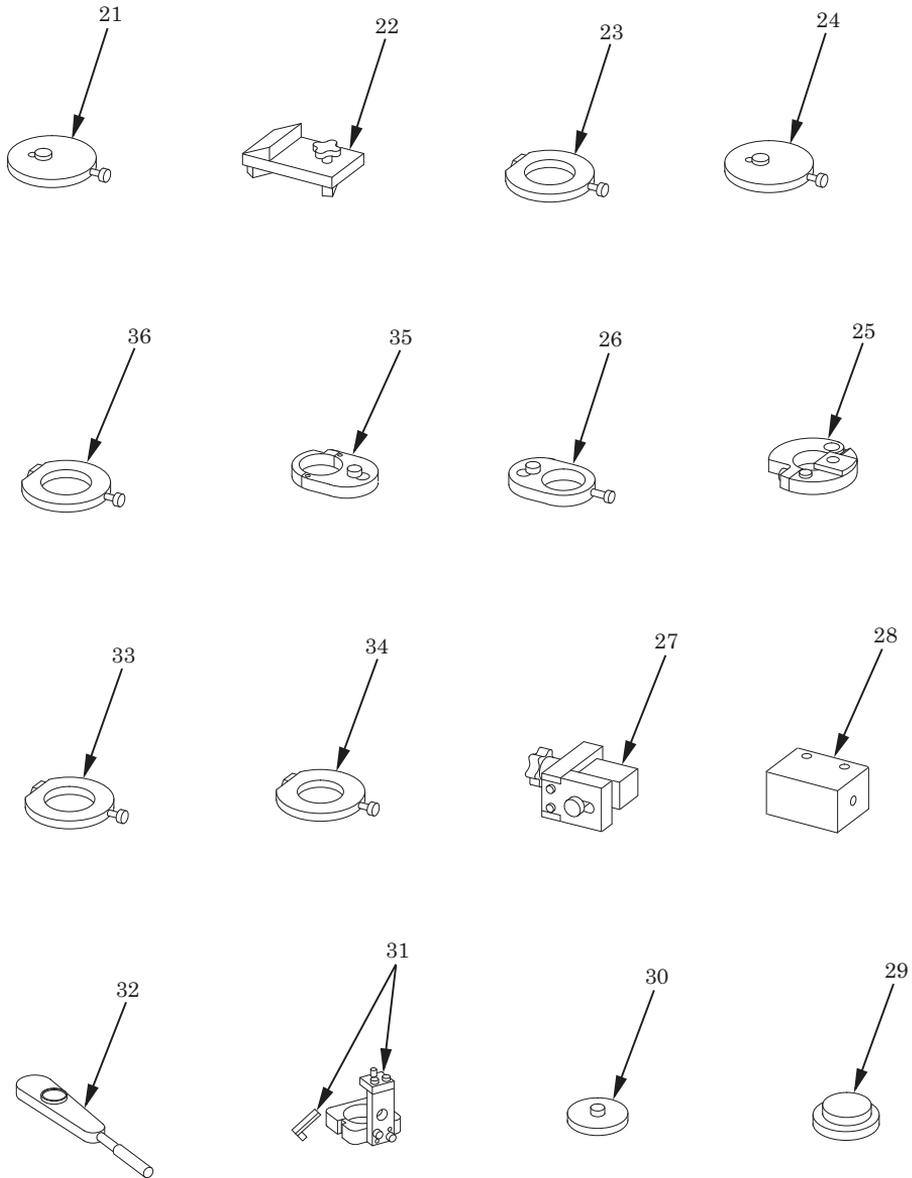


Figure 19. Special Tools (Sheet 2 of 2).

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 9500						
FIG. 19 SPECIAL TOOLS						
1	PAFZZ	5120-01-286-0455	19206	12577337	WRENCH,SPANNER (31 MM) .. UOC:BU1	1
2	PAFZZ	5120-01-286-0456	19206	12577338	WRENCH,SPANNER (34 MM) .. UOC:BU1	1
3	PAFZZ	5120-01-286-0460	19206	12577346	WRENCH,SPANNER (40 MM) .. UOC:BU1	1
4	PAFZZ	5120-01-286-0454	19206	12577336	WRENCH,SPANNER (4 MM) UOC:BU1	1
5	PAFZZ	5120-01-286-0462	19206	12577348	WRENCH,BOX (32 MM)..... UOC:BU1	1
6	PAFZZ	5120-01-286-0457	19206	12577343	WRENCH,BOX (38 MM)..... UOC:BU1	1
7	PAFZZ	5120-01-333-9794	19206	12576998	WRENCH,SPANNER, ADJ #44..... UOC:BU1	1
8	PAFZZ	1015-01-286-0435	19206	12577339	JAW ADAPTER (28 MM)..... UOC:BU1	1
9	PAFZZ	1015-01-286-0436	19206	12577340	JAW ADAPTER (32 MM)..... UOC:BU1	1
10	PAFZZ	1015-01-286-0437	19206	12577341	JAW ADAPTER (40 MM)..... UOC:BU1	1
11	PAFZZ	5120-00-198-5401	81348	GGG-K-275	WRENCH,KEY (1.27 MM)..... UOC:BU1	1
12	PAFZZ	5120-01-286-0472	19206	12577342	ADAPTER,TORQUE WRENCH..... UOC:BU1	1
13	PAFZZ	5110-01-390-9712	19206	12901131	REAMER,HAND (6 MM) UOC:BU1	1
14	PAFZZ	5110-01-390-7553	19206	12901130	REAMER,HAND (4 MM) UOC:BU1	1
15	PAFZZ	8105-01-326-0075	19206	12577466	TOOL ROLL UOC:BU1	1
16	PAFZZ	5120-01-333-9796	19206	12577461	WRENCH,HOOK 40/42 UOC:BU1	1
17	PAFZZ	5120-01-333-9797	19206	12577462	WRENCH,HOOK 45/50 UOC:BU1	1
18	PAFZZ	5120-01-333-9798	19206	12577463	WRENCH,HOOK 52/55 UOC:BU1	1
19	PAFZZ	5120-01-333-9799	19206	12577464	WRENCH,HOOK 58/62 UOC:BU1	1
20	PAFZZ	5120-01-286-0458	19206	12577344	WRENCH,SPANNER (4 POINT)..... UOC:BU1	1

(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
21	PAFZZ	5120-01-335-5062	19206	12944228	DRILL GUIDE..... UOC:BU1	1
22	PAFZZ	5120-01-335-5064	19206	12944229	DRILL GUIDE..... UOC:BU1	1
23	PAFZZ	5120-01-335-5063	19206	12944230	DRILL GUIDE..... UOC:BU1	1
24	PAFZZ	5120-01-333-2387	19206	12944231	DRILL GUIDE..... UOC:BU1	1
25	PAFZZ	5120-01-333-2394	19206	12944235	DRILL GUIDE..... UOC:BU1	1
26	PAFZZ	5120-01-333-2389	19206	12944234	DRILL GUIDE..... UOC:BU1	1
27	PAFZZ	5120-01-388-8346	19206	12901135	DRILL GUIDE..... UOC:BU1	1
28	PAFZZ	5120-01-388-3740	19206	12901137	DEPTH BLOCK..... UOC:BU1	1
29	PAFZZ	5120-01-332-7643	19206	12944242	WRENCH,RETAINER..... UOC:BU1	1
30	PAFZZ	5120-01-389-5477	19206	12901134	WRENCH,RETAINER..... UOC:BU1	1
31	PAFZZ	5120-01-388-1762	19206	12901136	DRILL GUIDE..... UOC:BU1	1
32	PAFZZ	5120-01-355-1736	19206	12901100	WRENCH,TORQUE..... UOC:BU1	1
33	PAFZZ	5120-01-333-2391	19206	12944236	DRILL GUIDE..... UOC:BU1	1
34	PAFZZ	5120-01-333-2388	19206	12944237	DRILL GUIDE..... UOC:BU1	1
35	PAFZZ	5120-01-333-2392	19206	12944233	DRILL GUIDE..... UOC:BU1	1
36	PAFZZ	5120-01-333-2390	19206	12944232	DRILL GUIDE..... UOC:BU1	1

END OF FIGURE

END OF WORK PACKAGE

FIELD MAINTENANCE

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
4730-00-050-4203	5	9	5305-01-286-0467	7	31
	7	12	5120-01-286-0472	19	12
	8	8	5310-01-286-0474	8	10
	13	5	5310-01-286-0475	5	11
5120-00-198-5401	19	11	5305-01-286-0479	12	12
5310-00-582-5965	9	8	5365-01-286-6308	9	11
5305-00-866-0444	9	9	5310-01-289-5273	11	2
4030-00-948-7315	12	5	5360-01-289-5281	18	2
4010-01-005-4775	12	6	5315-01-291-4573	5	12
4030-01-114-3894	12	7		7	20
5310-01-264-9404	12	18		14	7
5315-01-285-0110	18	9	5365-01-292-0955	9	7
1015-01-285-0140	13	2	1015-01-292-0966	16	2
1015-01-285-0141	12	4	1015-01-292-5242	6	3
1015-01-285-0142	17	2	1015-01-292-5243	5	1
	17	10	5310-01-292-7757	5	13
	17	21	5310-01-292-7759	7	28
5310-01-285-7373	12	3	5360-01-292-7778	9	10
5310-01-285-7374	8	1	3040-01-292-8926	18	6
5310-01-285-7402	12	17	1015-01-292-9239	5	7
5310-01-285-7403	12	13	5315-01-294-2094	18	4
1015-01-286-0435	19	8	5340-01-294-2101	18	7
1015-01-286-0436	19	9	5340-01-295-1827	7	16
1015-01-286-0437	19	10	5310-01-295-2514	7	17
1015-01-286-0439	17	11	5310-01-295-2515	7	21
1015-01-286-0440	17	1	5310-01-295-2516	7	5
5340-01-286-0441	17	6	5340-01-295-5384	7	27
5310-01-286-0444	9	13	5310-01-296-6071	7	8
5315-01-286-0445	18	3		8	5
5315-01-286-0449	18	5	3040-01-297-6580	9	12
5120-01-286-0454	19	4	5306-01-297-6802	17	12
5120-01-286-0455	19	1	5310-01-298-8470	11	3
5120-01-286-0456	19	2	1015-01-298-8501	6	1
5120-01-286-0457	19	6	4710-01-298-8540	17	4
5120-01-286-0458	19	20	5306-01-299-5923	5	6
5120-01-286-0460	19	3	5315-01-299-5993	14	3
5120-01-286-0462	19	5	5340-01-299-6178	14	5
5330-01-286-0463	5	4	1015-01-299-8806	6	2
	9	3	3020-01-299-8835	7	6
5305-01-286-0466	7	26	3010-01-299-8855	11	5

NATIONAL STOCK NUMBER INDEX - Continued

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
3020-01-299-9596	7	30	1015-01-312-6330	6	4
3120-01-300-0897	9	5	5310-01-319-8987	17	14
3120-01-300-6417	12	10	3040-01-320-2729	17	13
5360-01-300-6490	14	4	5305-01-320-3944	17	16
3120-01-300-9512	7	23	5305-01-320-4177	17	17
5360-01-300-9527	17	3	5360-01-320-4266	17	15
	17	9	5305-01-320-5788	17	19
	17	22	4710-01-321-9862	17	18
5305-01-301-3212	8	9	5330-01-325-9971	7	2
1015-01-301-3213	5	2	8105-01-326-0075	19	15
1015-01-301-3214	10	1	4030-01-332-4568	6	10
5340-01-301-8241	10	3	5120-01-332-7643	19	29
5365-01-301-8242	8	12	5120-01-333-2387	19	24
5305-01-302-0072	7	24	5120-01-333-2388	19	34
5310-01-302-0073	12	11	5120-01-333-2389	19	26
3040-01-302-2648	8	13	5120-01-333-2390	19	36
5355-01-302-4082	14	6	5120-01-333-2391	19	33
5365-01-302-4156	7	22	5120-01-333-2392	19	35
5305-01-303-1319	12	2	5120-01-333-2394	19	25
3040-01-303-1339	7	14	5120-01-333-9794	19	7
3040-01-303-1340	7	29	5120-01-333-9796	19	16
3040-01-303-1341	7	1	5120-01-333-9797	19	17
5305-01-303-5199	7	13	5120-01-333-9798	19	18
5305-01-303-9275	8	15	5120-01-333-9799	19	19
1015-01-304-0898	7	3	5120-01-335-5062	19	21
1015-01-304-0899	7	25	5120-01-335-5063	19	23
5365-01-304-5516	12	19	5120-01-335-5064	19	22
5365-01-304-5517	5	15	6650-01-340-6082	15	2
5365-01-304-5518	7	7	6650-01-341-5195	15	1
5365-01-304-5519	13	4	5120-01-355-1736	19	32
5305-01-304-6520	14	2	5315-01-385-6101	10	4
5310-01-304-6531	12	20	5315-01-385-6112	11	8
5310-01-304-6532	12	9	5315-01-386-3481	10	2
1015-01-304-6580	9	2	5315-01-386-3492	10	6
5340-01-304-6584	9	1	5306-01-386-3949	10	7
5340-01-304-6585	11	1	5315-01-386-3977	6	5
5340-01-304-6597	12	16	1015-01-387-0583	5	3
5305-01-304-6616	7	11	1015-01-387-0589	12	1
1015-01-304-9001	8	11	5120-01-388-1762	19	31
5310-01-304-9810	12	15	5315-01-388-2294	5	14
5365-01-305-3144	8	7	5210-01-388-3740	19	28
5310-01-306-1167	11	6	5340-01-388-3742	8	3

STOCK NUMBER	FIG.	ITEM
5315-01-388-4147	8	14
5120-01-388-8346	19	27
5120-01-389-5477	19	30
5110-01-390-7553	19	14
5110-01-390-9712	19	13
4010-01-391-3407	6	7
1015-01-418-2237	7	15
4730-01-429-8354	5	7
1015-01-432-3137	18	1
1015-01-433-4471	16	1
1015-01-452-9634	KITS	1
5340-01-465-4554	7	18
4010-01-476-6486	6	9
5360-01-476-6489	6	8
5315-01-482-1800	13	3
5306-01-513-3322	9	6
5315-01-518-4181	7	19
1015-01-521-1616	1	4
5305-01-521-3873	12	8
5305-01-521-4859	9	4
1015-01-522-0775	4	1
1015-01-522-2630	1	2
5305-01-523-3246	8	2
5310-01-539-6127	8	6
1015-01-553-2118	1	1
5340-01-558-8739	2	2
5310-12-156-4799	11	4
5310-12-301-1728	7	9
	8	4
5310-12-311-3530	12	14
5305-12-313-0952	7	4
	11	7

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FIELD MAINTENANCE

PART NUMBER INDEX

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
D63464/1-06026	11	8	12576933	17	15
D63464/2-06070	13	3	12576934	17	16
D63464/7-06050	5	14	12576935	17	19
D63477/1-133C	10	4	12576937	17	2
D63477/8-135P	8	14		17	10
DIN1481-3X16-B2D	7	20		17	21
	14	7	12576938	17	3
DIN1481-3X18-B2D	5	12		17	9
DIN2093-A28	11	4		17	22
DIN2093-B31,5-A3	7	9	12576939	17	4
	8	4	12576941	17	8
DIN2093-B40-A3P	12	14	12576949	18	6
DIN915-M5X8-45H	7	4	12576951	18	7
	11	7	12576952	18	2
DIN985-M8-A4C	12	18	12576976	12	4
DOD-P-63464/1A-0	7	19	12576998	19	7
GGG-K-275	19	11	12577015	6	9
ISO4026-M2.5X4-1	12	8	12577017	6	10
ISO4027-M3X4-45H	8	2	12577018	6	8
ISO4028-10.9-M6X	9	4	12577019	5	1
MIL-W-83420/3-001	12	6	12577020	12	15
MS15001-1	5	9	12577021	12	16
	7	12	12577027	13	2
	8	8	12577030	13	4
	13	5	12577031	12	9
MS35266-76	9	9	12577032	12	10
MS35338-44	9	8	12577033	12	19
MS51844-23	12	7	12577034	12	20
MS87006-33	12	5	12577035	12	12
12576881	2	1	12577036	12	11
12576922	16	2	12577038	12	2
12576923	17	20	12577039	5	7
12576924	17	5	12577041	8	15
12576925	17	7	12577042	5	13
12576928	17	13	12577047	8	11
12576929	17	12	12577048	8	12
12576930	17	18	12577050	5	8
12576931	17	14	12577051	8	10
12576932	17	17	12577052	8	7

PART NUMBER INDEX - Continued

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
12577053	8	13	12577123	11	5
12577055	5	11	12577125	11	3
12577056	7	8	12577126	11	1
	8	5	12577131	10	3
12577057	8	9	12577134	10	1
12577058	8	16	12577139	9	10
12577060	5	6	12577140	9	5
12577066	7	13	12577299-1	3	1
12577067	7	3	12577319	5	4
12577068	7	25		19	3
12577071	7	27	12577324	17	11
12577073	7	7	12577325	17	1
12577075	7	22	12577326	17	6
12577076	7	24	12577336	19	4
12577077	7	14	12577337	19	1
12577079	7	21	12577338	19	2
12577080	7	23	12577339	19	8
12577081	7	1	12577340	19	9
12577083	7	28	12577341	19	10
12577084	7	29	12577342	19	12
12577086	7	30	12577343	19	6
12577087	7	11	12577344	19	20
12577094	7	17	12577346	19	3
12577095	7	15	12577348	19	5
12577099	7	6	12577430	7	2
12577100	7	5	12577461	19	16
12577102	14	1	12577462	19	17
12577104	14	6	12577463	19	18
12577108	14	5	12577464	19	19
12577109	14	3	12577466	19	15
12577110	14	2	12900891	5	10
12577111	14	4	12900893	6	2
12577112	5	15	12900898	6	1
12577113	5	2	12900901	5	5
12577114	9	12	12900902	7	16
12577115	9	11	12900904	6	3
12577117	9	7	12900905	6	4
12577118	9	2	12901000	1	4
12577119	9	1	12901098	10	7
12577120	11	6	12901100	19	32
12577122	11	2	12901106	10	6

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
12901107	10	2	93-81	7	26
12901110	6	5	93-162	18	9
12901116	6	7	93-199	8	1
12901117	8	3	93-208	18	4
12901118	7	10	93-399	12	3
12901122	13	1	93-742	7	31
12901123	12	1	93-1275	18	5
12901124	5	3	93-1277	18	3
12901130	19	14	93-1386	9	13
12901131	19	13	93-1387	12	13
12901132	10	5	93-1389	12	17
12901134	19	30	9356166	15	2
12901135	19	27	9356181	15	1
12901136	19	31	9356182	1	3
12901137	19	28			
12901149	18	8			
12901164	9	6			
12901166	18	1			
12901167	16	1			
12901169	7	18			
12901190	3	2			
12901191	4	2			
12901192	4	1			
12901195	1	2			
12901292	8	6			
12901321	1	1			
12901322	2	2			
12944228	19	21			
12944229	19	22			
12944230	19	23			
12944231	19	24			
12944232	19	36			
12944233	19	35			
12944234	19	26			
12944235	19	25			
12944236	19	33			
12944237	19	34			
12944242	19	29			
5911365	KITS	1			

END OF WORK PACKAGE

CHAPTER 9
SUPPORTING INFORMATION
FOR
M120A1 120MM MORTAR

FIELD MAINTENANCE
REFERENCES

SCOPE

This work package lists all field manuals, firing tables, forms, miscellaneous publications, and technical manuals referenced in the manual.

FIELD MANUALS

FM 3-11.4	Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection
FM 3-11.5	NBC Decontamination
FM 3-22.90	Mortars
FM 3-22.91	Mortar Fire Direction Center Procedures
FM 4-25.11	First Aid
FM 7-90	Tactical Employment of Mortars
FM 9-207	Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to -65°F)
FM 31-70	Basic Cold Weather Manual
FM 31-71	Northern Operations

FIRING SCALES AND TABLES

FT-120-E-1	Firing Tables for Mortar, 120mm: Carrier-Mounted M121; Mortar, 120mm: Towed M120 (Cartridge, HE, M934/M934A1/M933/M933A1; Cartridge, WP, XM929/M929; Cartridge, Illum, M930; Cartridge, IR Illum, XM983; Cartridge, FRPC, M931), June 1999
12944305	Circular Firing Scales for 120mm Mortar: M91 Illum Cartridge
12944306	Circular Firing Scales for 120mm Mortar: M68 Smoke and M57 HE
12972477	Circular Firing Scales for 120mm Mortar: M929 WP Cartridge
12972496	Circular Firing Scales for 120mm Mortar: M933, M934 HE Cartridge
13005827	Graphical Firing Scales for 120mm Mortar: M930 Illum Cartridge
13005843	Graphical Firing Scales for 120mm Mortar: M983 IR Illum Cartridge
13011841	Graphical Firing Scales for 120mm Mortar: M931 FRPC Cartridge

FORMS

DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 2408-4	Weapons Record Data
DA Form 2408-9	Equipment Control Record
DA Form 5988-E	Equipment Inspection and Maintenance Worksheet - Electronic
SF 361	Transportation Discrepancy Report
SF 364	Report of Discrepancy (ROD)
SF 368	Product Quality Deficiency Report

MISCELLANEOUS PUBLICATIONS

AR 385-10	The Army Safety Program
AR 385-63	Range Safety
AR 735-11-2	Reporting of Supply Discrepancies
AR 750-1	Army Materiel Maintenance Policies
CTA 8-100	Army Medical Department Expendable/Durable Items
CTA 50-909	Field and Garrison Furnishings and Equipment
CTA 50-970	Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items)
DA PAM 385-24	The Army Radiation Safety Program
DA PAM 750-8	The Army Maintenance Management System (TAMMS) Users Manual
DOD Directive 5230.25	Withholding of Unclassified Technical Data from Public Disclosure
NRC Form 3	Notice to Employees
SC 9999-01-SKO	Small Arms Shop Set: Field Maintenance, Basic, Less Power and MAP Only
TB 43-180	Calibration and Repair Requirements for the Maintenance of Army Material
TB 9-1000-247-34	Standards for Overseas Shipment of Small Arms, Aircraft Armament, Towed Howitzers, Mortars, Recoilless Rifles, Rocket Launchers, and Associated Fire Control Equipment
10 CFR Part 19	Notices, Instructions and Reports to Workers
10 CFR Part 20	Standards for Protection against Radiation

TECHNICAL MANUALS

- TM 9-243 Use and Care of Hand Tools and Measuring Tools
- TM 9-254 General Maintenance Procedures for Fire Control Materiel
- TM 9-1000-202-14 Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Evaluation of Cannon Tubes
- TM 9-1015-250-10 Operator's Manual for Mortar, 120mm: Towed M120 and Mortar, 120mm: Carrier-Mounted M121
- TM 9-1220-243-12&P Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools List for Plotting Board, Indirect Fire, M16 W/E (1220-00-601-7941) and M19 W/E (1220-01-059-7989)
- TM 9-1230-205-13&P Operator and Field Maintenance Manual Including Repair Parts and Special Tools List (Including Depot Repair Parts) for Mortar Fire Control System - Dismounted 120mm, M150, NSN 1230-01-560-1027 (EIC: 3QT); Mortar Fire Control System - Dismounted 120mm, M151, NSN 1230-01-560-1028 (EIC: 3QS)
- TM 9-1230-207-13 Operator and Field Maintenance Manual for Mortar Fire Control System Software (Version 5)
- TM 9-1240-278-24&P Organizational, Direct Support, and General Support Maintenance and Repair Parts and Special Tools List for Optical Boresight, M45, W/E
- TM 9-1240-409-24&P Unit, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List (Including Depot Repair Parts) for M67 Sight Unit
- TM 9-1300-200 Ammunition, General
- TM 9-2330-392-14&P Operator's, Unit, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Trailer, Cargo: Light, 2-Wheel, M1101 (2330-01-387-5443) EIC: CBC; Trailer, Cargo, Heavy, 2-Wheel, M1102 (2330-01-387-5426) EIC: CBB; Chassis, Trailer: 2-Wheel (2330-01-387-5424) EIC: CCL
- TM 9-2590-527-13&P Operator and Field Maintenance Manual Including Repair Parts and Special Tools List for 120mm Mortar Stowage Kit, M326 (NSN 2590-01-551-7979)
- TM 9-4933-274-23&P Field Maintenance Manual Including Repair Parts and Special Tools List for Cannon Bore Erosion Gage Set (NSN 5280-01-560-1762)
- TM 9-6650-235-13&P Operator's, Unit, and Direct Support Maintenance Manual (Including Repair Parts) Borescope, M3

TECHNICAL MANUALS - Continued

TM 43-0139 Painting Instructions for Army Materiel
TM 750-244-7 Procedures for Destruction of Equipment in Federal
Supply Classifications 1000, 1005, 1010, 1015, 1020,
1025, 1030, 1055, 1090 and 1095 to Prevent Enemy
Use

END OF WORK PACKAGE

FIELD MAINTENANCE**MAINTENANCE ALLOCATION CHART (MAC) INTRODUCTION**

INTRODUCTION**The Army Maintenance System MAC**

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Maintenance System concept.

The MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Field - Includes three subcolumns, Crew (C), Service (O), and Field (F).

Sustainment - Includes two subcolumns, Below Depot (H) and Depot (D).

The maintenance to be performed below depot and in the field is described as follows:

1. Service maintenance. The responsibility of a using organization to perform maintenance on its assigned equipment. It normally consists of inspecting, servicing, lubricating, adjusting, and replacing parts, minor assemblies, and subassemblies. The replace function for this level of maintenance is indicated by the letter "O" in the third position of the SMR code. An "O" appearing in the fourth position of the SMR code indicates complete repair is possible at the service maintenance level.
2. Field maintenance. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "F" appearing in the third position of the SMR code. An "F" appearing in the fourth position of the SMR code indicates complete repair is possible at the field maintenance level. Items are returned to the user after maintenance is performed at this level.
3. Below depot sustainment. Maintenance accomplished on a component, accessory, assembly, subassembly, plug-in unit, or other portion either on the system or after it is removed. The replace function for this level of maintenance is indicated by the letter "H" appearing in the third position of the SMR code. An "H" appearing in the fourth position of the SMR code indicates complete repair is possible at the below depot sustainment maintenance level. Items are returned to the supply system after maintenance is performed at this level.

INTRODUCTION - Continued

The Army Maintenance System MAC - Continued

The tools and test equipment requirements table (immediately following the MAC) lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks table (immediately following the tools and test equipment requirements) contains supplemental instructions and explanatory notes for a particular maintenance function.

Maintenance Functions

Maintenance functions are limited to and defined as follows:

1. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel). This includes scheduled inspection and gagings and evaluation of cannon tubes.
2. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.
3. **Service.** Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases. This includes scheduled exercising and purging of recoil mechanisms. The following are examples of service functions:
 - a. **Unpack.** To remove from packing box for service or when required for the performance of maintenance operations.
 - b. **Repack.** To return item to packing box after service and other maintenance operations.
 - c. **Clean.** To rid the item of contamination.
 - d. **Touch up.** To spot paint scratched or blistered surfaces.
 - e. **Mark.** To restore obliterated identification.
4. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
5. **Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.

6. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
7. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
8. Paint (ammunition only). To prepare and spray color coats of paint so that the ammunition can be identified and protected. The color indicating primary use is applied, preferably, to the entire exterior surface as the background color of the item. Other markings are to be repainted as original so as to retain proper ammunition identification.
9. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.
10. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

NOTE

The following definitions are applicable to the "repair" maintenance function:

Services. Inspect, test, service, adjust, align, calibrate, and/or replace.

Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit Under Test (UUT).

Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

INTRODUCTION - Continued**Maintenance Functions - Continued**

11. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
12. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

Explanation of Columns in the MAC

Column (1) - Group Number. Column (1) lists Functional Group Code (FGC) numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

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

Column (3) - Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2). (For a detailed explanation of these functions refer to "Maintenance Functions" outlined above.)

Column (4) - Maintenance Level. Column (4) specifies each level of maintenance authorized to perform each function listed in column (3), by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

Field:

- C - Crew maintenance
- O - Service maintenance
- F - Field maintenance

Sustainment:

- L - Specialized repair activity (SRA)
- H - Below depot maintenance
- D - Depot maintenance

NOTE

The "L" maintenance level is not included in column (4) of the MAC. Functions to this level of maintenance are identified by a work time figure in the "H" column of column (4), and an associated reference code is used in the REMARKS column (6). This code is keyed to the remarks and the SRA complete repair application is explained there.

Column (5) - Tools and Equipment Reference Code. Column (5) specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column (6) - Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

Explanation of Columns in the Tools and Test Equipment Requirements

Column (1) - Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in column (5) of the MAC.

Column (2) - Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3) - Nomenclature. Name or identification of the tool or test equipment.

Column (4) - National Stock Number (NSN). The NSN of the tool or test equipment.

Column (5) - Tool Number. The manufacturer's part number.

Explanation of Columns in the Remarks

Column (1) - Remarks Code. The code recorded in column (6) of the MAC.

Column (2) - Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

END OF WORK PACKAGE

FIELD MAINTENANCE

MAINTENANCE ALLOCATION CHART (MAC)

MAINTENANCE ALLOCATION CHART (MAC)

Table 1. MAC for M120A1 120mm Mortar.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE
			FIELD			SUSTAINMENT			
			CREW	SERVICE	FIELD	BELOW DEPOT	DEPOT		
			C	O	F	H	D		
00	M120A1 120mm Mortar 12901293	Inspect Service	0.3 1.0	0.3 1.0	0.3 8.0			31	
01	M9 Mortar Baseplate 12901321	Inspect Service Repair	0.2	0.2	0.2 0.2 0.1		0.5	31	
02	M298 120mm Cannon 12901195	Inspect Service Replace Overhaul	0.2 0.5	0.2 1.5	1.0		2.0	1, 4, 10, 11, 30, 31, 44, 54	A, D
0201	Breech Cap Assembly 12901190	Inspect Repair Overhaul	0.2 0.3	0.2	0.2		2.0	10, 24, 30, 31, 44	
03	M191 Mortar Mount 12901000	Inspect Service Replace Repair Overhaul	0.3	0.3 0.4 0.1	0.3 6.5 4.0		8.0	13, 31, 39, 63	
0301	M191 Bipod Leg Assembly 12900891	Inspect Service Replace Repair	0.1	0.1 0.3 0.4	0.1 0.3 0.8			31	
030101	Bipod Leg Extension Assembly 12900904	Inspect Replace Repair		0.1 0.3 0.3				31	
03010101	Chain Assembly 12901120	Inspect Replace Repair		0.1 0.2 0.2				31	

MAINTENANCE ALLOCATION CHART (MAC) - Continued

Table 1. MAC for M120A1 120mm Mortar - Continued.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE
			FIELD			SUSTAINMENT			
			CREW	SERVICE	FIELD	BELOW DEPOT	DEPOT		
			C	O	F	H	D		
0302	M121 Elevating Mechanism 12900901	Inspect	0.2	0.2	0.2			3, 6, 8, 9, 13, 14, 15, 16, 17, 18, 19, 20, 25, 29, 31, 33, 34, 35, 39, 41, 47, 48, 51, 52, 53, 60, 62, 63	
		Service	0.1	0.1					
		Replace			1.0				
		Repair			3.0				
		Adjust			0.4				
0303	Cross Leveling Mechanism 12577039	Inspect	0.1	0.1	0.1			5, 9, 22, 27, 28, 31, 33, 40, 45, 50, 59	
		Service	0.1	0.1					
		Replace			0.5				
		Repair			1.5				
		Adjust			0.3				
0304	Buffer Mechanism 12577113	Inspect	0.1	0.1	0.1			9, 12, 31, 35, 38, 40, 42, 43, 53, 56, 57	
		Replace			0.5				
		Repair			2.0				
		Adjust			0.2				
030401	Buffer Housing Assembly 12577118	Inspect	0.1	0.1	0.1			31	
		Replace			0.5				
		Repair			1.8				
030402	Clamp Handle Assembly 12577119	Inspect	0.1	0.1	0.1			2, 3, 23, 31, 34, 52, 64	
		Test			0.2				
		Replace			0.1				
		Repair			0.8				
0305	Traversing Gear Assembly 12577019	Inspect	0.1	0.2	0.2			3, 7, 21, 26, 31, 32, 37, 38, 46, 49, 52, 58, 59	
		Service		0.2					
		Replace			1.0				
		Repair			2.0				
		Adjust			0.3				
030501	Sightunit Adapter Cover 12576976	Inspect	0.1					31	
		Replace	0.1						
		Repair		0.2					
030502	Traversing Gear Housing Assembly 12901123	Inspect	0.1	0.1	0.1			31	
		Replace			1.0				
		Repair				2.5			
0306	Traversing Extension Assembly 12901124	Inspect	0.1	0.1	0.2			7, 31, 55, 61	
		Replace			0.3				
		Repair			1.0				
04	M67 Sight Unit 9356182	Inspect Service Repair	0.2	0.2	0.2 0.2 0.1			31	B

Table 1. MAC for M120A1 120mm Mortar - Continued.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE
			FIELD			SUSTAINMENT			
			CREW	SERVICE	FIELD	BELOW DEPOT	DEPOT		
			C	O	F	H	D		
05	Basic Issue Items (Repair Parts)	Inspect Service Replace Repair	0.1 0.2 0.2	0.1 0.2					
0501	Artillery Cleaning Staff Assembly 12576922	Inspect Service Replace Repair	0.1 0.2 0.2	0.1 0.3			31		
050101	Cleaning Staff Section 12577325	Inspect Replace Repair		0.1 0.3 0.3			31		
050102	Manual Control Handle 12577326	Inspect Replace Repair		0.1 0.3 0.3			31		
050103	Cleaning Staff Section 12577324	Inspect Replace Repair		0.1 0.3 0.3			31		
0502	Cartridge Extractor 12901167	Inspect Service Replace Repair	0.1 0.1 0.2	0.1 0.1 0.3			31		
06	M45/M45A1 Boresight	Inspect Service Repair	0.1 0.1	0.1		1.0		C	

Table 2. Tools and Test Equipment for M120A1 120mm Mortar.

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER (NSN)	TOOL NUMBER
1	F	Accessory Outfit for Pullover Gages	4933-00-348-8652	SC 4931-95-A12
2	F	Adapter, Torque Wrench	5120-01-286-0472	12577342
3	F	Block, Depth	5210-01-388-3740	12901137
4	F	Borescope: Cannon Bore Inspecting, M3	6650-01-063-0035	11584701
5	F	Countersink, 90-degree	5133-00-293-1903	GGG-C-613
6	F	Direct Support Parts Kit, Semiannual Service	1015-01-452-9634	5911365

MAINTENANCE ALLOCATION CHART (MAC) - Continued

Table 2. Tools and Test Equipment for M120A1 120mm Mortar - Continued.

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER (NSN)	TOOL NUMBER
7	F	Drill, 2 mm	5133-01-115-7994	ANSI-B94.11M
8	F	Drill, 3 mm	5133-01-116-0621	ANSI-B94.11M
9	F	Drill, 4 mm	5133-01-113-6299	ANSI-B94.11M
10	C	Gage, Firing Pin	1015-01-406-9349	12901151
11	F	Gage Set, Cannon Bore Erosion	5280-01-560-1762	12901228
12	F	Guide, Drill	5120-01-388-8346	12901135
13	F	Guide, Drill	5120-01-388-1762	12901136
14	F	Guide, Drill	5120-01-335-5062	12944228
15	F	Guide, Drill	5120-01-335-5064	12944229
16	F	Guide, Drill	5120-01-335-5063	12944230
17	F	Guide, Drill	5120-01-333-2387	12944231
18	F	Guide, Drill	5120-01-333-2390	12944232
19	F	Guide, Drill	5120-01-333-2392	12944233
20	F	Guide, Drill	5120-01-333-2389	12944234
21	F	Guide, Drill	5120-01-333-2394	12944235
22	F	Guide, Drill	5120-01-333-2391	12944236
23	F	Guide, Drill	5120-01-333-2388	12944237
24	C	Hammer, Hand, 2 lb	5120-00-061-8546	11677028-3
25	F	Jaw Adapter	1015-01-286-0435	12577339
26	F	Jaw Adapter	1015-01-286-0436	12577340
27	F	Jaw Adapter	1015-01-286-0437	12577341
28	F	Reamer, Hand, 4 mm	5110-01-390-7553	12901130
29	F	Reamer, Hand, 6 mm	5110-01-390-9712	12901131
30	C	Removal Tool, Breech Cap	5120-01-407-8044	12901153
31	F	Shop Set, Small Arms: Field Maintenance, Basic, Less Power and MAP Only	4933-00-754-0664	SC 9999-01-SKO
32	F	Tap, 2.5 mm	5136-00-236-4330	ANSI-B94.9
33	F	Tap, 4 mm	5136-00-223-6253	ANSI-B94.9
34	F	Tap, 5 mm	5136-00-236-4322	ANSI-B94.9
35	F	Tap, 6 mm	5136-00-236-4317	ANSI-B94.9-1987
36	F	Tool Bag	8105-01-326-0075	12577466
37	F	Wrench, 8 mm	5120-01-113-9560	ANSI B107.9-1978

Table 2. Tools and Test Equipment for M120A1 120mm Mortar - Continued.

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER (NSN)	TOOL NUMBER
38	F	Wrench, 11 mm/13 mm	5120-01-102-5973	ANSI B107.9-1978
39	F	Wrench, 16 mm	5120-01-054-7134	ANSI-B107.9
40	F	Wrench, 19 mm	5120-01-111-5305	B107.9
41	F	Wrench, 24 mm	5120-01-113-9563	ANSI-B107.9
42	F	Wrench, Box (38 mm)	5120-01-286-0457	12577343
43	F	Wrench, Box (32 mm)	5120-01-286-0462	12577348
44	C	Wrench, Firing Pin	5120-01-299-5989	12901194
45	F	Wrench, Hook (40/42)	5120-01-333-9796	12577461
46	F	Wrench, Hook (45/50)	5120-01-333-9797	12577462
47	F	Wrench, Hook (52/55)	5120-01-333-9798	12577463
48	F	Wrench, Hook (58/62)	5120-01-333-9799	12577464
49	F	Wrench, Key, 1.27 mm	5120-00-198-5401	GGG-K-275
50	F	Wrench, Key, 1.5 mm	5120-01-079-8020	B18.3.2M
51	F	Wrench, Key, 2 mm	5120-01-045-4886	B18.3.2M
52	F	Wrench, Key, 2.5 mm	5120-01-045-4887	ANSI-B18.3.2M
53	F	Wrench, Key, 3 mm	5120-01-045-4888	ANSI-B18.3.2M
54	F	Wrench, Key, 5 mm	5120-00-900-9344	GGG-K-275
55	F	Wrench, Key, 6 mm	5120-00-900-9345	ANSI-B18.3.2M
56	F	Wrench, Retainer	5120-01-389-5477	12901134
57	F	Wrench, Retainer	5120-01-332-7643	12944242
58	F	Wrench, Spanner	5120-01-286-0455	12577337
59	F	Wrench, Spanner	5120-01-286-0456	12577338
60	F	Wrench, Spanner	5120-01-286-0460	12577346
61	F	Wrench, Spanner	5120-01-286-0454	12577336
62	F	Wrench, Spanner	5120-01-286-0458	12577344
63	F	Wrench, Spanner, Adjustable	5120-01-333-9794	12576998
64	F	Wrench, Torque	5120-01-355-1736	12901100

MAINTENANCE ALLOCATION CHART (MAC) - Continued**Table 3. Remarks for M120A1 120mm Mortar.**

REMARKS CODE	REMARKS
A	Refer to TM 9-1000-202-14.
B	Refer to TM 9-1240-409-24&P.
C	Refer to TM 9-1240-278-24&P.
D	Refer to TM 9-6650-235-13&P.

END OF WORK PACKAGE

OPERATOR
COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

INTRODUCTION**Scope**

This work package lists COEI and BII for the M120A1 120mm Mortar to help you inventory items for safe and efficient operation of the equipment.

General

The COEI and BII information is divided into the following lists:

Components of End Item (COEI). This list is for information purposes only and is not authority to requisition replacements. These items are part of the mortar. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

Basic Issue Items (BII). These essential items are required to place the mortar in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the mortar during operation and when it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

Explanation of Columns in the COEI List and BII List

Column (1) - Illus Number. Gives you the number of the item illustrated.

Column (2) - National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (3) - Description, Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The stowage location of COEI and BII is also included in this column. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (4) - Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment. These codes are identified below:

<u>Code</u>	<u>Used on</u>
BU1	M120A1

INTRODUCTION - Continued**Explanation of Columns in the COEI List and BII List - Continued**

Column (5) - U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) - Qty Rqr. Indicates the quantity required.

COMPONENTS OF END ITEM (COEI)

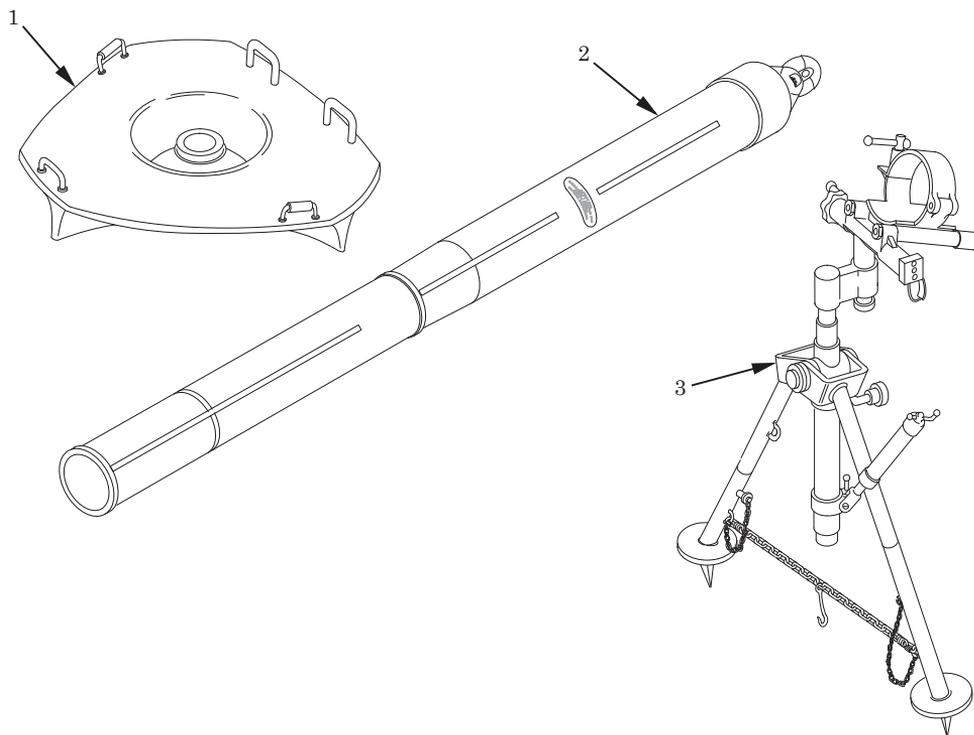


Figure 1. Components of End Item (Sheet 1 of 2).

Table 1. Components of End Item List.

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
1	1015-01-553-2118	BASEPLATE, MORTAR: M9 (WITH QUICK-STOW BRACKETS) 12901321 (1NUW7)	BU1	EA	1
2	1015-01-522-2630	CANNON, 120MM: M298 12901195 (1NUW7)	BU1	EA	1
3	1015-01-521-1616	MOUNT, MORTAR: M191 12901000 (19206)	BU1	EA	1

COMPONENTS OF END ITEM (COEI) - Continued

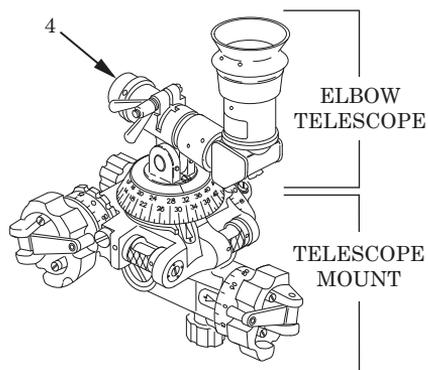


Figure 1. Components of End Item (Sheet 2 of 2).

Table 1. Components of End Item List - Continued.

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
4		<p style="text-align: center;">NOTE</p> <p>M67 Sight Unit Telescope Mount and Elbow Telescope must be ordered separately.</p> <p>SIGHT UNIT, M67 9356182 (19200)</p> <p>Consists of:</p> <p>TELESCOPE, ELBOW 9356181 (19200)</p> <p>MOUNT, TELESCOPE 9356166 (19200)</p>	BU1		
	6650-01-341-5195	TELESCOPE, ELBOW 9356181 (19200)		EA	1
	6650-01-340-6082	MOUNT, TELESCOPE 9356166 (19200)		EA	1

BASIC ISSUE ITEMS (BII)

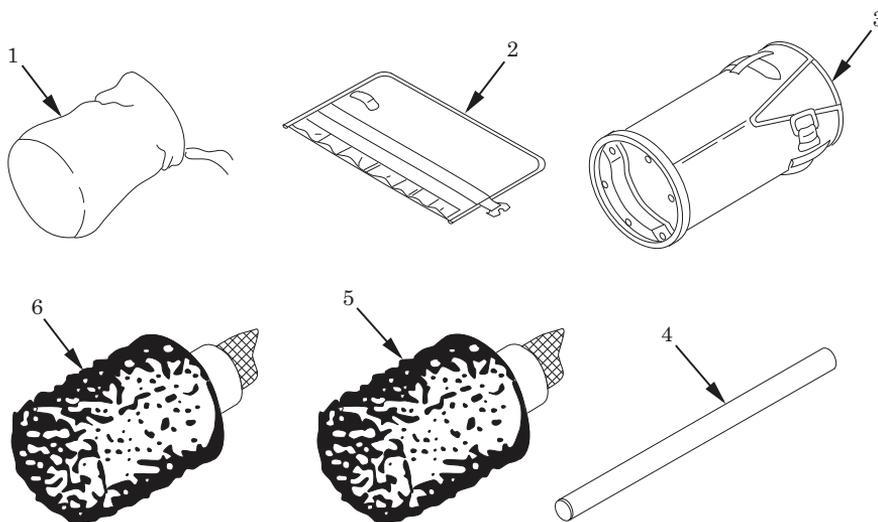


Figure 2. Basic Issue Items (Sheet 1 of 6).

Table 2. Basic Issue Items List.

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
1	1025-01-340-0509	BAG, TEXTILE (Used with artillery cleaning brush assembly) 12901063 (19206)	BU1	EA	1
2	8105-01-320-0962	BAG, TOOLS & ROLL 12576960 (19200)	BU1	EA	1
3	8105-01-286-6307	BAG, TOOLS & SPARE 12576942/A-619 (19206)	BU1	EA	2
4	5120-01-407-8044	BREECH CAP REMOVAL TOOL 12901153 (19206)	BU1	EA	1
5	1015-01-408-9014	BRUSH ASSEMBLY, ARTILLERY CLEANING (Nylon bristle) 12901147 (19206)	BU1	EA	1
6	1015-01-407-7616	BRUSH ASSEMBLY, ARTILLERY CLEANING (Brass bristle) 12972482 (19206)	BU1	EA	1

BASIC ISSUE ITEMS (BII) - Continued

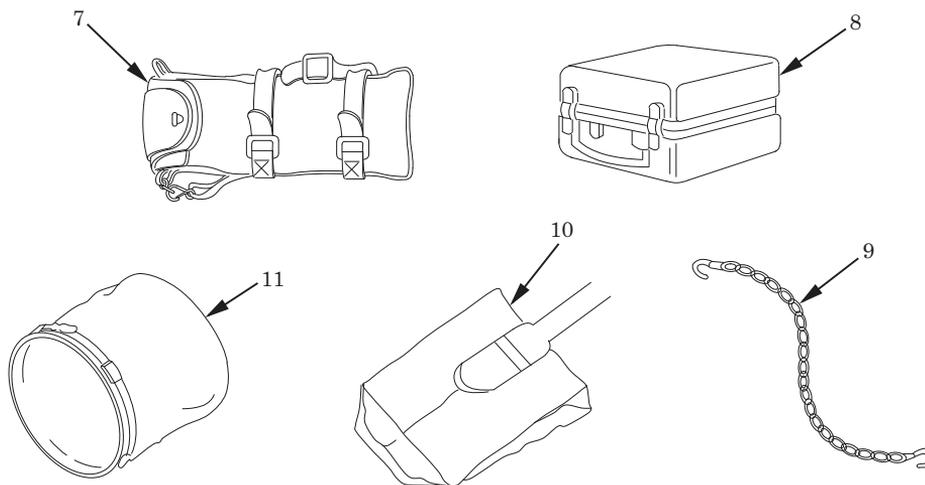


Figure 2. Basic Issue Items (Sheet 2 of 6).

Table 2. Basic Issue Items List - Continued.

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
7	1290-01-043-8288	CASE, AIMING POST 11733755 (19206)	BU1	EA	2
8	6650-01-521-9875	CASE, SIGHT UNIT PRF13005489 (19200)	BU1	EA	1
9	4010-00-047-3902	CHAIN ASSEMBLY (16 FT) 7077062 (19207)	BU1	EA	1
10	1240-01-043-7502	COVER, FIRE CONTROL 11733753 (19200)	BU1	EA	1
11	1015-01-407-4325	COVER, GUN MUZZLE 12901140 (19206)	BU1	EA	1

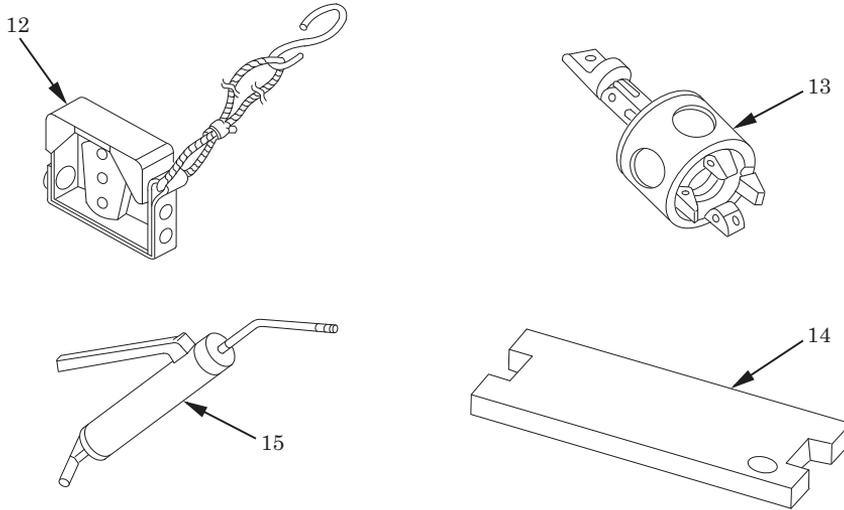


Figure 2. Basic Issue Items (Sheet 3 of 6).

Table 2. Basic Issue Items List - Continued.

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
12	1015-01-285-0141	COVER, SIGHT UNIT ADAPTER 12576976 (19206)	BU1	EA	1
13	1015-01-433-4471	EXTRACTOR, CARTRIDGE 12901167 (19206)	BU1	EA	1
14	1015-01-406-9349	GAGE, FIRING PIN 12901151 (19206)	BU1	EA	1
15	4930-01-030-0304	GUN, GREASE MIL-G-3859-1-14 (81349)	BU1	EA	1

BASIC ISSUE ITEMS (BII) - Continued

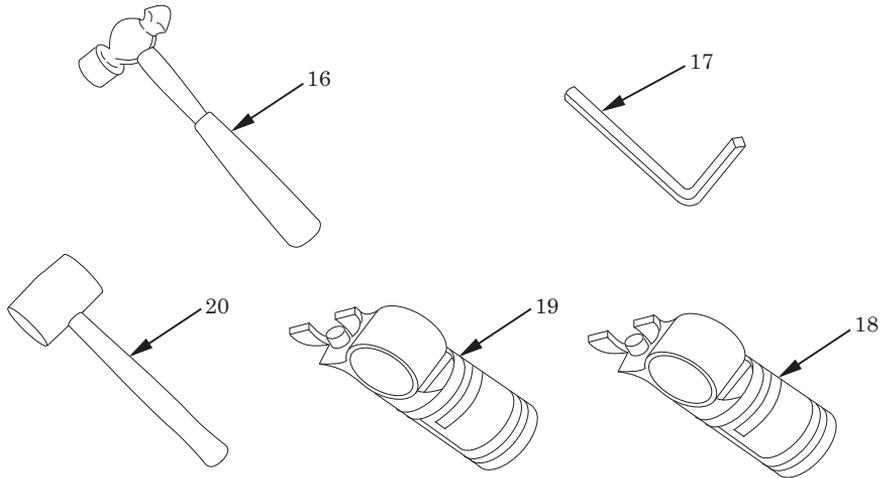


Figure 2. Basic Issue Items (Sheet 4 of 6).

Table 2. Basic Issue Items List - Continued.

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
16	5120-00-061-8546	HAMMER, HAND 11677028-3 (19207)	BU1	EA	1
17	5120-00-198-5400	KEY, SOCKET HEAD (.035) GGG-K-275 (81348)	BU1	EA	1
18	1290-00-169-1934	LIGHT, AIMING POST, M58 (GREEN) 12961204 (19200)	BU1	EA	2
19	1290-00-169-1935	LIGHT, AIMING POST, M59 (ORANGE) 12961205 (19200)	BU1	EA	1
20	5120-01-518-2102	MALLET, RUBBER RM32 (0Z2G2)	BU1	EA	1

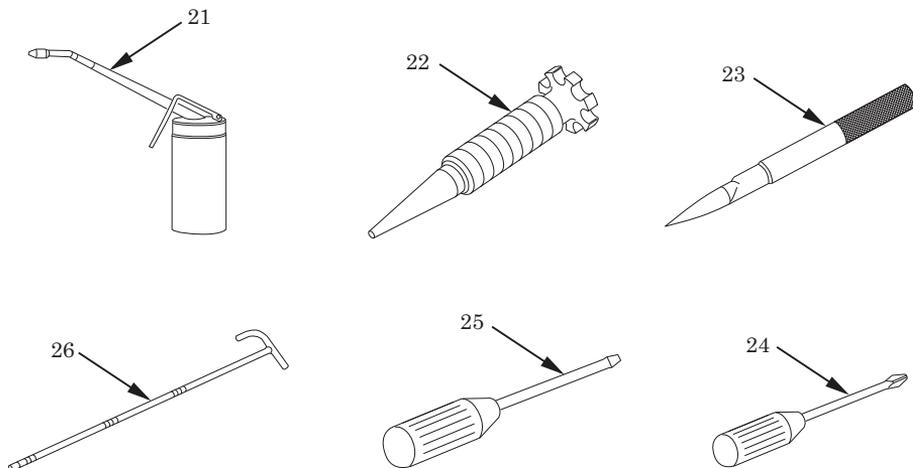


Figure 2. Basic Issue Items (Sheet 5 of 6).

Table 2. Basic Issue Items List - Continued.

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
21	4930-00-537-8977	OILER, HAND MS15766-1 (96906)	BU1	EA	1
22	1015-01-522-0775	PIN, FIRING 12901192 (1NUW7)	BU1	EA	2
23	1290-01-046-8320	POST, AIMING, M14 11736201 (19206)	BU1	EA	16
24	5120-00-820-2995	SCREWDRIVER, CROSSTIP GGG-S-121 (81348)	BU1	EA	1
25	5120-00-278-1269	SCREWDRIVER, FLAT TIP B107.15 (81348)	BU1	EA	1
26	1015-01-292-0966	STAFF ASSEMBLY, CLEANING, ARTILLERY 12576922 (19206)	BU1	EA	1

BASIC ISSUE ITEMS (BII) - Continued

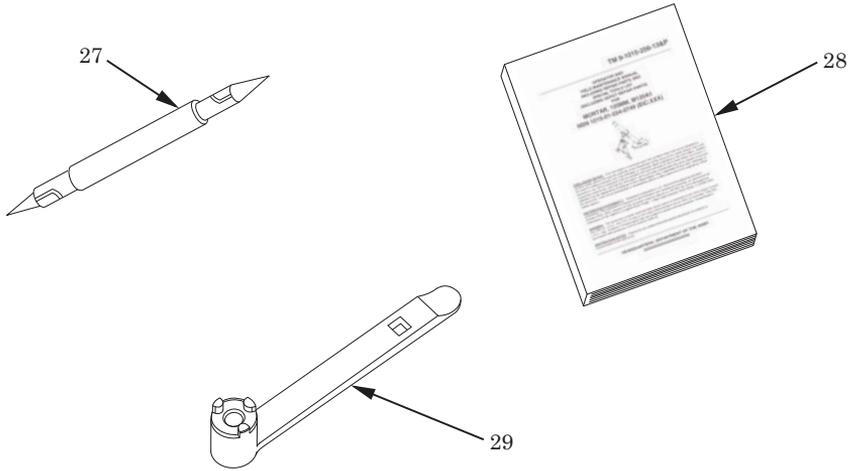


Figure 2. Basic Issue Items (Sheet 6 of 6).

Table 2. Basic Issue Items List - Continued.

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
27	1010-01-043-8195	STAKE, DRIVING, AIMIMG POST, M14 11741788 (19206)	BU1	EA	2
28		TM 9-1015-256-13&P	BU1	EA	1
29	5120-01-522-0776	WRENCH, FIRING PIN 12901194 (19206)	BU1	EA	1

END OF WORK PACKAGE

OPERATOR
ADDITIONAL AUTHORIZATION LIST (AAL)

INTRODUCTION**Scope**

This work package lists additional items you are authorized for the support of the M120A1 120mm Mortar.

General

This list identifies items that do not have to accompany the M120A1 mortar and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

Explanation of Columns in the AAL

Column (1) - National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (2) - Description, Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (3) - Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment. These codes are identified below:

<u>Code</u>	<u>Used on</u>
BU1	M120A1

Column (4) - U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (1).

Column (5) - Qty Recm. Indicates the quantity recommended.

ADDITIONAL AUTHORIZATION LIST ITEMS

Table 1. Additional Authorization List.

(1) National Stock Number (NSN)	(2) Description, Part Number/(CAGEC)	(3) Usable On Code	(4) U/I	(5) Qty Recom
1290-01-067-0687	AIMING CIRCLE 11785090 (19200)	BU1	EA	1
2590-01-356-2294	AMMUNITION COVER, 120MM MORTAR ROUND (LRRS) 12901141 (19206)	BU1	EA	1
8105-00-285-4744	BAG, SAND MIL-B-12233 (81349)	BU1	EA	1
6920-01-383-2939	BATTALION TRAINING AID 12961064 (19200)	BU1	EA	1
7510-00-889-3494	BINDER, LOOSE-LEAF 11677003 (19207)	BU1	EA	1
1240-00-152-3512	BORESIGHT (W/E), OPTICAL, M45A1 10549221 (19200)	BU1	EA	1
1240-00-152-2916	CASE, BORESIGHT 10549222 (19200)	BU1	EA	1
1290-00-930-4260	COMPASS, MAGNETIC 10547166 (19200)	BU1	EA	1
8140-01-326-0128	DIVIDER ASSEMBLY LRRS, 120MM MORTAR AC200000591 (28620)	BU1	EA	14
1220-01-339-4674	FIRING SCALE, GRAPHICAL (M57, HE/M68, WP) 12944306 (19200)	BU1	EA	1
1220-01-338-4754	FIRING SCALE, GRAPHICAL (M91, ILLUM) 12944305 (19200)	BU1	EA	1
1220-01-414-6399	FIRING SCALE, GRAPHICAL (M929, WP) 12972477 (19200)	BU1	EA	1
1220-01-415-8787	FIRING SCALE, GRAPHICAL (M933, M934, HE) 12972496 (19200)	BU1	EA	1
1220-01-502-1296	FIRING SCALE, GRAPHICAL (M933A1, M934A1, HE) 13002218 (19200)	BU1	EA	1

Table 1. Additional Authorization List - Continued.

(1) National Stock Number (NSN)	(2) Description, Part Number/(CAGEC)	(3) Usable On Code	(4) U/I	(5) Qty Recom
1220-01-510-7985	FIRING SCALE, GRAPHICAL (M930, ILLUM) 13005827 (19200)	BU1	EA	1
1220-01-515-4612	FIRING SCALE, GRAPHICAL (M983, IR ILLUM) 13005843 (19200)	BU1	EA	1
1220-01-540-6635	FIRING SCALE, GRAPHICAL (M931, FRPC) 13011841 (19200)	BU1	EA	1
1290-01-328-3897	FUZE SETTER 12929737 (19206)	BU1	EA	1
5965-01-388-4181	HEADSET, ACAPS A3206098 (80063)	BU1	EA	AR
4240-01-538-7970	HEADSET, HEARING PROTECTIVE 97011 (1QQ93)	BU1	EA	AR
1220-01-548-9063	PLOTTING BOARD 13014357 (19200)	BU1	EA	1
1015-01-209-3482	PLUG, GUN MUZZLE 12529519 (19206)	BU1	EA	1
5120-00-180-0728	SCREWDRIVER, JEWELER'S SWIVEL KNOB GGG-S-1808 (81348)	BU1	EA	1
5340-00-980-9277	STRAP, WEBBING (LRRS) 10900880 (19207)	BU1	EA	2
5340-01-015-6153	STRAP, WEBBING (M1101) NAS1213R10D72 (80205)	BU1	EA	AR
5340-01-044-0987	STRAP, WEBBING (M1101) 843770-5 (19204)	BU1	EA	AR
6675-00-240-1881	TRIPOD, SURVEYING (for arctic use only) 13207E1370 (97403)	BU1	EA	2

END OF WORK PACKAGE

FIELD MAINTENANCE
EXPENDABLE AND DURABLE ITEMS LIST

INTRODUCTION**Scope**

This work package lists expendable and durable items that you will need to operate and maintain the M120A1 120mm Mortar. This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items); CTA 50-909, Field and Garrison Furnishings and Equipment; or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanation of Columns in the Expendable/Durable Items List

Column (1) - Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use general purpose lubricating oil (WP 0061, item 14)).

Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item (C = Crew, O = Service/AMC, F = Field/ASB).

Column (3) - National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) - Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) - U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

EXPENDABLE AND DURABLE ITEMS LIST

Table 1. Expendable and Durable Items List.

(1) Item No.	(2) Level	(3) National Stock Number (NSN)	(4) Item Number, Description, Part Number/(CAGEC)	(5) U/I
1	O	8040-00-290-4301	ADHESIVE 8822584 (19203)	QT
2	O	6810-00-201-0906	ALCOHOL, DENATURED 1 pt (473.18 ml) 837015 (19203)	PT
3	C	8105-00-269-4662	BAG, PLASTIC Pkg of 100 MIL-B-117 (81349)	EA
4	O	8135-00-292-9719	BARRIER MATERIAL: grease-proofed, waterproofed, flexible 36 in. x 100 yd roll MIL-B-121 (81349)	RO
5	O	8020-00-242-7266	BRUSH, PAINT A-A-3192 (58536)	EA
6	C	7920-00-205-2401	BRUSH, CLEANING, TOOL AND PARTS: Chinese bristle, round 7920-00-205-2401 (80244)	EA
7	C	6850-00-227-1887	CLEANING COMPOUND, OPTICAL LENS: liquid 1 qt bottle	QT
	C	6850-00-392-9751	2 oz bottle A-A-59199 (58536)	OZ
8	C	6850-00-224-6657	CLEANING COMPOUND, RIFLE BORE (RBC): solution type 8 oz can	OZ
	C	6850-00-224-6663	1 gal. can MIL-PRF-372 (81349)	GL
9	C	5305-00-221-0872	CLOTH, ABRASIVE: crocus 50 sheet package ANSI B74.18 (80204)	SH
10	O	8315-00-989-9889	CUSHIONING MATERIAL: cellulose 20 in. x 50 ft roll A-A-1898 (58536)	RO
11	C	9905-00-257-2746	DECAL, INSTRUCTION 11731011 (19200)	EA

Table 1. Expendable and Durable Items List - Continued.

(1) Item No.	(2) Level	(3) National Stock Number (NSN)	(4) Item Number, Description, Part Number/(CAGEC)	(5) U/I
12	O	8415-00-266-8675	GLOVES, CHEMICAL AND SOLVENT RESISTANT MIL-DTL-32066 (81349)	PR
13	C	9150-01-228-3389	GREASE, AIRCRAFT (GA) 11581022 (1NUW7)	LB
14	C	9150-00-271-8427	LUBRICATING OIL, PRESERVATIVE, GENERAL PURPOSE (GPL) MIL-PRF-3150 (81349)	QT
15	C	9150-00-292-9687	LUBRICATING OIL, WEAPONS (LAW) 1 qt (0.946 l) can 51924 (0977B)	QT
16	C	6640-00-663-0832	PAPER, LENS: tissue sheet form 65-4900 (25518)	EA
17	O	8010-01-229-7540	POLYURETHANE COATING (BLACK) MIL-DTL-53039 (81349)	QT
18	O	8010-01-229-7546	POLYURETHANE COATING (GREEN) MIL-DTL-53039 (81349)	QT
19	O	8010-01-193-0516	PRIMER, COATING MIL-DTL-0053022 (81349)	KT
20	C	7920-00-205-1711	RAG, WIPING: cotton, unbleached, mixture of white or colored, designed for general purpose use 50 lb (22.68 kg) bale 7920-00-205-1711 (64067)	EA
21	C	1010-01-343-3883	SLEEVE, BORE CLEANING: with ties Box of 210 SLY-M-120-140-25 (65983)	BX
22	C	6850-00-281-1985	SOLVENT, DRY CLEANING 1 gal. (3.8 l) can A-A-711 (58536)	GL
23	O	5975-00-984-6582	STRAP, TIE MS3367-1-0 (OEFK4)	PK
24	O	7510-00-266-6712	TAPE, PRESSURE SENSITIVE ADHESIVE: Type 4, CL1 2 in. x 60 yd roll 8783476 (19203)	RO

EXPENDABLE AND DURABLE ITEMS LIST - Continued

Table 1. Expendable and Durable Items List - Continued.

(1) Item No.	(2) Level	(3) National Stock Number (NSN)	(4) Item Number, Description, Part Number/(CAGEC)	(5) U/I
25	O	7510-00-297-6655	TAPE, PRESSURE SENSITIVE ADHESIVE: paperback, water resistant ASTM D 5486/D 5486M TY5 (80244)	RO
26	O	8010-00-181-8080	THINNER, PAINT PRODUCT M81772-1-001G (81349)	GL
27	O	8030-01-054-3968	THREAD LOCKING COMPOUND MIL-S-46163 (81349)	BT
28	O	8030-00-148-9833	THREAD LOCKING COMPOUND 27121 (05972)	BX
29	O	8030-01-388-5604	THREAD LOCKING PRIMER 19267 (05972)	BT

END OF WORK PACKAGE

OPERATOR

LOOSE ROUND RESTRAINT SYSTEM

GENERAL

The Loose Round Restraint System (LRRS) is a system that provides a fast, simple method of securing "loose" 120mm cartridges (encased in cardboard tubing) in place for transport in the HMMWV (High Mobility Multipurpose Wheeled Vehicle). After assembly, the "egg crate" module rack is restrained in the cargo bed of a vehicle by means of authorized tiedown straps. The LRRS restrains cartridges from excessive longitudinal and lateral movement, and from contact with other cartridges. During cross country movement the divided racks and cartridges may slide a bit within the confines of the web strap tiedown assembly. The cartridges may bounce and sway back and forth over rough terrain, and the divided panels may bend and/or bow out in places. This is an expected characteristic of the divider rack and, after removal from the vehicle, it will re-form itself to near original shape unless extensive crushing damage has been done.

Use of the LRRS is optional. This work package shows the user how to assemble and secure the LRRS to accommodate 36 loose cartridges.

Individual panels making up the 36-round configuration are shown in Figure 1. Figure 2 shows the LRRS assembled and installed in the HMMWV vehicle. Figure 3 shows the disassembled LRRS in shipping configuration.

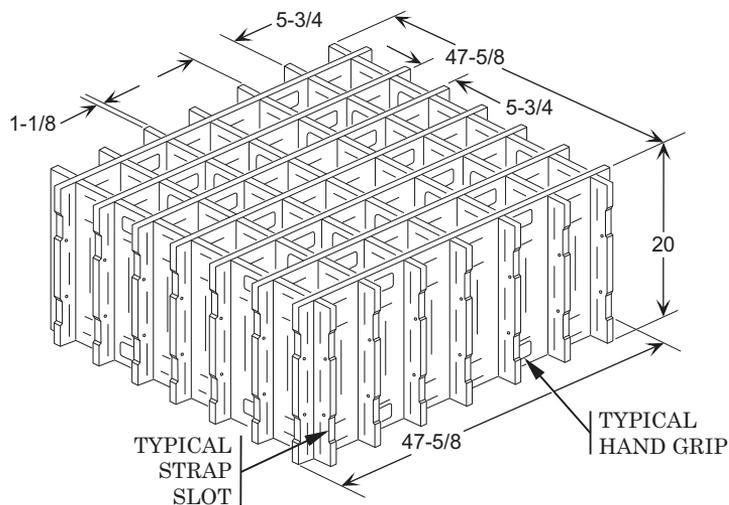


Figure 1. Configuration of LRRS.

GENERAL - Continued

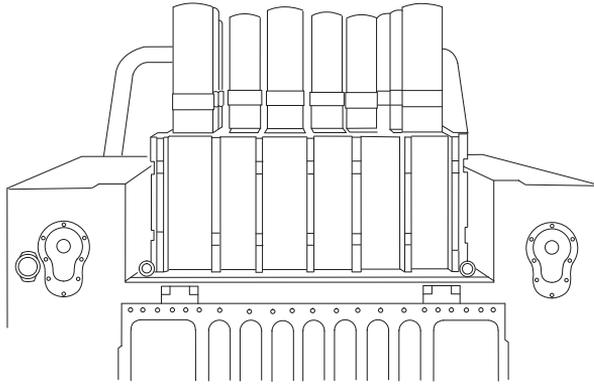


Figure 2. Installation of LRRS in HMMWV.

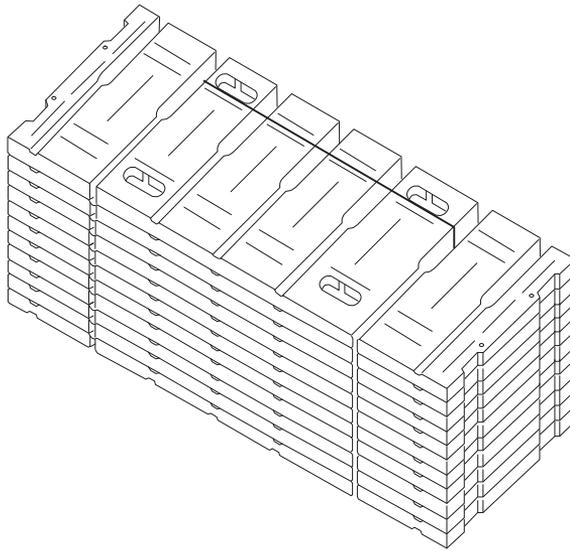


Figure 3. Shipping Configuration.

LRRS PANELS

The panels that make up the LRRS rack are green blow-molded high density polyethylene. "Mating" slots enable the panels to be mated together to form an "egg crate" module rack. Strap notches hold web straps for securing to vehicle side, front, or end wall, or to the floor, and "handles" permit easy lifting for assembly or disassembly.

Fourteen panels make up the LRRS configuration. Each panel has seven "mating slots", is 47-5/8 in. x 1-1/8 in. (121.0 cm x 2.9 cm), and weighs approximately 7.0 lb (3.2 kg). Each panel has four strap notches and "handles" to permit easy lifting. Figure 4 shows a LRRS panel makeup.

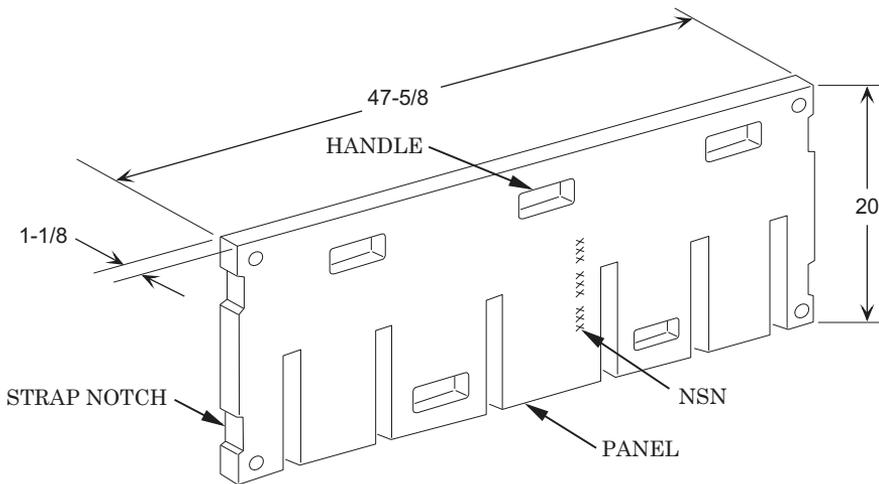


Figure 4. Panel Makeup.

The panels require no maintenance and are not repairable. If an individual panel should break, it will be discarded and a replacement obtained.

ASSEMBLY OF LRRS

Each 36-round divider rack is fabricated of fourteen panels which comprise the system. Each panel has seven "mating slots". The seven panels are mated together by positioning panels on the floor, on edge, side-by-side, in line with each other, approximately 8.0 in. (20.3 cm) apart with slots up. Starting at one end, an eighth panel is inserted, slots down, into the end slots on all panels. Push the panel all the way down until it contacts the floor. This partial assembly will now stand by itself. Next, position the remaining six panels in the same manner. The assembled divided rack will have 36 compartments, each of which measures 5-3/4 in. x 5-3/4 in. (14.6 cm x 14.6 cm).

ASSEMBLY OF LRRS - Continued

When placing an assembled 36-round divided rack in the vehicle, or assembling a 36-round divided rack in the vehicle, it should be noted that, if the divider rack is positioned or assembled in position with the two handles at the top, each panel can be lifted up and out of the divided rack as needed to remove the cartridges.

GENERAL TIE-DOWN NOTES FOR RACK

All divided racks must be held down with one or more web straps in such a manner that the divided rack cannot "work up" and "dump" the cartridges underneath it. This strap must always be positioned in the top strap notches on the divided rack in order to provide the proper hold-down. See Figure 5 for proper installation of the tie-down strap.

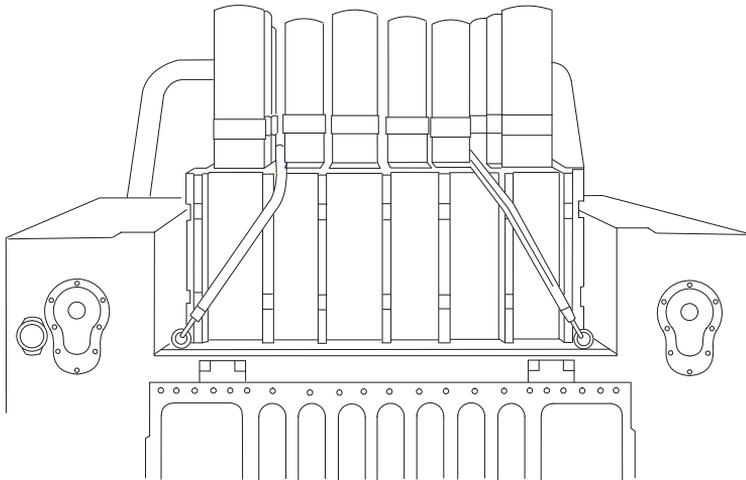


Figure 5. Installation of Tie-Down Strap.

Tie-down straps are identified and listed in WP 0060, Additional Authorization List.

Ammunition cover (LRRS) is identified and listed in WP 0060, Additional Authorization List.

END OF WORK PACKAGE

OPERATOR
ASSOCIATED SUPPORT ITEM OF EQUIPMENT (ASIOE)

GENERAL

The M1101 Cargo Trailer, the M326 120mm Mortar Stowage Kit, and the M150 120mm Dismounted Mortar Fire Control System are not supplied with the weapon but are Associated Support Item of Equipment (ASIOE) items.

Refer to TM 9-2330-392-14&P for information about the M1101 Trailer. Refer to TM 9-2590-527-13&P for information about the M326 Mortar Stowage Kit. Refer to TM 9-1230-205-13&P for information about the M150 Mortar Fire Control System.

See the following table for acquisition data.

ACQUISITION DATA

Table 1. Acquisition Data for ASIOE Items.

(1) Item Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) Usable On Code	(5) U/I	(6) Qty Rqr
1	2330-01-387-5443	TRAILER, CARGO: M1101 12450002 (19207)	BU1	EA	1
2	2590-01-551-7979	120MM MORTAR STOWAGE KIT: M326 13016183 (44114)	BU1	EA	1
3	1230-01-560-1027	120MM DISMOUNTED MORTAR FIRE CONTROL SYSTEM: M150 13017950 (19200)	BU1	EA	1

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RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tools Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE Date you filled out this form
For use of this form, see AR 25-30; the proponent agency is ODISC4.							
TO: (Forward to proponent of publication or form) (Include ZIP Code) U. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 1 Rock Island Arsenal, Rock Island, IL 61299-7630						FROM: (Activity and location) (Include ZIP Code) Your mailing address	
PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 9-1015-256-13&P					DATE 30 November 2009	TITLE Operator's and Field Maintenance Manual for 120MM Mortar, M120A1 (NSN 1015-01-554-0749) (EIC: 4SN)	
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>	
1	0051-7				1	The CAGEC and part number for the baseplate, item 4 of Figure 3, are incorrect.	
							
<small>*Reference to line numbers within the paragraph or subparagraph.</small>							
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PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS		
PUBLICATION NUMBER TM 9-1015-256-13&P	DATE 30 November 2009	TITLE Operator's and Field Maintenance Manual for 120MM Mortar, M120A1 (NSN 1015-01-554-0749) (EIC: 4SN)

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS	<i>(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)</i>
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SAMPLE

TYPED NAME, GRADE OR TITLE Your Name	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE Your Signature
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TO: (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 1 Rock Island Arsenal, Rock Island, IL 61299-7630						FROM: (Activity and location) (Include ZIP Code)	
PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 9-1015-256-13&P						DATE 30 November 2009	TITLE Operator's and Field Maintenance Manual for 120MM Mortar, M120A1 (NSN 1015-01-554-0749) (EIC: 4SN)
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON <i>(Provide exact wording of recommended changes, if possible).</i>	
*Reference to line numbers within the paragraph or subparagraph.							
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

TO: <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 1 Rock Island Arsenal Rock Island, IL 61299-7630	FROM: <i>(Activity and location) (Include ZIP Code)</i>	DATE
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PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS		
PUBLICATION NUMBER TM 9-1015-256-13&P	DATE 30 November 2009	TITLE Operator's and Field Maintenance Manual for 120MM Mortar, M120A1 (NSN 1015-01-554-0749) (EIC: 4SN)

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS	<i>(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)</i>
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TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tools Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is ODISC4.							
TO: (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/ TECH PUBS 1 Rock Island Arsenal, Rock Island, IL 61299-7630						FROM: (Activity and location) (Include ZIP Code)	
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TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:

A handwritten signature in cursive script that reads "Joyce E. Morrow".

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
0931401

DISTRIBUTION: To be distributed in accordance with the Initial Distribution Number (IDN) 401230, requirements for TM 9-1015-256-13&P.

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