D E P A R T M E N T  O F  T H E  A R M Y  T E C H N I C A L  M A N U A L

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

## FIELD ARTILLERY TRAINER KITS (WITH FIELD ARTILLERY TRAINER M31)

**This copy is a reprint which includes current pages from Changes 1 and 2.**

H E A D Q U A R T E R S ,  D E P A R T M E N T  O F  T H E  A R M Y

SEPTEMBER 1976

**WARNING**

**If you're extracting a live round, pull bolt back S-L-O-W-L-Y. Firing pin will move forward as bolt is moved rearward. Misfire device should be used.**

**WARNING**

**Before starting an inspection, be sure to clear the trainer or subcaliber device. Do not actuate the firing mechanism until the weapon has been cleared. Inspect the receiver to insure that it is empty and check to see that no ammunition is in position to be introduced. Avoid having live ammunition in the vicinity of the work.**

**WARNING**

**The projectile fired by the trainer does not fragment when ignited. Do not fire the trainer if there are troops deployed forward of the line of fire.**

**WARNING**

**Because the M31 has no recoil, crewmen may develop unsafe habits which would lead to injury during live fire. Batteries should practice, and become proficient in, occupying positions at realistic distances before training on the reduced scale 14.5-mm range. The lanyard holder assembly should always be used to fire the M31 when installed as a subcaliber device.**

CHANGE

No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 5 August 1985

OPERATOR, ORGANIZATIONAL, AND
DIRECT SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)
FIELD ARTILLERY TRAINTER KITS
(WITH FIELD ARTILLERY TRAINER M31)

TM 9-6920-361-13&P, 22 September 1976, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page.

| Remove Pages | Insert Pages |
|---|---|
| 1-1 and 1-2 | 1-1 and 1-2 |
| 4-1 and 4-2 | 4-1 and 4-2 |
| A-1/(A-2 Blank) | A-1/(A-2 Blank) |
| C-7 through C-10 | C-7 through C-10 |

File this and other change sheets in back of the publication for reference purposes.

**By Order of the Secretary of the Army:**

**JOHN A. WICKHAM, JR.**
***General, United States Army***
***Chief of Staff***

**Official:**

**DONALD J. DELANDRO**
***Brigadier General, United States Army***
***The Adjutant General***

**DISTRIBUTION:**

To be distributed in accordance with DA Form 12-40, Operator's; Organizational and Direct Support Maintenance requirements for Trainer, Field Artillery, Kits, with Trainer M31.

CHANGE )
)
No.1 )

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 30 April 1982

OPERATOR, ORGANIZATIONAL, AND
DIRECT SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND
SPECIAL TOOLS LIST)
FIELD ARTILLERY TRAINER KITS
(WITH FIELD ARTILLERY TRAINER M31)

TM 9-6920-361-13&P, 22 September 1976, is changed as follows:

The purpose of this change is to update configuration of adapter assemblies and to add the M198 Howitzer adapter assembly.

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration identification number.

| Remove pages | Insert pages |
|---|---|
| iii and iv | iii and iv |
| 1-1 through 1-8 | 1-1 through 1-8 |
| 2-15 through 2-22 | 2-15 through 2-22 |
| None | 2-22.1 and 2-22.2 |
| 2-23 through 2-27/(2-28 blank) | 2-23 through 2-27/(2-28 blank) |
| 3-1 through 3-4 | 3-1 through 3-4 |
| 4-1 through 4-8 | 4-1 through 4-8 |
| None | 4-8.1/14-8.2 blank) |
| A-1/(A-2 blank) | A-1/(A-2 blank) |
| B-5 and B-6 | B-5 and B-6 |
| C-3 through C-8 | C-3 through C8 |
| C-11 and C-12 | C-11 and C-12 |
| C-23 and C-24 | C-23 and C24 |
| None | C-24.1 and C-24.2 |
| C-25 and C-26 | C-25 and C26 |
| None | C-26.1 and C-26.2 |
| C-27 and C-28 | C-27 and C-28 |
| None | C-28.1 and C-28.2 |
| C-29 through C-32 | C-29 through C-32 |
| INDEX 1 through INDEX 6 | INDEX 1 through INDEX 6 |

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

**By Order of the Secretary of the Army:**

**E. C. MEYER**
***General, United States Army***
***Chief of Staff***

**Official:**

**ROBERT M. JOYCE**
***Brigadier General, United States Army***
***The Adjutant General***

Distribution:

To be distributed in accordance with DA Form 12-40, Organizational Maintenance requirements for Trainer, Field Artillery, 14.5-MM, M31.

TECHNICAL MANUAL
NO. 9-6920-361-13&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *22 September 1976*

# OPERATOR, ORGANIZATIONAL, AND DIRECT SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FIELD ARTILLERY TRAINER KITS (WITH FIELD ARTILLERY TRAINER M31)

Current as of 7 June 1976

**REPORTING OF ERRORS**

You can help improve this manual by calling attention to errors and recommending improvements and by stating your reasons for the recommendations. Your letter or DA Form 2028 (recommended Changes to Publications and Blank Forms) should be mailed directly to Commander, US Army Armament Command, ATTN: DRSARMAS, Rock Island, IL 61201. A reply will be furnished directly to you. For your convenience, preaddressed DA Forms 2028 are included as final pages of this manual.



*This manual supersedes TM 9-6920-221-13, 27 October 1966 including all changes.

## LIST OF ILLUSTRATIONS

## LIST OF ILLUSTRATIONS - Continued

# CHAPTER 1
# INTRODUCTION

## Section I. GENERAL

**1-1. Scope**. This technical manual contains instructions for the operations of the 14.5-mm field artillery trainer M31. It also contains instructions for the operation and maintenance of the trainer when it is used as an inbore subcaliber device on the various light, medium, and heavy weapons.

**1-2. Field Artillery Trainer Kits**. Kits included in this manual are as follows:

a. Kit, Artillery Trainer for 105-mm How M102-11578584.

b. Kit, Artillery Trainer for 155-mm How M109/M109A1-11578585.

c. Kit, Artillery Trainer for 175-mm Gun M107 and 8-inch How M110-11578586.

d. Kit, Artillery Trainer for 105-mm How M101A1-11578587.

e. Kit, Artillery Trainer for 155-mm How M114A1 11578588.

f. Kit, Artillery Trainer for 155-mm How M114A1/8-inch How M110 Composite Bn-11578589.

g. Kit, Artillery Trainer for 105-mm How M101A1/155-mm How 114A1 Composite Bn-11578590.

h. Kit, Artillery Trainer for United States Military Academy-USMA-11578591.

i. Kit, Artillery Trainer for United States Army Infantry School-USAIS-11578592.

j. Kit, Artillery Trainer for United States Army Field Artillery School-USAFAS-11578593.

**1-3. Maintenance Forms and Records**. Forms and records used for equipment maintenance will be prescribed in DA PAM 738-750, The Army Maintenance Management System.

## Section II. DESCRIPTION AND DATA

**1-4. Description**.

a. *General.* The 14.5-mm field artillery trainer M31 consists of a bolt-action, single-shot, rifled barrel assembly which is mounted on a mount assembly and supported by a tripod assembly.

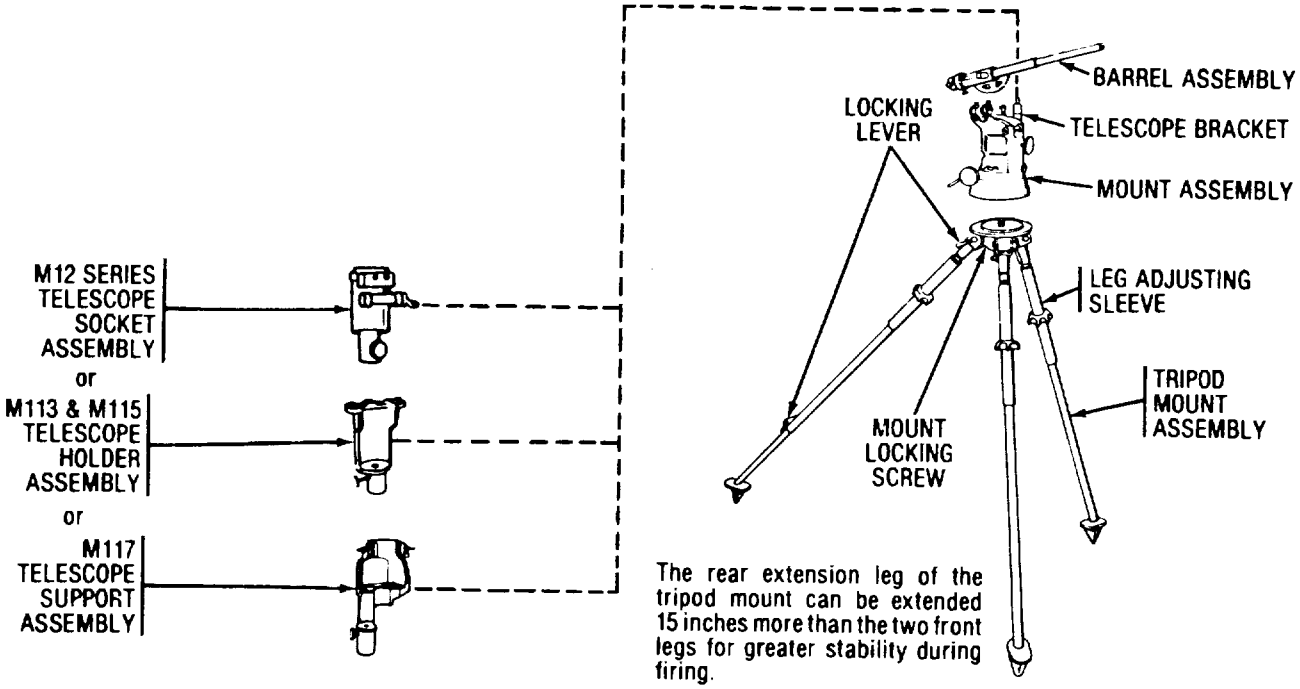



*Figure 1-1. Mount and tripod assemblies.*

b. *Mount Assembly.* The mount assembly consists of the rotating upper mount and the fixed base mount which contain the elevating and traversing gears. The telescope bracket is attached to the left side of the upper mount. The identification plate is located on the right side of the upper mount.

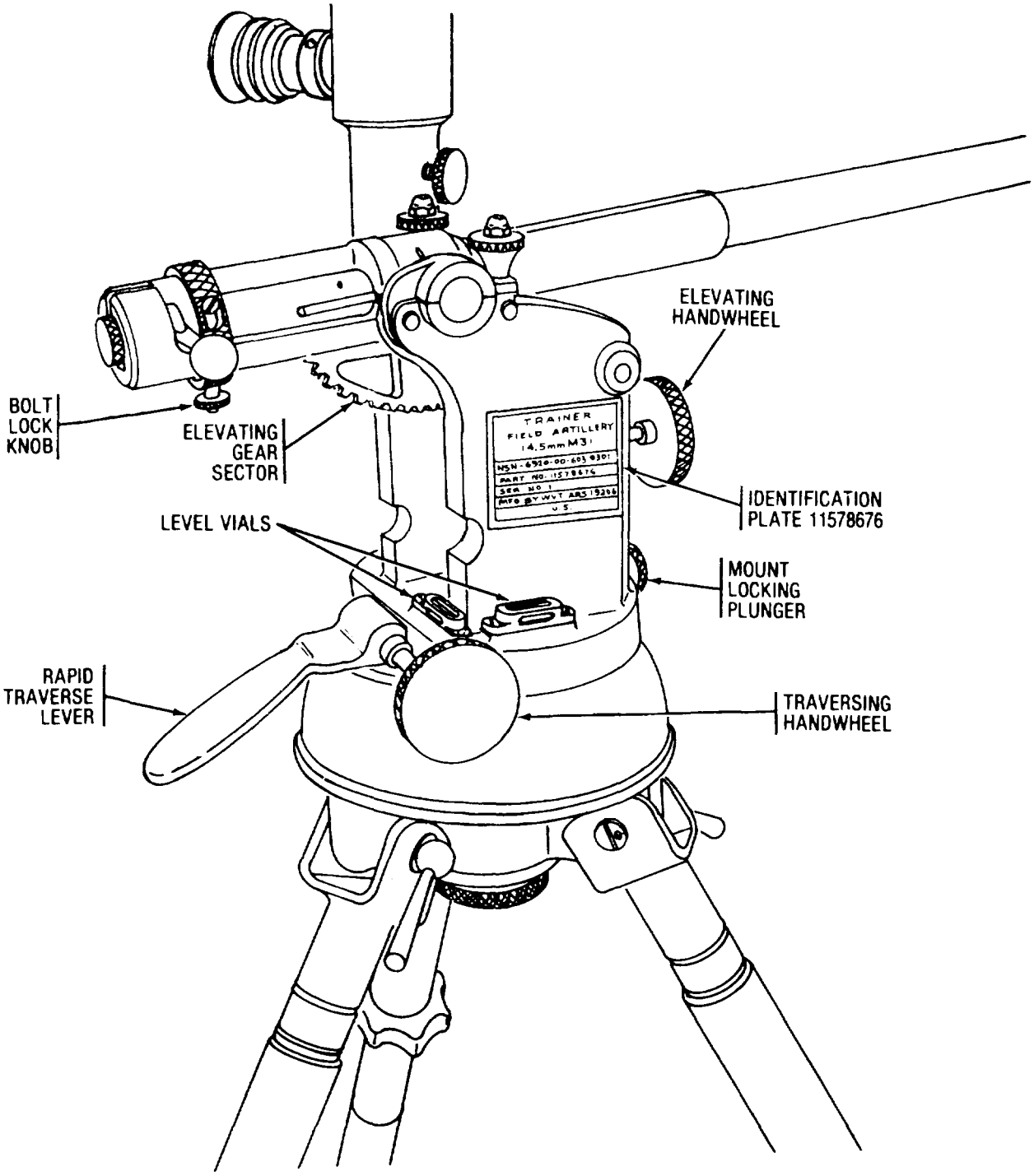



*Figure 1-2. Mount assembly.*

c. *Barrel Assembly.* The barrel assembly consists of a barrel trunnion and receiver assembly, a breech bolt group, a safety, and an elevating gear sector. The elevating gear sector is removed when the barrel assembly is used as a subcaliber device. The top portion of the barrel has a flat machined surface to be used with a gunner's quadrant for laying the trainer for elevation.

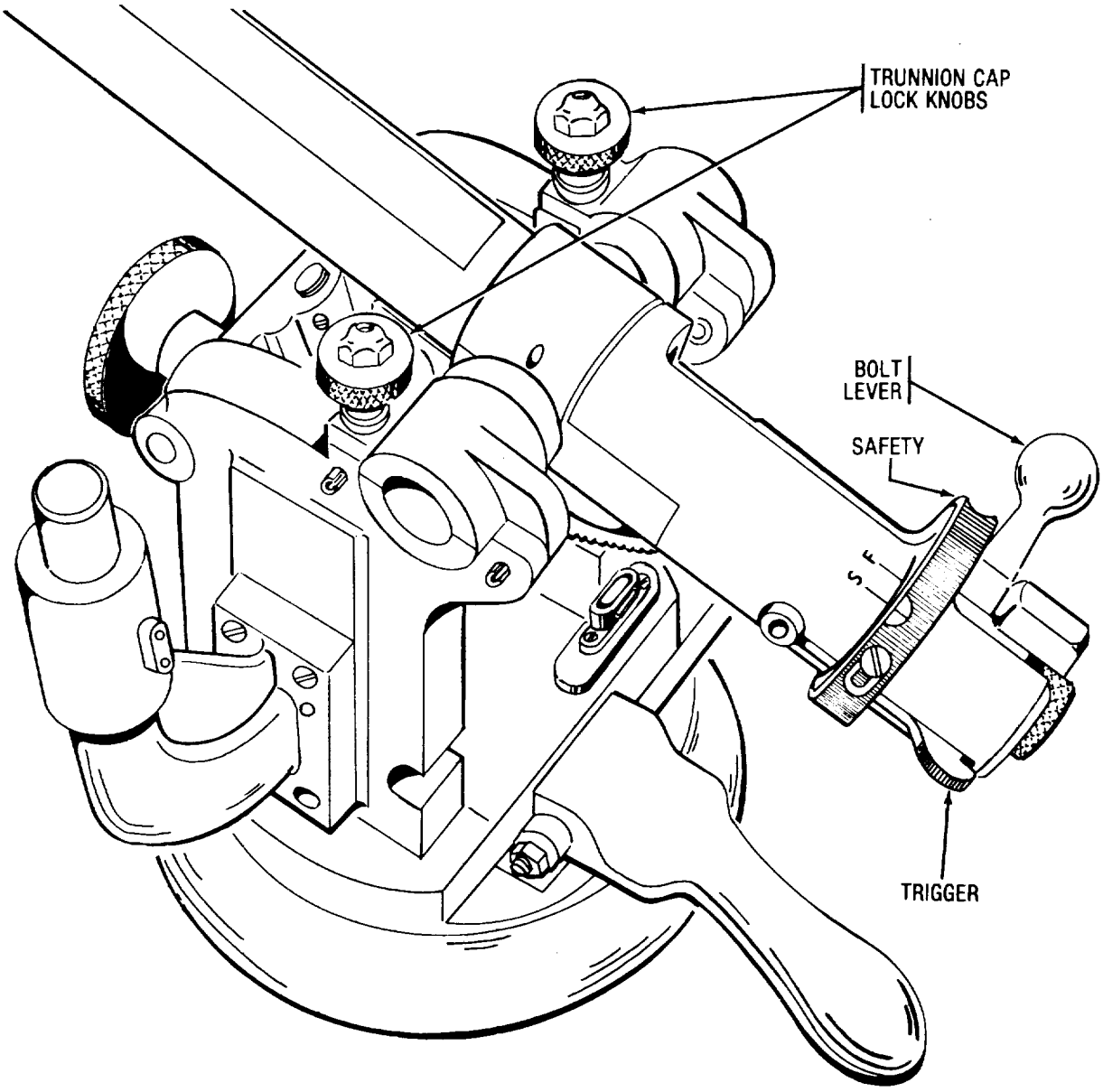
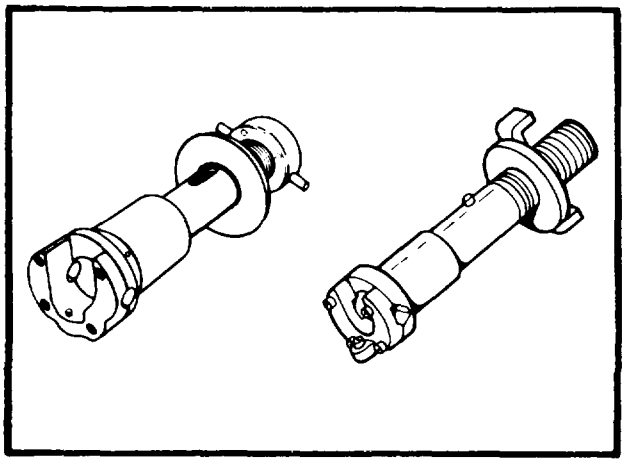
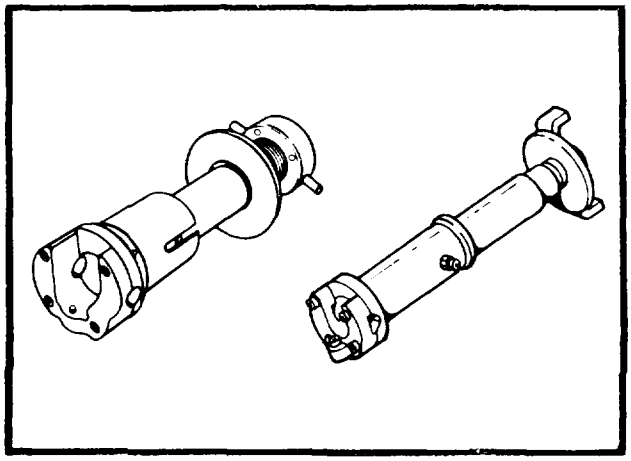



*Figure 1-3. Barrel assembly.*

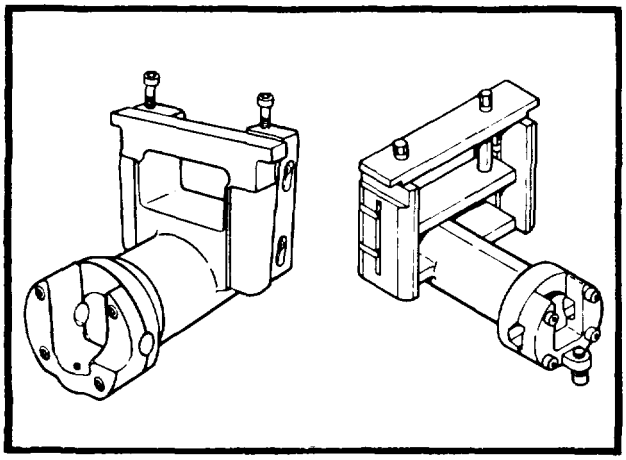
d. Adapter Assemblies. The adapter assemblies are furnished in the various sizes and configurations necessary to mount the 14.5-mm cannon as an inbore subcaliber device in light, medium, and heavy artillery weapons. A small quantity of adapters were made from optional method of manufacture drawings. They are slightly different in appearance, but are completely interchangeable.



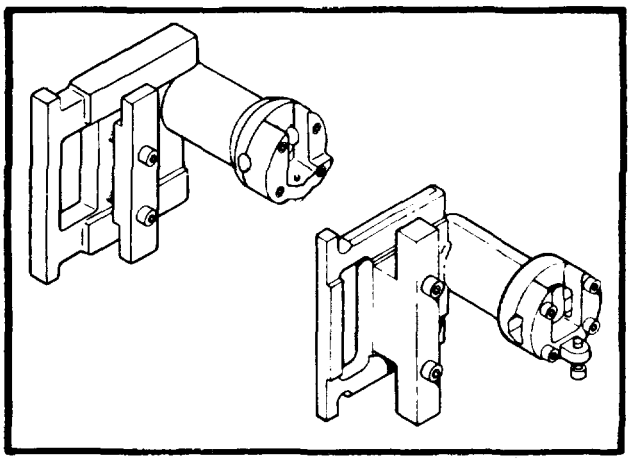
ADAPTER ASSEMBLIES for M109l M109A1/M115/M110 Howitzers and M107 Gun



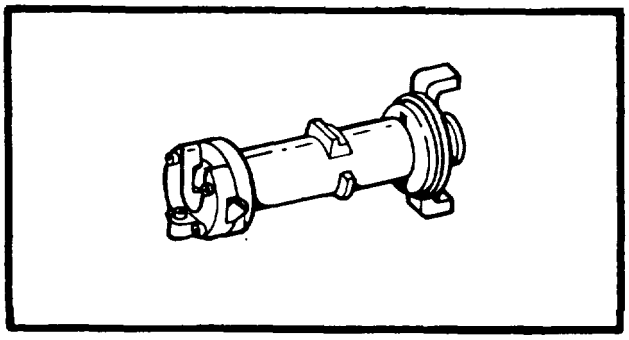
ADAPTER ASSEMBLIES for M114A1 Howitzer



ADAPTER ASSEMBLIES for M102 Howitzer



ADAPTER ASSEMBLIES for M101A1 Howitzer



ADAPTER ASSEMBLY for M198 Howitzer

*Figure 1-4. Adapter assemblies.*

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e. *Lanyard Ring Assembly.* The lanyard ring assembly consists of a holder, lever, and lanyard which when placed on the barrel assembly provide an off-carriage means of firing the subcaliber device.

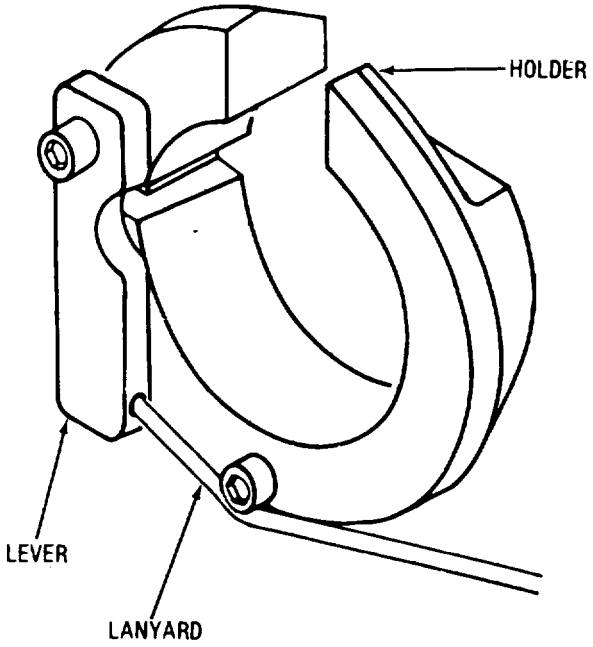



*Figure 1-5. Lanyard ring assembly.*

f. *Ammunition.* The trainer fires a projectile that ignites and produces an audible report, a puff of smoke visible for 1,000 meters in daylight, and a flash of light visible for several kilometers at night. Cartridges are available with a 3-second delay fuze (M181), a 6-second delay fuze (M182), or a point detonation fuze (M183).

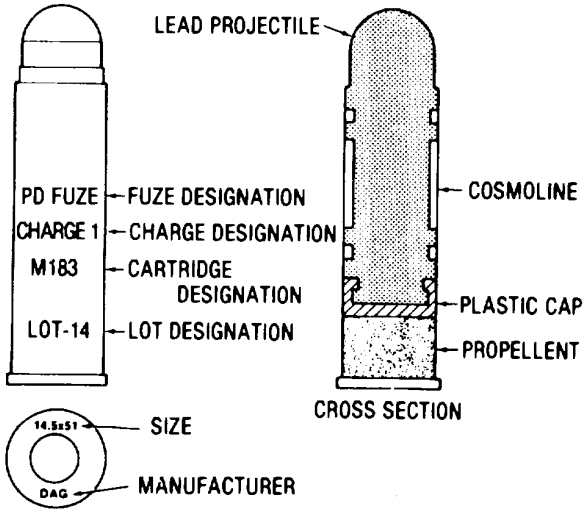



*Figure 1-6. Trainer ammunition.*

**1-5. Differences Between Kits.**

a. For list of available kits see para 1-2.

b. All kits contain certain items required to fire the M31 trainer either from the tripod or as a subcaliber device. These items are as follows:

(1) Graphical firing tables.
(2) Graphical site tables.
(3) Tabular firing tables.
(4) M18 FADAC tapes (revision 5).
(5) TM 9-6920-361-13&P (6) Safety tongs.
(7) Organizational repair parts.

c. Specific kits contain additional equipment as required for the types of weapons supported. Units equipped with the M12 series panoramic telescope will be issued a telescope socket assembly. Units equipped with the M113 or the M115 panoramic telescope will be issued a telescope holder assembly. Units equipped with the M117 panoramic telescope will be issued a telescope support assembly. Here is the breakdown on this equipment:

(1) Kit for 105-mm How M102

(a) Two M31 trainers complete with telescope holder assembly.

(b) Six adapters for 105-mm How M102 with six lanyard ring assemblies.

(c) Four 14.5-mm barrels with cleaning kits.

(2) Kit for 155-mm How M109/M109AI (a) Two M31 trainers complete with telescope support assembly.

(b) Six adapters for the 155-mm How M109/M 109AI with six lanyard ring assemblies.

(c) Four 14.5-mm barrels with cleaning kits.

(3) Kit for 175-mm Gun M107 and 8-inch How M110

(a) Two M31 trainers complete with telescope holder assembly.

(b) Four adapters for the 175-mm How M107 and 8-inch How M110 with four lanyard ring assemblies.

(c) Two 14.5-mm barrels with cleaning kits.

(4) Kit for 105-mm How M101A1

(a) Two M31 trainers complete with telescope socket assembly.

(b) Six adapters for the 105-mm How M101A1 with six lanyard ring assemblies.
(c) Four 14.5-mm barrels with cleaning kits.

(5) Kit for 155-mm How M114A1.

(a) Two M31 trainers complete with telescope socket assembly.
(b) Six adapters for the 155-mm How M114A1 with six lanyard ring assemblies.
(c) Four 14.5-mm barrels with cleaning kits.

(6) Kit for 155-mm How M114A1/8-inch How M10 Composite Bn.

(a) Two M31 trainers with one telescope socket assembly and one telescope holder assembly.
(b) Six adapters for the 155-mm How M114A1 and four adapters for the 8-inch How M110, with six lanyard ring assemblies.
(c) Four 14.5-mm barrels with cleaning kits.

(7) Kit for 105-mm How M101A1/155-mm How M114A1 Composite Bn.

(a) Two M31 trainers complete-with telescope socket assembly.
(b) Six adapters for the 105-mm How M101A1 and six adapters for the 155-mm How MI 14A1, with twelve lanyard ring assemblies.
(c) Four 14.5-mm barrels with cleaning kits.

(8) Kit for United States Military Academy Sixteen M31 Trainers complete with telescope socket assembly.

(9) Kit for United States Army Infantry School Seven M31 trainers complete with telescope socket assembly.

(10) Kit for United States Army Field Artillery School.

(a) Twelve M31 trainers complete with telescope holder assembly.
(b) Twelve adapters for the 105-mm How M102 with twelve lanyard ring assemblies.
(c) Twelve 14.5-mm barrels with cleaning kits.

(11) Kit for 155-mm How M198

(a) Two M31 trainers complete with telescope holder assembly.
(b) Six adapters for the 155-mm How M198 with six lanyard ring assemblies.
(c) Four 14.5-mm barrels with cleaning kits.

(12) Kit for 105-mm How M101A1/ 155-mm How M198 Composite Bn.

(a) Two M31 trainers with one telescope socket assembly and one telescope holder assembly.
(b) Six adapters for the 105-mm How M101A1 and six adapters for the 155-mm How M198, with twelve lanyard ring assemblies.
(c) Four 14.5-mm barrels with cleaning kits.

(13) Kit for 155-mm How M198/8-inch How M110 Composite Bn.

(a) Two M31 trainers with one telescope holder assembly and one telescope socket assembly.
(b) Six adapters for the 155-mm How M198 and four adapters for the 8-inch How M110, with six lanyard ring assemblies.
(c) Four 14.5-mm barrels with cleaning kits.

**1-6. Tabulated Data**

a. General.

| | |
|---|---|
| Barrel | Rifled portion 13-1/4 inches long, uniform right hand twist, one turn in 8.5 calibers |
| Breech | Bolt action with safety |
| Firing mechanism | Trigger located at left rear of breech |
| Elevating limits | Minus 52 mils and plus 1,617 mils |
| Loading limits | Minus 52 mils and plus 1,070 mils |
| Traverse | 6,400 mils |
| Mils per turn of handwheel: | |
| Elevating | 52 mils |
| Traversing | 66 mils |

b. Ammunition (Fixed Round 14.S-mm Cartridge).

| | |
|---|---|
| M181-Charge 1 (1305A365). | 3-second delay fuze |
| M182-Charge 1 (1305A366). | 6-second delay fuze |
| M183-Charge 1 (1305A367). | Point detonating fuze |
| Muzzle velocity (all cartridges) | 100 meters per second |

c. *Weights.*

Tripod mount assembly . ..... 46 pounds
Mount assembly (rotating and fixed base) ..... 47 pounds
Barrel assembly ..... 8.5 pounds
Telescope socket assembly for M12 Series panoramic telescope ..... 4 pounds
Telescope holder assembly for M113 or M115 panoramic telescope ..... 6 pounds
Telescope support assembly for M117 panoramic telescope ..... 7 pounds
Adapter for 105-mm How M101A1 ..... 27 pounds
Adapter for 105- mm How M102 ..... 29 pounds
Adapter for 155-mm HowM114A1 ..... 21 pounds
Adapter for M109/M109A1/ M107/M110vehicles. ..... 24 pounds
Adapter for 155-mm How M198 ..... 15 pounds

d. *Dimensions.*

Recommended emplacement height on tripod ..... 64 inches
Spread of front legs emplaced ..... 55 inches
Length of front legs ..... 45 inches
Length of extended rear leg ..... 60 inches
Length of barrel ..... 15.75 inches
Shipping and storage chest ..... 61 x 12-3/4 x 11-7/8

**1-7. Basic Issue Items**

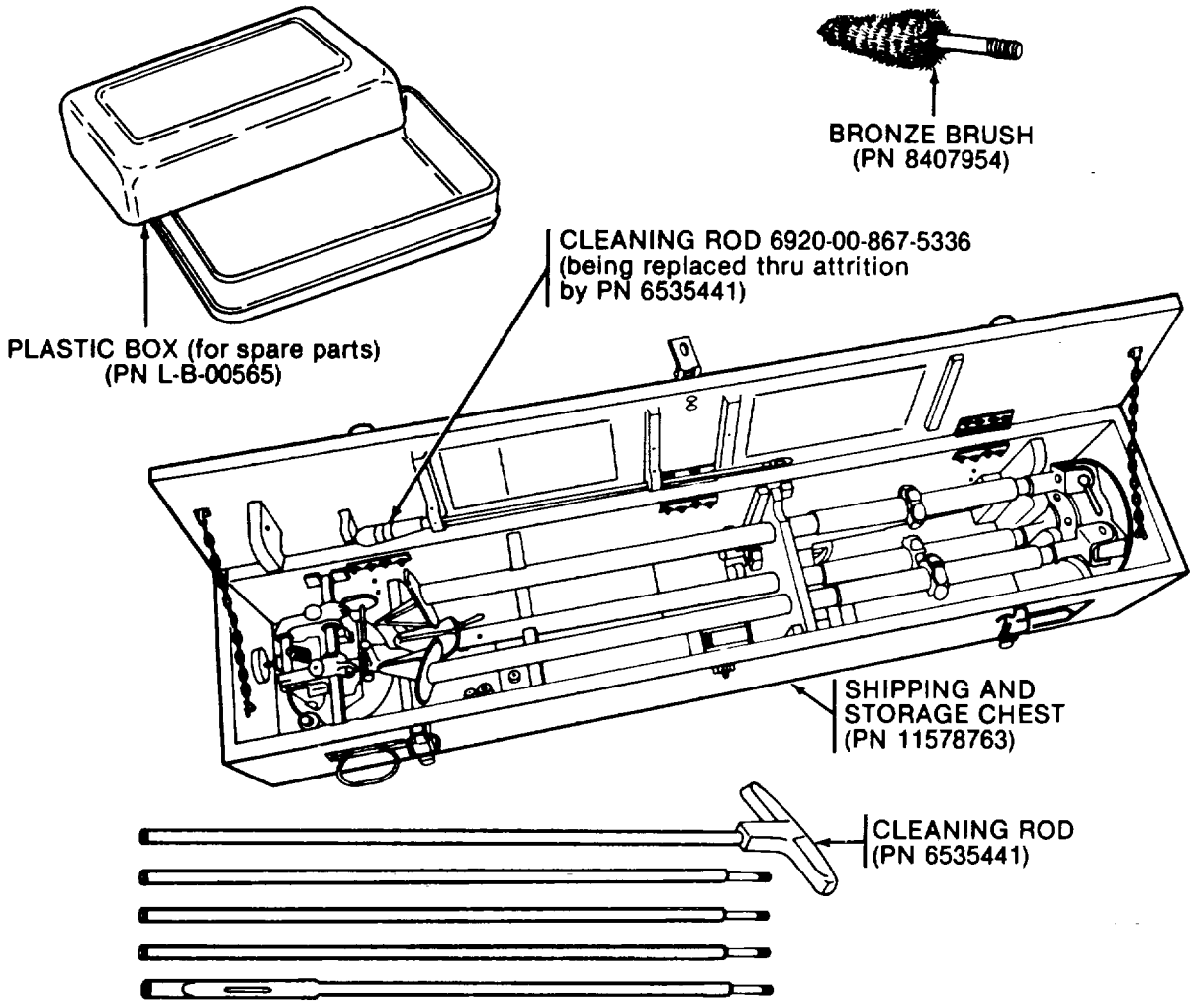
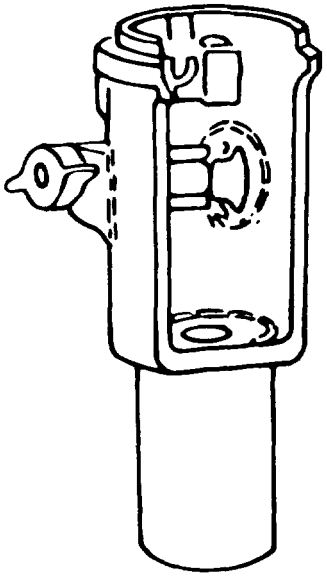


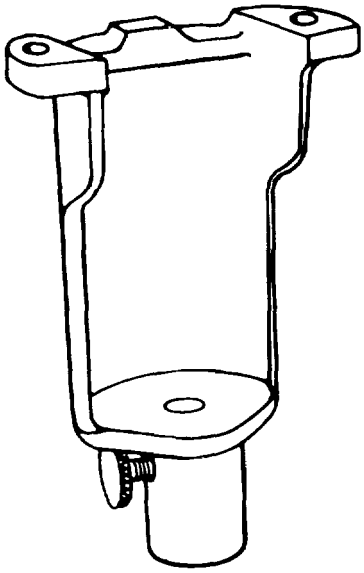

*Figure 1-7. Basic issue items.*

ARR 81-1841

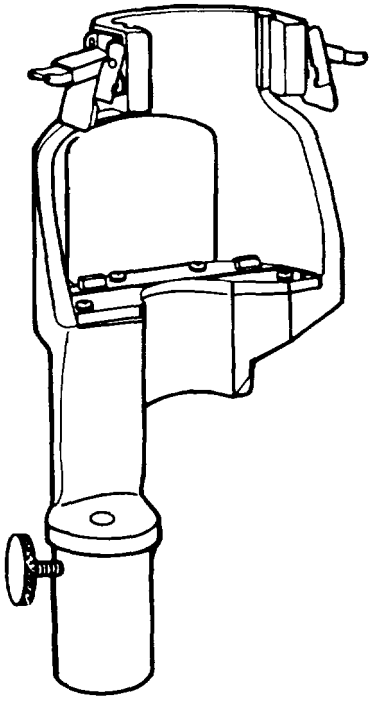
**1-7. Basic Issue Items - Continued**



TELESCOPE SOCKET (PN 11578700)
For M12 Series Panoramic Telescope



TELESCOPE HOLDER ASSEMBLY (PN 11727520)
For M113/M115 Panoramic Telescope



TELESCOPE SUPPORT ASSEMBLY (PN 11728907)
For M117 Panoramic Telescope

ARR 81-1842

**1-8. Items Troop Installed or Authorized**. Troop installed items are listed in section III of appendix C, and are illustrated in paragraphs 1-4d and e.

**1-9. Consumable and Expendable Items.**

| | | |
|---|---|---|
| GAA | 5 lbs. | 9150-00-190-0904 |
| SD | 1 gal. | 6850-00-281-1985 |
| Rags | 5 lbs. | 7920-00-234-8465 |
| Enamel | 1 gal. | 8010-00-297-2116 |
| Brush | 2 | 7920-00-205-2401 |
| Swabs | 1,000 | 1005-00-288-3565 |
| CLP | 1 pt./w/ trigger spray | 9150-01-054-6433 |
| | 4-oz. bt. | 9150-01-079-6124 |

*Figure 1-7. Basic issue items--continued.*

# CHAPTER 2
# OPERATING INSTRUCTIONS

## Section I. PREPARATION FOR OPERATION

**2-1**. **General**. The amount of time spent in preparation greatly determines the amount of benefit the unit will derive from training with the M31. Certain preparations must be made in order to get maximum benefit from the equipment in the training kits. Your unit must construct a miniature range, develop a special map, and instruct personnel on the use of the equipment. The more thorough the preparation, the better your training will be.

**2-2**. **Constructing a Firing Range**.

a. *Select a Range Site*. The first step is the selection of a range site. Commanders may authorize M31 trainer firing on permanent firing ranges or in other approved training areas--when such firing is conducted in accordance with safety requirements which will be discussed later. The terrain should be slightly rolling. Otherwise, rounds can be lost in deep ditches, behind large mounds, or in exceptionally tall (higher than six inches) grass or weeds.

b. *Types of Ranges*. Permanent, semipermanent, and temporary ranges can be constructed. Their characteristics are:

(1) Permanent range. A permanent range is one which is used only for 14.5-mm firing. The targets, reference points, firing point markers, observation posts, and other manmade objects are permanently emplaced and marked. Most military posts have sufficient area to accommodate one or more such ranges.

(2) *Semipermanent*. A semipermanent range is one which must be shared with other training activities or operations, such as known distance rifle range, drill field or temporary landing field. The targets, reference points, etc., must be removed after use and all reference stakes which mark the location of these items must be at or below ground level. The unit can use the range on a scheduled basis.

(3) *Temporary range*. A temporary range is one which is used by the unit on a one-time basis (e.g., one day or one weekend) and is normally on private property such as a meadow, field, or pasture.

c. Surface Danger Zone.

(1) The dimensions of the surface danger zone are dependent on the nature of the firing and the type of surface conditions present within the surface danger zone.

(2) Figure 2-1 represents the "worst case" for soft or medium soil conditions. If the area for the proposed surface danger zone is limited, the exact dimensions for all surface conditions can be determined by using table 2-1 in conjunction with figure 2-2. For example, if the maximum range to be fired was 500 meters, and the impact area was composed of soft soil, the surface danger area would extend 580 meters downrange and the lateral buffer zone would be 25 meters outside of the right and left deflection limits as shown in figure 2-3.

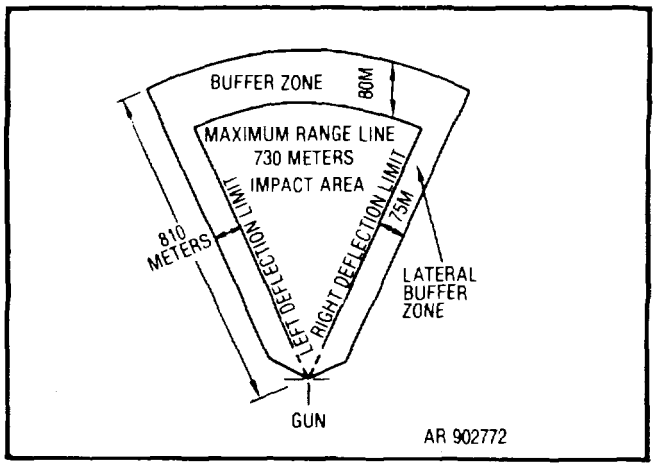



*Figure 2-1. Surface danger zone*

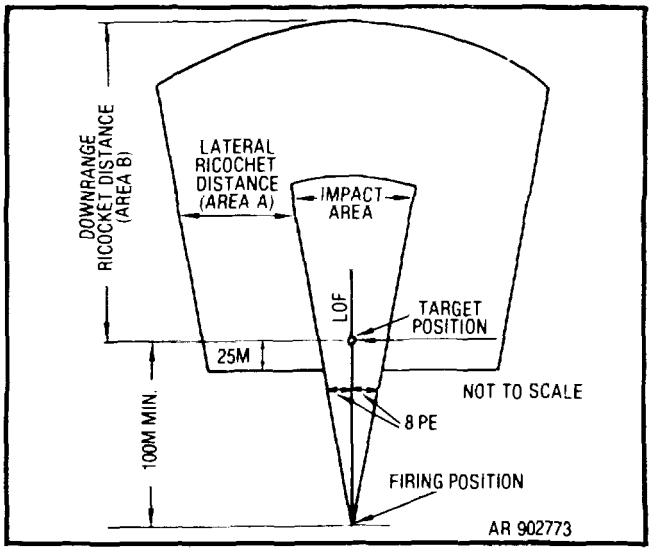



*Figure 2-2. For determining the exact surface danger area required (Charge 1 only)*

*Table 2-1. Required Surface Danger Zone Dimensions (Charge 1 Only).*

| Impact Area Condition | Range to Target | Maximum Ricochet Distance (Charge 1 Only) | |
|---|---|---|---|
| | | Downrange (Area B) | Lateral (Area A) |
| Soft soil (loose and essentially rock free for the top six (inches) | 100 | 470 | 75 |
| | 150 | 420 | 75 |
| | 200 | 375 | 75 |
| | 250 | 330 | 75 |
| | 300 | 305 | 75 |
| | 350 | 290 | 75 |
| | 400 | 285 | 75 |
| | 450 | 80 | 25 |
| | 500 | 80 | 25 |
| | 550 | 80 | 25 |
| | 600 | 80 | 25 |
| | 650 | 80 | 25 |
| | 700 | 80 | 25 |
| | 730 | 80 | 25 |
| Medium soil (essentially) rock free and of medium hardness) | 100 | 490 | 75 |
| | 150 | 455 | 75 |
| | 200 | 410 | 75 |
| | 250 | 370 | 75 |
| | 300 | 355 | 75 |
| | 350 | 350 | 75 |
| | 400 | 350 | 75 |
| | 450 | 80 | 25 |
| | 500 | 80 | 25 |
| | 550 | 80 | 25 |
| | 600 | 80 | 25 |
| | 650 | 80 | 25 |
| | 700 | 80 | 25 |
| | 730 | 80 | 25 |
| Macadam/Concrete (also hard soil with rock present) | 100 | 1345 | 120 |
| | 150 | 1310 | 135 |
| | 200 | 1265 | 145 |
| | 250 | 1215 | 195 |
| | 300 | 1165 | 205 |
| | 350 | 1120 | 245 |
| | 400 | 1070 | 250 |
| | 450 | 1020 | 285 |
| | 500 | 965 | 310 |
| | 550 | 910 | 310 |
| | 600 | 855 | 325 |
| | 650 | 790 | 315 |
| | 700 | 710 | 310 |
| | 730 | 590 | 280 |

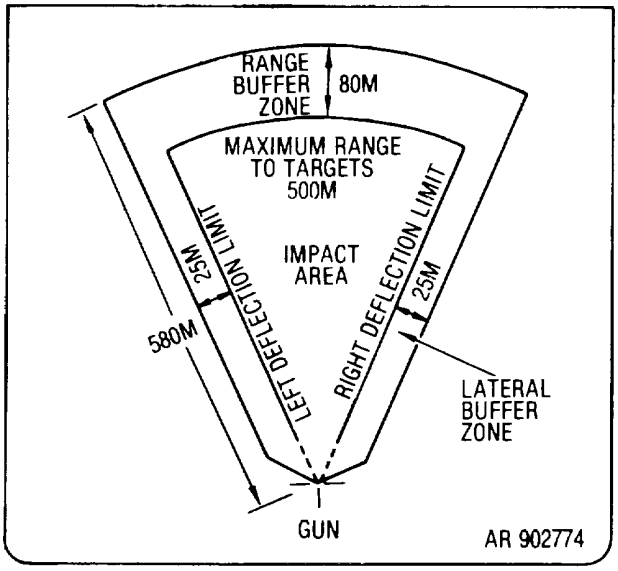



*Figure 2-3. Example of computed surface danger zone*

(3) Entering the surface danger zone is prohibited unless positive protection is provided against ricochet and projectile impact. When it is necessary to position personnel within the surface danger zone, the officer in charge or safety officer will insure adequate protection is provided. Minimum thicknesses of material required to protect personnel are:

(a) Wood--2 inches.

(b) Aluminum--0.04 inches.

(c) Sandbags--3 (18 inches total thickness).

(d) Sand or soil backed by wood or metal for support-14 inches.

d. Federal Aviation Administration (FAA) Notification.

(1) Since the 14.5-mm trainer is used to conduct indirect fire and is classified as field artillery, the airspace in the firing area represents a hazard to low flying aircraft. When the 14.5-mm range is established at a location other than a military reservation (e.g., a large plot of farmland) the selected site must be classified as a controlled firing area by the FAA.

(2) A controlled firing area is an area in which activities are conducted which, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft in flight. Further information on controlled firing areas, and instructions for submitting a request, are found in AR 95-50. The unit should contact the appropriate Department of the Army Regional Representative (AR 95-50) for TM 9-6920361-13&P assistance when preparing a request. Normally 90 days is the minimum time required for approval or disapproval of a request.

(3) Military reservations normally are classified as restricted areas for nonmilitary aircraft. The site for the range on a military reservation can thus be approved by the post range control personnel.

e. Range Construction.

(1) After the site for the range has been selected, it should be examined by ground reconnaissance to determine the best position for observation posts (OP) and firing positions (FP). It is very important that these positions be selected so that the angle T is kept as small as possible. In addition, the FPs should be almost on line with the OPs so that your OPs do not interfere with the lateral safety limits.

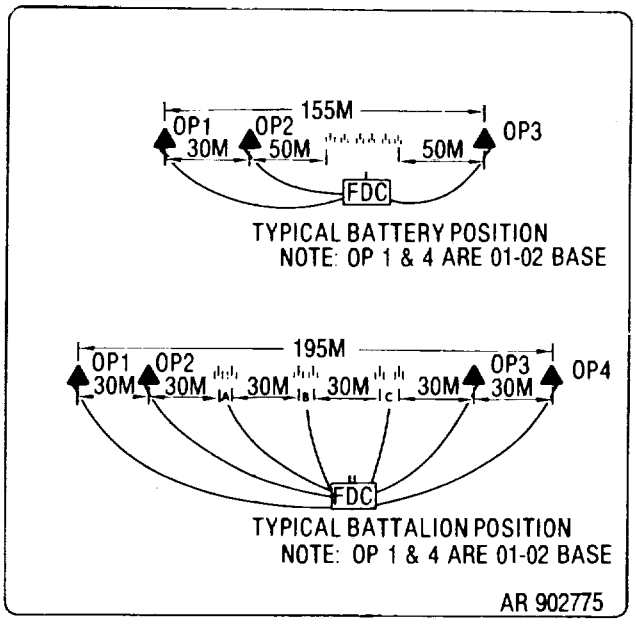



*Figure 2-4. Typical battery and battalion positions*

(2) Figure 24 is a sketch of typical battery and battalion position areas. If the area offers good observation from three or four sides, select several FP; OP combinations to permit the unit to move from one position to another. The terrain should be evaluated carefully in an attempt to locate the firing positions in accordance with good position selection criteria.

(3) A target area plan should be devised by the project officer and approved by the unit commander. While the plan need not be to scale, it should show the relative location of houses, roads and other manmade objects to be constructed in the area.

(4) A good plan will save many hours in organizing work details and will allow several projects to be accomplished simultaneously. For example, if the plan shows four roads in the target area, and the project officer has four work crews, he need only to stake the start point, road junctions, crossroads, and terminal point. The work crew will then be able to follow a simple sketch with minimum supervision from the project officer.

(5) As the roads are constructed, buildings can be erected to represent farmhouses, villages and towns. Manmade objects such as buildings and towns are represented on the observer's map by normal military symbols.

(6) Two-way roads should be about 40-50 inches wide. For permanent or semipermanent ranges, the roads can be made of asphalt, gravel, concrete, or any other material that would indicate a road. A scraper can be used to scrape out a road; however, the road may lose its identity when grass and weeds grow in the cleared area.

(7) The observer can best use buildings, water towers or other permanent terrain features to relate to targets. By using imagination and ingenuity, realistic reference points can be constructed. All targets should be three dimensional to insure accurate representation of the target from any viewing angle.

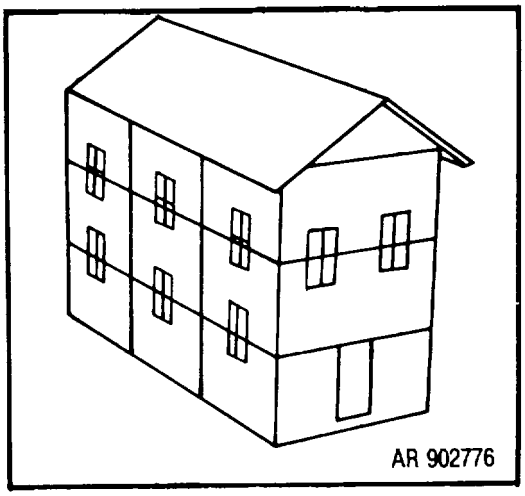



*Figure 2-5. Cinder block house*

Some target examples are:

(a) Simple buildings (as shown in figure 2-5) can be constructed in minutes by one man stacking nine cinder blocks three wide and three high. Doors and windows can be painted on the blocks. Ammunition boxes or other salvage lumber can be used to construct A-frame type roofs to be placed on top of the cinder blocks. Several houses of this type positioned in the same area can be used to represent a village.

(b) A 55-gallon drum placed on end and painted aluminum or with red and white squares can be used to represent a water tower.

(c) By placing a cross on the roof of one of the buildings, it will look like a church to the observer. The church can also be shown on the observer's map by the appropriate military symbol.

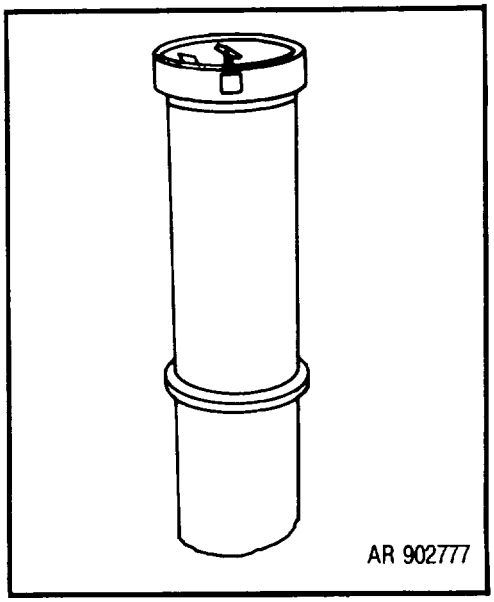



*Figure 2-6. 155-mm Propellant container target*

(8) Full scale artillery ranges use car bodies, salvaged tanks, trucks, etc., for targets. Targets for the 14.5-mm range could be cardboard boxes, old automobile tires, ammunition boxes, propellant containers, etc. A 155-mm propellant container makes a good adjusting point (fig. 2-6). Half the metal container is painted and the unpainted portion is buried in the ground. Use of several such containers, painted in different colors, offers a good variety of adjusting points.

(9) However, more realism is created if the unit builds trucks, tanks, self-propelled artillery weapons, and other type military vehicles which can be placed in the impact area and identified to the observer as a target for him to engage. For example, the officer in charge of firing could identify a target near an APC as: TEN PERSONNEL IN VICINITY OF DISABLED APC. THE APC IS THE ADJUSTING POINT.

(10) Here are five examples (fig. 2-7 thru 2-11) of types of targets used on permanent, Semipermanent or temporary ranges. The targets are all made from plywood and scrap lumber. Targets should be accurately located by survey and secured to a stake at that location.

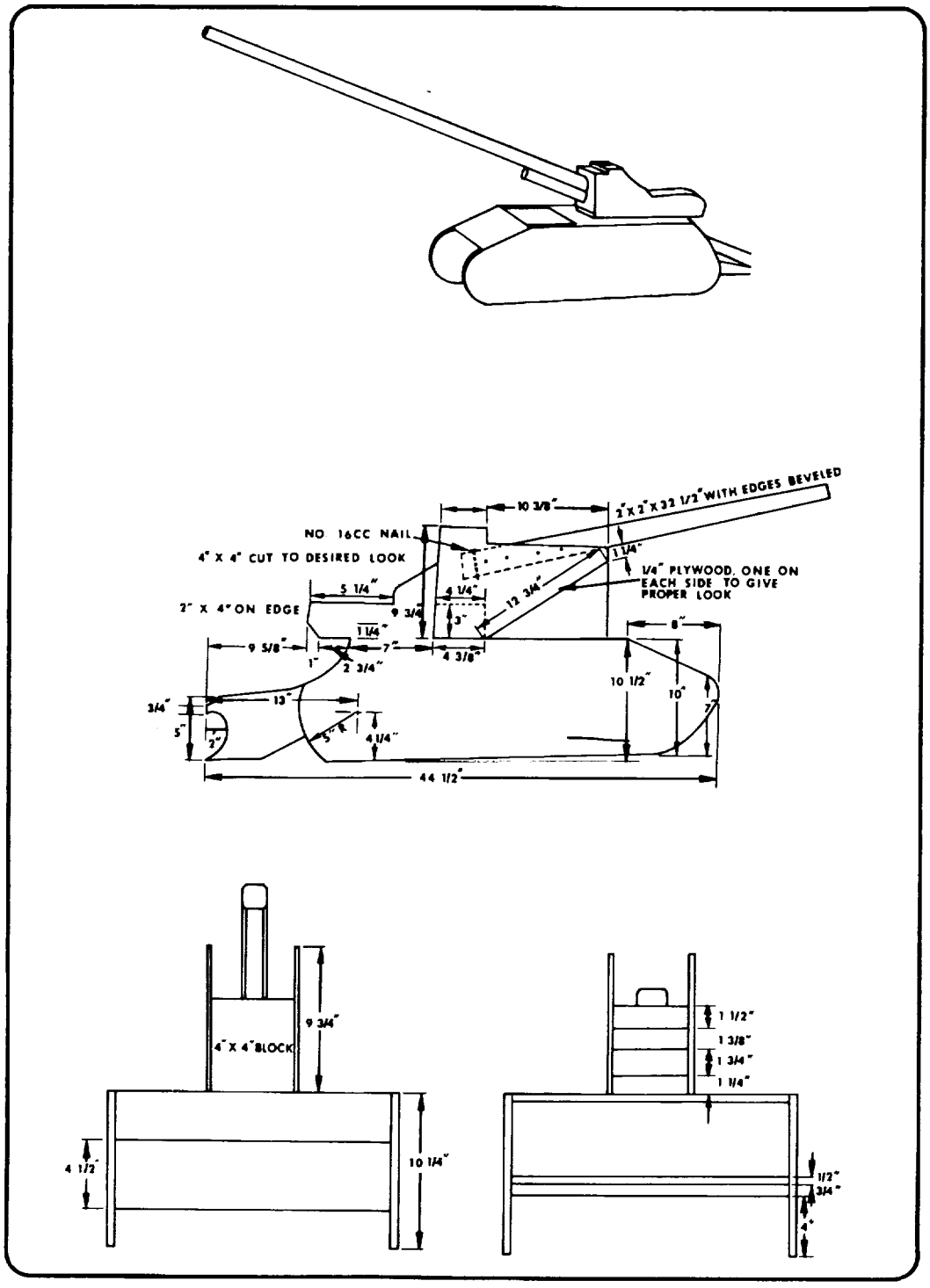
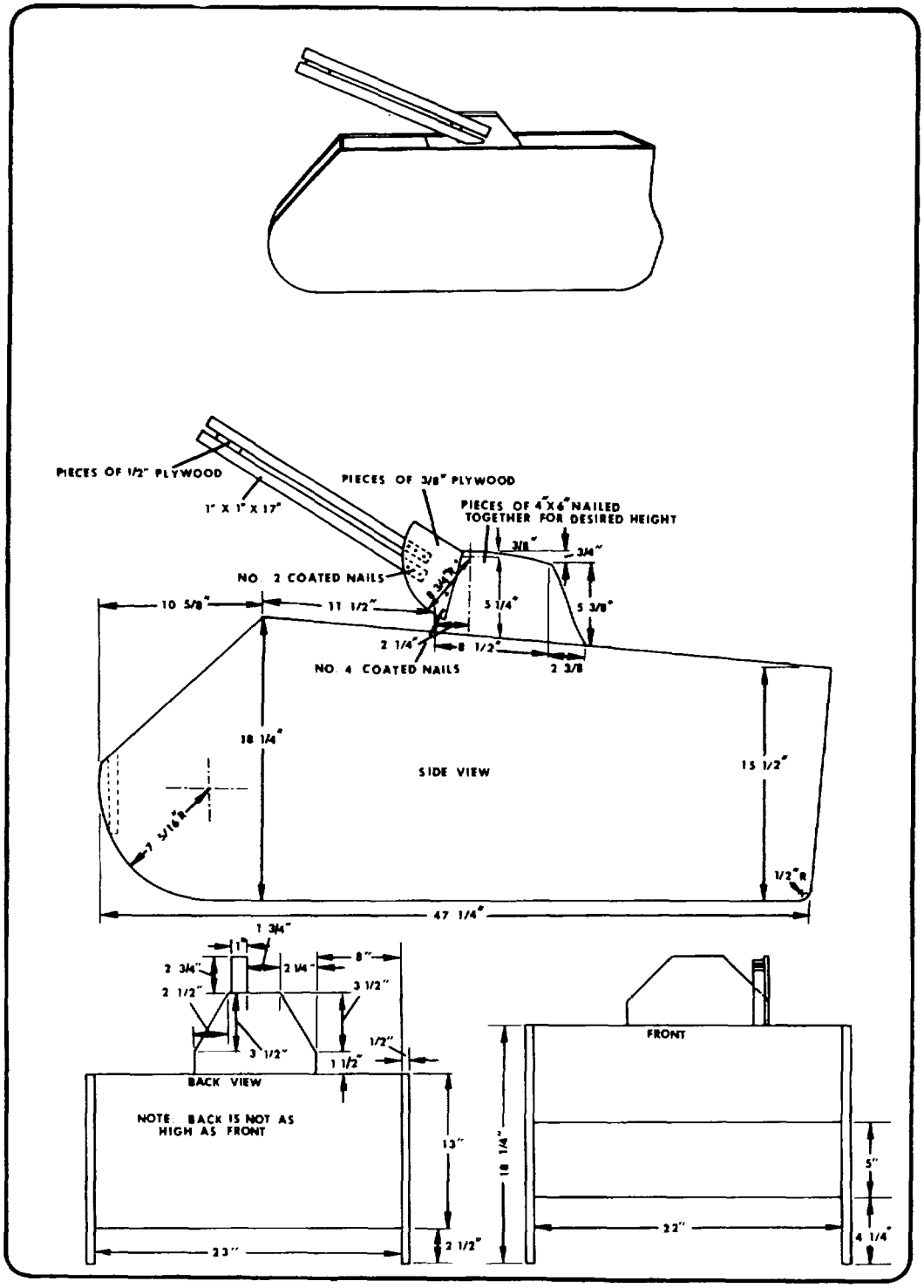



*Figure 2-7. 175-mm Gun target model*




AR 902779

*Figure 2-8. Self-propelled antiaircraft vehicle target model*

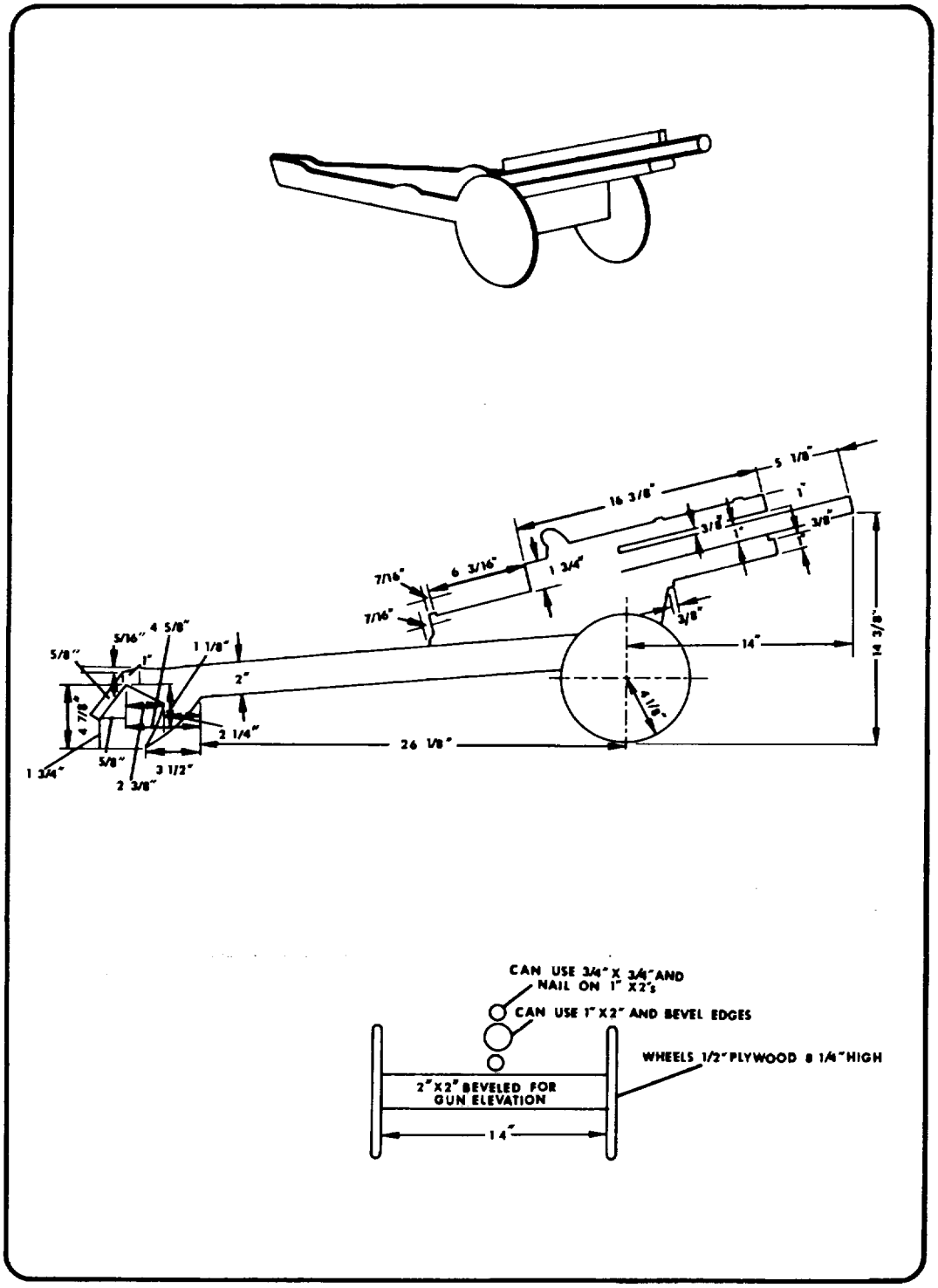



*Figure 2-9. 105-mm Howitzer target model*

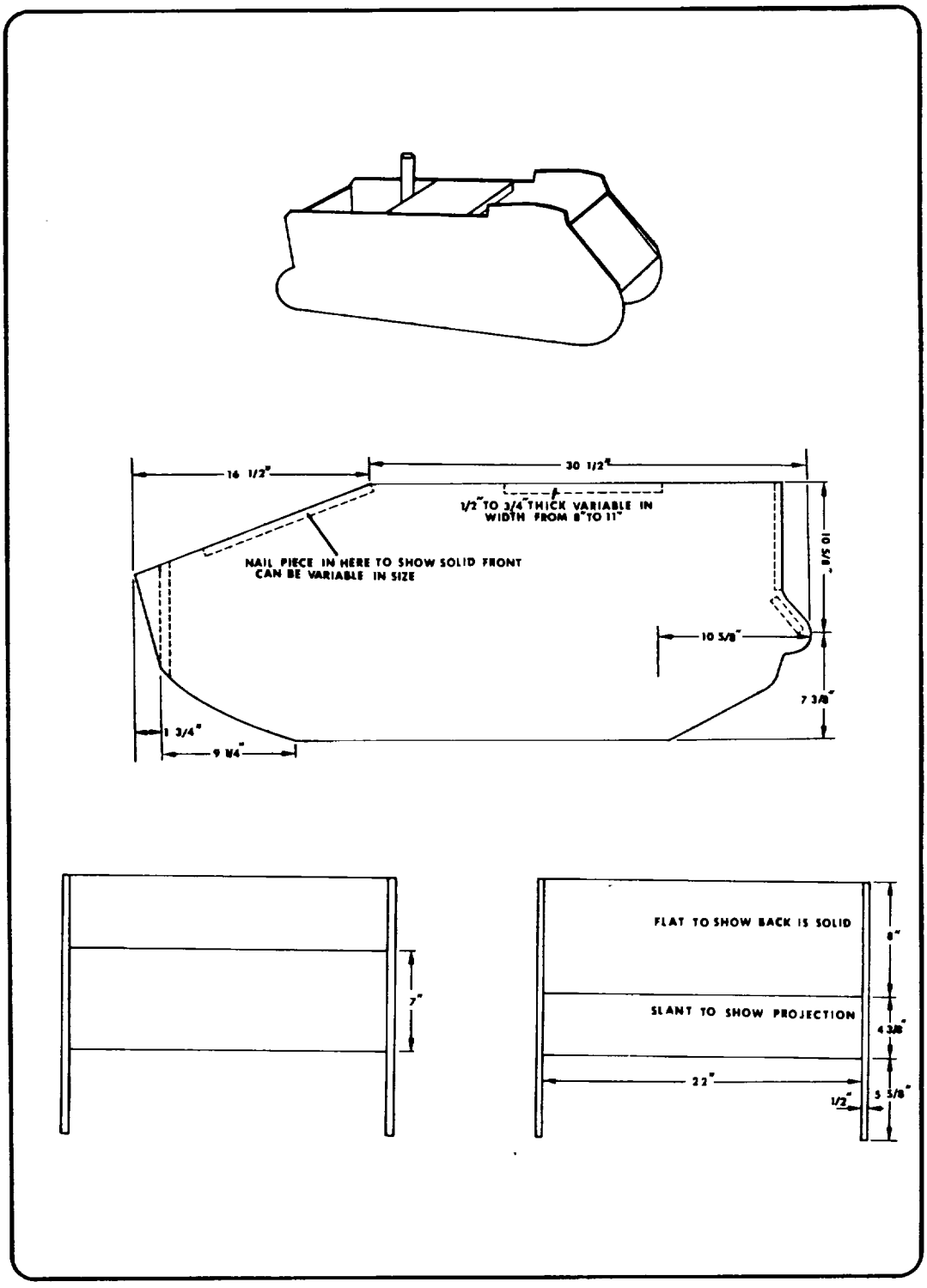



*Figure 2-10. Armored personnel carrier target model*

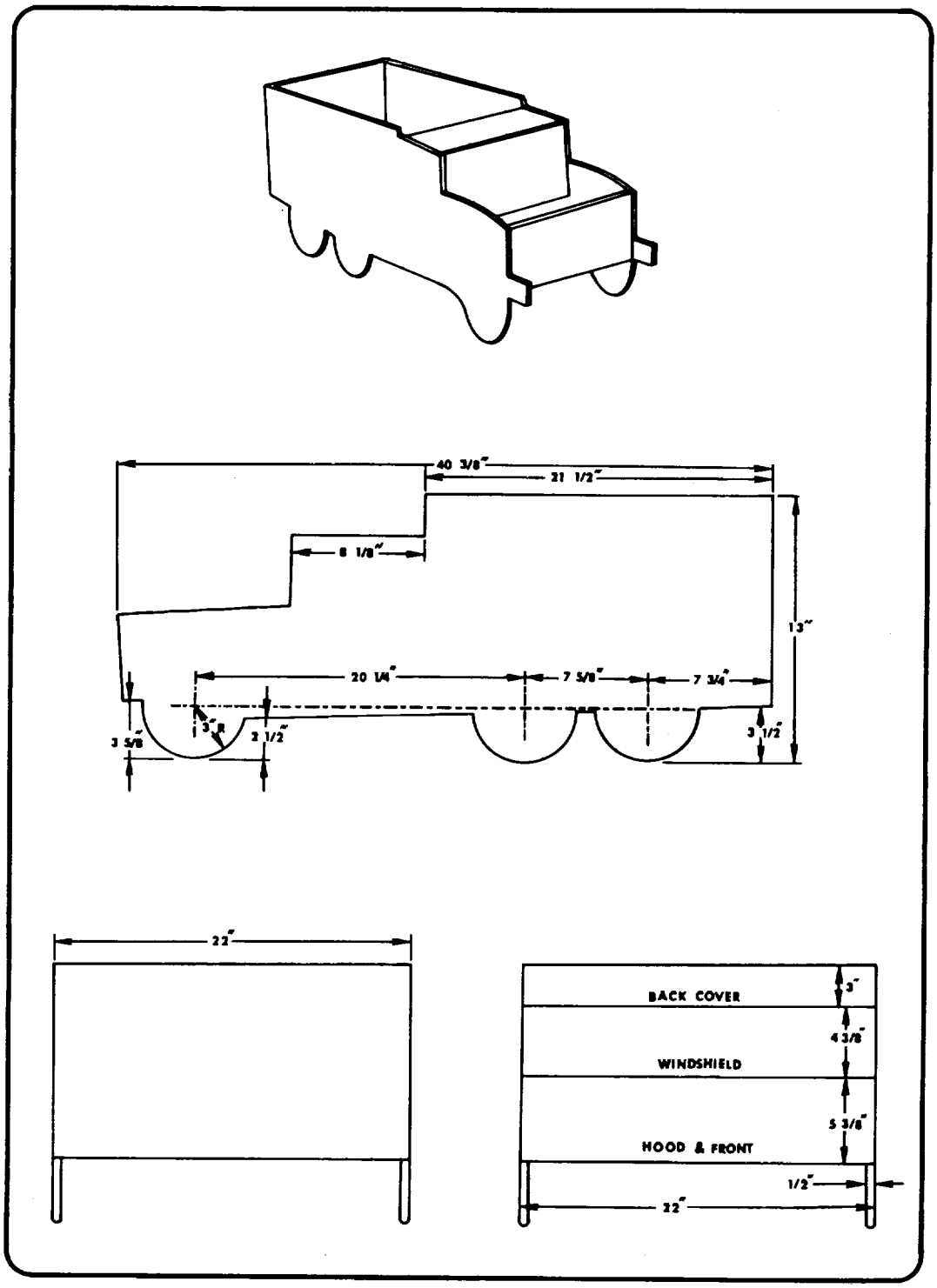



*Figure 2-11. 2 1/2 Ton target model*

**2-3. Constructing a Map for the Range.**

a. *Maps for Permanent and Semipermanent Ranges.*

(1) For permanent and semipermanent ranges a 1:5,000 scale map of the impact area should be constructed. Most training aids centers can enlarge a portion of a map in order to create the required scale. Figure 2-12 shows a type 1:5,000 scale map of 800 meters by 1,100 meters section of a range at Fort Sill, Okla. The map shows the contour lines and terrain features shown on the original map.

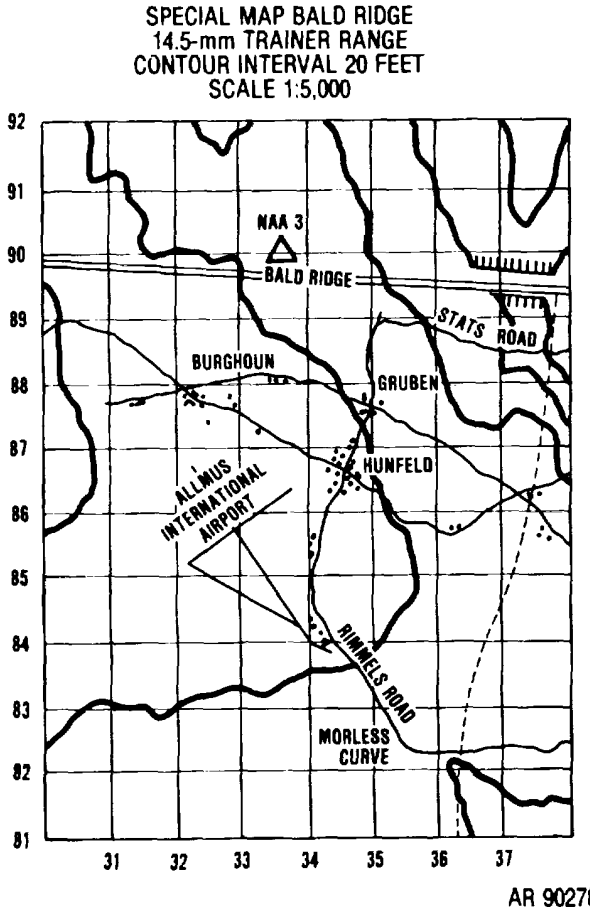



*Figure 2-12. Example of a 14.5-mm range map*

(2) After the roads, buildings, and other constructed terrain features (such as small mounds or orchards) have been positioned and accurately located by survey, they are included on the map. The map need not be in color if the terrain is fairly level and there are few contour lines. However, there should be sufficient information on buildings, roads, orchards, etc., to permit the observer to locate targets in relation to a known point that he can identify on the ground and on the map.

(3) The grid lines on the special map are scaled to 100 meters (1,000 decimeters) apart so the observer can use the normal observed fire (OF) fan and the coordinate scale that he would use with a1:50,000 map.

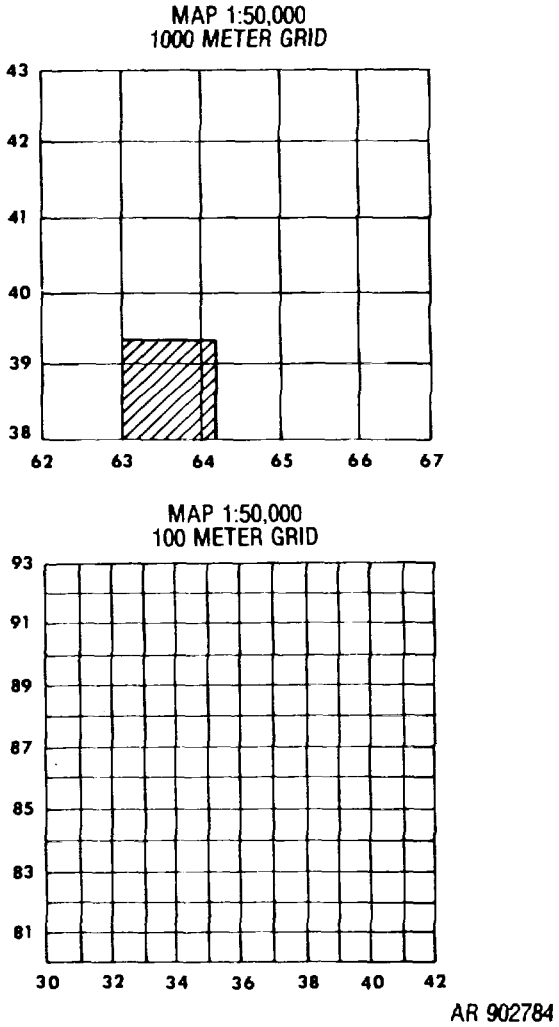



*Figure 2-13. Labeling the special map*

(4) When labeling the grid lines on the special map use the 100 meter value. For example, if you are preparing a map of the area which is located in the shaded square of a 1:50,000 map, you would label the grid lines of the special map as shown in figure 2-13, leaving off the 10,000 meter digit and adding the 100 meter digit.

b. Maps for a Temporary) Range.

(1) Since a temporary range may be available to a unit for only one or two days, it is not practical to construct an elaborate range map. Therefore, the unit may begin the service practice by constructing an observed fire (OF) chart and then convert to a surveyed firing chart when survey is completed.

(2) The forward observer will be required to locate all targets using the shift from a known point method until survey has located his position and the OP is plotted on the firing chart. At that time, the forward observer can send polar coordinates in his call for fire.

(3) Survey should start at the earliest opportunity and, if possible, be completed prior to the start of the service practice, precluding the need for an OF chart. The survey party can provide the forward observer with a crude map by drawing 500-meter grid lines between the 1,000-meter lines on a 1:25,000 grid sheet. This creates a map of 1:50,000 scale. Each grid line is then labeled with its 100-meter (1,000 decimeters) designation. The grid sheet will then become a map with 1:5,000 scale (figure 2-14).

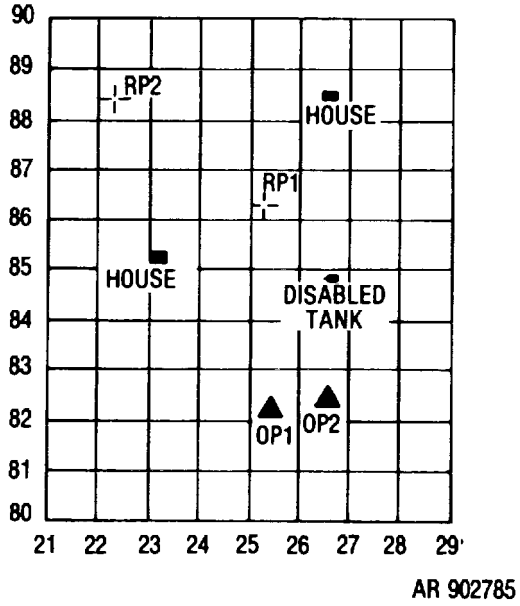



*Figure 2-14. Special grid sheet map*

(4) Critical points (buildings, road junctions, watertowers, targets, OPs, FPs, etc.) can be plotted on the grid sheet. These critical points should be located to the nearest 0.1 meter with an accuracy of 1 in 500. This information will be required to construct the special map.

c. Survey Requirements.

(1) A type of firing point marker which could be used on a permanent range is shown in figure 2-15. The marker is a metal rod with a flat piece of metal 12 inches by 6 inches welded to it. A 3-foot piece of pipe driven into the ground serves as a holder for the marker. Reference points in the impact area are used by the officer in charge to identify targets to the observer. For example, FROM REFERENCE POINT THREE, GO RIGHT 35 MILS AND DOWN FROM THE SKYLINE ZERO MILS. THIS WILL PLACE YOU ON A SELF-PROPELLED GUN.

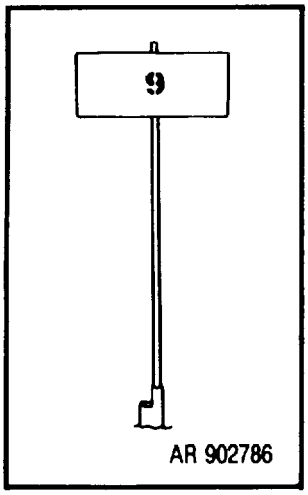



*Figure 2-15. Firing point marker*

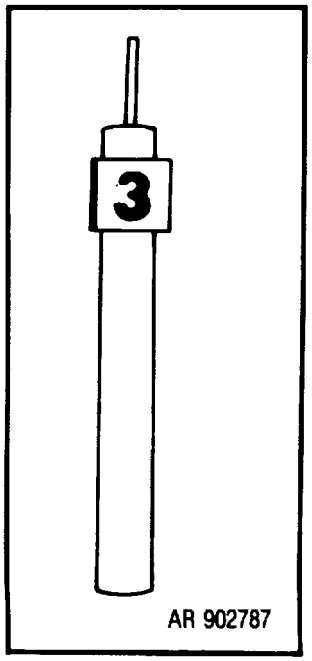



*Figure 2-16. Permanent reference point*

(2) The permanent reference point shown in figure 2-16 is a piece of telephone pole embedded in the ground. Numbers placed on all sides of the pole permit all-round identification. On temporary ranges, portable reference points can be positioned in the impact area. An example is the volleyball net pole shown in figure 2-17. Such a reference point need not be located by survey. The officer in charge of the OPs should determine the azimuth to the reference point prior to the conduct of the service practice. The battalion survey party should provide the battalion S3 with a list of targets, firing points and OPs, showing the coordinates and altitudes of each to the nearest 0.1 meter. The list should also reflect the target number and description for ease of identification.

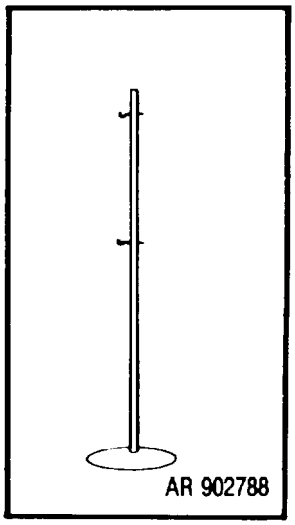



*Figure 2-17. Temporary reference point*

Here is a sample target list:

| TGT | COORDINATES (M) | ALT (M) | DESCRIPTION |
|---|---|---|---|
| 21 | 2168.1 3826.5 | 391 | Self-propelled gun |
| 22 | 2207.4 3794.6 | 389 | Red 8-inch propellant container |
| 23 | 2294.5 3788.2 | 392 | Half buried white auto tire |

## Section II. SERVICE UPON RECIEPT OF EQUIPMENT

**2-4. General**. When a new or reconditioned trainer is first received, it is the responsibility of the officer-in-charge to determine whether the trainer has been properly prepared for service by the supplying organization and whether it is in condition to perform its mission.

**2-5**. **Inspecting and Servicing the Equipment**.

a. Inspect and service the trainer as follows:

(1) Remove trainer from shipping and storage chest.

(2) Remove volatile corrosion inhibiter.

(3) Remove corrosion-preventive compound.

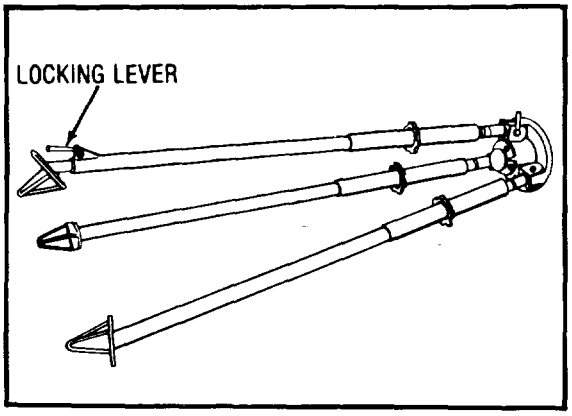
(4) Inspect all assemblies for excessive wear, damage, missing parts or corrosion, proper assembly, and correct adjustment. Inspect the safety and all levers and locks for proper functioning.

(5) Check to see that trainer is complete with all tools and equipment.

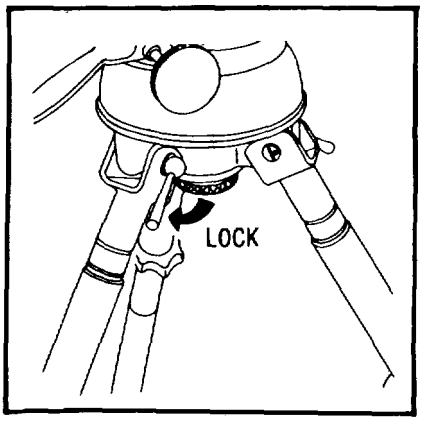
(6) Clean and lubricate (Par. 3-4).

**2-6**. **Setting-up Instructions for the M31 Trainer**.

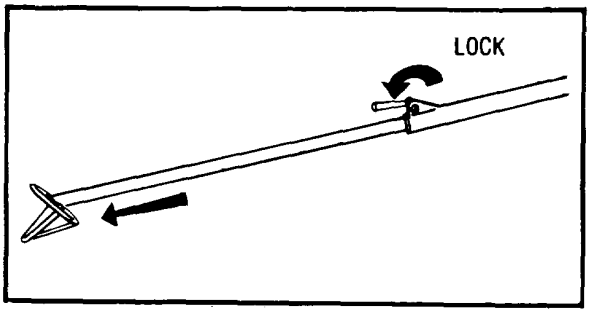
a. Assembly. The 14.5-mm trainer has four major assemblies which are assembled in the following sequence when emplacing the 14.5-mm trainer on the tripod. The four sections are packed in the shipping[storage chest along with maintenance tools and equipment. To set up the trainer follow steps 1 through 9.



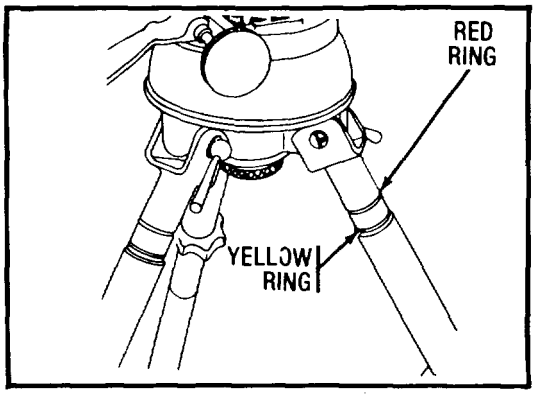

**Step 1:** Remove the tripod assembly from the storage chest. (Note that the rear leg has the locking lever near the bottom).



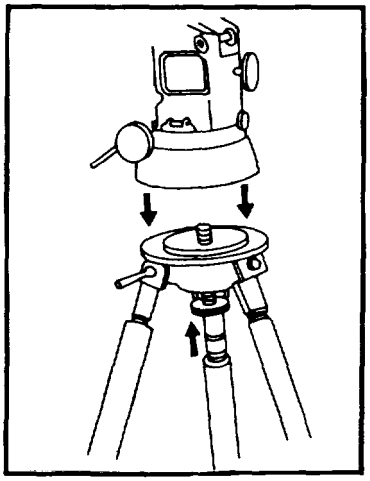

**Step 2:** With the rear leg pointing opposite to the direction of fire, spread the two front legs about 4-1/2 feet apart and lock them in place by turning the leg locking levers to the outward position.



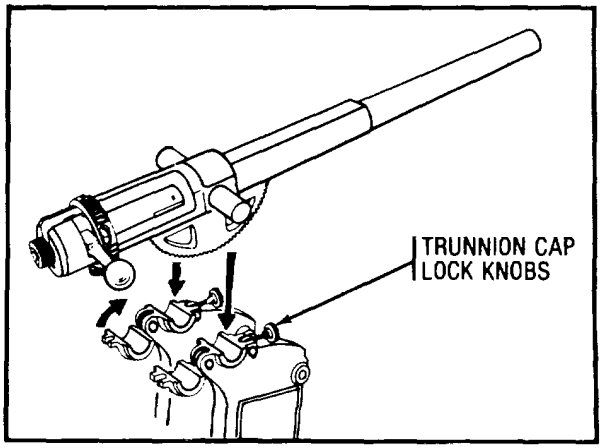

**Step 3:** Unlock the locking lever at the bottom of the rear leg and extend the leg about 15 inches. Lock it in the extended position by tightening the lower locking lever. Then place the rear leg in the ground so the top of the tripod assembly is approximately level.



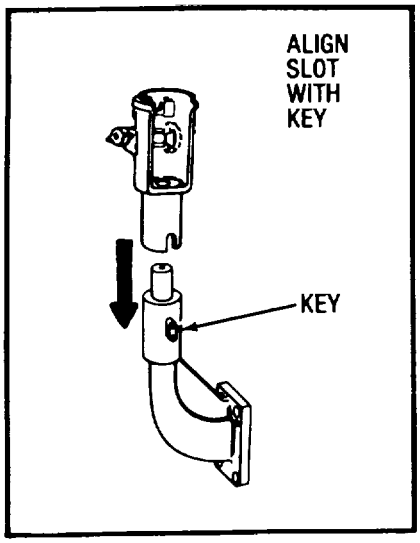

**Step 4:** Extend each leg until the yellow ring can be seen. The yellow ring indicates the center of the threads. There are two red rings on each leg which indicates that the rotating collar has reached the end of the threads. Do not turn the rotating collar beyond the red rings.



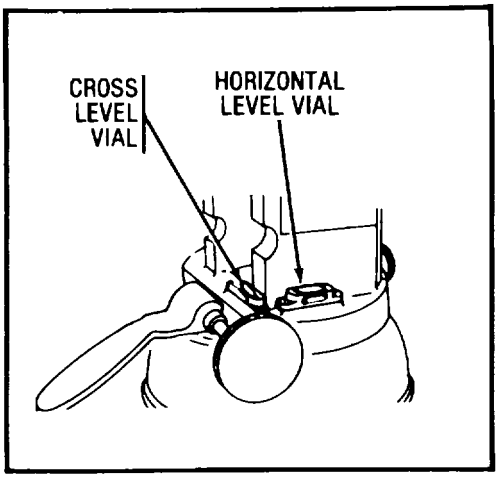
**Step 5:** remove the mount assembly from the storage chest and place it on top of the tripod assembly. Aline key on tripod base with keyway in bottom of mount. Then tighten the mount locking screw into the mount assembly.



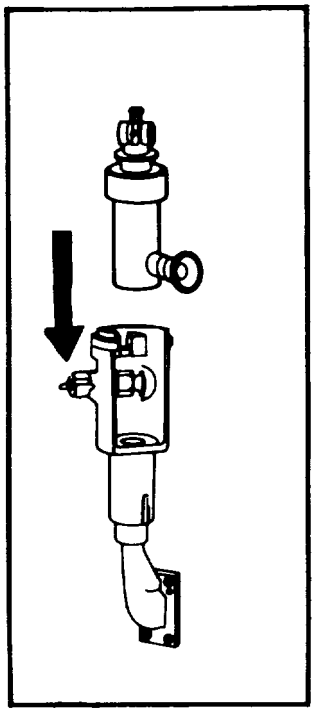

**Step 6:** Open the trunnion caps. Remove the barrel from the chest and attach it to the mount assembly by placing the trunnions in the recesses. Lock the trunnion caps.




**Step *7:*** Attach the telescope socket, holder, or support assembly to the mount assembly.

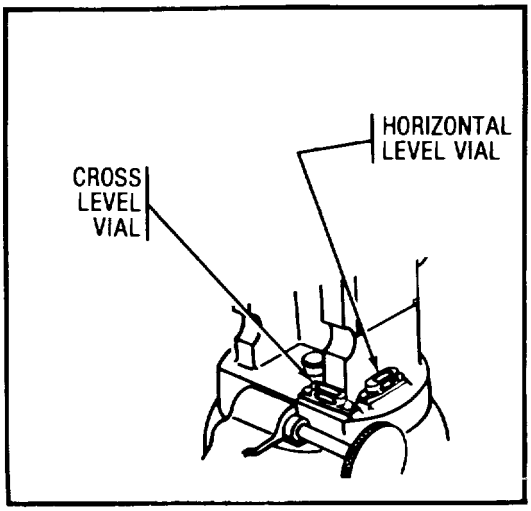



**Step 8:** Level the mount. There are two level vials on the mount. With the tube pointed in the approximate direction of fire, turn the traversing handwheel until one of the level vials is directly over the rear leg. This vial will be known as the "cross level vial". In this position the other level vial will be near the right front leg and will be known as the "horizontal level vial". The horizontal level vial bubble is centered by turning the rotating collar of the rear leg. The cross level vial bubble is centered by simultaneously turning the rotating collar of the two front legs either toward each other or away from each other.

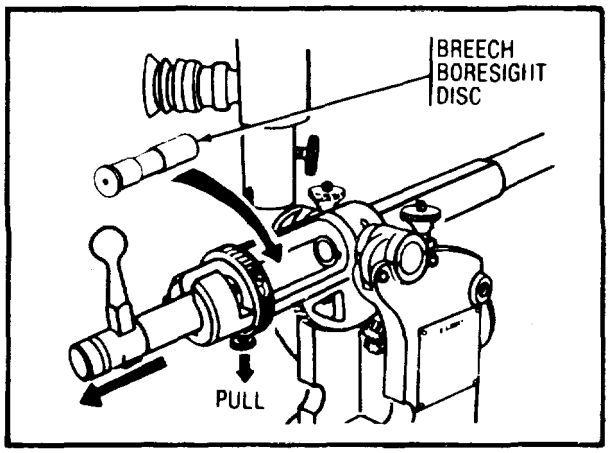


**Step 9:** Place the panoramic telescope into the telescope socket, holder, or support assembly.

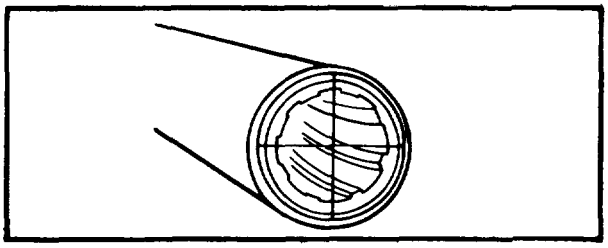
*b. Boresighting.* The distant aiming point method of boresighting is used when the 14.5-mm trainer is mounted on the tripod. To boresight the trainer follow steps I through 5.



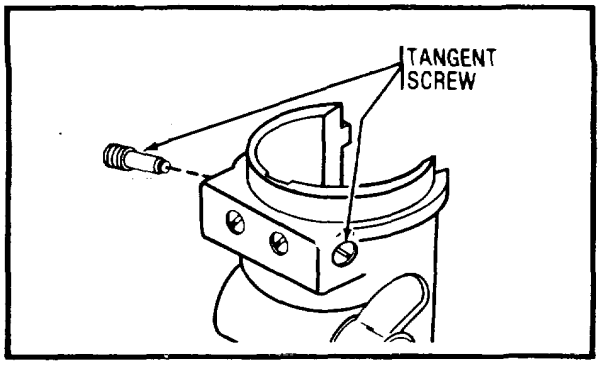

**Step 1:** Center both the horizontal and the cross level vial bubbles.




**Step 2:** Remove the bolt. Install breech boresight disc. (The breech boresight disc is a fired cartridge case that has a 1/16-inch hole drilled in the center of the cartridge base.



**Step 3:** Attach cross thread to the muzzle.



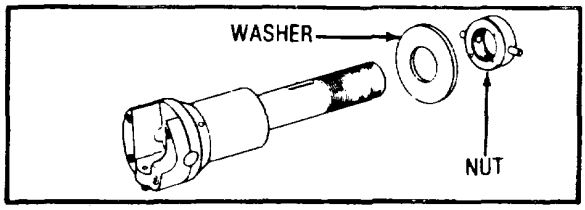

**Step 4:** Sight the tube onto a distant aiming point (1, 500 meters). Aline panoramic telescope sight on the same distant aiming point using the tangent screws on the telescope mount or the telescope boresight adjusting screw

**NOTE**

**When the M115/M117 panoramic telescope is mounted in the support it is 1600 mils out of boresight. Since it is impractical to turn the azimuth scale 1600 mils using the boresight adjusting screw, the telescope head will be turned to the distant aiming point, and then the reset counter will be set to 3200. Use only the lower scale for laying and referring**.

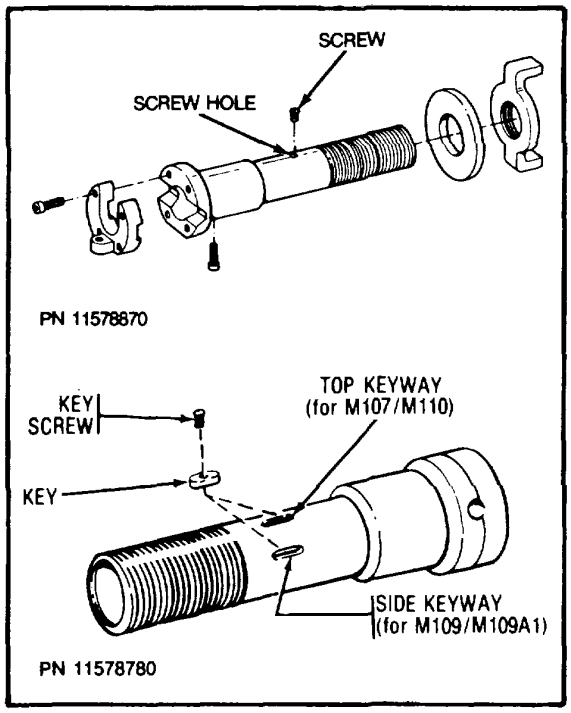
*c. End-for-end test.* To perform the end-for-end test of the gunner's quadrant, refer to TM 9-1290-200-15 and the operator's manual for the major caliber weapon.

**2-7. Installation Instructions for the M1091 M109Al/M115/M110 Howitzers and M107 Guns**. The 14.5-mm gun barrel is mounted in the breech of the M109/M109A1 155-mm howitzers, the M107 175-mm gun and the M110 8-inch howitzer as a subcaliber device. To mount the gun barrel and boresight the piece follow steps 1 through 13.

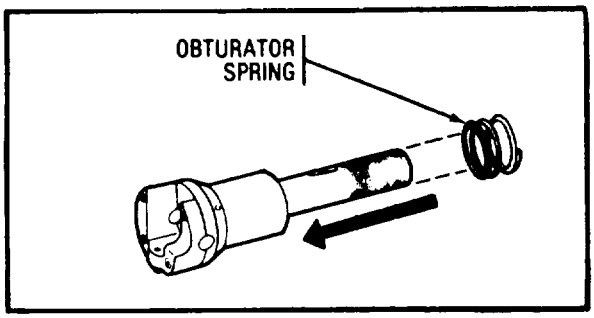



**Step 1:** Remove the obturator group, obturator spring, and firing mechanism housing assembly (refer to the operator's manual for the major caliber weapon).

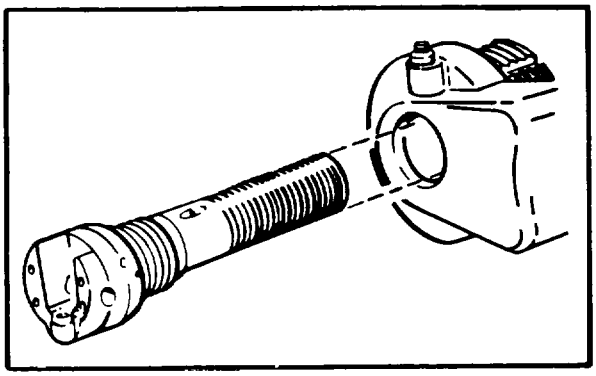
**Step 2:** Remove adapter nut and washer.



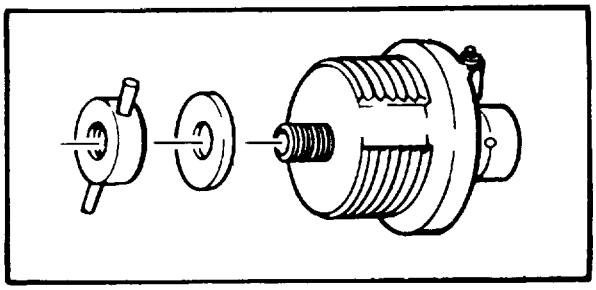

**Step 3:** Install the key in the appropriate keyway and secure with a screw: The top keyway is for the M107/M110 weapons, the side keyway is for the M109 and M109A1 155-mm howitzers. Adapter PN 11578870 has no keyway. Install screw in appropriate screw hole.



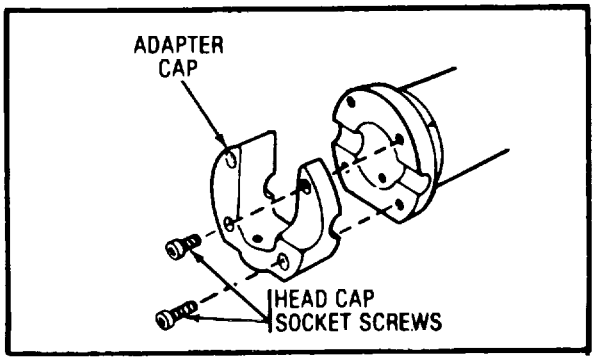

**Step4:** Place the obturator spring over the adapter.



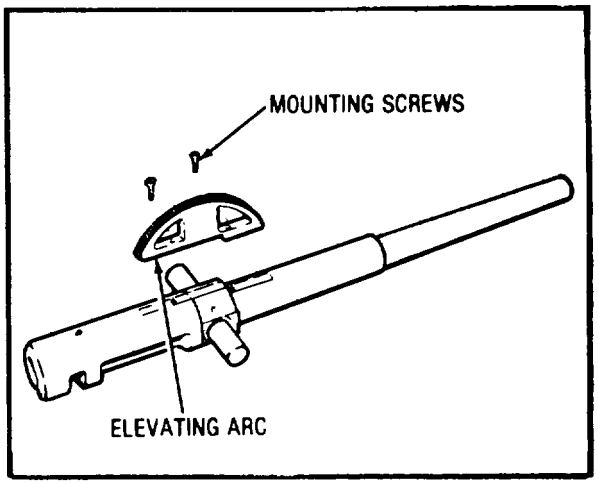
**Step 5:** Insert the adapter (top up) in the breech-block.



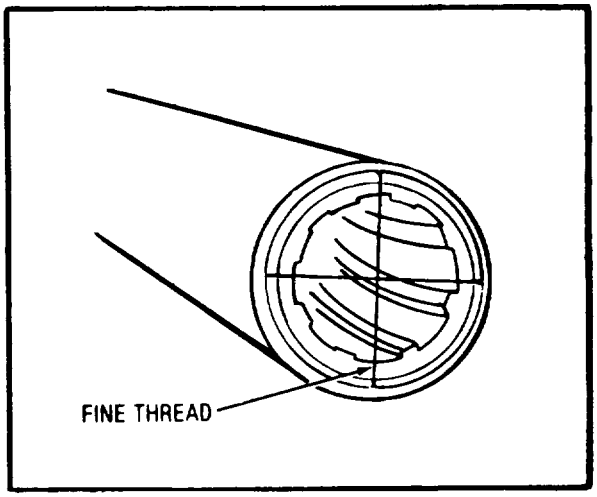
**Step 6:** Place the washer on the adapter. Tighten the nut all the way down, then loosen it one turn. The loosening of the nut allows the breech to be closed fully.



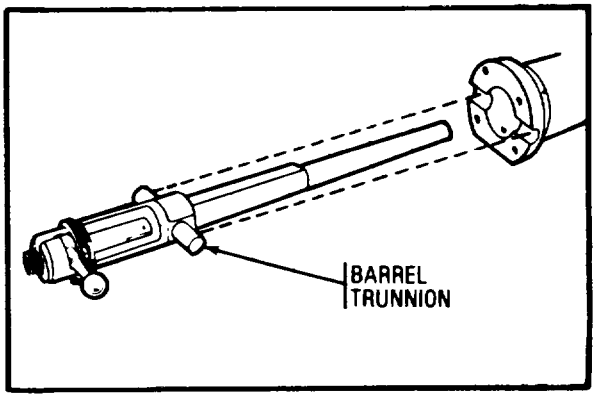

**Step 7:** Remove the four head cap socket screws and the adapter cap.



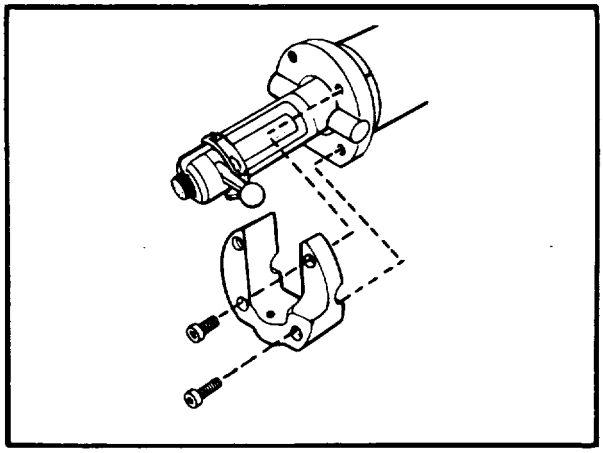

**Step 8:** Remove the elevating arc from the gun barrel by removing the two mounting screw.



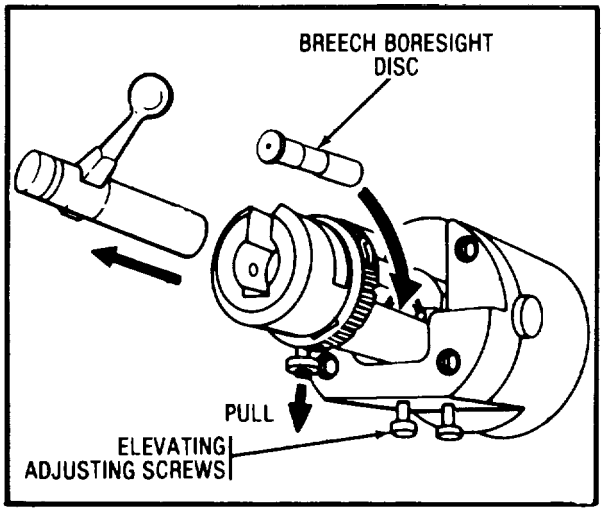

**Step 9:** Attach fine thread across the four witness marks on the end of the tube by using a rubber band. Also place boresight strings on the muzzle of the howitzer.




**Step 10:** Place the gun barrel in the adapter and engage the barrel trunnions with the adapter slots.

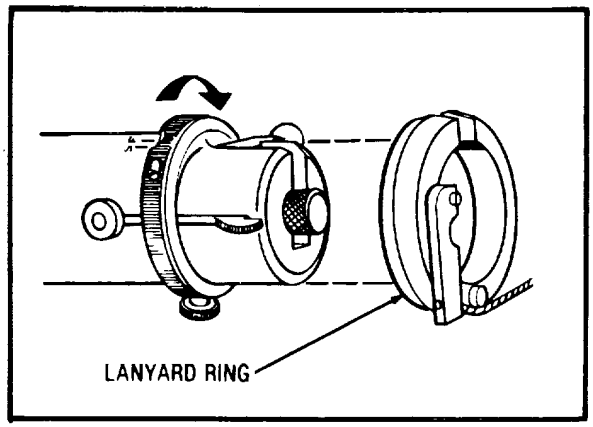


**Step 11.** Lock the barrel into position by securing the adapter cap to the body (short screw in upper right hole). Do not tighten the four screws yet.



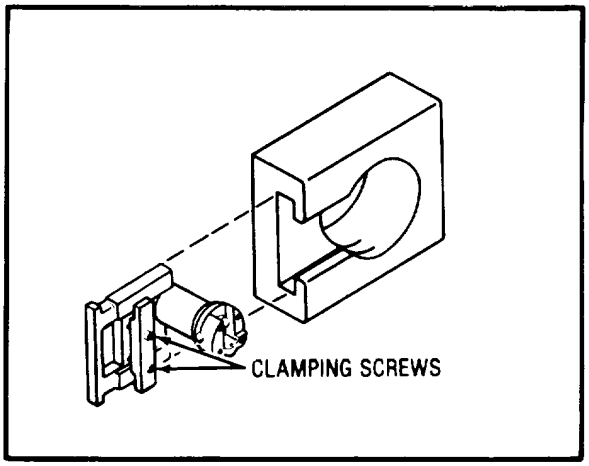

**Step 12:** Close the breech, remove the bolt by pulling down on the locking cap and pulling bolt to the rear. To boresight the 14.5 mm device:

1. Tighten both elevating adjusting screws against the barrel.
2. Place the breech boresight disc in the cartridge chamber.
3. Sighting through the breech boresight disc, aline the horizontal boresight string of the 14.5 mm barrel with the horizontal boresight string of the primary weapon by adjusting elevating adjusting screws (the rear screw lowers the barrel, the front screw raises the barrel).
4. Tighten the four adapter cap screws.
5. Verify the alinement of the muzzle horizontal boresight strings. Remove the muzzle boresight strings from the primary weapon.
6. Select a distant aiming point (DAP) at least 1,500 meters from the weapon.
7. Sighting through the breech boresight disc aline the 14.5mm barrel on the DAP.
8. Refer the panoramic sight to the DAP. The reading should be 3200 mils. If the reading is not 3200 adjust to 3200 mils.
9. Remove boresight disc and install bolt.

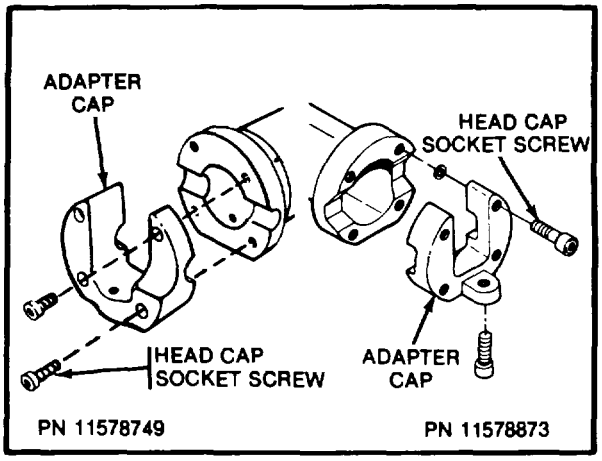



**Step 13:** Turn the safety ring to the "fire" position. Place the lanyard ring over the rear of the breech, matching the openings of breech and the lanyard ring.

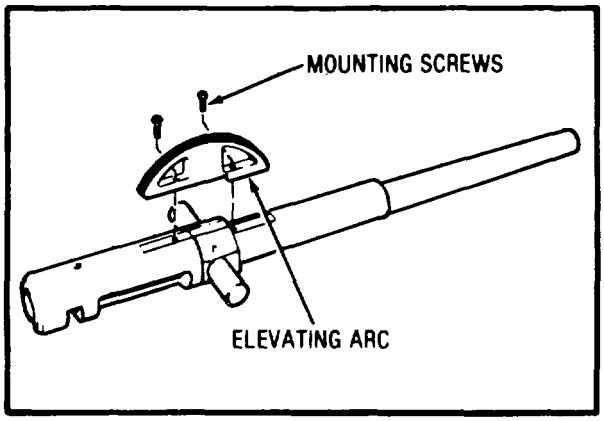
**2-8. Installation Instructions for the M101A1 Howitzer.** The 14.5-mm gun barrel is mounted in the breech of the M101A1 howitzer as a subcaliber device. To mount the gun barrel, follow steps 1 through 8.



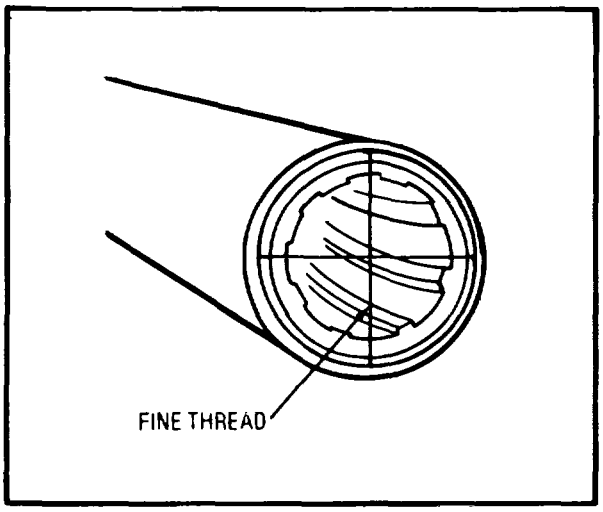

**Step 1:** Open the breech and place the adapter in the breech recess. (If the weapon is going to be moved, remove the breech block). Make sure the two clamping screws are in an unscrewed position. Tighten the two clamping screws.



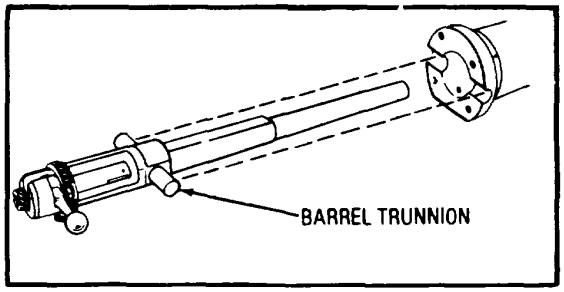

**Step 2:** Remove the four head cap socket screws and the adapter cap.



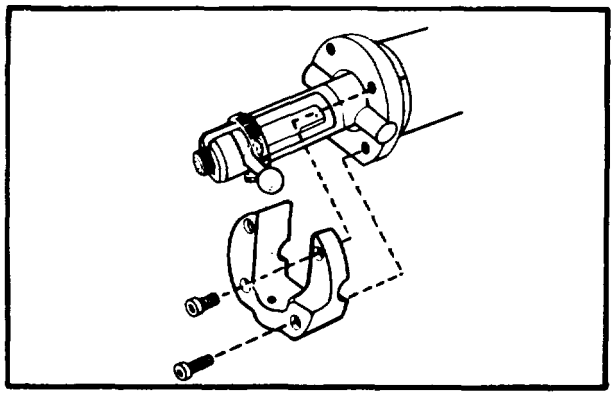

**Step 3:** Remove the elevating arc from the gun barrel by removing the two mounting screws.




**Step 4:** Attach fine thread across the four witness marks on the end of the tube by using a rubber band. Also place boresight strings on the muzzle of the bowitzer.



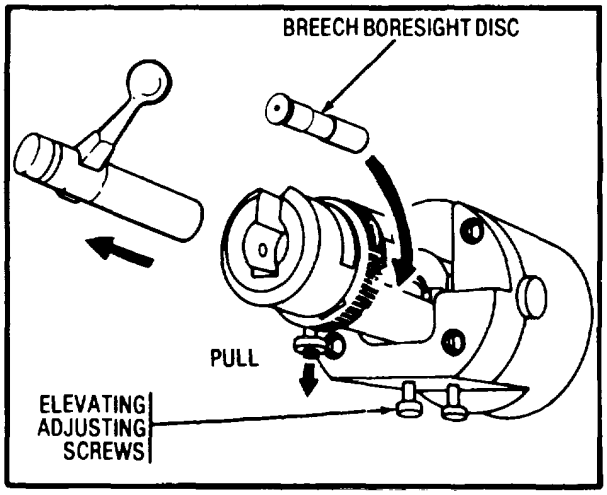

**Step 5:** Place the gun barrel in the adapter and engage the barrel trunnions with the adapter slots.



**NOTE**

Adapter PN 11578873 does not have short screws.

**Step 6:** Lock the barrel into position by securing the adapter cap to the body (short screw must be in upper right hole). Do not tighten the four screws yet.




**Step 7:** Boresight the 14.5mm gun in the following sequence:

1. Remove the bolt and install the breech boresight disc.

2. Sight through the breech boresight disc and aline the horizontal boresight string of the gun with the horizontal cross-hair string on the howitzer To raise the barrel, tighten the front elevating adjusting screw and loosen the rear elevating adjusting screw. To lower the barrel. loosen the front screw and tighten the rear screws.

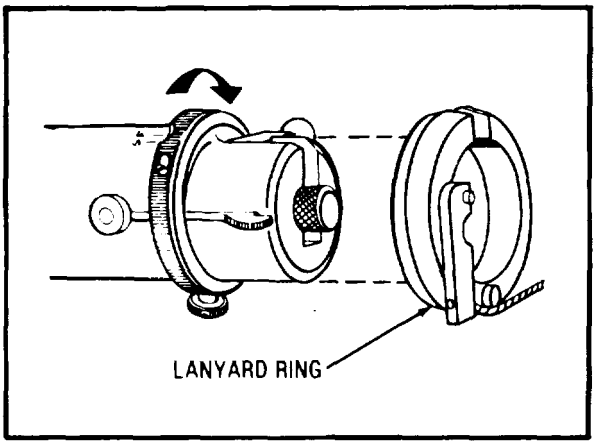
3. When the horizontal crosshairs are in alinement and the two elevating adjusting screws are tight, tighten the four head cap socket screws.

4. Remove the howitzer boresight strings.

5. Select a distant aiming point (DAP) at least 1, 500 meters from the weapon. Sighting thru the breech boresight disc aline the 14.5-mm barrel on the DAP.

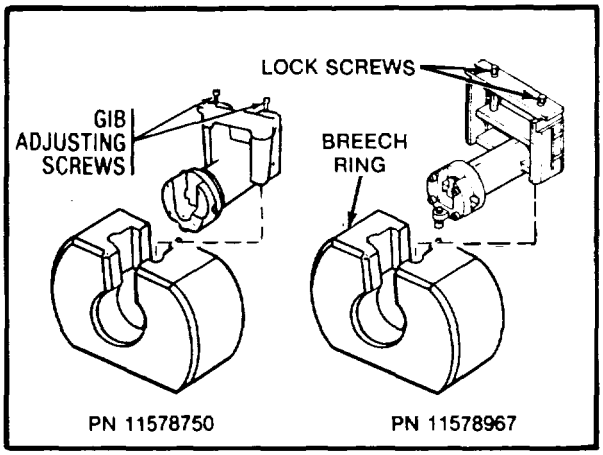
6. Refer the panoramic sight to the distant aiming point. The reading should be zero. If it is not set to zero, turn azimuth knob until azimuth scale reads zero, then adjust the sight onto the distant aiming point using the tangent adjusting screw.

7. Remove boresight disc and install bolt.

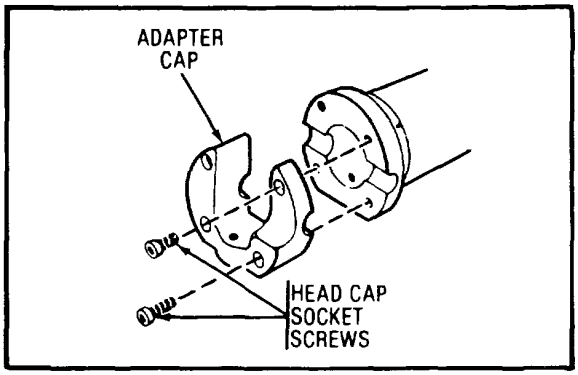



**Step 8:** Turn the safety ring to the "tire" position. Place the lanyard ring over the rear of the breech, matching the openings of breech and the lanyard ring.

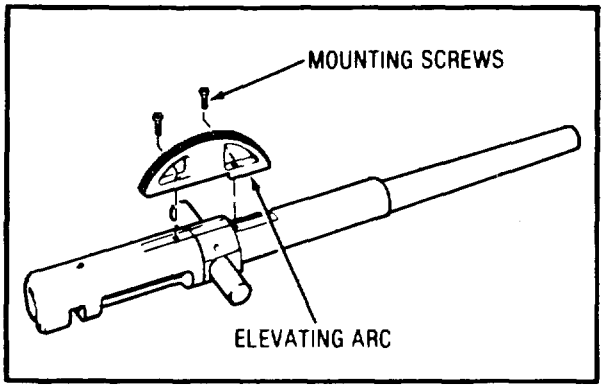
**2-9. Installation Instructions for the M102 Howitzer.** The 14.5-mm gun barrel is mounted in the breech of the M102 howitzer as a subcaliber device. To mount the gun barrel, follow steps 1 through 8.



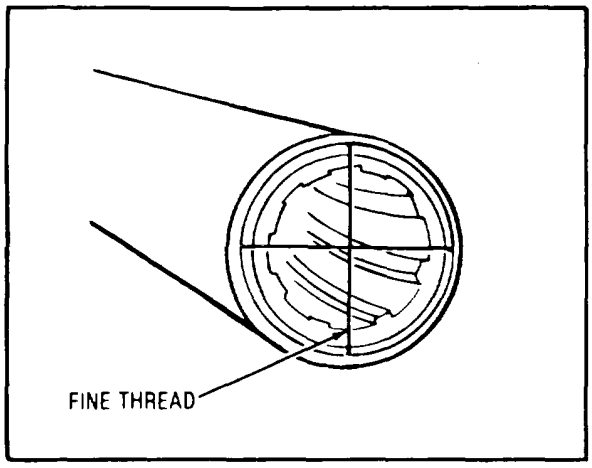

**Step 1:** Open the breech and place the adapter in the breech recess. The gib adjusting screws should be in the unscrewed position. Make sure the adapter rests against the breech ring then turn the gib screws finger tight. Tighten the screws an additional 1/2 turn. Loosen lock screws before positioning adapter PN 11578967 in breech recess. Tighten the screws to lock adapter in breech ring.



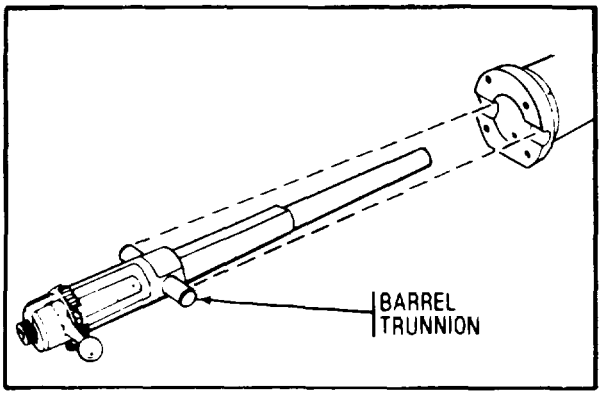

**Step 2**: Remove the four head cap socket screws and the adapter cap.



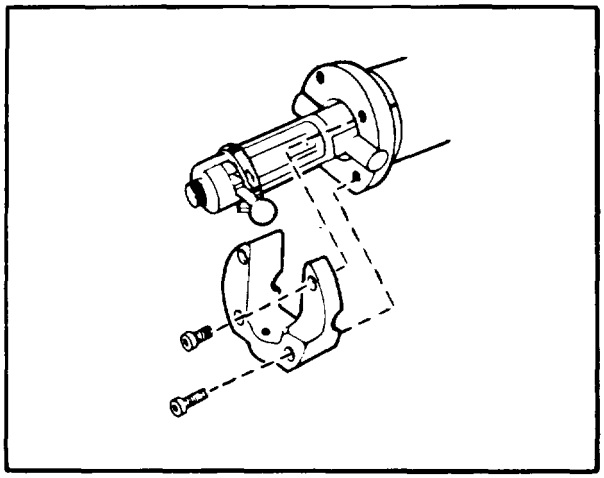

**Step 3:** Remove the elevating arc from the barrel by removing the two mounting screws



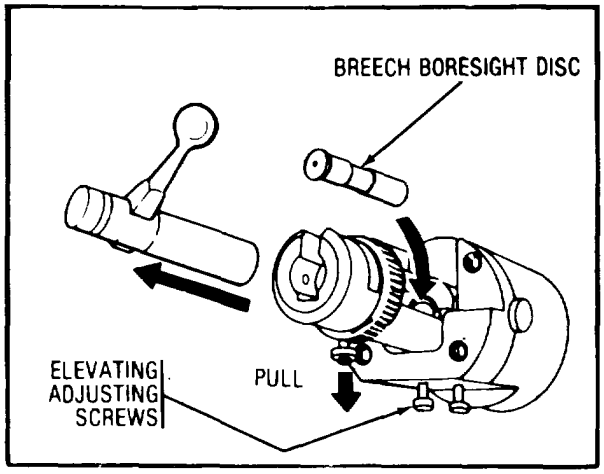

**Step 4:** Attach fine thread across the four witness marks on the end of the tube by using a rubber band. Also place boresight strings on the muzzle of the howitzer




**Step 5:** Place the gun barrel in the adapter and engage the barrel trunnions with the adapter slots.

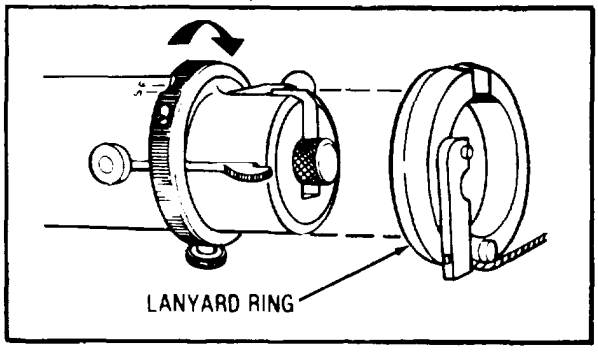


**Step 6**: Lock the barrel into position by securing the adapter cap to the body Do not tighten the four screws yet.



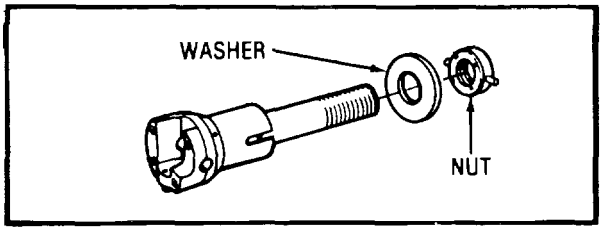

**Step 7:** Boresight the 14.5-mm gun in the following sequence:

1. Remove the bolt and install the breech boresight disc
2. Sight through the breech boresight disc and align the horizontal boresight string of the gun with the horizontal cross-hair string on the howitzer To raise the barrel. tighten the front elevating adjusting screw To lower the barrel, loosen the front screw and tighten the rear screws
3. When the horizontal crosshairs are in alinement and the two elevating screws are tight, tighten the four head cap socket screws.
4. Remove the howitzer boresight strings.
5. Select a distant aiming point (DAP) at least 1, 500 meters from the weapon. Sighting thru the breech boresight disc aline the 14.5-mm barrel on the DAP.
6. Refer the panoramic sight to the distant aiming point. The reading should be 3200 mils. If the reading is not 3200, adjust it to 3200 mils.
7. Remove boresight disc and install breech-bolt.



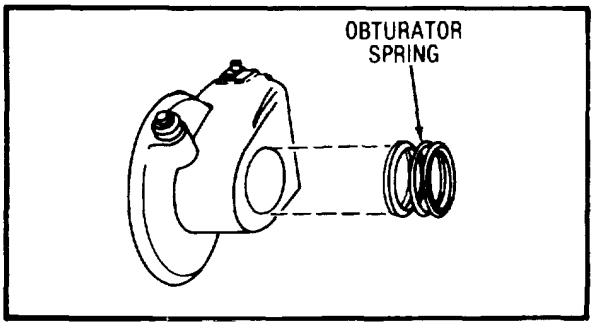

**Step 8:** Turn the safety ring to the "tire" position. Place the lanyard ring over the rear of the breech, matching the openings of breech and the lanyard ring.

**2-10. Installation Instructions for the M114A1 Howitzer.** To mount the barrel in the M114A1 howitzer and boresight the device, follow steps 1 through 13.

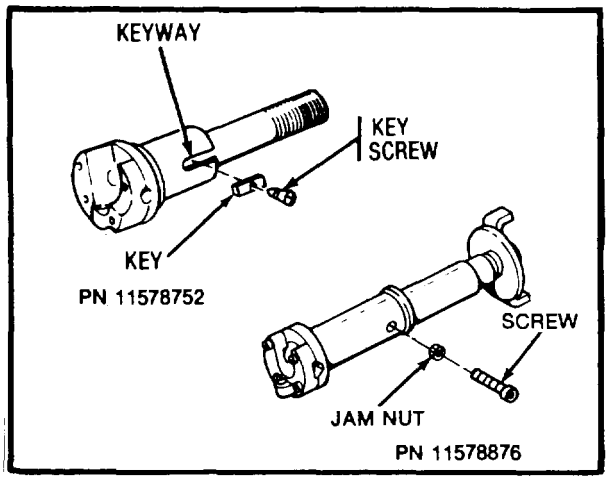



**Step 1:** To remove the obturator group, obturator spring, and firing mechanism housing assembly, refer to the operator's manual for the major caliber weapon.

**Step 2:** Remove adapter nut and washer.



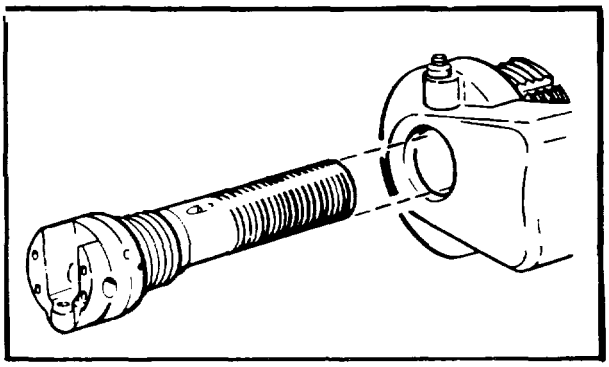

**Step 3:** Place the obturator spring in the firing mechanism housing recess.



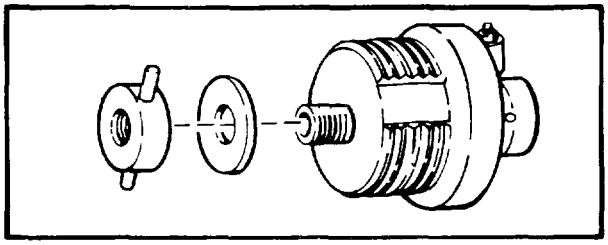

**Step 4:** Install the key in the keyway and secure with a screw.

**NOTE**

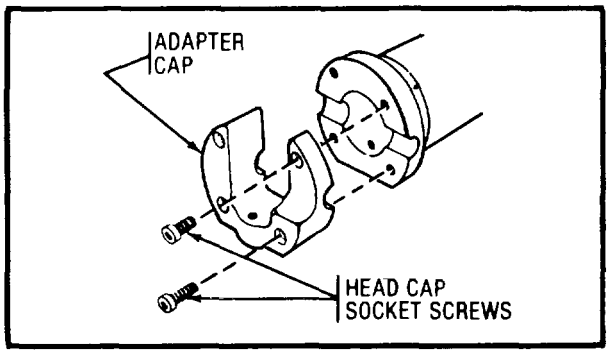
**Adapter PN 11578876 does not have keyway. Use as issued with screw and jam nut.**



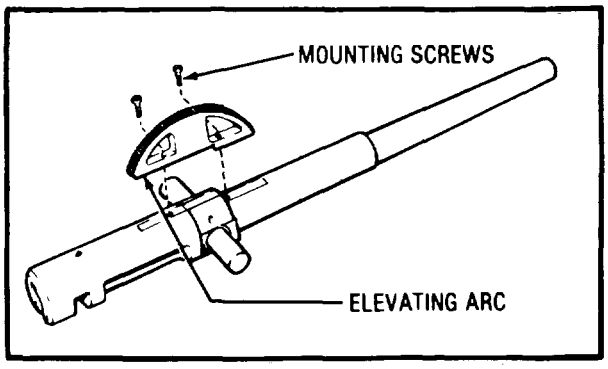
**Step 5:** Insert the adapter (top up) in the breech-block.



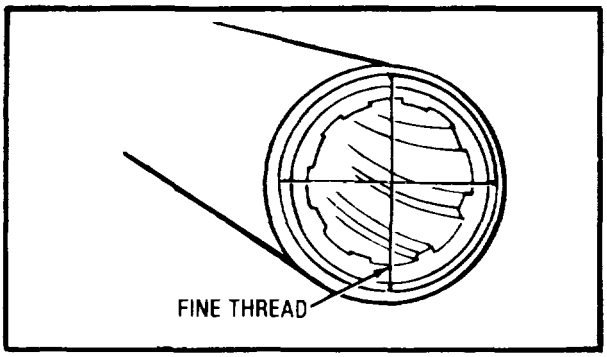
**Step 6:** Place the washer on the adapter. Tighten the nut all the way down, then loosen it two turns. The loosening of the nut allows the breech to be closed fully.



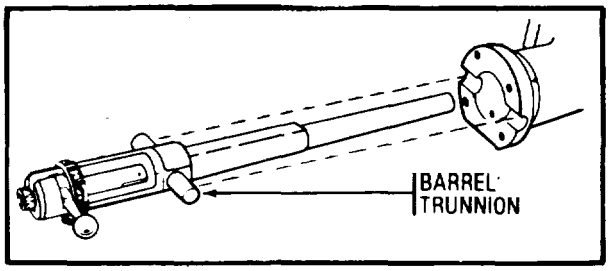

**Step 7:** Remove the four head cap socket screws and the adapter cap.



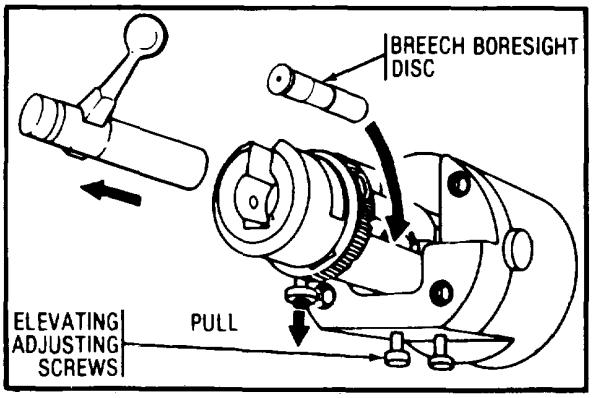

**Step 8:** Remove the elevating arc from the gun barrel by removing the two mounting screw.




**Step 9:** Attach fine thread across the four witness marks on the end of the tube by using a rubber band. Also place boresight strings on the muzzle of the howitzer.



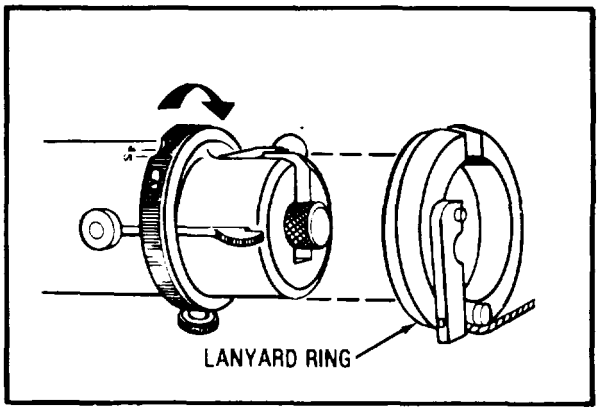

**Step 10:** Place the gun barrel in the adapter and engage the barrel trunnions with the adapter slots.




**Step 11:** Lock the barrel into position by securing the adapter cap to the body. Small bolt goes in upper right hole. Do not tighten the four screws yet.

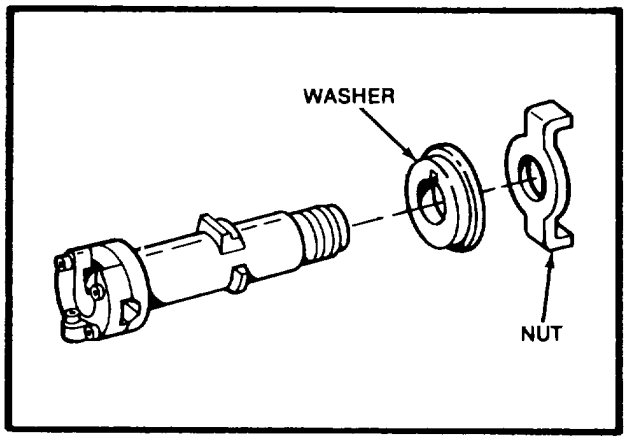
**Step 12:** Close the breech, remove the bolt by pulling down on the locking cap and pulling bolt to the rear. To boresight the 14.5-mm device:

1. Tighten both elevating adjusting screws against the barrel.
2. Place the breech boresight disc in the cartridge chamber.
3. Sighting through the breech boresight disc, aline the horizontal boresight string of the 14.5-mm barrel with the horizontal boresight string of the primary weapon by adjusting the elevating adjusting screws (the rear screw lowers the barrel, the front screw raises the barrel).
4. Tighten the four adapter cap screws.
5. Verify the alinement of the muzzle horizontal boresight strings. Remove the muzzle boresight strings from the primary weapon.
6. Select a distant aiming point (DAP) at least 1, 500 meters from the weapon.
7. Sighting through the breech boresight disc aline the 14.5-mm barrel on the DAP.
8. Refer the panoramic sight on the DAP. The reading should be zero. If it does not read zero, set to zero. Then adjust the sight on the distant aiming point using the target adjusting screws.
9. Open breech and remove boresight strings from muzzle of subcaliber device.
10. Close breech. Remove boresight disc and install bolt.



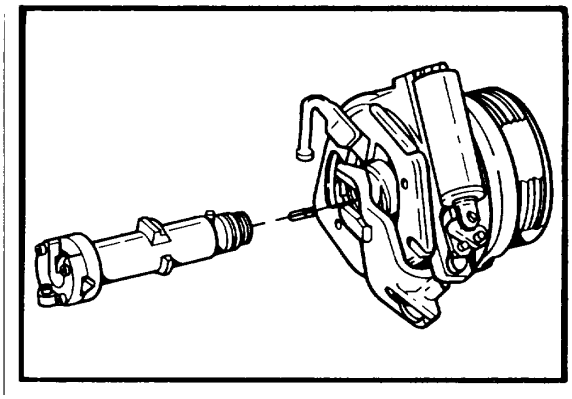

**Step 13:** Turn the safety ring to the "fire" position. Place the lanyard ring over the rear of the breech, matching the openings of breech and the lanyard ring.

**2-10.1. Installation Instructions for the M198 Howitzer**. To mount the barrel in the M198 howitzer and boresight the device, follow steps 1 through 11.

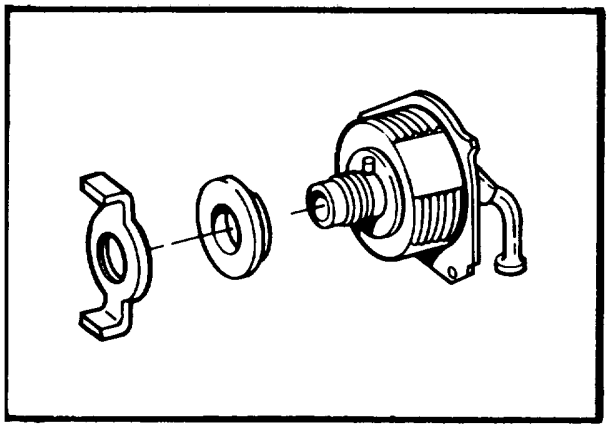



**Step 1**: To remove the firing mechanism, firing mechanism block, and obturator spindle assembly, refer to the operator's manual for the major caliber weapon.

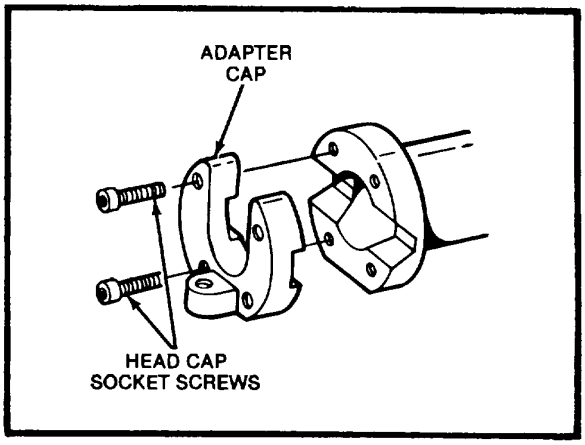
**Step 2:** Remove adapter nut and washer.



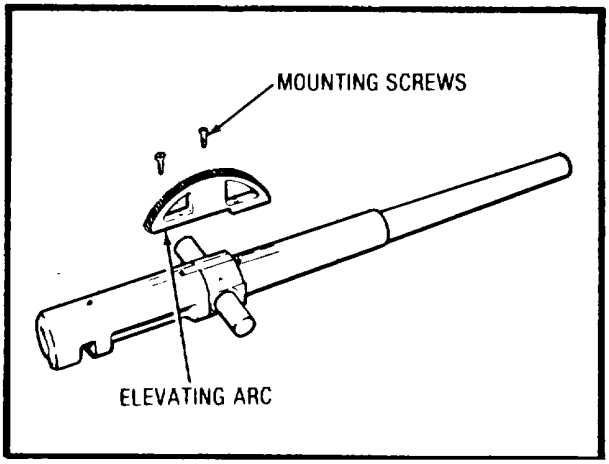
**Step 3:** Insert the adapter (top up) in the breechblock.



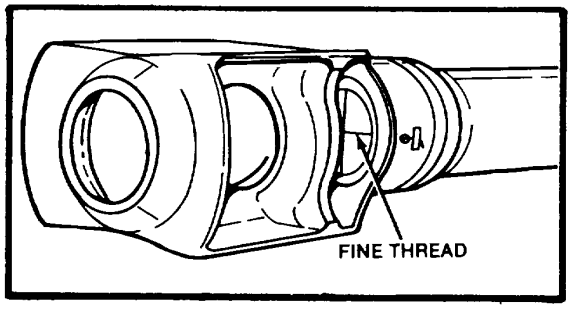
**Step 4:** Aline pin on adapter with slot in washer and install washer. Install nut and tighten completely.



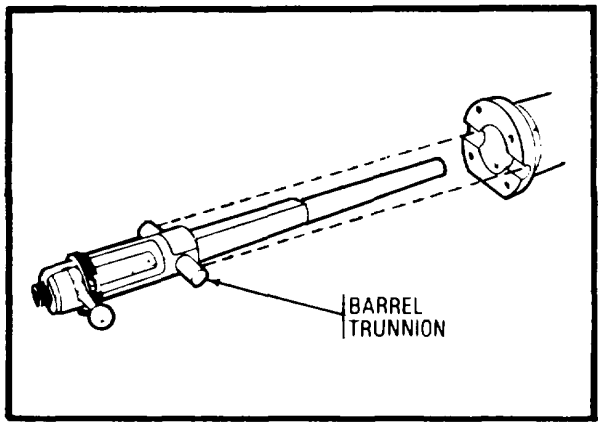

**Step 5:** Remove the four head cap socket screws and the adapter cap.



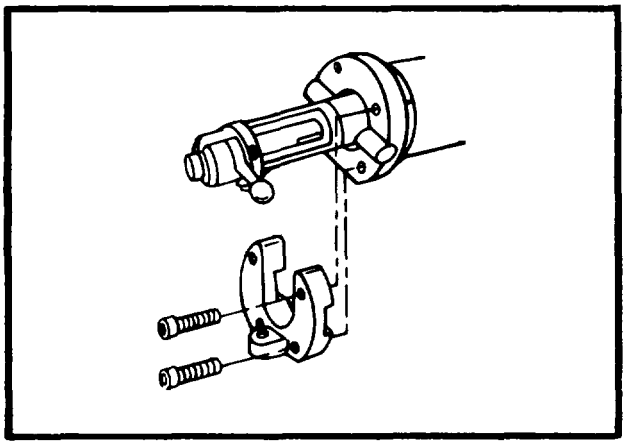

**Step 6:** Remove the elevating arc from the gun barrel by removing the two mounting screws.




**Step 7:** Attach fine thread across the tour witness marks on the end of the tube by using a rubber band. Also place boresight strings on the muzzle of the howitzer.



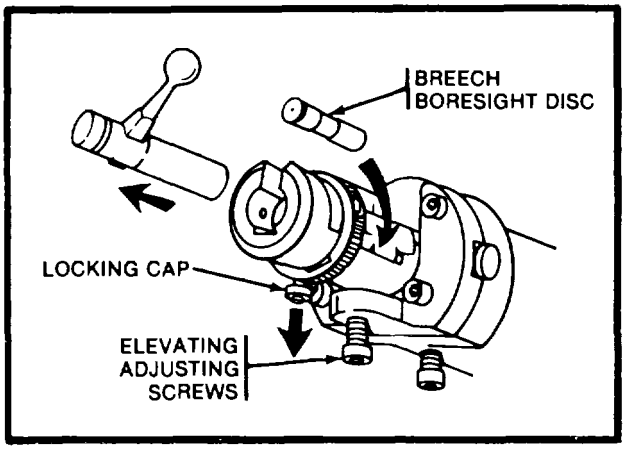

**Step 8:** Place the gun barrel in the adapter and engage the barrel trunnions with the adapter slots.



**Step 9:** Lock the barrel into position by securing adapter cap to the body. Do not tighten the four screws yet.

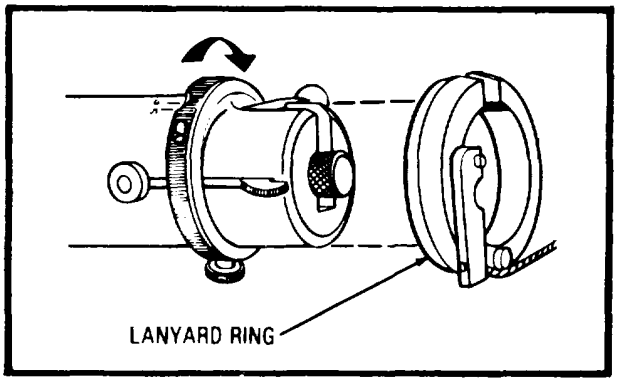
**CAUTION**

**Use caution if opening breech with barrel assembly installed to prevent barrel assembly from striking top carriage.**




**Step 10:** Close the breech, remove the bolt by pulling down on the locking cap and pulling bolt to the rear. To boresight the 14.5-mm device:

1. Tighten both elevating adjusting screws against the barrel.
2. Place the breech boresight disc in the cartridge chamber.
3. Sighting through the breech boresight disc, aline the horizontal boresight string of the 14.5-mm barrel with the horizontal boresight string of the primary weapon by adjusting the elevating adjusting screws (the rear screw lowers the barrel, the front screw raises the barrel).
4. Tighten the four adapter cap screws.
5. Verify the alinement of the muzzle horizontal boresight strings. Remove the muzzle boresight strings from the primary weapon.
6. Select a distant aiming point (DAP) at least 1, 500 meters from the weapon.
7. Sighting through the breech boresight disc, aline the 14.5-mm barrel on the DAP.
8. Refer the panoramic sight on the DAP. The reading should be zero. If it does not read zero, set to zero. Then adjust the sight on the DAP using the target adjusting screws.
9. Open breech and remove boresight strings from muzzle of subcaliber device.
10. Close breech, remove boresight disc and install bolt.




**Step 11:** Turn the safety ring to the :fire: position. Place the lanyard ring over the rear of the breech, matching the openings of breech and the lanyard ring.

## Section III. OPERATION UNDER USUAL CONDITIONS

**2-11. General.** This section contains training procedures, and instructions for operation of the trainer M31 and the associated inbore subcaliber devices under conditions of moderate temperature and humidity. For operation under unusual conditions see Section IV

**2-12. Training Procedures.**

**WARNING**

**During firing mission, personnel should wear safety glasses, suitable ear protection devices, and stand to the rear of the weapon barrel.**

a. *Firing Battery Procedures.*

(1) When the 14.5-mm trainer is mounted in the primary weapon as a subcaliber device, the on-carriage fire control equipment and traversing and elevating mechanism will be used to lay the weapon for direction and elevation.

(2) During firing, the weapon can be serviced by a four-man crew-chief of section, gunner, assistant gunner, and number 1 cannoneer. The chief of section, gunner, and assistant gunner will perform their duties as though the primary weapon is being fired, except the breech is not opened and closed. Cannoneer number 1 will load the piece.

(3) During the conduct of the fire mission, realistic commands are announced to the section; e.g., FIRE MISSION, BATTERY ADJUST AT MY COMMAND, CHARGE 1, DEFLECTION 3270, QUADRANT 365, BATTERY 2 ROUNDS IN EFFECT (NUMBER 3 ONE ROUND SHELL HE, LOT X, FUZE Q HAVE BEEN DESIGNATED AS STANDARD). Each command will require the section to respond in much the same manner as though the primary weapon were being fired.

(4) When the 14.5-mm bursts are more than five meters apart, the observer will have difficulty in spotting the center of the two bursts for range. Therefore, when positioning the weapons, the lateral distance between tubes should be about one-tenth the normal emplacement lateral distance. Special corrections can be applied to fire for effect data if the weapons are more than the normal distance apart, but it is unrealistic to habitually apply special corrections during fire for effect. Minimum quadrant elevation should be computed and reported as normal operations. Crest clearance for the 14.5-mm trainer is five decimeters. Either the tabular or graphical solution is acceptable.

(5) When using the inbore version in a six-gun battery mode with all of the weapons separated by five meters or less, some special techniques must be used. Aiming posts and/or collimators should be identified by section to preclude a mixup of aiming points between sections. Numbers, section colors, lights, or any other easy, logical method can be used. Additionally, problems may be encountered when traversing self-propelled weapons. During large deflection changes, the weapons should be traversed in unison to avoid the possibility of hitting adjacent weapons with gun tubes.

**CAUTION**

**During firing, the bore should be cleaned with the bronze bore brush after every 10 to 15 rounds to reduce the possibility of a muzzle burst.**

(6) There is considerable buildup of cosmoline in the tube during firing, and if it is not removed, there is a loss in range. Eventually the cosmoline buildup will cause a muzzle burst.

(7) It is not necessary to remove the 14.5-mm tube from the adapter for cleaning. Remove the bolt and swab the bore from the breech end of the tube. After firing has been completed and the adapter is removed, both the howitzer's primary tube and the 14.5-mm tube must be cleaned as though both tubes were fired. The adapter bore is cleaned using the same cleaning material as used for the 14.5-mm device.

(8) A muzzle burst is currently considered a malfunction. In the event of a muzzle burst, the officer in charge of firing should report the malfunction to local ammunition authorities. Normally the ammunition lot will not be suspended, however, the details of the malfunction should be reported through proper channels.

b. *Observer Procedures.*

(1) When the observer is provided a special map as previously discussed, normal observer procedures (including the use of an OF fan) are used to determine target locations. The OT factor determined by the observer is based upon thousands of decimeters rather than thousands of meters. For example, an observer-target distance of 2, 800 decimeters (280 meters) would result in an OT factor of 3. The observer corrects for deviation by multiplying the measured deviation by the OT factor and announcing his corrections to the nearest ten decimeters; i.e., RIGHT 60.

(2) The observer uses the bracketing method of range adjustment. Caution should be exercised in establishing the range bracket because the observer in many cases will think his rounds are much closer to the target than they actually are. As an example, if the rounds are 30 meters (300 decimeters) short of the target, the observer should announce ADD 400 in order to obtain a range bracket.

(3) Air observer (AO) training can be conducted using a helicopter. The aircraft should fly at an altitude of about 200 feet to the rear of the firing position. The AO should be given *shot' ten seconds before the weapons fire, in order to properly position the aircraft for observation.

c. *Fire Direction Center Procedures.*

*(1) Manual solution.*

(a) The 1:25, 000 scale grid sheet is set up in the same manner as for firing the main tube except that the space between grid lines is 1, 000 decimeters.

(b) The target grid is oriented in the same manner as with other field artillery weapons. The horizontal control operator (HCO) plots the target using the 1:25, 000 coordinate scale and determines chart data (range and deflection) using the 1:25, 000 scale range-deflection protractor or using the graphical firing table (GFT) fan determine deflection and elevation. The vertical control operator (VCO) determines site using the special map and the 14.5-mm graphical site table (GST).

(c) When the difference in altitude is determined in feet or meters, it must be converted to decimeters. For example, if the difference in altitude is 31.2 meters, the VCO would use 312 decimeters as the vertical interval (VI) and the range announced by the HCO to determine site. Instructions and examples on GST usage are printed on the back of the GST. The computer, using the 14.5-mm graphical firing table (GFT), computes the gun data and announces the fire commands to the guns.

(d) Because of short range of the 14.5-mm trainer, small vertical differences, such as one or two meters, equate to several meters in range. Therefore, in order to obtain valid corrections when conducting a registration, the height of the barrel above the surveyed battery center should be considered. When constructing a firing chart the surveyed altitude of the battery should be increased the following amount.

| Model | Howitzer | Decimeters |
|---|---|---|
| M101A1 | 105-mm | +10 |
| M102 | 105-mm | +10 |
| M114A1 | 155-mm | +15 |
| M109/M109A1 | 155-mm | +20 |
| M110 | 8-inch | +20 |
| M107 | 175-mm (Gun) | +20 |
| M198 | 155-mm | +20 |

(2) *FADAC Solution.* The M18 FADAC tape (revision 5) will be utilized for the FADAC solution.

d. *Mission Procedures.*

(1) During practice for unit ATT/ORTT, the following missions may be conducted using the M31:

(a) Battery emergency mission
(b) High burst registration
(c) Mean-point-of-impact registration
(d) Precision impact registration
(e) Destruction mission
(f) MET plus VE fire for effect
(g) High-angle battalion mass mission
(h) Battalion TOT
(i) Coordinated illumination mission

Those missions that cannot be conducted are time transfers and area time adjustments.

(2) During the march from the rendezvous area to a firing position (or from one firing position to another), an emergency mission may be conducted if the 14.5-mm barrel has been previously installed and boresighted (para. 2-7 through 2-10.1). The emergency mission position may become a primary position requiring survey, communication, and other improvements.

(3) During a battalion exercise the survey party may establish an 01-02 base. If the point selected for the MPI or HB is about 300 meters down range, then the length of the base should be 60 to 100 meters. A good rule to follow is that the length of the base should be no less than 1/5 the observing range. Care should be exercised when selecting the 01-02 base; make sure that the guns do not fire over the personnel occupying the 01-02 base.

**NOTE**

**Do not apply registration corrections obtained from a HB registration to subsequent firing data. Do not attempt to transfer fire using the 3-or 6-second delay round.**

(4) When conducting a high burst registration, you can use either the 3-second or 6-second delay round. The chart location of the high burst will be at the appropriate deflection and at a GT range corresponding to 3or 6seconds. This plot will provide orienting data for 01 and 02. The quadrant elevation fired should correspond to a time of flight 0.6 seconds greater than the present time (3 or 6 seconds) of the round. Eight rounds will normally provide sufficient data to obtain corrections.

(5) The same 01-02 base can be used to conduct an MPI registration provided the chart location of the MPI is about the same as the chart location of HB. Registration corrections obtained from an MPI registration can be applied to all subsequent fire using the PD fuze.

(6) Precision fire is conducted with one gun on a point target to obtain registration corrections or to destroy a target. Since there is no fragmentation of the projectile, most targets should be considered destroyed after one or two target hits. Data obtained from a precision registration may be used to construct an OF chart or to determine corrections to survey chart data. The 01-02 personnel and the forward observers use the same procedures for spotting as with their primary weapon.

(7) If a MET station is available, you should conduct your precision registration concurrent with the time of the MET in order to determine a VE.

(8) The survey party may locate targets accurately enough (within 0.1 meters) to use MET plus VE techniques in engagement as outlined in FM 640. The 14.5-mm tabular firing tables contain sufficient information plus sample problems to allow FDC personnel to work a MET as though they were working it for their primary weapon (weight of projectile cannot be determined accurately, so we do not attempt to apply that value). A propellant temperature correction can be applied if the powder thermometer is placed in the vicinity of the projectiles.

(9) High angle fire mission with one battery adjusting and massing the battalion can be conducted with very good results even when the wind is blowing 20 to 30 miles per hour. The 10m site factor on the GFT should be used to determine site. Do not attempt to fire at a quadrant elevation above 1250 mils since the round may not impact with the nose of the projectile in the downward position.

(10) The time of flight on the GFT and in the TFT is sufficiently accurate to permit battalion TOT missions to be fired. Battalion TOT targets should be selected near a lateral limit rather than in the center of sector, so as to allow different times of flight for each battery.

(11) Coordinated illumination missions may be fired by having the forward observer, or someone located in the vicinity of the OP, fire at the appropriate time either a hand-held, star-cluster parachute flare or a flare fired from the M79 grenade launcher. The flare will provide illumination over most of the impact area for about one minute. The call for fire should include "AT MY COMMAND" allowing the observer to fire as soon as the target area is adequately illuminated. This may allow the observer to see the results of two corrections with one flare.

**2-13. Preparation for Firing.**

a. *Assembly and Installation.* Assemble or install the trainer or subcaliber device in accordance with applicable paragraphs 2-6 through 2-10.1)

**NOTE**

**Trainer M31 will be positioned with the rear leg opposite the direction of fire.**

*b. Boresighting.* The trainer or subcaliber device has been boresighted during assembly or installation. Recheck boresighting in accordance with applicable paragraphs (para. 2-6 through 2-10.1).

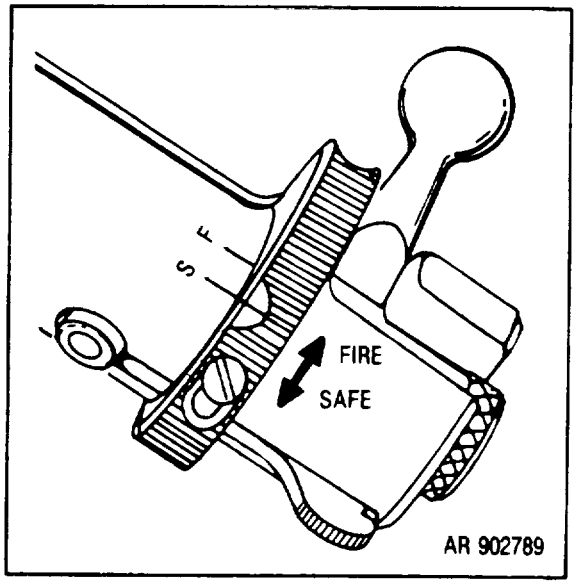



*Figure 2-18. Operation of safety*

**2-14. Firing the Trainer.**

*a. Loading.* Pull the breech bolt to the rear, and make sure the bore and chamber are dry and free of dirt and foreign matter. Place safety in the safe position, (fig. 2-18), insert a cartridge in the chamber and close the bolt.

*b. Firing.* Rotate safety to fire position. Depress the trigger by pulling the lanyard, or if lanyard ring assembly is not installed, by placing the thumb on the trigger and the forefinger on the opposite side of the receiver to prevent lateral movement of the barrel when trigger is depressed.

*c. Extraction.* Pull the bolt to the rear to eject the cartridge case. If the case fails to extract, use the cleaning rod to remove it; then follow instructions in table 3-2. If the adapter is installed in the breech recess of the major caliber weapon (e.g., 105-mm howitzer M102) it will have to be removed from the tube in order to push the cartridge case out with the cleaning rod. If the adapter is installed in place of the obturator spindle (e.g., 155-mm howitzer M114A1), it is only necessary to open the breechblock of the major caliber weapon.

d. *Misfire, Hangfire, and Cookoff*

(1) *Misfire.* A misfire is a complete failure to fire and may be due to a faulty firing mechanism or faulty element in the propelling charge explosive train. A misfire in itself is not dangerous, but since it cannot be immediately distinguished from a delay in the functioning of the firing mechanism or from a hangfire, these possibilities should be considered until they have been eliminated. Such delay in the functioning of the firing mechanism could result from the presence of foreign matter such as sand, grit, frost, and ice, or improper or excessive oil or grease. These conditions might create a partial mechanical restraint which, after some delay, is overcome as a result of the continued force applied by the spring, and the firing pin then driven into the primer in the normal manner. No cartridge should be left in a hot trainer or subcaliber device any longer than circumstances require because of the possibility of a cookoff.

(2) *Hangfire.* A hangfire is a delay in the functioning of a propelling charge at the time of firing. The amount of delay is unpredictable but, in most cases, will fall within the range of a split second to several minutes. A hangfire cannot immediately be distinguished from a misfire, and, therefore, it may be mistaken for a misfire. In case of a misfire, perform the following steps in sequence:

(a) Keep the device trained on the target and all personnel clear of the muzzle.

(b) Before attempting to remove the cartridge from the trainer, personnel not required for the operation will be cleared from the vicinity.

(c) Inspect rear of bolt to determine if the firing pin has been released and is forward. (It will protrude from the rear of the bolt if the weapon is cocked). If the firing pin has been released, wait 30 seconds and proceed with steps d, e, and f.

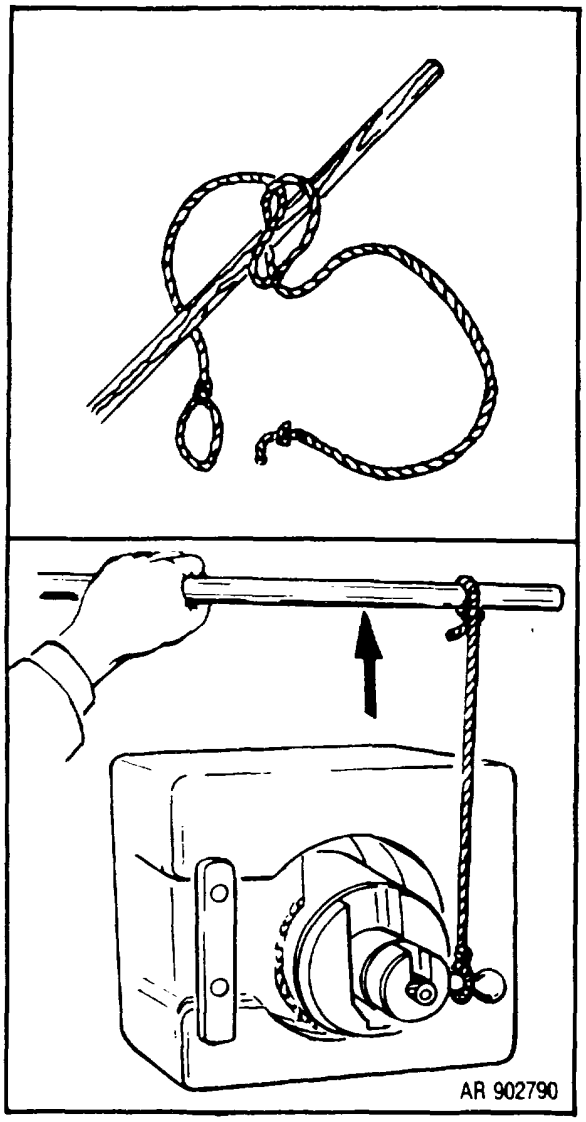



**Figure 2-19. Misfire device**

**NOTE**

**You may have a hangfire. A hangfire cannot be distinguished from a misfire if the firing pin has been released. If the firing pin has not been released you can immediately proceed to steps d, e, and f.**

(d) Attach locally fabricated device, (figure 2-19) to breech bolt lever.

(e) Pull bolt lever up, then to the rear and eject cartridge.

(f) Inspect the cartridge from a distance to determine if the cartridge or firing mechanism is at fault. If the primer is dented, dispose of the cartridge in accordance with local regulations for small arms ammunition. If primer is not dented, disassemble the bolt and repair as necessary.

(3) *Cookoff:* A cookoff is a functioning of any or all of the components of a cartridge chambered in a very hot trainer due to the heat from the trainer. If the cartridge propellant should cookoff, the projectile will be propelled from the trainer with normal velocity even though no attempt was made to fire the primer by actuating the firing mechanism. In such case, there may be uncertainty as to whether or when the cartridge will fire, and precautions should be observed the same as those prescribed for hangfire. To prevent a cookoff, a cartridge which has been loaded into a very hot trainer should be fired immediately, or removed after a lapse of 5 seconds and within 10 seconds.

**2-15. Services after Firing.**

a. Immediately after firing and on two consecutive days thereafter, thoroughly clean the barrel bore, receiver, breech bolt, and firing pin with lubricant and preservative cleaner (CLP), making certain that all surfaces are well coated. Do not wipe dry. On the third day after firing, clean with CLP, wipe dry (using clean lintfree cloth), and coat **I** lightly with CLP.

b. Clean all exposed surfaces of the trainer, and lubricate in accordance with paragraph 3-4.

c. Disassemble the trainer in reverse sequence as indicated in paragraph 2-6, and replace in shipping and storage chest.

d. Remove subcaliber device in reverse order of applicable installation paragraph (see para. 2-7 through 2-10.1).

## Section IV. OPERATION UNDER UNUSUAL CONDITIONS

**2-16. General.**

a. Operational procedures for the trainer or subcaliber device under unusual conditions are the same as under usual conditions (para. 2-12 through 2-15). Special instructions for servicing the trainer or subcaliber device under unusual conditions are contained herein. In addition to the normal preventive maintenance services, special care in cleaning must be observed where extremes of temperature, humidity, and atmospheric conditions are present or anticipated. Proper cleaning and handling guards against excessive wear and deterioration of the materiel. b. When chronic failure of materiel results from subjection to extreme conditions, report of such failure should be made in accordance with paragraph 1-2.

**2-17. Operation in Cold Climates.**

a. Special preparation of materiel scheduled for operation in extreme cold weather is necessary. Extreme cold will cause lubricants to thicken or congeal, which will impair operation of the trainer. Lubricate the materiel for operation in cold climates according to instructions in FM 9-207.

b. Protect the materiel when not in use. Keep snow and ice from the controls. Provide as much protection as possible.

c. When the materiel is brought from a cold temperature to a heated area, it should be wrapped in a covering of sufficient thickness to allow it to reach 'room temperature' gradually.

d. If a materiel is brought into a warm area and condensation forms, it must be thoroughly cleaned and dried as soon as it reaches room temperature. If materiel is taken into below freezing temperatures before it is thoroughly cleaned and dried, ice will form in its mechanisms, making it inoperative.

**2-18. Operation in Hot Climates.**

a. In hot climates, the film of oil necessary for operation and preservation will be quickly dissipated and should be renewed more frequently. Inspect the materiel more frequently, paying particular attention to hidden surfaces (the bore, receiver, and like places), where corrosion might occur and not be quickly noticed.

b. Perspiration is a contributing factor to rusting because it contains acids and salts. After handling, clean, wipe dry, and restore oil film.

# CHAPTER 3
# OPERATOR MAINTENANCE INSTRUCTIONS

## Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

**3-1. Repair Parts.** Repair parts supplied to the operator are listed in appendix C, which is the authority for requisitioning replacements.

**3-2. Special Tools and Equipment. There** are no special tools or equipment required for repair of the trainer.

## Section II. CLEANING AND LUBRICATION INSTRUCTIONS

**3-3. General.** These instructions are provided for the operating maintenance personnel to properly clean and lubricate the trainer (fig. 3-1).

**3-4. Cleaning and Lubrication**.

*a. Barrel Assembly.* Weekly clean all exposed I metal surfaces and apply a light film of CLP (fig. 3-1). Wipe the barrel bore, receiver, breech bolt, and firing pin dry before firing.

b. *Mount Assembly.*

(1) Weekly clean all unpainted metal surfaces and apply a light film of CLP. Do not oil bronze components.

(2) Monthly clean the bevel gears and elevating and traversing worm gears, and apply artillery and automotive grease (GAA).

(3) Touch-up painted surfaces, as necessary.

c. *Tripod Mount Assembly.*

(1) Weekly clean all exposed metal surfaces and apply a light film of CLP. Extend and do the same for the hidden portion of the rear leg.

(2) Place a few drops of CLP at the top and bottom of the leg adjusting sleeve between the sleeve and tripod legs; then rotate the adjusting sleeve to its maximum limits in both directions (red lines around the legs indicate the maximum limits).

(3) Touch-up painted surfaces, as necessary.

*d. Telescope Socket, Holder and Support Assemblies.* Weekly clean all unpainted metal surfaces and apply a light film of CLP. Place a few drops of CLP on the telescope lock and handle. Touch-up painted surfaces, as necessary.

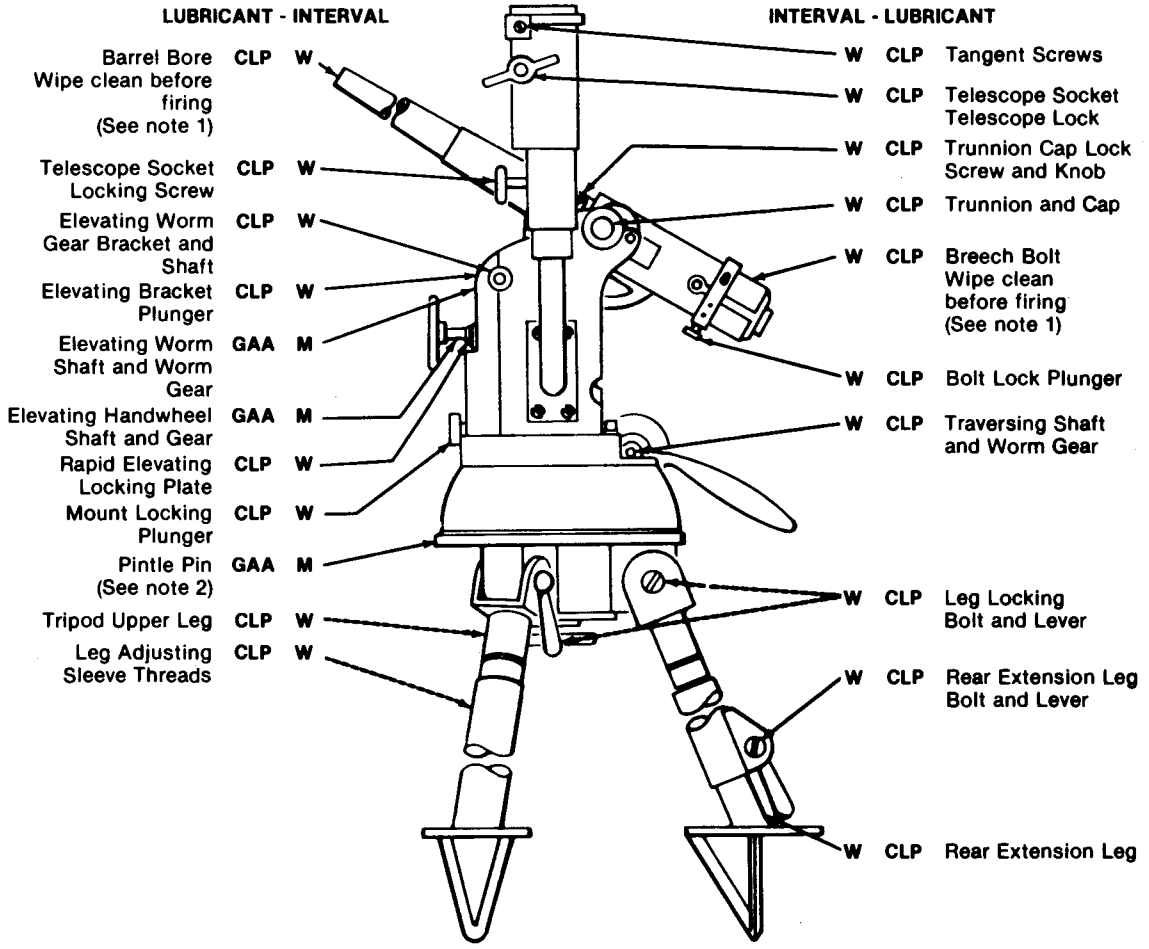
*e. Adapter Assemblies.* Weekly clean and apply a light film of CLP. After firing, clean the adapter bore using the same procedures prescribed for the barrel bore (fig. 3-1).

# LUBRICATION CHART

## TRAINER, FIELD ARTILLERY: 14.5mm, M31

Lubrication will be performed only as prescribed by this lubrication chart except as required under unusual conditions described in the TM.

Clean parts with THINNER, PAINT, MINERAL SPIRITS: (TPM) or SOLVENT, DRY CLEANING: (SD). Dry before lubricating. Lubricate places on all three tripod legs indicated by dotted arrows.




- KEY -

| LUBRICANTS | EXPECTED TEMPERATURES | | | INTERVALS |
|---|---|---|---|---|
| | above +32° | +40° to −10°F | 0° to −60°F | |
| CLP - CLEANER, LUBRICANT AND PRESERVATIVE | ALL TEMPERATURES | | | W - Weekly |
| GAA - GREASE, AUTOMOTIVE AND ARTILLERY | ALL TEMPERATURES | | | M - Monthly |

-NOTES-

1. **BARREL BORE, RECEIVER, BREECH BOLT, AND FIRING PIN.** - Immediately after firing thoroughly clean with CLP, making certain that all surfaces are well coated. Do not wipe dry. On the day after firing, clean with CLP; wipe dry, using clean, lint free cloth and coat lightly with CLP. Weekly thereafter when Trainer is not being fired, clean with CLP, wipe dry, and reoil with CLP.

2. **PINTLE PIN.** - Monthly remove the upper rotating mount from the fixed base mount and lubricate with GAA.

ARR 81-1843

*Figure 3-1. Lubrication chart*

## Section III. PREVENTIVE MAINTENANCE SHECKS AND SERVICES

**3-5. General.**

a. To insure that the 14.5-mm field artillery trainer M31 or subcaliber device is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed are listed in table 3-1. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded, together with the corrective action taken, on DA Form 2407 at the earliest opportunity. The frequency of the preventive maintenance services prescribed is considered a minimum requirement for operation of the materiel under usual conditions. Under unusual operating conditions, such as extreme temperatures, dust or sand, extremely wet terrain, moist or salty atmosphere, or in rain or snow, it will be necessary to perform the maintenance services more frequently.

b. The general preventive maintenance services outlined below will be observed, in addition to those referred to in table 3-1.

(1) Check to see that the trainer is correctly assembled, and no parts or components are missing.

(2) Inspect for loose, broken, or damaged parts. Tighten loose parts.

(3) Each time the trainer is disassembled for cleaning or repair, carefully inspect all parts for cracks, excessive wear, rust, and like defects which might cause malfunctions. Clean all parts before assembly.

**3-6. Operator's Preventive Maintenance** The item or points to be inspected and serviced by the operators are listed in table 3-1.

*Table 3-1. Preventive Maintenance Checks and Services*

**B - Before firing** **D - During firing** **A - After firing**

| Item | Interval B | Interval D | Interval A | Procedure | Work time (M, H) |
|---|---|---|---|---|---|
| Barrel assembly | x | x | x | See that bolt lock plunger properly engages the breech bolt. | 0.1 |
| | x | x | x | Check bolt for smooth operation. | |
| | x | x | x | Check safety for proper operation. | |
| | x | x | x | Check trigger for proper functioning. | |
| Barrel | x | | | Insure that bore is free of all residue by use of bronze cleaning brush. | 0.2 |
| | x | | | Wipe bore clean and dry. | |
| | | x | | Clean barrel with bronze cleaning brush after each 15 cartridges. | |
| | | | x | Clean barrel. | |
| Mount assembly | x | x | x | Insure that trunnion caps hold barrel assembly securely. | 0.1 |
| | x | | | Check elevating handwheel for smooth operation. | |
| | x | | | Check traversing handwheel for smooth operation. | |
| | x | | | Check for broken level vials. | |
| | x | | | Insure that gears disengage properly for rapid elevating and traversing of trainer. | |
| | x | x | | Insure that mount assembly is mated to the tripod securely. | |
| Telescope socket assembly | x | | | Check telescope socket for secure retention of telescope socket assembly. | 0.1 |
| Tripod mount assembly | x | x | | Check leg locking levers. They must hold the legs securely in place. | 0.1 |
| | x | x | | Check mount locking screw for secure retention of the mount assembly. | |

## Section IV. TROUBLESHOOTING

**3-7. General.** This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the trainer or subcaliber device which is peculiar to operator maintenance operations only. Malfunctions which may occur are listed in table 3-2. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action is described opposite the probable cause.

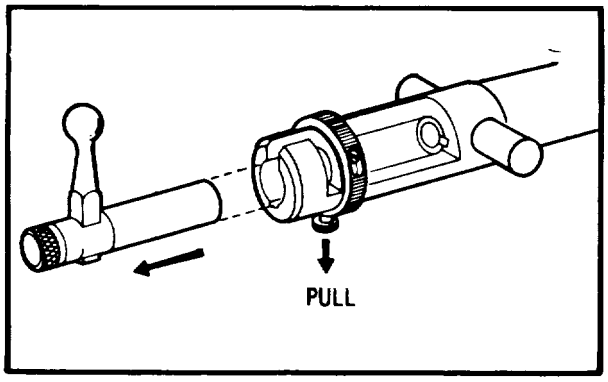
*Table 3-2. Troubleshooting*

| Malfunction | Probable cause | Corrective action |
|---|---|---|
| Failure to fire | Defective firing pin | Replace firing pin. |
| | Weak firing pin compression helical spring | Replace spring. |
| | Defective trigger | Replace trigger. |
| Failure to extract | Defective extractor | Replace extractor. |
| | Weak or broken extractor spring | Replace spring. |
| Hard to elevate | Elevating gears out of adjustment | Adjust gears. |
| Jerky elevation | Burred or stripped gears | Notify direct support maintenance. |
| Jerky traverse | Burred or stripped gears | Notify direct support |
| Tripod legs bind | Bent legs | Notify direct support maintenance. |

## Section V. MAINTENANCE INSTRUCTIONS

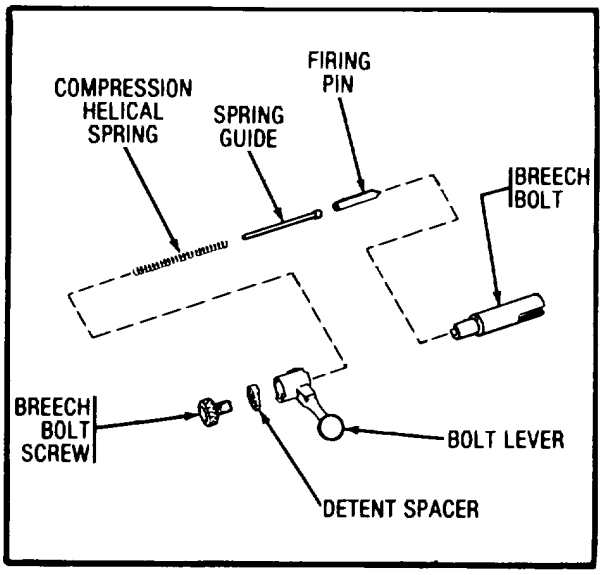
**3-8. General.** Maintenance by the operator is confined to replacing the firing pin and firing pin compression helical spring (para. 3-9), cleaning and lubricating the trainer (para. 3-4), and preventive maintenance checks and services (table 3-1).

**3-9. Maintenance of Firing Pin and Spring.** To replace a damaged or broken firing pin or compression helical spring, perform the following steps in sequence:




**Step 1:** Remove the bolt by pulling down on the bolt locking cap and pulling bolt to the rear.

**Step 2:** Remove the breech bolt screw, detent spacer, and bolt lever. The compression helical spring, spring guide, and firing pin will now slide out the rear of the bolt.




**Step 3:** Replace the spring and/or firing pin as required, then reassemble parts in reverse order.

# CHAPTER 4
# ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

## Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

**4-1. Repair Parts.** Repair parts supplied for organizational maintenance are listed in appendix C, which is the authority for requisitioning replacements.

**4-2. Special Tools and Equipment.** There are no special tools and equipment required for repair of the trainer.

## Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

**4-3. General.** To insure that the 14.5-mm field artillery trainer M31 and subcaliber devices are ready for operation at all times, they must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed are listed in table 4-1. The item numbers indicate the sequence of minimum inspection requirements. A11 deficiencies and shortcomings will be recorded, together with the corrective action taken, as required by DA PAM 738-750 (TAMMS).

**4-4. Organizational Preventive Maintenance.** Service by organizational maintenance personnel includes a systematic check to see that all operator's preventive maintenance has been properly performed at the prescribed intervals and that the materiel is in the best possible operating condition. The services outlined in table 4-1 are to be performed by organizational maintenance personnel at the designated intervals, in addition to any maintenance required as a result of the checks and services by the operator.

*Table 4-1. Preventive Maintenance Checks and Services*

| Weekly | Item to be inspected | Procedure | Reference | Time standards |
|---|---|---|---|---|
| 1 | Barrel assembly | | Para 3-4 | 0.2 |
| X | | Check all components for proper functioning | Para 4-7 and 4-8 | |
| X | | Replace cracked or broken parts, and weak springs | | |
| 2 | Mount assembly | | Para 4-9 | 0.1 |
| X | | Check all components for proper functioning | | |
| 3 | Tripod mount assembly | | | |
| X | | Check overall for proper functioning and for broken or missing parts | Para 4-10 | 0.1 |
| 4 | Telescope socket, holder and support assemblies | | | |
| X | | Replace tangent screws when worn or stripped | Para 4-11 | 0.2 |
| X | | Replace telescope socket locking screws when worn or stripped | | 0.1 |
| 5 | Adapter assemblies | | | 0.1 |
| X | | Check overall for proper functioning and for broken or missing parts | Para 4-12 | |
| 6 | Tools and | | | 0.2 |
| X | equipment | Replace all missing or broken items | | |

## Section III. ORGANIZATIONAL

**4-5. General.** This section describes organizational maintenance for the 14.5-mm field artillery trainer M31 and subcaliber devices. Replacement of repair parts will be limited to those allocated in the maintenance allocation chart (app. B) and repair parts and special tools list (app. C). For troubleshooting see chapter 3.

**4-6. Removal and Installation of Major Components.** The major components of the trainer are contained in the shipping and storage chest. If necessary to remove components from assembled trainer, refer to paragraph 2-6 For assembly, refer to paragraph 2-6.

**4-7. Maintenance of Breech Bolt Group.**

*a. Disassembly (Fig. 4-1).*

(1) Remove breech bolt group from barrel receiver (para. 3-9).

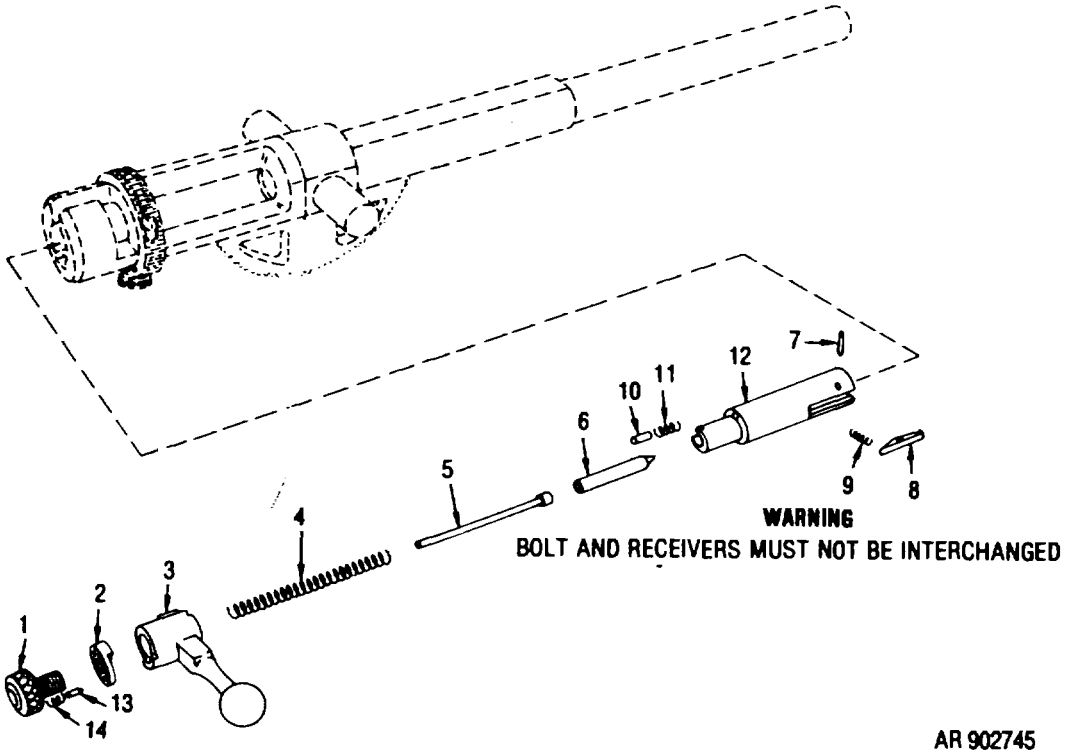
(2) Disassemble the breech bolt group in accordance with figure 4-1.

*b. Maintenance.*

(1) Clean and oil the breech bolt group as indicated in the lubrication chart (fig. 3-1) and paragraph para 3-4.

(2) Remove corrosion, burs, or scored areas with crocus cloth.

(3) Replace damaged or broken parts. If either the bolt or breech bolt lever is unserviceable, notify direct support maintenance personnel.




1. Bolt Screw - 11578612
2. Detent Spacer - 11578578
3. Bolt Lever - 11578601
4. Firing Pin Spring - 11578613
5. Spring Guide - 11578610
6. Firing Pin - 11578606
7. Extractor Pin - 11578631
8. Extractor - 11578608
9. Extractor Spring
10. Plunger - 11578609
11. Spring
12. Breech Bolt - 11578600
13. Plunger - 11578611
14. Bolt Spring

*Figure 4-1. Disassembly/assembly of breech bolt group*

c. Assembly.

(1) Assemble the breech bolt group in accordance with figure 4-1.

(2) Install the breech bolt group into the barrel receiver.

**4-8. Maintenance of Barrel Assembly.**

a. Disassembly (Fig. 4-2).

(1) Remove the breech bolt group from barrel receiver (para. 3-9).

(2) Disassemble the barrel assembly in accordance with figure 4-2.

b. Maintenance.

(1) Clean and oil the barrel assembly as indicated in the lubrication chart (fig. 3-1) and subparagraph 3-4.

(2) Remove corrosion, burs, or scored areas with crocus cloth.

(3) Replace damaged or broken parts.
If the safety is unserviceable, notify direct support maintenance personnel.

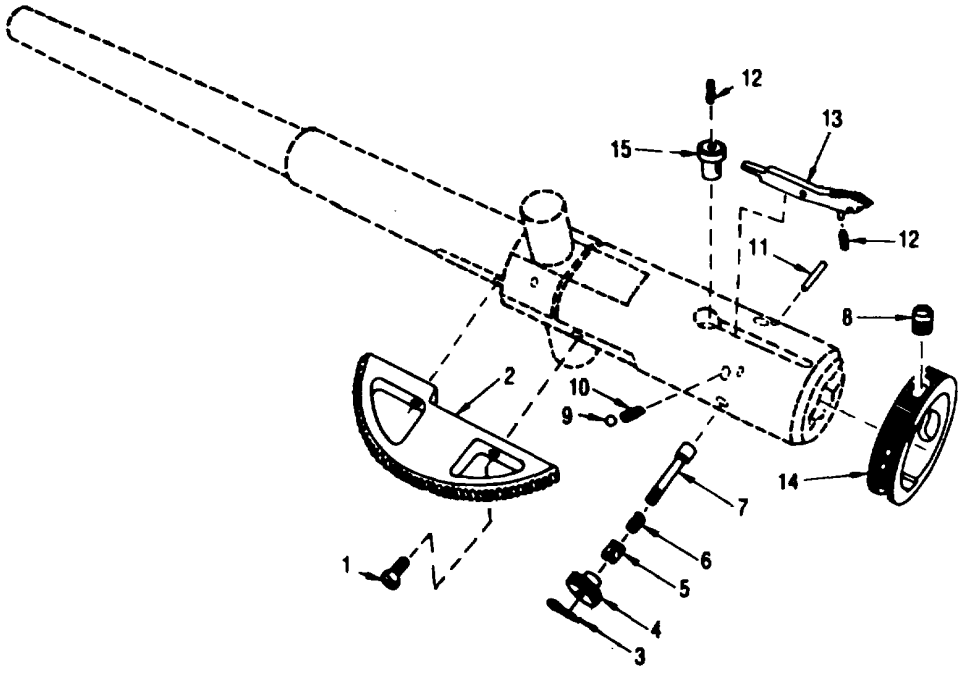
c. Assembly.

(1) Assemble the barrel assembly in accordance with figure 4-2.

(2) Install the breech bolt group into the barrel receiver.

**NOTE**

**Be sure to assemble the bolt guide (15, fig. 4-2) with the beveled side on the bottom towards the muzzle of barrel.**




Legend

1. Screw - 11578764
2. Gear Sector - 11578695
3. Cotter Pin
4. Lock Knob - 11578617
5. Lock Bushing - 11578623
6. Lock Spring
7. Lock Plunger - 11578624
8. Stop Screw - 11578622
9. Bearing Ball - 11578632
10. Lock Spring
11. Trigger Pin - 11578630
12. Compression Spring
13. Trigger - 11578628
14. Safety - 11578607
15. Bolt Guide - 11578604

*Figure 4-2. Disassembly/assembly of barrel assembly*

**4-9. Maintenance of Mount Assembly**.

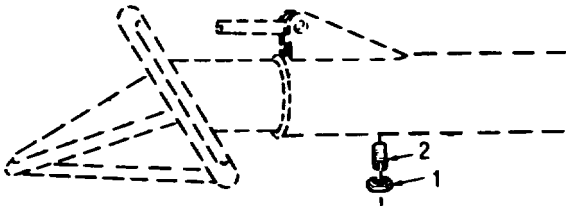
a. Clean and oil the mount as indicated in the lubrication chart (fig. 3-1) and subparagraph 3-4.

b. Remove corrosion, burs, or scored areas with crocus cloth.

**4-10. Maintenance of Tripod Mount Assembly.**

a. Clean and oil the tripod mount assembly as indicated in the lubrication chart (fig. 3-1) and subparagraph 3-4.

b. Replace the guide screw nut (1, fig. 4-3) and guide screw (2, fig. 4-3), if worn or threads are damaged.




Legend
1. Guide Nut 11578712
2. Guide Screw 11578711

*Figure 4-3. Removal/installation of guide nut and screw from/to tripod rear leg*

**4-11. Maintenance of Telescope Socket, Holder, and Support Assemblies**.

a. Clean and oil the telescope socket, holder, or support assembly as indicated in paragraph 3-4.

b. Replace damaged locking screw (I, fig. 4-4) in the telescope socket, holder, or support assembly in accordance with figure 4-4 (telescope socket shown).

c. Loosen setscrew and replace tangent screw (2, fig. 44) if damaged.

**4-12. Maintenance of Adapter Assemblies.**

a. Adapter Assemblies (PN1178866and PN 11578873) for 10-mm Howitzer M1101A1.

(1) Disassemble in accordance with figure 4-5.

(2) Clean and lubricate in accordance with paragraph 3-4.

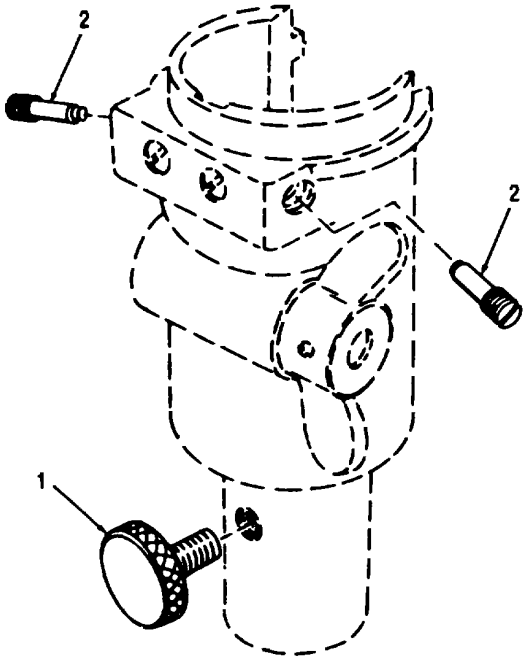
(3) Replace or repair broken or damaged parts.

(4) Assemble in accordance with figure 4-5.

b. Adapter Assemblies (PN 11578750 and PN 11678967) for 105-mm Howitzer M102.

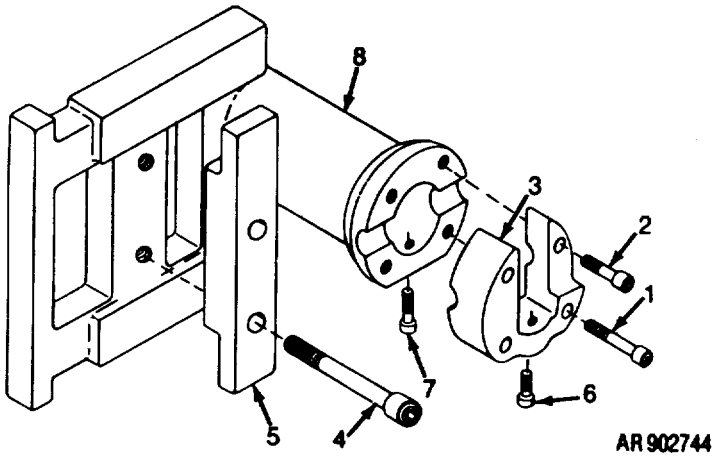
(1) Disassemble in accordance with figure 4-6

(2) Clean and lubricate in accordance with paragraph 3-4.




Legend
1. Locking Screw 11578705
2. Tangent Screw 11578698

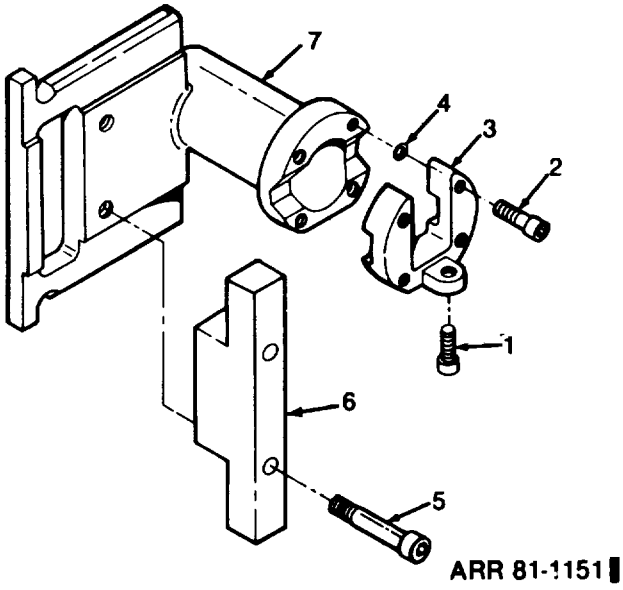
*Figure 4-4. Removal/installation of telescope lock and tangent screws from/to telescope socket*




Legend

1. Screw
2. Screw
3. Cap - 11578778
4. Screw
5. Locking Bar - 11578839
6. Screw
7. Screw
8. Adapter Body - 11578838

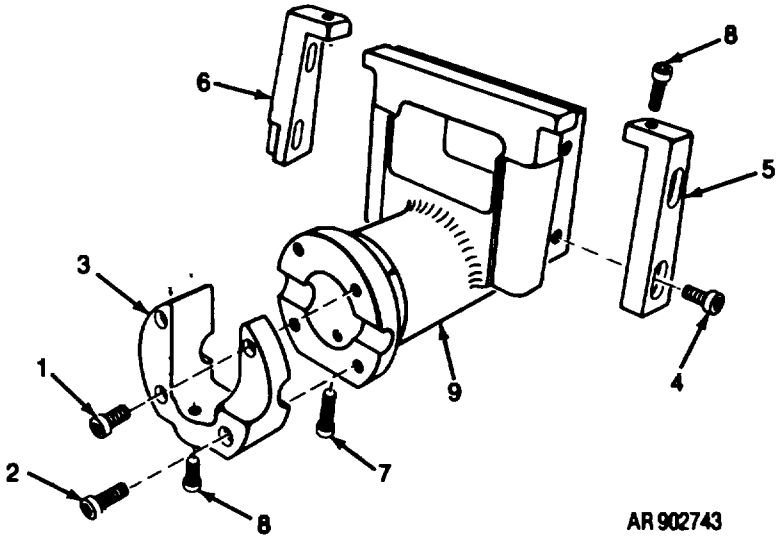
*Figure 4-5. Disassembly/assembly of adapter assembly PN 11578865 for M101A1*




Legend

1. Screw
2. Screw
3. Cap - 11578868
4. Ring (Screw Retaining) - 11578950
5. Screw
6. Locking Bar - 11578866
7. Adapter Body - 11578865

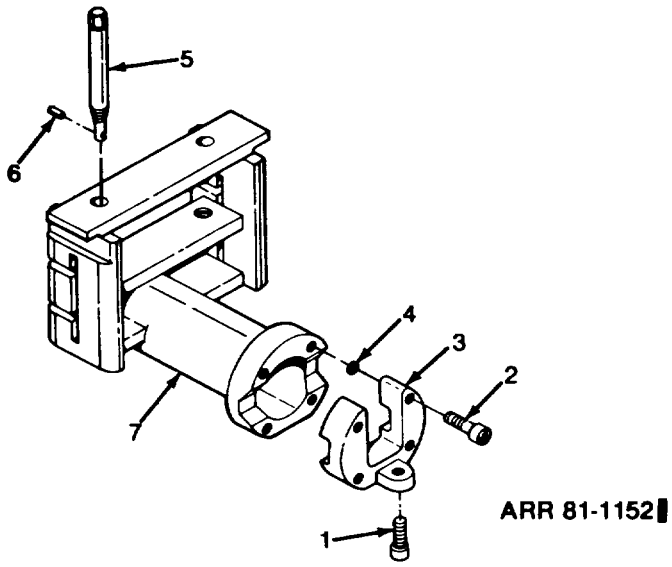
*Figure 4-5A. Disassembly/assembly of adapter assembly PN 11578873 for M101A1*




Legend

1. Socket Head Cap Screw
2. Socket Head Cap Screw
3. Cap - 11578778
4. Socket Head Cap Screw
5. Right Gib - 11578777-1
6. Left Gib - 11578777-2
7. Socket Head Cap Screw
8. Socket Head Cap Screw
9. Adapter Body - 11578776

*Figure 4-6. Disassembly/assembly of adapter assembly PN 11578750 for M102*




Legend

1. Screw
2. Screw
3. Cap - 11578868
4. Ring - 11578950
5. Screw, Lock - 11578969
6. Pin
7. Adapter Body - 11578968

*Figure 4-6A. Disassembly/assembly of adapter assembly PN 11578967 for M102*

(3) Replace or repair broken or damaged parts.

(4) Assemble in accordance with figure 4-6.

c. Adapter Assemblies (PN 11578752 and PN 11578876) for 155-mm Howitzer M114 and M114A1.

(1) Disassemble in accordance with figure 4-7.

(2) Clean and lubricate in accordance with paragraph 34.

(3) Replace or repair broken or damaged parts.

(4) Assemble in accordance with figure 4-7

d. Adapter Assemblies (PN 11578867and PN 1578870) for 155mm Howitzer M109, 175mm Gun M107, and 8-inch Howitzer Ml10.

(1) Disassemble in accordance with figure 4-8.

(2) Clean and lubricate in accordance with paragraph 3-4.

(3) Replace or repair broken or damaged parts.

(4) Assemble in accordance with figure 4-8.

e. Adapter Assembly (PN 11579605) for 155mm Howitzer M198.

(1) Disassemble in accordance with figure 4-8

(2) Clean and lubricate in accordance with paragraph 3-4.

(3) Replace or repair broken or damaged parts.

(4) Assemble in accordance with figure 4-8

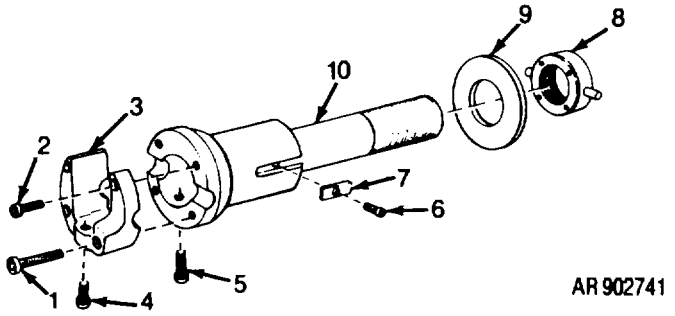
**4-13. Maintenance of Lanyard Ring Assembly.**

a. Disassemble in accordance with figure 4-9.

b. Clean and lubricate in accordance with paragraph 3-4.

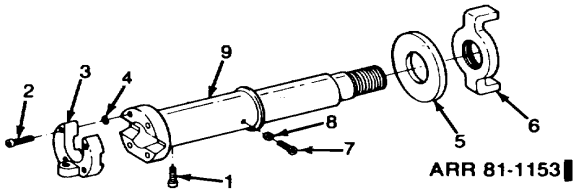
c. Replace or repair broken or damaged parts.

d. Assemble in accordance with figure 4-9.



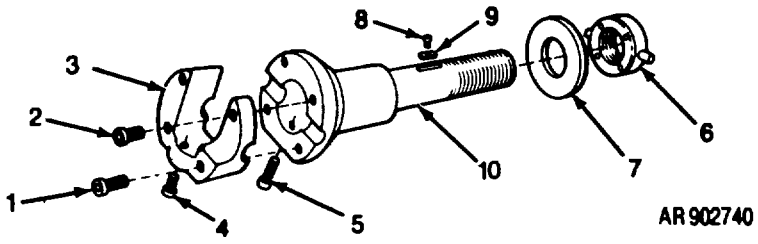

Legend
1. Socket Head Cap Screw
2. Socket Head Cap Screw
3. Cap- 11578718
4. Socket Head Cap Screw
5. Socket Head Cap Screw
6. Socket Head Cap Screw
7. Key - 11578836
8. Nut Assembly - 11578834
9. Washer - 11578837
10. Adapter Body - 11578835

*Figure 4-7. Disassembly/assembly of adapter assembly PN 11578752 for M114 and M114A1*




Legend
1. Screw
2. Screw
3. Cap-11578868
4. Ring (Screw Retaining) - 11578950
5. Washer
6. Nut
7. Screw (Modified)
8. Jam Nut
9. Adapter Body - 11678877

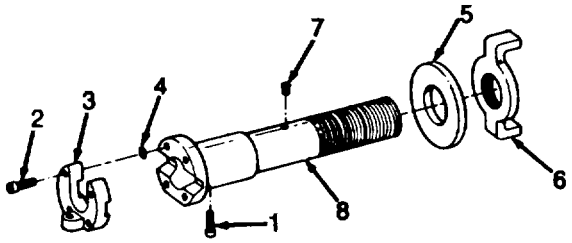
*Figure 4-7A. Disassembly/assembly of adapter assembly PN 11578876 for M114A1*




Legend

1. Socket Head Cap Screw
2. Socket Head Cap Screw
3. Cap - 11578778
4. Socket Head Cap Screw
5. Socket Head Cap Screw
6. Nut Assembly - 11578779
7. Washer - 11578783
8. Socket Head Cap Screw
9. Key - 11578784
10. Adapter Body - 11578781

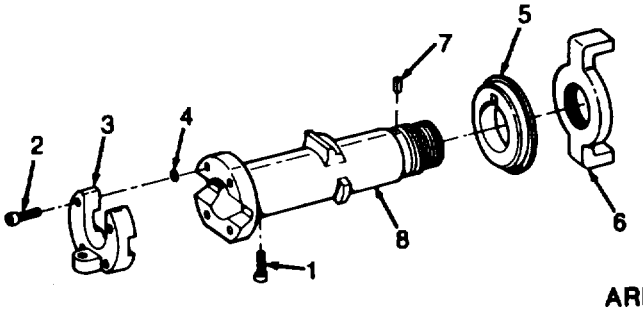
*Figure 4-8. Disassembly/assembly of adapter assembly PN 11578780 for M109 series and M107/M110*




Legend

1. Screw
2. Screw
3. Cap - 11578868
4. Ring (Screw Retaining) - 11578950
5. Washer
6. Nut
7. Screw (Modified)
8. Adapter Body - 11578867

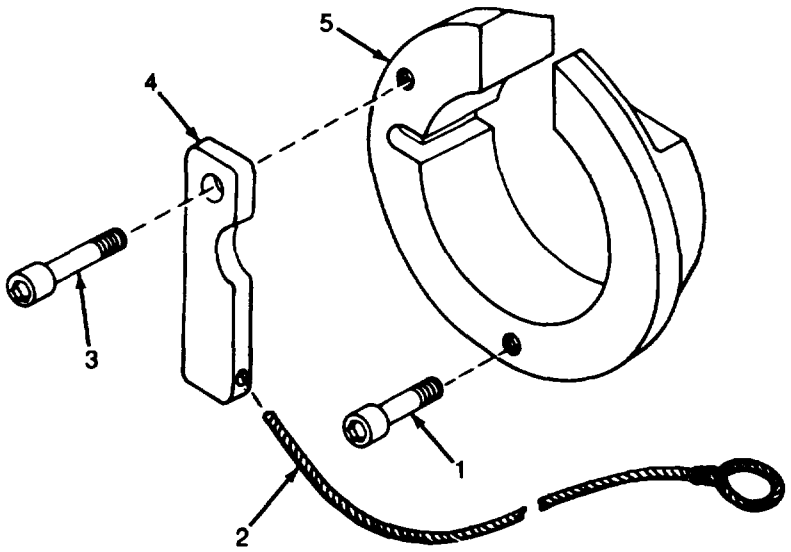
*Figure 4-8A. Disassembly/assembly of adapter assembly PN 11578870 for M109/M109A1/M110*




Legend

1. Screw
2. Screw
3. Cap - 11578868
4. Ring (Screw Retaining) - 11578950
5. Step Washer
6. Nut
7. Pin
8. Adapter Body - 11579604

*Figure 4-8B. Disassembly/assembly of adapter assembly PN 116796056 for M198*




Legend

1. Screw
2. Lanyard - 11578774
3. Screw
4. Lever - 11578773
5. Holder - 11578771

*Figure 4-9. Lanyard ring assembly - exploded view*

# CHAPTER 5

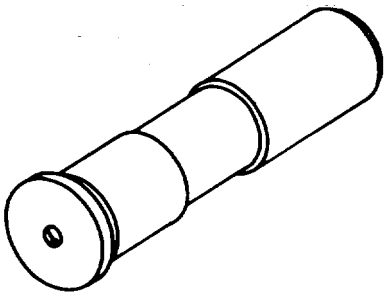
# DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

## Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

**5-1. Repair Parts**. Repair parts supplied for direct support maintenance are listed in appendix C, which is the authority for requisitioning replacements.

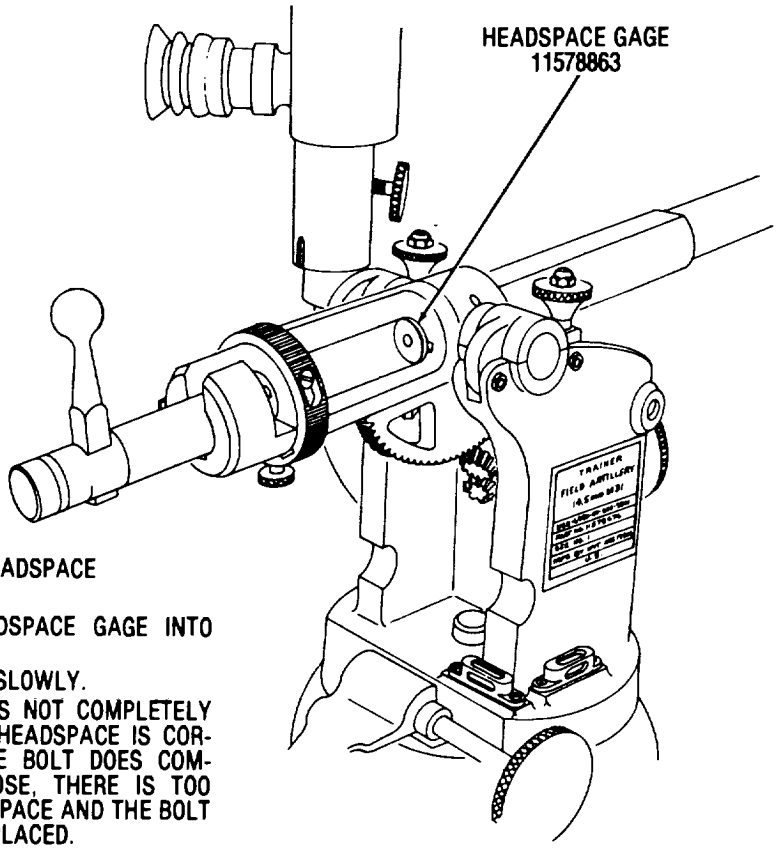
**5-2. Special Tools and Equipment**. The head-space gage P/N 11578863 required for inspection of the trainer is illustrated in figure 5-1 and its use is illustrated in figure 5-2.

**5-3. Consumable Supplies**. Consumable supplies normally required in performing assembly and repair operations are listed in table 5-1.



AR 902756

*Figure 5-1. Headspace gage*




CHECKING HEADSPACE

STEP 1: OPEN BOLT.

STEP 2: INSERT HEADSPACE GAGE INTO BREECH.

STEP 3: CLOSE BOLT SLOWLY.

STEP 4: IF BOLT DOES NOT COMPLETELY CLOSE, THE HEADSPACE IS CORRECT. IF THE BOLT DOES COMPLETELY CLOSE, THERE IS TOO MUCH HEADSPACE AND THE BOLT MUST BE REPLACED.

AR 902757

*Figure 5-2. Checking headspace*

*Table 5-1. Consumable Supplies*

| NSN | Description |
|---|---|
| | GREASE, AIRCRAFT AND INSTRUMENT: MIL-G-23827 |
| 9150-00-985-7245 | 8 oz tube |
| 9150-00-985-7246 | 1 lb can |
| 9150-00-985-7247 | 5 lb can |
| 9150-00-985-7248 | 35 lb pail |
| | GREASE, AUTOMOTIVE AND ARTILLERY: MIL-G-10924 |
| 9150-00-190-0904 | 1 lb can |
| 9150-00-190-0905 | 55 lb can |
| 9150-00-190-0907 | 35 lb pail |
| | GREASE, GRAPHITE SOFT: grade 1, V-G 671 |
| 9150-00-190-0917 | 1 lb can |
| 9150-00-190-0919 | 5 lb can |
| | GREASE, MOLYBDENUM DISULFIDE: liquid, MIL-G-21164 |
| 9150-00-935-4018 | 14 oz cartridge |
| 9150-00-754-2595 | 1 lb can |
| 9150-00-223-4004 | 5 lb can |

## Section II. TROUBLESHOOTING

**5-4. General**. This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the trainer or subcaliber device which is peculiar to direct support maintenance operation only. Malfunctions which may occur are listed in table 5-2. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause. For troubleshooting procedures performed by lower levels of maintenance, refer to tables 3-2 and 4-1.

*Table 5-2. Troubleshooting*

| Malfunction | Probable cause | Corrective action |
|---|---|---|
| Breech bolt does not slide smoothly | Bolt damaged or burred | Remove burs or replace breech bolt. |
| Safety inoperative | Safety detent ball bearing damaged | Replace ball bearing. |
| | Safety detent ball bearing spring weak | Replace spring. |
| Failure to elevate | Barrel trunnion damaged or bent | Replace barrel trunnion and receiver assembly. |
| | Elevating bevel gear or worm gear stripped or burred | Remove burs or replace gears. |
| | Elevating bracket shaft bent | Replace shaft. |
| | Elevating worm gear bracket worn or damaged | Replace bracket. |
| Failure to traverse | Traversing worm gear or worm wheel gear stripped or burred | Remove burs or replace gears. |
| | Traversing shaft bent | Replace shaft. |
| | Rapid traverse lever damaged | Replace lever. |
| Rapid traverse lever fails to lock in place. | Broken torsion helical spring | Replace spring. |

## Section III. INSPECTION

**5-5. General**.

**WARNING**

**Before starting an inspection, be sure to clear the trainer or subcaliber device. Do not actuate the firing mechanism until the weapon has been cleared. Inspect the receiver to insure that it is empty and check to see that no ammunition is in position to be introduced. Avoid having live ammunition in the vicinity of the work.**

a. Check to see that trainer has been cleaned of all corrosion-preventive compound, grease, excessive oil, dirt, or foreign matter which might interfere with proper functioning or obscure the true condition of the parts.

b. Make an overall inspection of the weapon for general appearance, condition, operation, and manual functioning.

**5-6. Categories of Inspection**. The two categories of inspection are: (1) Inspection of materiel in the hands of troops, and (2) Direct support maintenance inspection. Direct support maintenance inspections are listed below.

| Inspection | Explanation |
|---|---|
| Initial | Perform initial inspection of materiel received in maintenance support shops to determine materiel serviceability and required maintenance. |
| In-process | Perform in-process inspection during repair or overhaul to insure materiel conforms to maintainability standards. |

# CHAPTER 6
# DIRECT SUPPORT MAINTENANCE REPAIR INSTRUCTIONS

## Section I. GENERAL MAINTENANCE

**6-1. General**.

a. This section contains those procedures which are of a general nature. Reference will be made to pertinent paragraphs in this section in the repair sections, in order to eliminate constant repetition of general instructions. Special reclamation instructions are contained in pertinent repair paragraphs.

b. In sections II through V, major assemblies are disassembled, repaired, overhauled, replaced, assembled, and given a final inspection. These instructions are supplementary to instructions for operator and organizational maintenance, which are covered in preceding chapters.

**6-2. Disassembly and Assembly Procedures**.

a. In disassembling an assembly, remove the major subassemblies, whenever possible. Subassemblies may then be disassembled, as necessary, into individual parts.

b. During assembly, subassemblies should be assembled first and then installed to form a complete assembly. Lubricate parts that are normally lubricated with aircraft and instrument grease (GL) before assembly.

c. Complete disassembly of an assembly is not always necessary in order to make a required repair or replacement. Good judgment should be exercised to keep assembly and disassembly operations to a minimum.

d. Maintenance functions to be performed are outlined in appendix B. Disassembly will follow numerical sequence in the illustrations, assembly will follow reverse order of numerical sequence in the illustrations.

**6-3. Replacement of Parts**.

a. Replace all damaged screws, nuts, pins, or snap rings.

b. Replace all springs, if they are broken, kinked, bent, if they fail to function properly, or if they fail to meet specific requirements.

c. If a required new part is not available, a reconditioned used part may be substituted. Such reconditioned used parts should approximate the finish of corresponding new parts. Allowable tolerances must not be exceeded. Remove all burs and rough spots with a fine stone or crocus cloth.

d. Redrilling and filing of all replacement parts, except bolts, is permitted to obtain proper fit.

**6-4. Use of Tools**.

a. Care must be exercised to use tools that fit and are suitable for the task to be performed, in order to avoid unnecessary mutilation of parts and/or damage to tools.

b. Keep tools clean and work with clean parts. The rules of good housekeeping must be observed.

**6-5. Welding**. Refer to TM 9-237.

**6-6**. **Repairing Damaged Threads**. Repair damaged threads with a thread restorer or by chasing on a lathe.

**6-7. Painting**. Refer to TM 43-0139.

**6-8**. **Cleaning**. Refer to TM 9-208-1 and 9-208-2.

**6-9. Finished Surfaces**. All painted or treated surfaces will be refinished to match the appearance of new parts as outlined below.

a. Paint all surfaces on which paint has deteriorated or become damaged.

b. Do not paint working parts inside groups or mechanisms. Lightly lubricate such components in accordance with paragraph 3-4.

c. Do not paint polished machine-finished surfaces.

**6-10. Lubrication**. Refer to paragraph 3-4.

## Section II. MAINTENANCE OF THE BOLT ASSEMBLY

**6-11. Initial Inspection**. Check headspace in accordance with figure 5-2.

**6-12. Disassembly**. Disassemble the bolt assembly in accordance with figure 6-1.

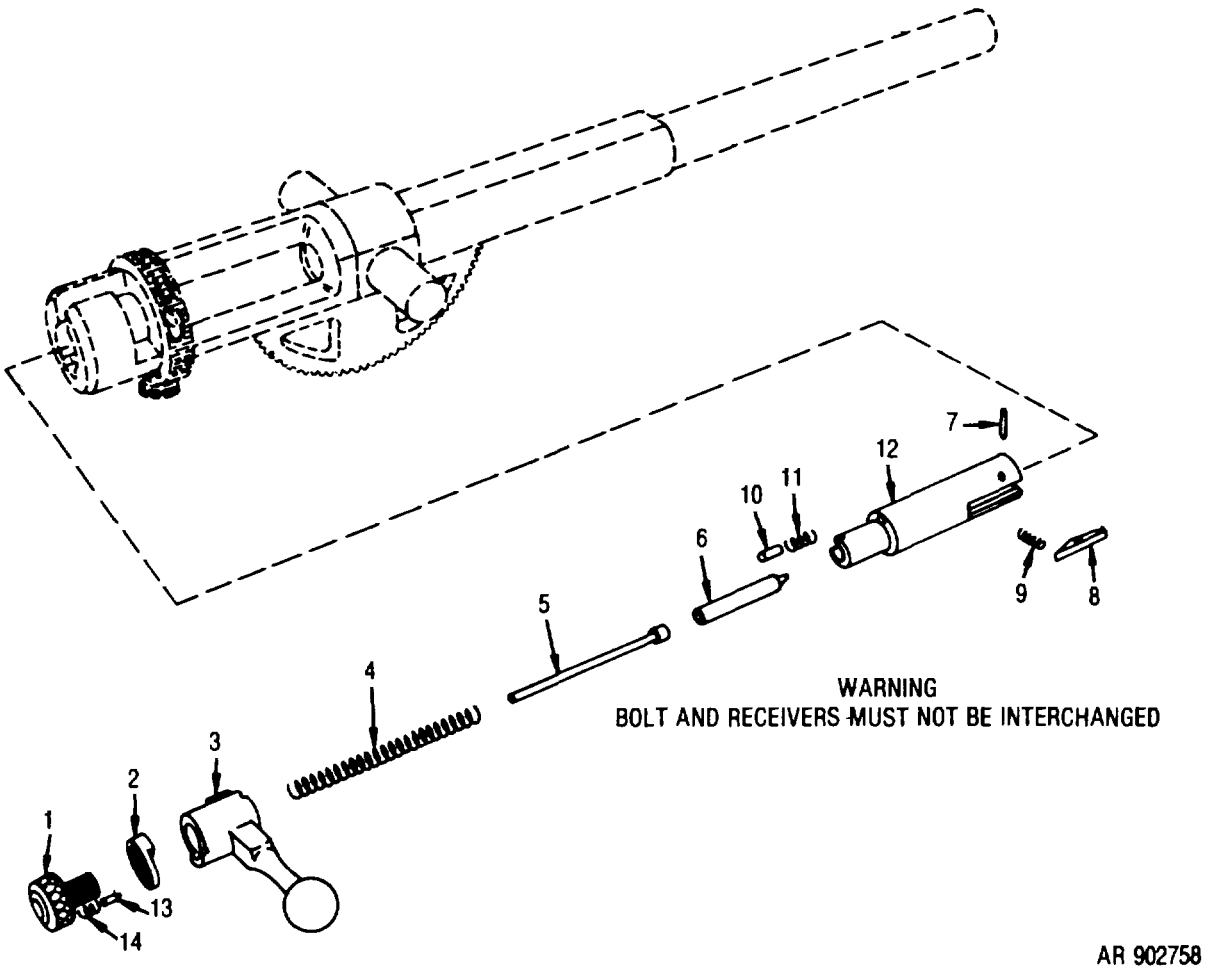
**6-13. Cleaning, Inspection, and Repair**.

a. **Cleaning**. Refer to paragraph 6-8.

b. **Inspection**. Refer to paragraphs 5-4 and 5-5.

c. **Repair**. Replace the bolt or operating handle if damaged. Check headspace (fig. 5-2) if bolt is replaced.

**6-14. Assembly**. Assemble the bolt assembly in accordance with figure 6-1.




Legend

1. Screw - 11578612
2. Spacer - 11578578
3. Lever - 11578601
4. Spring - 11578613
5. Guide - 11578610
6. Firing Pin - 11578606
7. Extractor Pin - 11578631
8. Extractor - 11578608
9. Extractor Spring
10. Plunger - 11578609
11. Plunger Spring
12. Breech Bolt - 11578600
13. Plunger - 11578611
14. Spring

*Figure 6-1. Disassembly/assembly of breech bolt assembly*

## Section III. MAINTENANCE OF THE MOUNT ASSEMBLY

**6-15. Disassembly**. Disassemble the mount assembly as shown in figures 6-2 through 6-9.

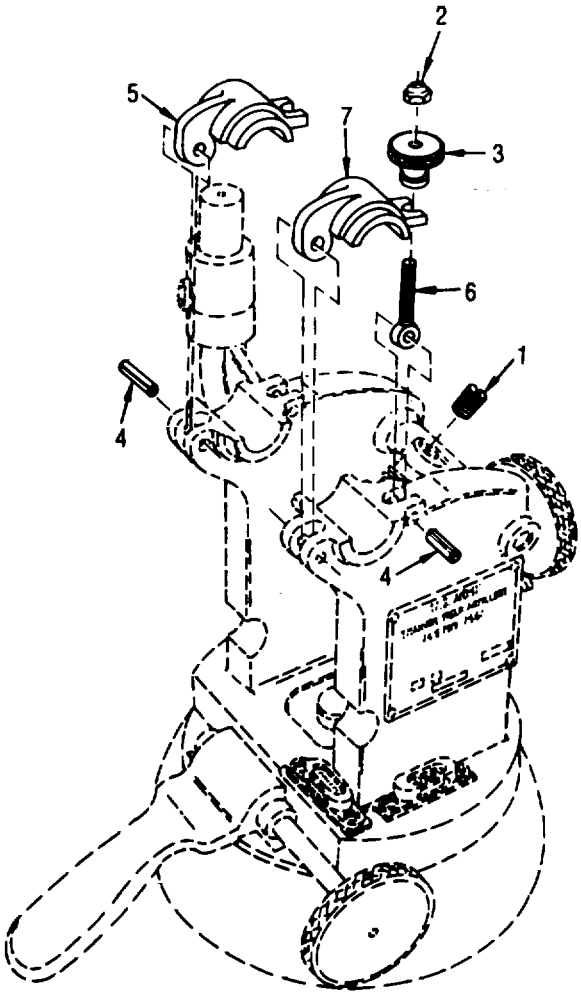
**6-16. Cleaning, Inspection, and Repair**.

a. *Cleaning*. Refer to paragraph 6-8.

b. *Inspection*. Refer to paragraphs 5-4 and 5-5.

c. *Repair*. Refer to paragraph 6-3.

**6-17. Assembly**. Assemble the mount assembly in accordance with figures 6-2 through 6-9.




FILE CONCAVE SURFACE OR REPLACEMENT TRUNNION CAPS UNTIL CANNON WILL ELEVATE AND DEPRESS WITHOUT BINDING.

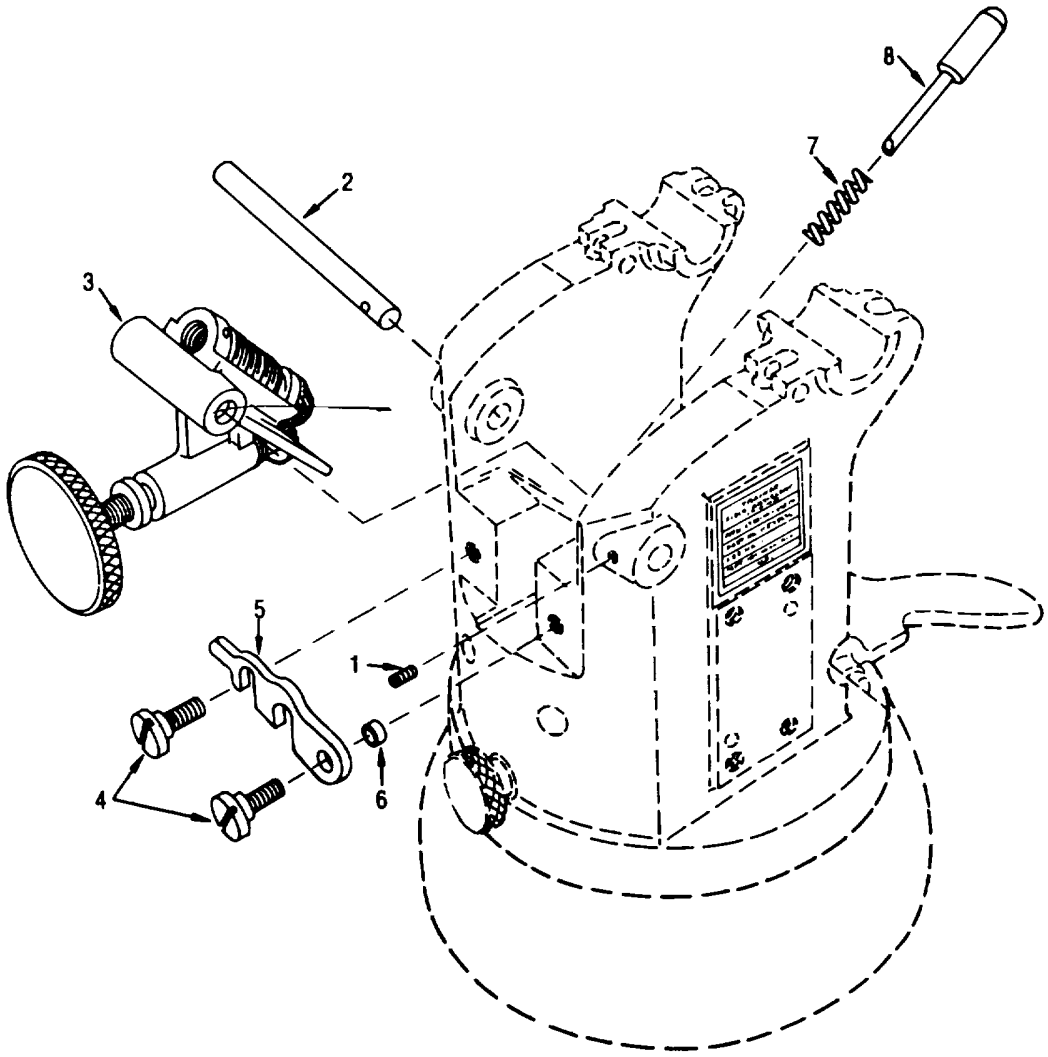
ADJUST SCREW (1) UNTIL ELEVATING GROUP OPERATES FREELY WITHOUT ENDPLAY BEFORE TIGHTENING SETSCREW.

AR 902747

Legend

1. Adjusting Screw - 11578657
2. Stopnut - 11578678
3. Lock Knob - 11578640
4. Spring Pin - 11578645
5. L.H. Trunnion Cap - 11578646
6. Lock Screw - 11578638
7. R.H. Trunnion Cap - 11578647

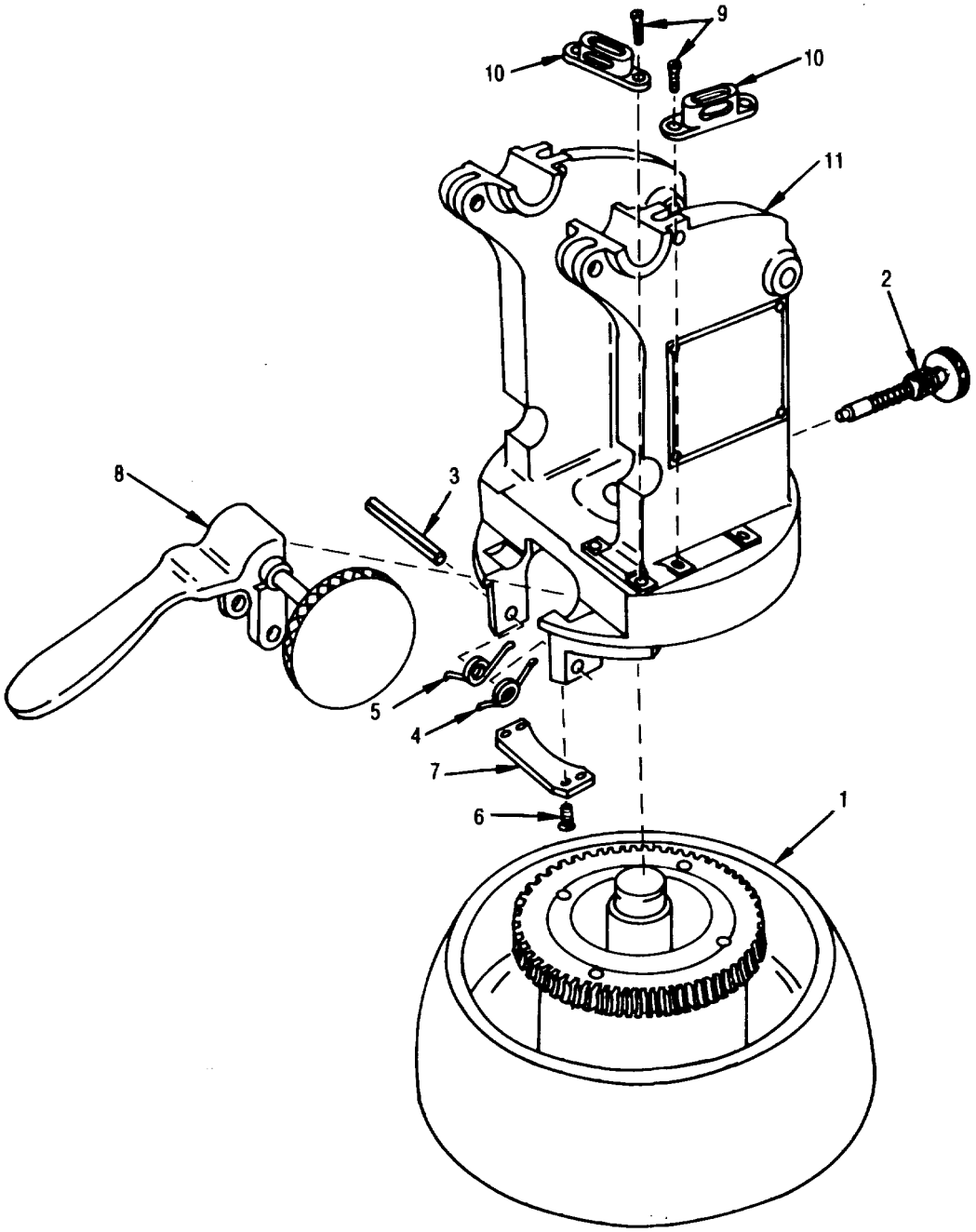
*Figure 6-2. Removal/ installation of LH. and R.H. trunnion caps*




Legend

1. Shaft Setscrew - 11578669
2. Bracket Shaft - 11578655
3. Bracket Assembly - 11578754
4. Locking Screw - 11578636
5. Locking Plate - 11578648
6. Locking Sleeve - 11578713
7. Spring
8. Bracket Plunger - 11578649

*Figure 6-3. Replacing elevation group*

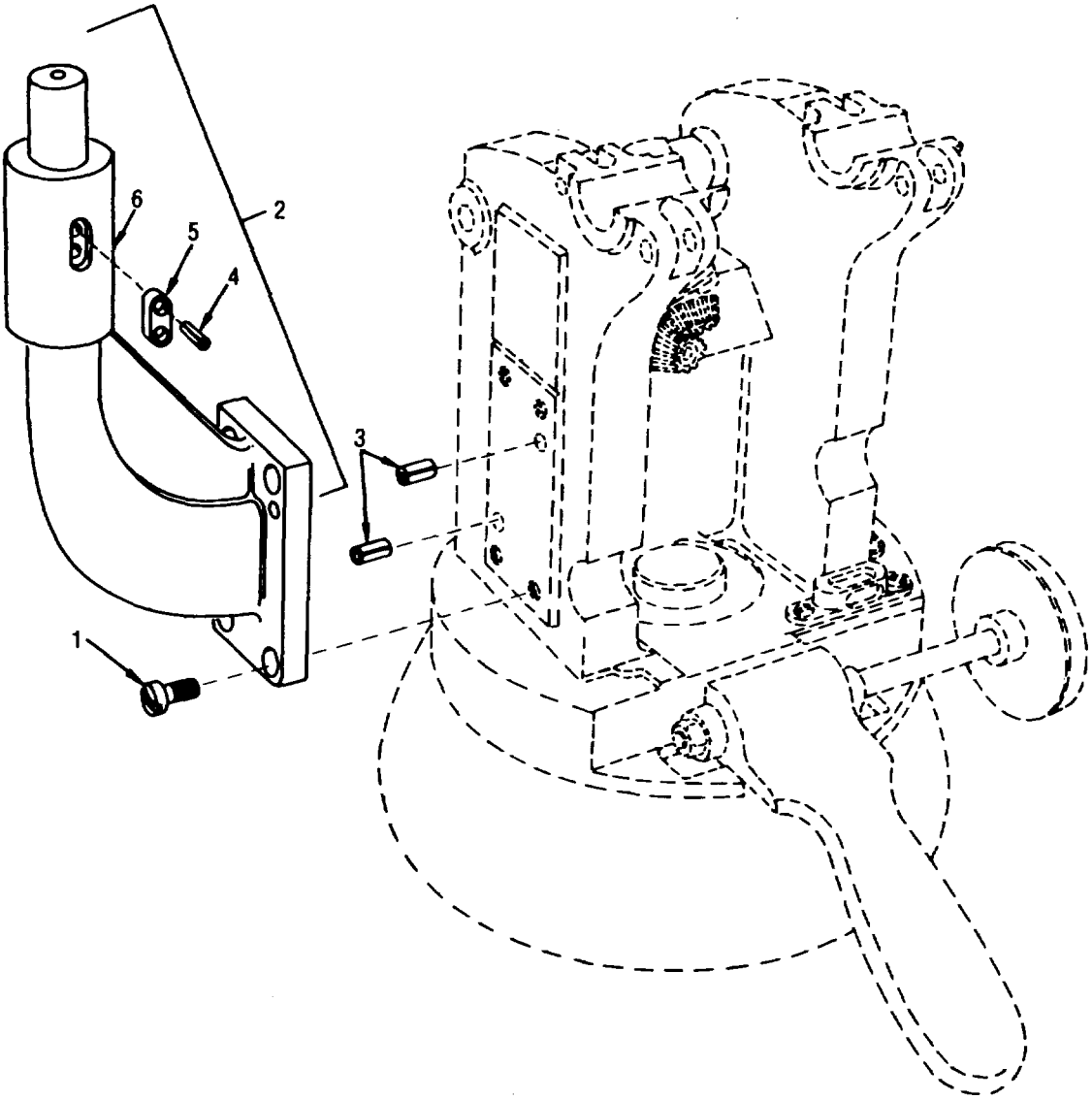



AR 902731

Legend

1. Fixed Base Assembly - 11578756
2. Locking Assembly - 11578757
3. Spring Pin - 11578615
4. Right Spring - 11578642
5. Left Spring - 11578641
6. Plate Screw - 11578662
7. Plate - 11578644
8. Lever Assembly - 11578755
9. Level Vial Screw - 11578679
10. Level Vial - 11578654
11. Upper Mount- 11578620

*Figure 6-4. Disassembly/assembly of mount group*



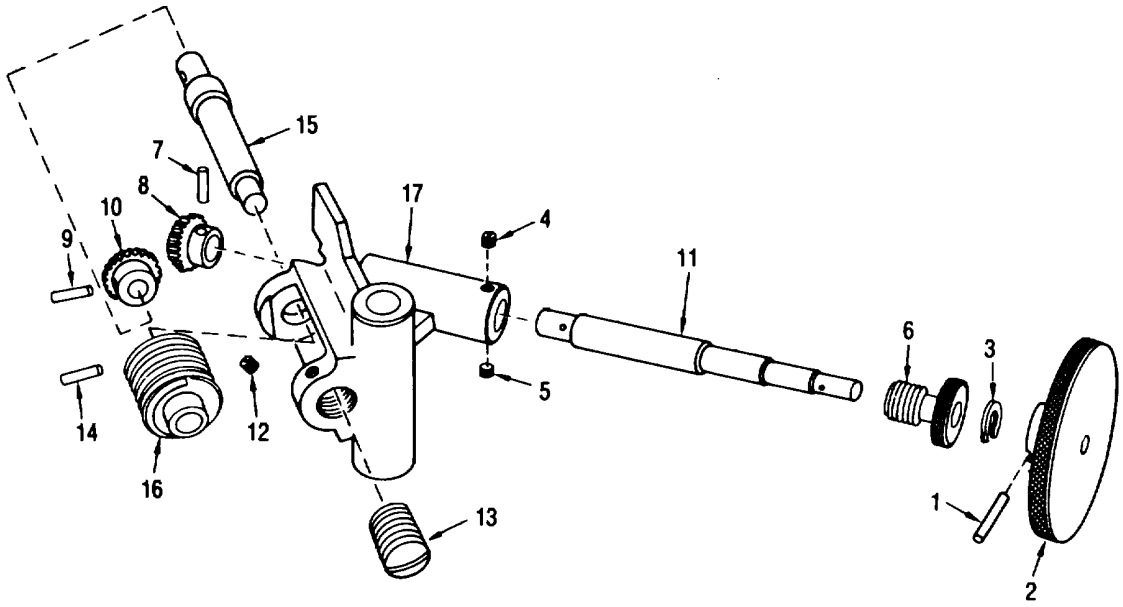

DRILL EXISTING HOLES TO 0.196 + 0.002 DIAMETER AND 0.63 + 0.02 DEEP TO ACCEPT SPRING PIN (3)
DRILL EXISTING HOLES TO 0.118 + 0.004 DIAMETER AND 0.41 + 0.01 DEEP TO ACCEPT SPRING PINS (4)

AR 902759

Legend

1. Telescope Bracket Screw - 11578746
2. Telescope Bracket Assembly - 11578714
3. Spring Pin - 11578747
4. Spring Pin - 11578715
5. Bracket Key - 11578716
6. Telescope Socket Bracket - 11578659

*Figure 6-5. Replacing telescope bracket assembly*

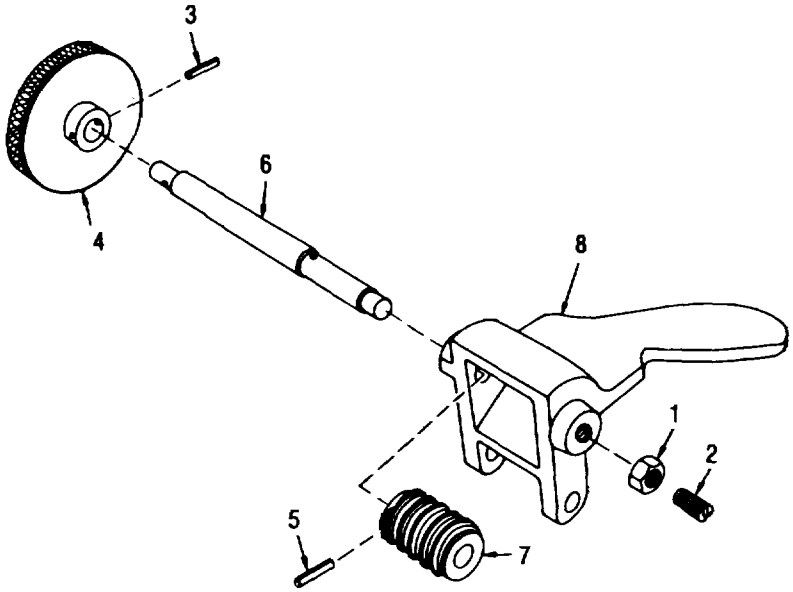



PRESS GEARS AND HANDWHEEL TIGHT AGAINST SHOULDER AND DRILL 0.078 + 0.004 HOLE TO ACCEPT SPRING PINS (1, 7, 9, AND 14)
ADJUST SCREW (13) FOR 0.002 MAXIMUM WORM GEAR END PLAY BEFORE TIGHTENING SETSCREW (12).
ADJUST BUSHING (6) FOR 0.002 MAXIMUM HANDWHEEL BACKLASH BEFORE TIGHTENING SETSCREW.

AR 902763

Legend
1. Spring Pin - 11578680
2. Handwheel - 11578651
3, Snap Ring - 11578673
4. Setscrew - 11578672
5. Setscrew - 11578672
6. Bushing - 11578658
7. Spring Pin - 11578680
8. Bevel Gear - 11578650
9. Spring Pin - 11578680
10. Bevel Gear - 11578650
11. Shaft - 11578652
12. Setscrew - 11578672
13. Adjusting Screw - 11578657
14. Spring Pin - 11578680
15. Shaft - 11578653
16. Worm Gear - 11578656
17. Elevating Worm Gear Bracket - 11578709

*Figure 6-6. Disassembly/assembly of elevating worm gear assembly*

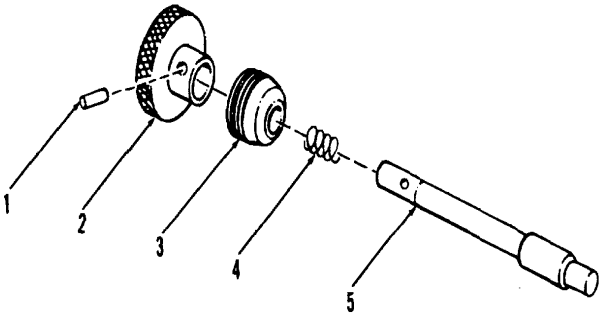



PRESS WORM GEAR AND HANDWHEEL TIGHT AGAINST SHOULDER AND DRILL 0.078 + 0.004 TO ACCEPT SPRING PINS (3 AND 5)
ADJUST SETSCREW (2) FOR 0.002 MAXIMUM WORM GEAR END PLAY AND THEN TIGHTEN NUT (1)

AR 902764

Legend
1. Shaft Nut - 11578664
2. Shaft Setscrew - 11578665
3. Spring Pin - 11578680
4. Traversing Handwheel - 11578651
5. Spring Pin - 11578680
6. Traversing Shaft - 11578639
7. Worm Gear- 11578635
8. Traverse Lever - 11578661

*Figure 6-7. Disassembly/assembly of rapid traverse lever assembly*

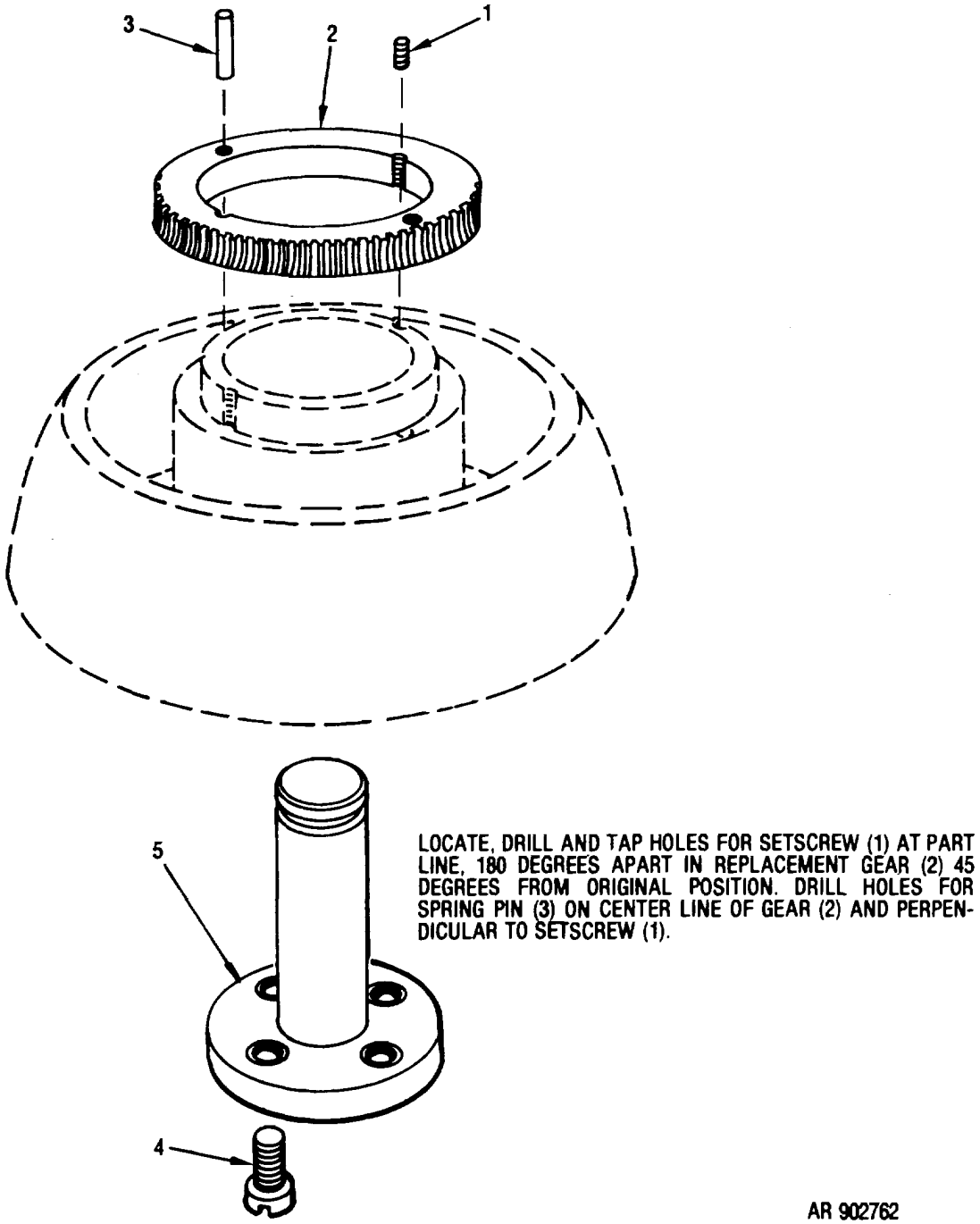



DRILL HOLE FOR SPRING PIN (1) IN REPLACEMENT KNOB (2) OR PLUNGER (5) AS FOLLOWS:
1. PLACE KNOB ON PLUNGER
2. CHECK THAT END OF PLUNGER IS FLUSH WITH OUTER SIDE OF KNOB WITHIN 0.01
3. DRILL 0.078 + 0.004 HOLE THROUGH KNOB AND PLUNGER

AR 902765

Legend
1. Spring Pin - 11578680
2. Locking Knob - 11578618
3. Locking Bushing - 11578637
4. Spring - 11578660
5. Locking Plunger - 11578619

*Figure 6-8. Disassembly/assembly of plunger locking assembly*




Legend

1. Setscrew - 11578667
2. Worm Wheel Gear - 11578643
3. Spring Pin - 11578668
4. Pintle Pin Screw - 11578666
5. Pintle Pin - 11578621

*Figure 6-9. Disassembly/assembly of fixed mount base assembly*

## Section IV. MAINTENANCE OF THE TRIPOD MOUNT ASSEMBLY

**6-18. Disassembly**. Disassemble the tripod mount assembly as shown in figures 6-10 through 6-13.

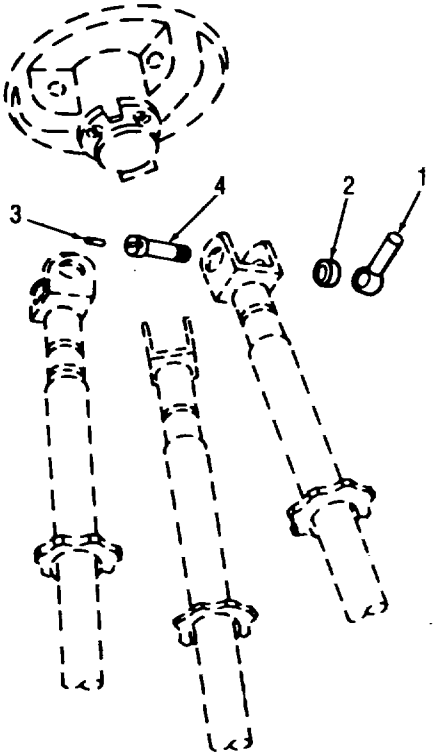
**6-19. Cleaning, Inspection, and Repair**.

a. *Cleaning*. Refer to paragraph 6-8.

b. *Inspection*. Refer to paragraphs 5-4 and 5-5.

c. *Repair*. Refer to paragraph 6-3.

**6-20. Assembly**. Assemble the tripod mount assembly as shown in figures 6-10 through 6-13.

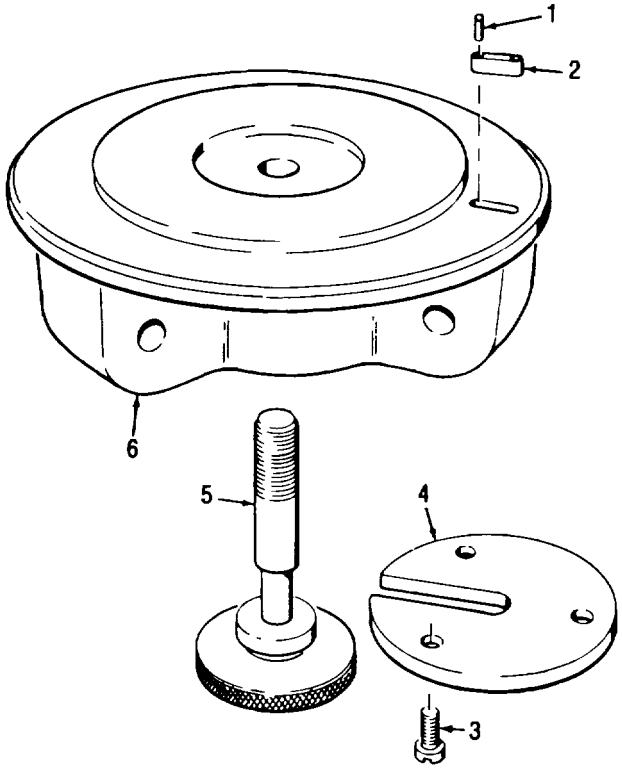



TIGHTEN REPLACEMENT SCREW (4) FINGER TIGHT WITH LEVER (1) IN THE 3 O'CLOCK POSITION, THEN DRILL AND TAP HOLE FOR SETSCREW (3).

AR 902766

Legend
1. Locking Lever - 11578691
2. Spacer- 11578681
3. Setscrew - 11578667
4. Locking Screw - 11578693

*Figure 6-10. Replacement of tripod locking lever group*

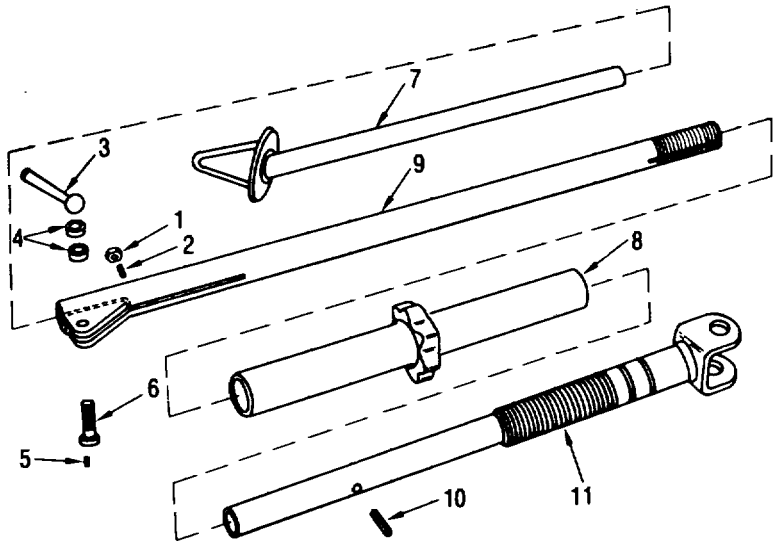



DRILL 0.118 + 0.004 DIAMETER HOLES FOR SPRING PINS (1) IN REPLACEMENT KEY (2). PINS MUST BE FLUSH WITH TOP OF KEY.

AR 902767

Legend
1. Spring Pin - 11578715
2. Key- 11578716
3. Retainer Screw - 11578717
4. Retainer - 11578683
5. Locking Screw - 11578682
6. Tripod Base - 11578689

*Figure 6-11. Disassembly/assembly of tripod base assembly*



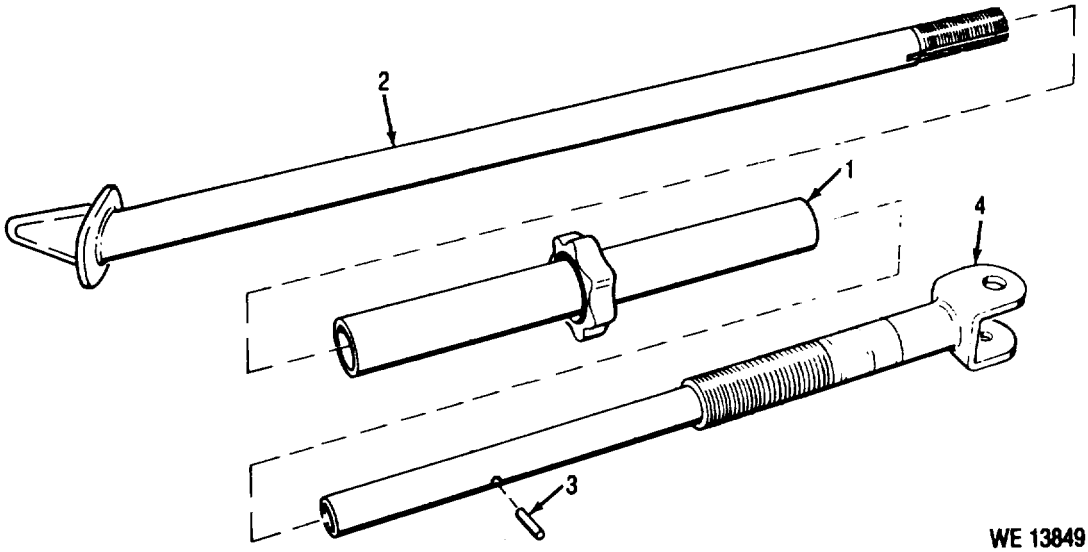

DRILL AND TAP HOLE FOR SETSCREW (5) IN SCREW (6) AT ASSEMBLY.

AR 902768

Legend

1. Guide Screw Nut - 11578712
2. Guide Screw - 11578711
3. Locking Lever - 11578691
4. Lever Spacer- 11578681
5. Setscrew - 11578667
6. Bolt - 11578694
7. Rear Leg - 11578684
8. Adjusting Sleeve - 11578692
9. Lower Rear Leg - 11578690
10. Pin- 11578710
11. Upper Leg - 11578688

*Figure 6-12. Disassembly/assembly of tripod rear leg assembly*




Legend

1. Adjusting Sleeve - 11578692
2. Lower Front Leg - 11578685
3. Pin - 11578710
4. Upper Leg - 11578688

*Figure 6-13. Disassembly/assembly of tripod front leg group*

## Section V. MAINTENANCE OF THE TELESCOPE SOCKET, HOLDER, AND SUPPORT ASSEMBLIES

**6-21. Disassembly**. Disassemble telescope socket, holder, and support assemblies in accordance with figures 6-14 through 6-16.

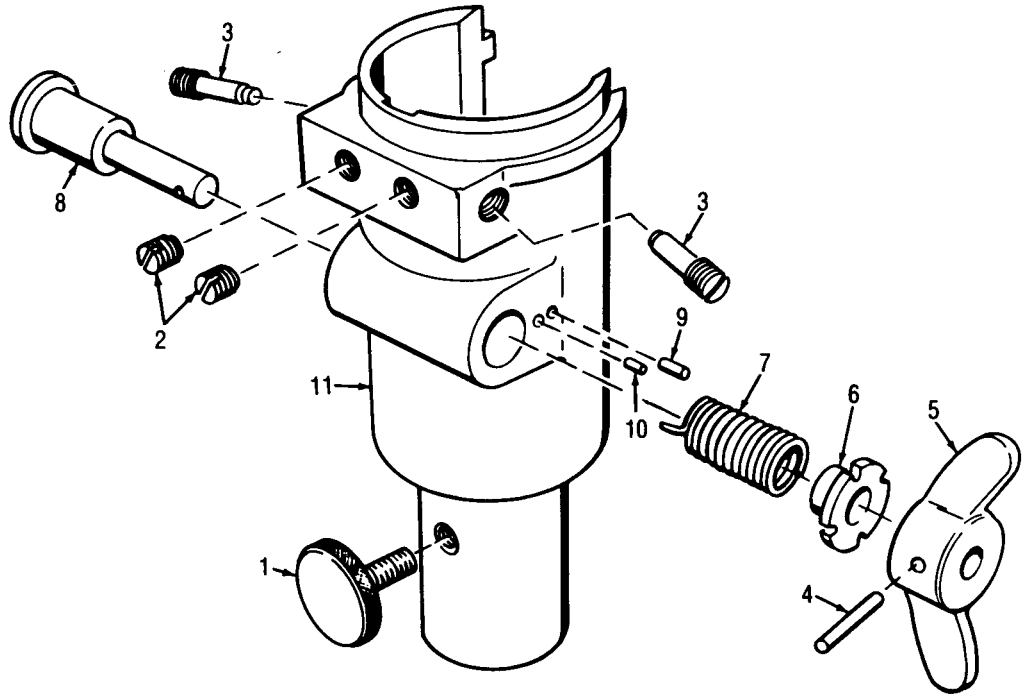
**6-22. Cleaning, Inspection, and Repair**.

a. *Cleaning*. Refer to paragraph 6-8.

b. *Inspection*. Refer to paragraphs 5-4 and 5-5.

c. *Repair*. Refer to paragraph 6-3.

**6-23. Assembly**. Assemble telescope socket, holder, and support assemblies in accordance with figures 6-14 through 6-16.

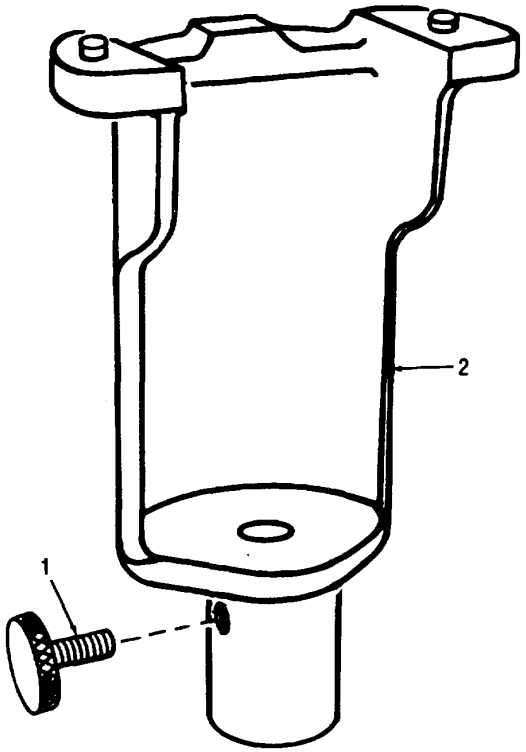



ASSEMBLE SPRING (7) AND RETAINER (6) FOR A MINIMUM OF 2 IN-LB TORQUE WITH THE WINGS OF HANDLE (5) TURNED 45 DEGREES FROM VERTICAL

Legend

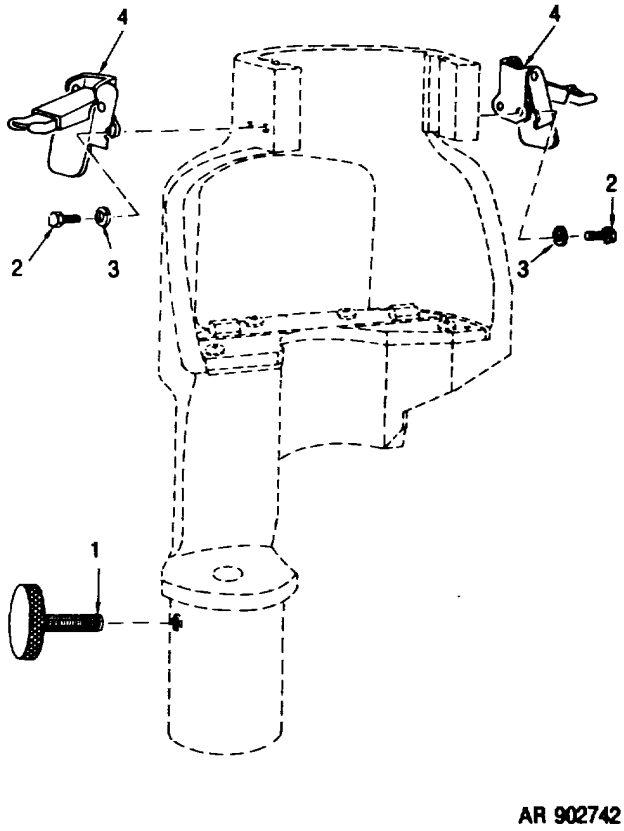
1. Locking Screw - 11578705
2. Setscrew- 11578704
3. Tangent Screw - 11578698
4. Spring Pin - 11578708
5. Lock Handle - 11578702
6. Spring Retainer - 11578701
7. Lock Spring - 11578703
8. Telescope Lock - 11578697
9. Spring Pin - 11578706
10. Spring Pin - 11578707
11. Telescope Socket - 11578699

*Figure 6-14. Disassembly/assembly of telescope socket assembly*




Legend
1. Screw - 11727518
2. Holder- 11727519

*Figure 6-15. Disassembly/assembly of telescope holder assembly*




Legend
1. Screw- 11727518
2. Screw
3. Washer
4. Catch- 10531763

*Figure 6-16. Disassembly/assembly of telescope support assembly - exploded view*

## Section VI. FINAL INSPECTION

**6-24. General**. Final inspection is performed after repair has been completed to insure that materiel is acceptable for return to user or for return to replacement stock according to the standards established.

**6-25. Final Inspection**. Refer to table 6-1 for final inspections.

*Table 6-1. Final Inspection*

| Component or assembly | Point or item of inspection | Method of inspection | Acceptable condition |
|---|---|---|---|
| Barrel assembly | Overall | Visual | All parts must be present and secure. |
| | Breech bolt, safety, trigger, and bolt lock plunger | Manual | Test for proper functioning. |
| Mount assembly | Overall | Visual | Inspect for appearance. All painted surfaces must be covered; all parts must be present and securely fastened; and identification plate must be secure and legible. |
| | Elevating group | Manual | Elevate and depress trainer several times Operation must be smooth and free. |
| | Traversing group | Manual | Traverse trainer several times Operation must be smooth and free. |
| | Mount locking plunger | Manual | Must lock upper (rotating) mount to fixed base mount. |
| | Rapid traverse lever | Manual | Must release worm gear from worm wheel gear for rapid traverse. |
| Tripod mount assembly | Overall | Visual | Inspect for appearance. All painted surfaces must be covered, and all parts must be present and securely fastened. |
| | Trunnion caps | Manual | Must hold barrel assembly securely on mount assembly. |
| | Mount locking screw | Manual | Must hold mount assembly securely on tripod base. |
| | Leg locking levers | Manual | Must hold tripod legs securely in position. |
| Telescope socket, holder, and support assemblies | Overall | Visual | Inspect for appearance. All painted surfaces must be covered, and all parts must be present and securely fastened. |
| | Telescope lock | Manual | Must secure telescope. |
| Adapter assembly | Caps | Manual | Must hold barrel assembly securely in adapter. |
| | Jib | Manual | Must hold adapter securely in major caliber gun. |
| | Locking bar | Manual | Must hold adapter securely in major caliber gun. |
| | Locking nut | Manual | Must hold adapter securely in major caliber gun. |
| | Adjusting screws | Manual | Must adjust, and hold subcaliber gun in boresighted position. |

# CHAPTER 7
# AMMUNITION

**7-1. General**. The 14.5-mm trainer ammunition is classified as 'fixed' ammunition and is ready for firing as it comes from the packing box. The cartridge size and manufacturer's identification are stamped on the base of the cartridge case. Subparagraph 1-4f shows an example of cartridge markings. Projectiles with two types of fuze action are available for use with the trainer:

(1) A point-detonating (PD) fuze (M183) which functions on impact.

(2) A 3-second delay fuze (M181) and a 6-second delay fuze (M182) which present airbursts when fired at a time of flight in excess of 3 seconds and 6 seconds respectively from the time of firing. The latter two fuzes are not "delay" as we think of them. They are factory set time fuzes which do not have a point-detonating element. A cross section of the 14.5-mm projectile is shown in subparagraph 1-4f. The projectile is coated with cosmoline under the cartridge case.

**7-2. Ammunition Type**. Ammunition for the 14.5-mm field artillery trainer M31 is classified as "fixed" ammunition type. A cartridge (complete round of ammunition) consists of all the ammunition components necessary to fire the trainer once; this includes a loaded projectile, a propelling charge, a primer, and a fuze. A cross section of a cartridge is shown in subparagraph 1-4f.

**7-3. Cartridges**. There are three kinds of cartridges available for use with the trainer, as indicated below.

a. Cartridge M183 (subparagraph 1-4f) has a point detonation (PD) fuze that produces smoke with a slight detonation upon impact. The smoke cloud produced is visible with the naked eye at a distance up to 3,280 feet (1000 m) by day, and is visible by a flash at night.

b. Cartridge M181 has a fuze which has a three second delay detonation action. The other characteristics are the same as M183 above.

c. Cartridge M 182 has a fuze which has a six second delay detonation action. The other characteristics are the same as M183 above.

**7-4. Ballistic Data**. This ammunition is capable of functioning with all the ballistic properties of an artillery combat projectile. Propelling charge is 0.22g (3.5 gr), producing 328 f/s (100 m/s) initial velocity. Maximum effective range is 798.3 yds (730 m).

**7-5. Markings**. Fuze designation, charge designation, and manufacturer's lot number are inscribed on the side of the cartridge case with a black indelible ink (subparagraph 1-4f).

**7-6. Packaging**. Ten cartridges are packed in a cardboard box. Each box is marked with quantity of cartridges, charge designation, fuze designation, model number, and lot number.

**7-7. Preparation for Firing.**

a. The cartridges are ready for firing as they come from the cardboard box.

b. Some of the cosmoline may appear on the projectile forward of the cartridge case. Unless the exposed cosmoline collects dust or dirt, it should not be removed. The cartridge should be free of all foreign matter before loading. In order to keep the ammunition clean, the round should not be removed from the cardboard box until immediately before firing.

c. The ammunition should be protected from the sun, rain, dust, or other damaging elements in order to maintain standard performance. Due to the low muzzle velocity (100 meters per second) a small increase or decrease from standard will result in several decimeters in range dispersion.

**7-8**. **Dud Policing and Disposal**. After firing on other than a permanent range, police the surface area to locate dud projectiles. Dud projectiles will be conspicuously marked for later identification. Flags, engineer tape, etc., may be used. Personnel will not attempt to pick up duds with their hands or disturb the duds during policing. The retrieving of duds to permit disposal by burning or demolition is authorized only when the equipment used to retrieve the dud provides adequate protection to

retrieving personnel. If M181 and M182 projectiles have been fired, the retrieving equipment must protect personnel against fragmentating in case fuze functioning occurs during retrieval. Long handle tongs (24-inch) may be used only to retrieve dud projectiles from the M183 cartridge. When picking up a dud with the tongs, position the projectile in the tongs so that the plastic cap is away from the body. Dud projectiles will be carried at the side of the body, parallel to the ground and with the fuze end forward. Dud projectiles will be disposed of by blowing the projectile in place utilizing standard demolition methods or by collecting the duds and burning in an open pit. When using the open pit burning method, sufficient combustible material should be used to assure complete burning.

## CHAPTER 8
## SHIPMENT AND LIMITED STORAGE

**8-1. Shipping**.

a. *Responsibility*. When shipping the trainer or subcaliber device, the officer in charge of preparing the shipment will be responsible for furnishing the materiel in a serviceable condition and properly processed for shipment, including the preparation of Army shipping documents.

b. *Army Shipping Documents*. Prepare all Army shipping documents in accordance with AR 725-50.

c. *Preparation for Shipment*. Materiel removed from storage for shipment need not be reprocessed unless inspection reveals it is inadequately preserved.

**8-2. Cleaning and Drying**.

a. *Cleaning*. Remove dirt and other foreign matter from surfaces of the trainer or subcaliber device with clean, lint-free, dry cloths.

b. *Drying*. Components must be thoroughly dried before preservation and packaging.

**8-3. Preservation and Packaging**. Specific preservation and packaging instructions are not available for the trainer or subcaliber device at this time. However, procedures similar to those outlined for machine guns in TB ORD 623 arid TM 38-230 will be followed for the trainer.

**8-4. Marking**. Marking will be in accordance with TM 38-230.

# APPENDIX A
# REFERENCES

**A-1. Table of Allowances** The following Department of the Army table of allowances pertains to this materiel:

Ammunition, Rockets, and Missiles for Training ..... TA 23-100

**A-2. Technical Manuals** The following Department of the Army technical manuals pertain to this materiel:

Ammunition and explosives standards ..... TM 9-1300-206
Ammunition maintenance ..... TM 9-1300-250
Materiels Used for Cleaning, Preserving, Abrading and Cementing Ordnance
Materiel; and Related Materiels Including Chemicals ..... TM 9-247
Operation and Maintenance of Ordnance Materiel in Cold Weather (0° to -65°F) ..... TM 9-207
Operator's Manual: Welding Theory and Application ..... TM 9-237
Painting Instructions for Field Use ..... TM 43-0139
Preservation, Packaging, and Packing of Military Supplies and Equipment,
Preservation and Packaging (volume 1) ..... TM 38-230-1
The Army Maintenance Management System (TAMMS) ..... DA PAM 738-750

# APPENDIX B
# MAINTENANCE ALLOCATION CHART

## Section I. INTRODUCTION

**B-1. General**.

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

b. The Maintenance Allocation Chart (MAC) in section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

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

d. Section IV contains supplemental instructions on explanatory notes for a particular maintenance function.

**B-2. Maintenance Functions**.

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

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

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

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

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

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

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

h. *Replace*. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. *Repair*. The application of maintenance services[1] or other maintenance actions[2] to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

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

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

[1]Services - inspect, test, service, adjust, align, calibrate, or replace.
[2]Action - welding, grinding, riveting, straightening, facing, remachining, or resurfacing.

**B-3. Column Entries Used in the MAC**.

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

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

c. *Column 3, Maintenance Functions*. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see para. B-2)

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

C ..... Operator or crew.
O ..... Organization maintenance.
F ..... Direct support maintenance.
H ..... General support maintenance.
D ..... Depot maintenance.

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

f. Column 6, Remarks. This column shall contain a letter code in alphabetic order which shall be keyed to the remarks contained in Section IV.

**B-4. Column Entries Used in Tool and Test Equipment Requirements**.

a. *Column 1, Tool or Test Equipment Reference Code*. The tool and test equipment reference code correlates with a maintenance function on the identified end item or component.

b. *Column 2, Maintenance Level*. The lowest level of maintenance authorized to use the tool or test equipment.

c. *Column 3, Nomenclature*. Name or identification of the tool or test equipment.

d. *Column 4, National/NATO* Stock Number. The National or NATO stock number of the tool or test equipment.

e. *Column 5, Tool Number*. The manufacturer's part number.

**B-5. Explanation of Columns in Section IV**.

a. Reference Code. The code scheme recorded in column 6, section II.

b. Remarks. This column lists information pertinent to the maintenance function being performed as indicated on the MAC, section II.

## Section II. MAINTENANCE ALLOCATION CHART

| (1) Group number | (2) Component/Assembly | (3) Maint. function | (4) Maint. level C | O | F | H | D | (5) Tools and equipment | (6) Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 01. | BARREL ASSEMBLY | | | | | | | | |
| | | Inspect | 0.1 | | | | | | |
| | | Service | 0.2 | | | | | | |
| | | Install | 0.1 | | | | | | |
| | | Repair | | | 1.5 | | | | |
| | | Overhaul | | | | | 2.0 | | |
| 01.01 | Barrel Trunnion and Receiver Assembly | Inspect | | 0.2 | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | | | 0.5 | | |
| | | Repair | | | | | 1.0 | | |
| | | Overhaul | | | | | 1.5 | | |
| 01.02 | Breech Bolt Group | Inspect | 0.1 | | | | | 1 | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | 0.1 | | | | |
| | | Repair | | 0.3 | | | | | |
| | | Overhaul | | | | | 0.8 | | |
| 01.03 | Artillery Trainer Safety | Inspect | 0.1 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | 0.2 | | | | |
| | | Repair | | | 0.5 | | | | |
| | | Overhaul | | | | | 1.0 | | |
| 01.04 | Trainer Trigger | Inspect | 0.1 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | 0.2 | | | | | |
| | | Repair | | | 0.3 | | | | |
| | | Overhaul | | | | | 0.8 | | |
| 02. | MOUNT ASSEMBLY | Inspect | 0.1 | | | | | | |
| | | Service | 0.2 | | | | | | |
| | | Install | 0.1 | | | | | | |
| | | Repair | | | 2.1 | | | | |
| | | Overhaul | | | | | 2.6 | | |
| 02.01 | Elevating Mechanism Group | Inspect | | 0.1 | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Adjust | | 0.1 | | | | | |
| | | Replace | | | 0.2 | | | | |
| | | Repair | | | 1.0 | | | | |
| | | Overhaul | | | | | 1.5 | | |
| 02.02 | Traversing Mechanism Group | Inspect | | 0.1 | | | | | |
| | | Service | | 0.1 | | | | | |
| | | Adjust | | 0.1 | | | | | |
| | | Replace | | | 0.2 | | | | |
| | | Repair | | | 1.0 | | | | |
| | | Overhaul | | | | | 1.5 | | |
| 02.03 | Rapid Traversing Group | Inspect | | 0.1 | | | | | |
| | | Service | | 0.1 | | | | | |
| | | Replace | | | 0.3 | | | | |
| | | Repair | | | 0.5 | | | | |
| | | Overhaul | | | | | 1.0 | | |

## Section II. MAINTENANCE ALLOCATION CHART - Continued

| (1) Group number | (2) Component/Assembly | (3) Maint. function | (4) Maint. level C | O | F | H | D | (5) Tool/ equipment | (6) Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 02.04 | Trunnion Caps | Inspect | 0.1 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | 1.0 | | | | |
| | | Repair | | | 1.0 | | | | |
| | | Overhaul | | | | | 1.5 | | |
| 02.05 | Base Group | Inspect | 0.2 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | 0.5 | | | | |
| | | Repair | | | 2.0 | | | | |
| | | Overhaul | | | | | 2.5 | | |
| 02.06 | Elevating Bracket Plunger Group | Inspect | 0.1 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | 0.3 | | | | |
| | | Repair | | | 1.5 | | | | |
| | | Overhaul | | | | | 2.0 | | |
| 02.07 | Mount Locking Plunger Group | Inspect | 0.1 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | 0.3 | | | | |
| | | Repair | | | 1.5 | | | | |
| | | Overhaul | | | | | 2.0 | | |
| 02.08 | Artillery Trainer Level Vials | Inspect | 0.1 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | 0.2 | | | | |
| | | Repair | | | 1.0 | | | | |
| | | Overhaul | | | | | 1.5 | | |
| 02.09 | Telescope Socket Bracket Group | Inspect | 0.1 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | 1.0 | | | | |
| | | Repair | | | 1.0 | | | | |
| | | Overhaul | | | | | 1.5 | | |
| 03. | TRIPOD MOUNT ASSEMBLY | | | | | | | | |
| | | Inspect | 0.2 | | | | | | |
| | | Service | 0.2 | | | | | | |
| | | Install | 0.1 | | | | | | |
| | | Repair | | | 3.0 | | | | |
| | | Overhaul | | | | | 3.5 | | |
| 03.01 | Tripod Base Group | Inspect | 0.1 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Replace | | | 1.0 | | | | |
| | | Repair | | | 1.5 | | | | |
| | | Overhaul | | | | | 2.0 | | |
| 03.02 | Leg Assemblies | Inspect | 0.1 | | | | | | |
| | | Service | 0.2 | | | | | | |
| | | Replace | | | 0.5 | | | | |
| | | Repair | | | 1.5 | | | | |
| | | Overhaul | | | | | 2.0 | | |

## Section II. MAINTENANCE ALLOCATION CHART - Continued

| (1) Group number | (2) Component/Assembly | (3) Maint. function | (4) Maint. level C | O | F | H | D | (5) Tools and equipment | (6) Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 04 | TELESCOPE SUPPORT ASSEMBLIES | | | | | | | | |
| | | Inspect | 0.1 | | | | | | |
| | | Service | 0.2 | | | | | | |
| | | Install | 0.2 | | | | | | |
| | | Replace | | | 0.2 | | | | |
| | | Repair | | | 0.5 | | | | |
| | | Overhaul | | | | | 1.0 | | |
| 05. | ADAPTER ASSEMBLIES | | | | | | | | |
| | | Inspect | 0.1 | | | | | | |
| | | Service | 0.2 | | | | | | |
| | | Install | 0.3 | | | | | | |
| | | Replace | | | 0.2 | | | | |
| | | Repair | | 0.3 | | | | | |
| | | Overhaul | | | | | 0.8 | | |
| 06. | LANYARD HOLDER ASSEMBLIES | | | | | | | | |
| | | Inspect | 0.1 | | | | | | |
| | | Service | 0.1 | | | | | | |
| | | Install | 0.2 | | | | | | |
| | | Replace | | | 0.2 | | | | |
| | | Repair | | 0.5 | | | | | |
| | | Overhaul | | | | | 1.0 | | |

## Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

| REF. CODE | MAINT. LEVEL | NOMENCLATURE | NATIONAL/NATO STOCK NUMBER | TOOL* NUMBER |
|---|---|---|---|---|
| 1 | F | Gage, Field Headspace<br>**Note**<br>**No special test equipment is required for basic weapon. AU other necessary tools are contained in Tool Kit, Small Arms Repairman (SC 4933-95-CL-A07), NSN 493340-357-7770, LIN Item W510910.** | 692010-025-4596 | 11578863 |

## Section IV. REMARKS

| Reference Code | Remarks |
|---|---|
| | None applicable |

# APPENDIX C
# BASIC ISSUE ITEMS LIST AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST AND ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST

## Section I. - INTRODUCTION

C-1. **Scope.** This manual lists basic issue items; items troop installed or authorized; repair parts; special tools; test, measurement, and diagnostic equipment (TMDE); and other support equipment required for operation and performance of organizational and direct support maintenance of the 14.5-mm trainer M31.

C-2. **General.** This Basic Issue Items, Items Troop Installed or Authorized, Repair Parts and Special Tools List is divided into into the following sections:

a. *Section II. Basic Issue Items List.* A list of items which are furnished with and which must be turned in with the end item.

b. *Section III. Items Troop Installed or Authorized List.* A list of items which, at the discretion of the unit commander, may accompany the end item, but should not be turned in with the end item.

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

d. *Section V. Special Tools List.* A list of special tools, TMDE, and support equipment authorized for the performance of maintenance at the organizational level.

e. *Section VI. National Stock Number and Part Number Index.* A list, in ascending numerical sequence, of all National stock numbers appearing in the listings, followed by a list, in alphameric sequence, of all part numbers appearing in the listing. National stock number and part numbers are cross-referenced to each illustration figure and item number appearance. This index is followed by a cross-reference list of reference designations to figure and item numbers when applicable.

C-3. **Explanation of Columns.**. The following provides an explanation of columns found in the tabular listings:

*a. Illustration.* This column is divided as follows:

(1) *Figure Number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item Number.* The number used to identify each item called out in the illustration.

b. *Source, Maintenance, and Recoverability Codes (SMR).*

(1) *Source Code.* Source codes are assigned to support items to indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

| Code | Definition |
|---|---|
| PA | -Item procured and stocked for anticipated or known usage. |
| PB | - Item procured and stocked for insurance purpose because essentiality dictates that a minimum quantity be available in the supply systems. |

PC - Item procured and stocked and which otherwise would be coded PA except that it is deteriorative in nature.

PD - Support item, excluding support equipment, procured for initial issue or outfitting and stocked only for subsequent or additional initial issues or outfittings. Not subject to automatic replenishment.

PE - Support equipment procured and stocked for initial issue or outfitting to specified maintenance repair activities.

PF - Support equipment which will not be stocked but which will be centrally procured on demand.

PG - Item procured and stocked to provide for sustained support for the life of the equipment. It is applied to an item peculiar to the equipment which, because of probable discontinuance or shutdown of production facilities, would prove uneconomical to reproduce at a later time.

KF - An item of a maintenance kit and not purchased separately. Maintenance kit defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.

KB - Item included in both a depot overhaul/ repair kit and a maintenance kit.

MO - Item to be manufactured or fabricated at organizational level.

MF - Item to be manufactured or fabricated at the direct support maintenance level.

MH - Item to be manufactured or fabricated at the general support maintenance level.

MD - Item to be manufactured or fabricated at the depot maintenance level.

AO - Item to be assembled at organizational level.

AF - Item to be assembled at direct support maintenance level.

AD - Item to be assembled at depot maintenance level.

XA - Item is not procured or stocked because the requirements for the item will result in the replacement it of the next higher assembly.

XB - Item is not procured or stocked. If not available through salvage, requisition.

XD - A support item that is not stocked. When required, item will be procured through normal supply channels.

**NOTE**

**Cannibalization or salvage may be used as a source of supply for any items source coded above except those coded XA, XD, and aircraft support items as restricted by AR 700-42.**

(2) *Maintenance Code.* Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

Code — Application/Explanation

C - Crew or operator maintenance performed within organizational maintenance.

O - Support item is removed, replaced, used at the organizational level.

I - Support item is removed, replaced, used by the direct support element of integrated direct support maintenance.

F - Support item is removed, replaced, used at the direct support level.

**NOTE**

**Codes "I" and ”F” will be considered the same by direct support units.**

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes:

| Code | Application Explanation |
|---|---|
| O | - The lowest maintenance level capable of complete repair of the support item is the organizational level. |
| F | - The lowest maintenance level capable of complete repair of the support item is the direct support level. |
| L | - Repair restricted to designated specialized repair activity. |
| Z | - Nonreparable. No repair is authorized. |
| B | - No repair is authorized. The item may be reconditioned by adjusting, lubricating, etc., at the user level. No parts or special tools are procured for the maintenance of this item. |

(3) *Recoverability Code.* Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items.

The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows:

| *Recoverability* Code | Definition |
|---|---|
| Z | - Nonreparable item. When unserviceable, condemn and dispose at the level indicated in position 3. |
| O | - Reparable item. When uneconomically reparable, condemn and dispose at organizational level. |
| F | - Reparable item. When uneconomically reparable, condemn and dispose at the direct support level. |
| H | - Reparable item. When uneconomically reparable, condemn and dispose at the general support level. |
| D | - Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level. |
| L | - Reparable item. Repair, condemnation, and disposal not authorized below depot/specialized repair activity level. |
| A | - Item requires special handling or condemnation procedures because of specific reasons (i.e, precious metal content, high dollar value, critical material or hazardous material). Refer to appropriate manuals/directives for specific instructions. |

c. *National Stock Number.* Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

d. *Part Number.* 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. For BIIL and ITIAL, see explanation of description column, par. f.

**NOTE**

**When a stock numbered item is requisitioned, the repair part received may have a different part number than the part being replaced.**

e. *Federal Supply Code for Manufacturer (FSCM).* The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc. For BIIL and ITIAL, see explanation of description column, par. f.

f. *Description.* Indicates the Federal item name and, if required, a minimum description to identify the item. The last line for each item in the BIIL and ITIAL indicates the part number with the FSCM in parentheses.

g. *Unit of Measure (U/M).* Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g. ea, in, pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

h. *Quantity Furnished with Equipment (Basic Issue Items Only).* Indicates the quantity of the basic issue item furnished with the equipment.

i. *Quantity, Authorized (Items Troop Installed or Authorized Only).* Indicates the quantity of the item authorized to be used with the equipment.

j. *Quantity Incorporated in Unit.* Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable, (e.g., shims, spacers, etc).

C-4. **Special Information**.

a. Usable on codes are shown in description U column. Uncoded items are applicable to all kits. Identification of the usable on codes in this publication are:

| Code | Used On |
|---|---|
| PLA | KIT, ARTILLERY TRAINER: 11578585, 11578586, 11578589, and 11579628 |
| PLB | KIT, ARTILLERY TRAINER: 11578587,11578590, and 11579627 |
| PLC | KIT, ARTILLERY TRAINER: 11578584, 11578586, and 11578593 |
| PLD | KIT, ARTILLERY TRAINER: 11578584, 11578585, 11578586, 11578587, 11578588, 11578589, 11578590, and 11578593 |
| PLE | KIT, ARTILLERY TRAINER: 11578585 and 11578589 |
| PLF | KIT, ARTILLERY TRAINER: 11578585, 11578586, 11578587, 11578589, 11578590, and 11578593 |
| PLG | KIT, ARTILLERY TRAINER: 11578584, 11578585, 11578587,11578588, 11578589, and 11578590 |
| PLH | KIT, ARTILLERY TRAINER: 11578584, 11578585, 11578586, 11578587, 11578588, 11578589, 11578590, 11578591, and 11578593 |
| PLI | KIT, ARTILLERY TRAINER: 11578584, 11578585, 11578586, 11578587, 11578588, 11578589, 11578590,11578592, and 11578593 |
| PLJ | KIT, ARTILLERY TRAINER: 11578585, 11578586, 11578588, 11578589, and 11578592 |
| PLK | KIT, ARTILLERY TRAINER: 11578584 and 11578593 |
| PLL | KIT, ARTILLERY TRAINER: 11578584, 11578586, 11578589, and 11578593 |
| PLM | KIT, ARTILLERY TRAINER: 11578588 and 11578590 |
| PLN | KIT, ARTILLERY TRAINER: 11578587, 11578588, 11578590, 11578591, and 11578592 |
| PLO | KIT, ARTILLERY TRAINER: 11578587, 11578590, 11578592, and 11578593 |
| PLP | KIT, ARTILLERY TRAINER: 11578585, 11578586, 11578588, 11578589, and 11578590 |
| PLQ | KIT, ARTILLERY TRAINER: 11579626, 11579627, |
| PLR | KIT, ARTILLERY TRAINER: 11578584, 11578585, 11578586, 11578587, 11578588, 11578589, 11578590, 11578593, 11579626, 11579627, and 11579628 |
| PLS | KIT, ARTILLERY TRAINER: 11578585, 11578586, 11578589, 11579626, 11579627, and 11579628 |

b. Action change codes indicated in the left-hand margin of the listing page denote the following:

N-Indicates an added item.
C-Indicates a change in data.
R-Indicates a change in NSN only.

**C-5. How to Locate Repair Parts.**

*a. When National Stock Number or Part Number is Unknown.*

(1) *First.* Using the table of contents, determine the subgroup within which the repair part belongs. This is necessary since illustrations are prepared for subgroups, and listings are divided into the same groups.

(2) *Second.* Find the illustration covering the subgroup to which the repair part belongs.

(3) *Third.* Identify the repair part on illustration and note the illustration figure and item number of the repair part.

(4) *Fourth.* Using the Repair Parts Listing, find the figure and item number noted on the illustration.

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

(1) *First.* Using the Index of National Stock Numbers and Part Numbers, find the pertinent National stock number or part number. This index is in ascending NSN sequence followed by a list of part numbers in ascending alphameric sequence, cross-referenced to the illustration figure number and item number.

(2) *Second.* After finding the figure and item number, locate the figure and item number in the repair parts list.

## Section II. BASIC ISSUE ITEM LIST

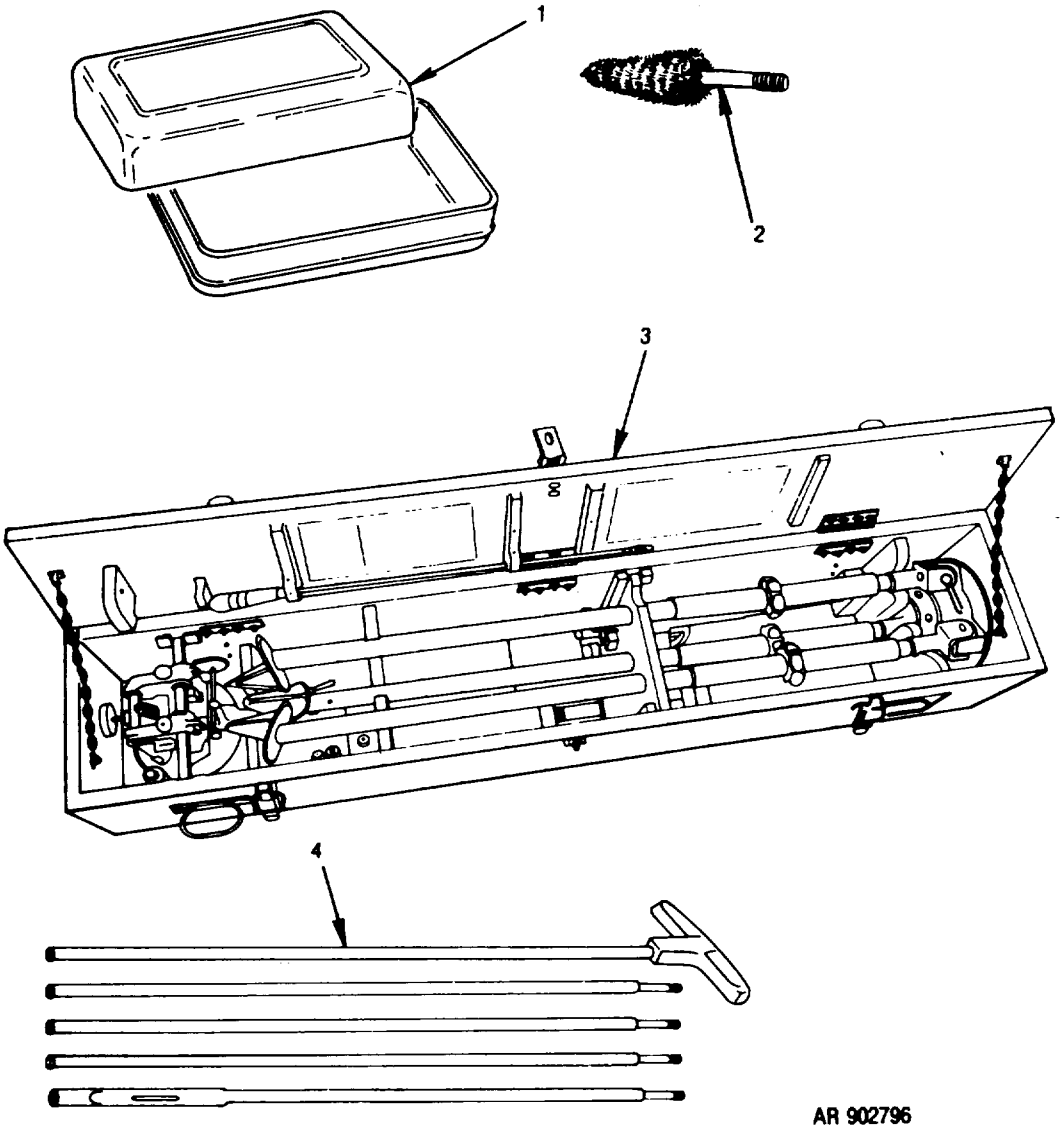



*Figure C-1. Basic issue items*

| (1) ILLUSTRATION (A) FIG. | (1) ILLUSTRATION (B) ITEM | (2) NATIONAL STOCK NUMBER | (3) DESCRIPTION PART NUMBER | USABLE ON CODE | (4) QTY FURN WITH EQUIP |
|---|---|---|---|---|---|
| C-1 | 1 | 7620-00-935-9815 | BOX, PLASTIC (L-B-00566) (81348) | | 1 |
| C-1 | 2 | 1005-00-508-2589 | BRUSH, BRONZE (8407954) (19204) | | 1 |
| C-1 | 3 | 6920-01-040-1486 | CHEST, METAL, M31 TRAINER (11578763) (19206) | | 1 |
| C-1 | 4 | 1005-00-653-5441 | ROD, CLEANING (6535441) (19204) | | 1 |

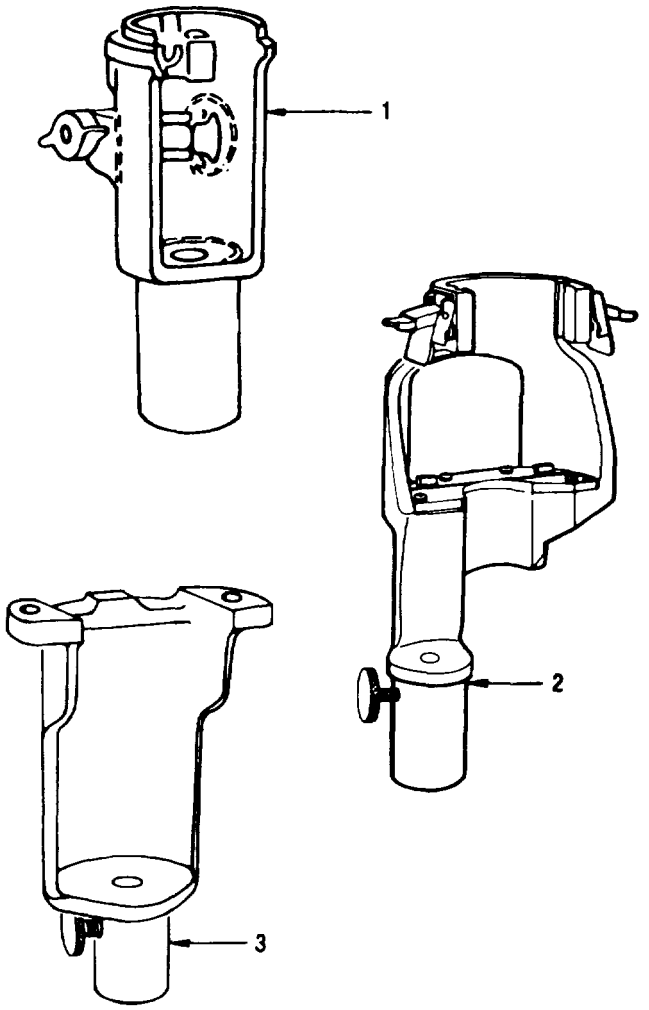



*Figure C-2. Basic issue items- continued*

| (1) ILLUSTRATION (A) FIG. | (B) ITEM | (2) NATIONAL STOCK NUMBER | (3) DESCRIPTION PART NUMBER | USABLE ON CODE | (4) QTY FURN WITH EQUIP |
|---|---|---|---|---|---|
| C-2 | 1 | 6920-00-378-9823 | SOCKET ASSY: FOR M12A7 TELESCOPE (11578700) | PLN | 1 |
| | | OR | (19206) OR | | |
| C-2 | 2 | 6920-00-378-9824 | SUPPORT ASSY: FOR M117 TELESCOPE (11728907) | PLE | |
| | | OR | (19200) OR | | |
| C-2 | 3 | 6920)00-46-5968 | HOLDER ASSY: FOR M113/M115S TELESCOPE (11727520) (D1104) | PLL | |

## Section III. ITEMS TROOP INSTALLED OR AUTHORIZED

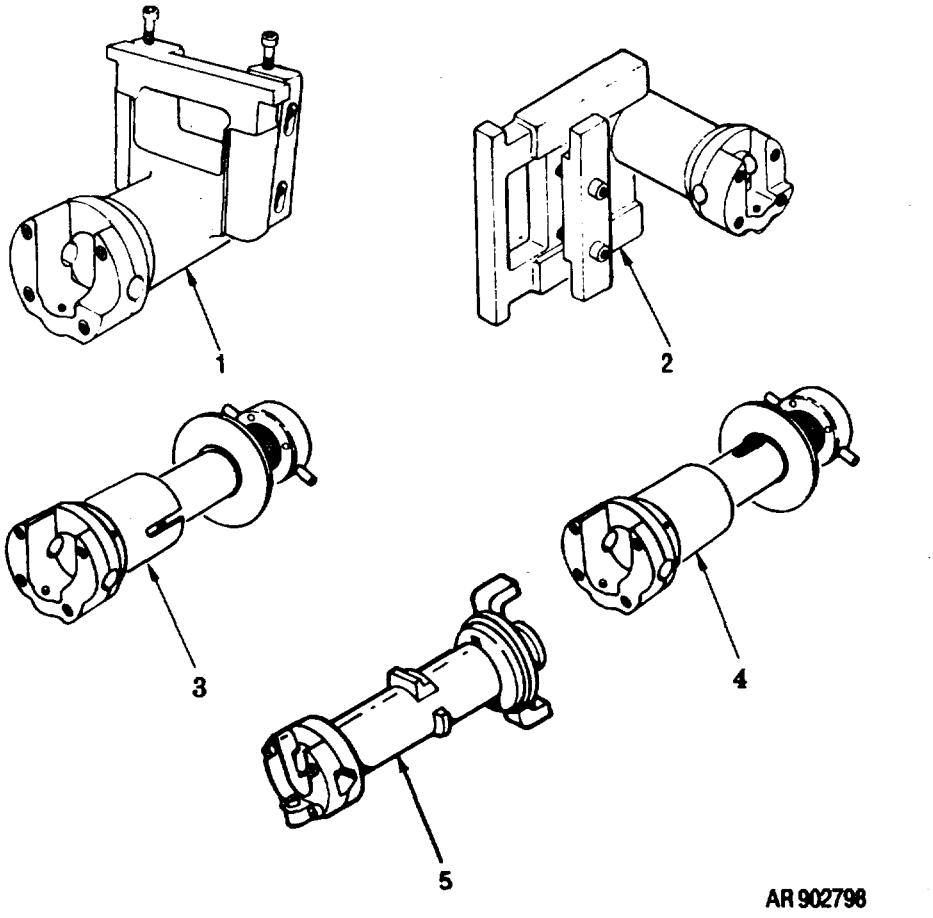



*Figure C-3. Items troop installed or authorized*

| (1) ILLUSTRATION (A) FIG. | (1) ILLUSTRATION (B) ITEM | (2) NATIONAL STOCK NUMBER | (3) DESCRIPTION PART NUMBER | USABLE ON CODE | (4) QTY FURN WITH EQUIP |
|---|---|---|---|---|---|
| | | | KIT, ARTILLERY TRAINER: 11578584, 11578585, 11578586, 11578587, 11578588, 11578589, 11578590, 11578591, 11578592, 11578593. | | |
| | | 6920-00-603-9301 | TRAINER, M31: 11578676 (19206) | | 2 |
| C-3 | 1 | 6920-00-095-2578 | ADAPTER ASSEMBLY, M102: 11578750 (19206) | PLK | 6 |
| C-3 | 2 | 6920-00-345-8947 | ADAPTER ASSEMBLY, M101A1: 11578749(19206) | PLB | 6 |
| C-3 | 3 | 6920-00-345-8949 | ADAPTER ASSEMBLY, M114, M114A1: 11578752 (19206) | PLM | 6 |
| C-3 | 4 | 6920-00-095-2576 | ADAPTER ASSEMBLY, M109, M109AI, M107, M110: 11578780(19206) | PLA | 6 |
| C-3 | 5 | 6920-01-117-3637 | ADAPTER ASSEMBLY, M198: 11579605 (19206) | PLQ | 6 |

| (1) NATIONAL STOCK NUMBER | (2) DESCRIPTION FSCM AND PART NUMBER | USABLE ON CODE | (3) U/M | (4) QTY AUTH |
|---|---|---|---|---|
| | ARTILLERY TRAINER-Continued | | | |
| 7520-00-990-1452 | BOX, PLASTIC: L-B-00565 (81348) | | EA | 1 |
| 1290-00-275-1700 | CARTRIDGE ASSEMBLY (FADAC): 8213330 | | EA | 2 |
| | CASE, SHIPPING & STORAGE: 11578765 (19206) | PLF | EA | 3 |
| | CASE, SHIPPING & STORAGE: 11578767 (19206) | PLC | EA | 6 |
| | CASE, SHIPPING & STORAGE: 11578769 (19206) | PLG | EA | 2 |
| | CASE, SHIPPING & STORAGE: 11578770(19206) | | EA | 1 |
| 1220-00-442-2446 | GRAPHICAL FIRING TABLE: 10557266 | | EA | 13 |
| 1220-00-221-6328 | GRAPHICAL SITE TABLE: 11729002 | | EA | 10 |
| 6920-00-295-8113 | GUN ASSEMBLY (less sector gear): 11578634 (19206) | PLD | EA | 4 |
| 6920-00-867-5317 | KNOB, BOLT LOCK: 11578617(19206) | | EA | 1 |
| 6920-00-095-2577 | LANYARD RING ASSEMBLY: 11578753 (19206) | PLD | EA | 12 |
| | NUT, SELF-LOCKING: 11578678 (19206) | | EA | 2 |
| 6920-00-867-5301 | PIN, FIRING: 11578606(19206) | | EA | 1 |
| 6920-00-867-5300 | PLUNGER, BOLT LEVER: 11578609 (19206) | | EA | 1 |
| 6920-00-867-5314 | PLUNGER, BOLT LOCK: 11578624 (19206) | | EA | 1 |
| 5120-00-245-7047 | SAFETY TONGS: GGG-T-546 | | EA | 2 |
| 5360-00-950-2997 | SPRING, BOLT LOCK: MS24585-C80 (19206) | | EA | 1 |
| 6920-00-867-5305 | SPRING, HELICAL COMPRESSION: 11578613(19206) | | EA | 1 |
| 5360-00-925-7852 | SPRING. PLUNGER: MS24585-C12 (96906) | | EA | 1 |
| 6920-00-867-5315 | STOP, BOLT LOCK: 11578633 (19206) | | EA | I |
| | TABULAR FIRING TABLE: | | EA | 10 |
| 5120-00-224-4659 | WRENCH, ALLEN 1/4": GGG-K-275 | PLI | EA | 1 |
| 5120-00-889-2162 | WRENCH, ALLEN 7/64': GGG-K-275 | PLJ | EA | 1 |
| 5120-00-240-5300 | WRENCH, ALLEN 3/16": GGG-T-546 | PLH | EA | 1 |
| 5120-00-198-5391 | WRENCH, ALLEN 1/2": GGG-K-275 | PLO | EA | 1 |

## Section IV. REPAIR PARTS LIST

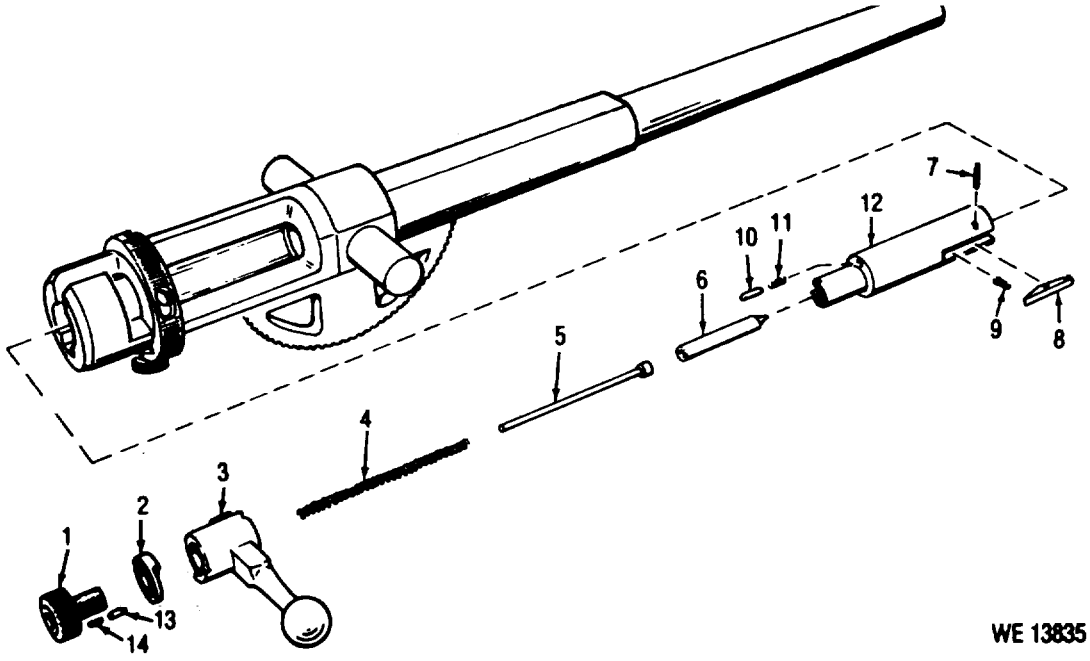



*Figure C-4. Breechbolt group - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | BREECH BOLT GROUP | | |
| C-4 | 1 | PAOZZ | 5305-00-069-8701 | 11578612 | 19206 | SCREW, BREECH BOLT | EA | 1 |
| C-4 | 2 | PAOZZ | 6920-00-867-5308 | 11578578 | 19206 | SPACER, DETENT | EA | 1 |
| C-4 | 3 | PAFZZ | 6920-00-868-5662 | 11578601 | 19206 | LEVER, BREECH BOLT, TRAINER | EA | 1 |
| C-4 | 4 | PAOZZ | 5360-00-867-5303 | 11578613 | 19206 | SPRING, HELICAL, COMPRESSION: firming pin | EA | 1 |
| C-4 | 5 | PAOZZ | 6920-00-867-5302 | 11578610 | 19206 | GUIDE, FIRING PIN SPRING, TRAINER | EA | 1 |
| C-4 | 6 | PAOZZ | 6920-00-867-5301 | 11578606 | 19206 | FIRING PIN, TRAINER: breech bolt | EA | 1 |
| C-4 | 7 | PAOZZ | 6920-00-867-5297 | 11578631 | 19206 | PIN, EXTRACTOR, TRAINER | EA | 1 |
| C-4 | 8 | PAOZZ | 6920-00-867-8879 | 11578608 | 19206 | EXTRACTOR, TRAINER | EA | 1 |
| C-4 | 9 | PAOZZ | 5360-00-993-7572 | MS24585-C10 | 96906 | SPRING | EA | I |
| C-4 | 10 | PAOZZ | 6920-00-867-5300 | 11578609 | 19206 | PLUNGER, BOLT LEVER | EA | 1 |
| C-4 | 11 | PAOZZ | 6920-00-926-7862 | MS24585-C12 | 96906 | SPRING, PLUNGER | EA | 1 |
| C-4 | 12 | PBFZZ | 6920-00-867-5296 | 11578600 | 19206 | BREECH BOLT, TRAINER | EA | 1 |
| C-4 | 13 | PAOZZ | 6920-00-927-1157 | 11578611 | 19206 | PLUNGER, BARREL ASSEMBLY | EA | 1 |
| C-4 | 14 | PAOZZ | 5360-00-993-7572 | MS24585-C10 | 96906 | SPRING | EA | 1 |

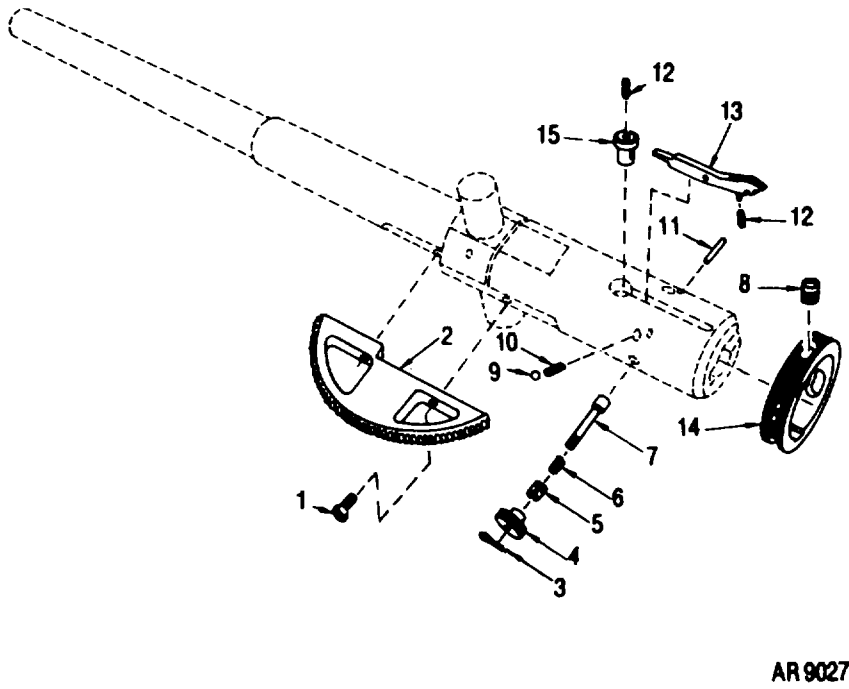



*Figure C-5. Barrel assembly - partial exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | BARREL ASSEMBLY | | |
| C-5 | 1 | PAOZZ | 5305-00-069-8703 | 11578764 | 19206 | SCREW, GEAR SECTOR: elevating, barrel assembly | EA | 2 |
| C-5 | 2 | PAOZZ | 6920-00-867-5320 | 11578695 | 19206 | GEAR SECTOR: elevating, barrel | EA | 1 |
| C-5 | 3 | PAOZZ | 5315-00-236-8345 | MS24665-5 | 96906 | PIN, COTTER | EA | 1 |
| C-5 | 4 | PAOZZ | 6920-00-867-5317 | 11578617 | 19206 | KNOB, BOLT, LOCK | EA | 1 |
| C-5 | 5 | PAOZZ | 6920-00-867-5318 | 11578623 | 19206 | BUSHING, BOLT LOCK | EA | 1 |
| C-5 | 6 | PAOZZ | 5360-00-950-2997 | MS24585-C80 | 96906 | SPRING, BOLT LOCK | EA | 1 |
| C-5 | 7 | PAOZZ | 6920-00-867-5314 | 11578624 | 19206 | PLUNGER, BOLT LOCK | EA | 1 |
| C-5 | 8 | PAOZZ | 5305-00-069-8702 | 11578622 | 19206 | SCREW, SAFETY STOP | EA | 1 |
| C-5 | 9 | PAOZZ | 6920-00-867-5306 | 11578632 | 19206 | BALL, BEARING, SAFETY DETENT | EA | 1 |
| C-5 | 10 | PAOZZ | 5360-00-950-2997 | MS24585-C80 | 96906 | SPRING, BOLT, LOCK | EA | 1 |
| C-5 | 11 | PAOZZ | 6920-00-867-5294 | 11578630 | 19206 | PIN, TRIGGER, TRAINER | EA | 1 |
| C-5 | 12 | PAOZZ | 5360-00-867-5311 | MS24585-C49 | 96906 | SPRING, HELICAL, COMPRESSION | EA | 3 |
| C-5 | 13 | PAOZZ | 6920-00-867-5309 | 11578628 | 19206 | TRIGGER, TRAINER | EA | 1 |
| C-5 | 14 | PAFZZ | 6920-00-867-5313 | 11578607 | 19206 | SAFETY, ARTILLERY TRAINER | EA | 1 |
| C-5 | 15 | PAOZZ | 6920-00-867-5310 | 11578604 | 19204 | GUIDE, BOLT, TRAINER | EA | 1 |

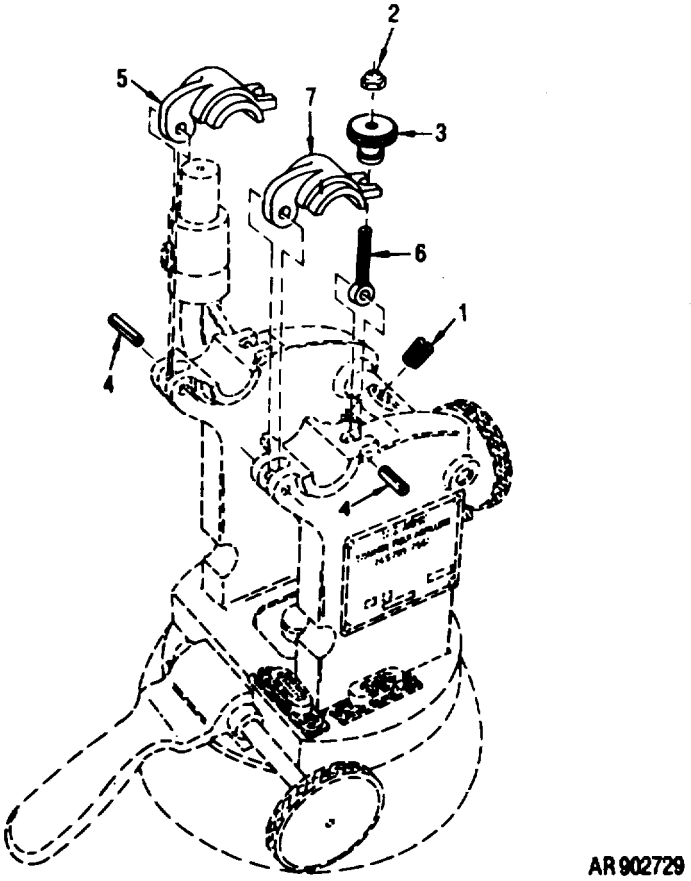



*Figure C-6. Trunnion caps*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | TRUNNION CAPS | | |
| C-6 | 1 | PAFZZ | 5305-00-069-8700 | 11578657 | 19206 | SCREW, ADJUSTING, WORM WHEEL: elevating bracket | EA | 1 |
| R C-6 | 2 | PAFZZ | 5310-01-056-7463 | 11578678 | 19206 | STOPNUT | EA | 2 |
| C-6 | 3 | PAFZZ | 6920-00-867-5271 | 11578640 | 19206 | KNOB, TRUNNION CAP LOCK | EA | 2 |
| C-6 | 4 | PAFZZ | 6920-00-867-5253 | 11578645 | 19206 | PIN, SPRING | EA | 4 |
| C-6 | 5 | PAFZZ | 6920-00-867-5252 | 11578646 | 19206 | CAP, TRUNNION, LEFT | EA | 1 |
| C-6 | 6 | PAFZZ | 5305-00-069-8692 | 11578638 | 19206 | SCREW, TRUNNION CAP LOCK | EA | 2 |
| C-6 | 7 | PAFZZ | 6920-00-867-5255 | 11578647 | 19206 | CAP. TRUNNION, RIGHT | EA | 1 |

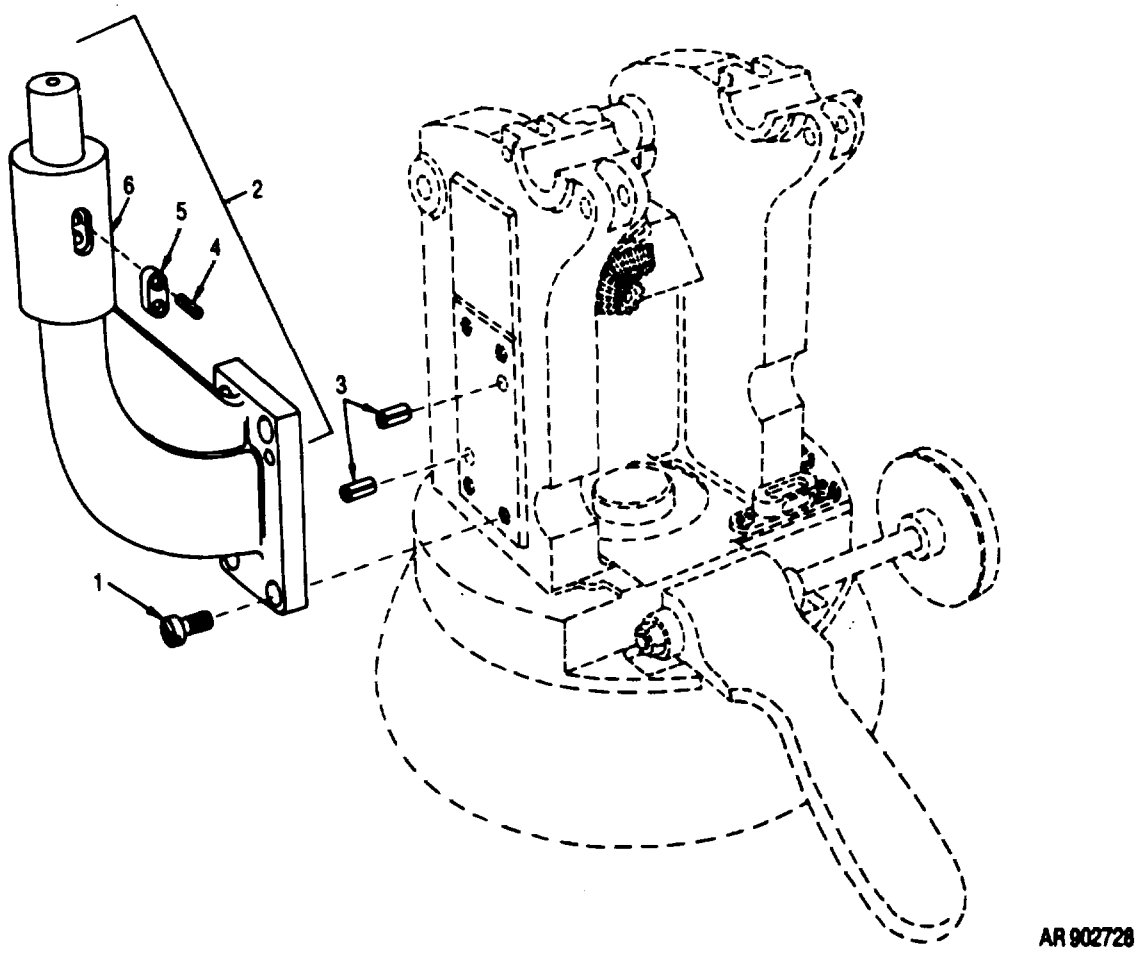



*Figure C-7. Telescope bracket removed from mount*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | TELESCOPE BRACKET | | |
| C-7 | 1 | PAFZZ | 5305-00-069-8698 | 11578746 | 19206 | SCREW, TELESCOPE BRACKET | EA | 4 |
| C-7 | 2 | AFFZZ | | 11578714 | 19206 | BRACKETASSEMBLY,TELESCOPE | EA | 1 |
| C-7 | 3 | PAFZZ | 6920-00-867-5284 | 11578747 | 19206 | PIN, SPRING | EA | 2 |
| C-7 | 4 | PAFZZ | | 11578715 | 19206 | PIN, SPRING | EA | 2 |
| C-7 | 5 | PAFZZ | 6920-00-867-5334 | 11578716 | 19206 | KEY, TELESCOPE SOCKET BRACKET | EA | 1 |
| C-7 | 6 | PAFZZ | 6920-00-867-5283 | 11578659 | 19206 | BRACKET. TELESCOPE SOCKET | EA | 1 |

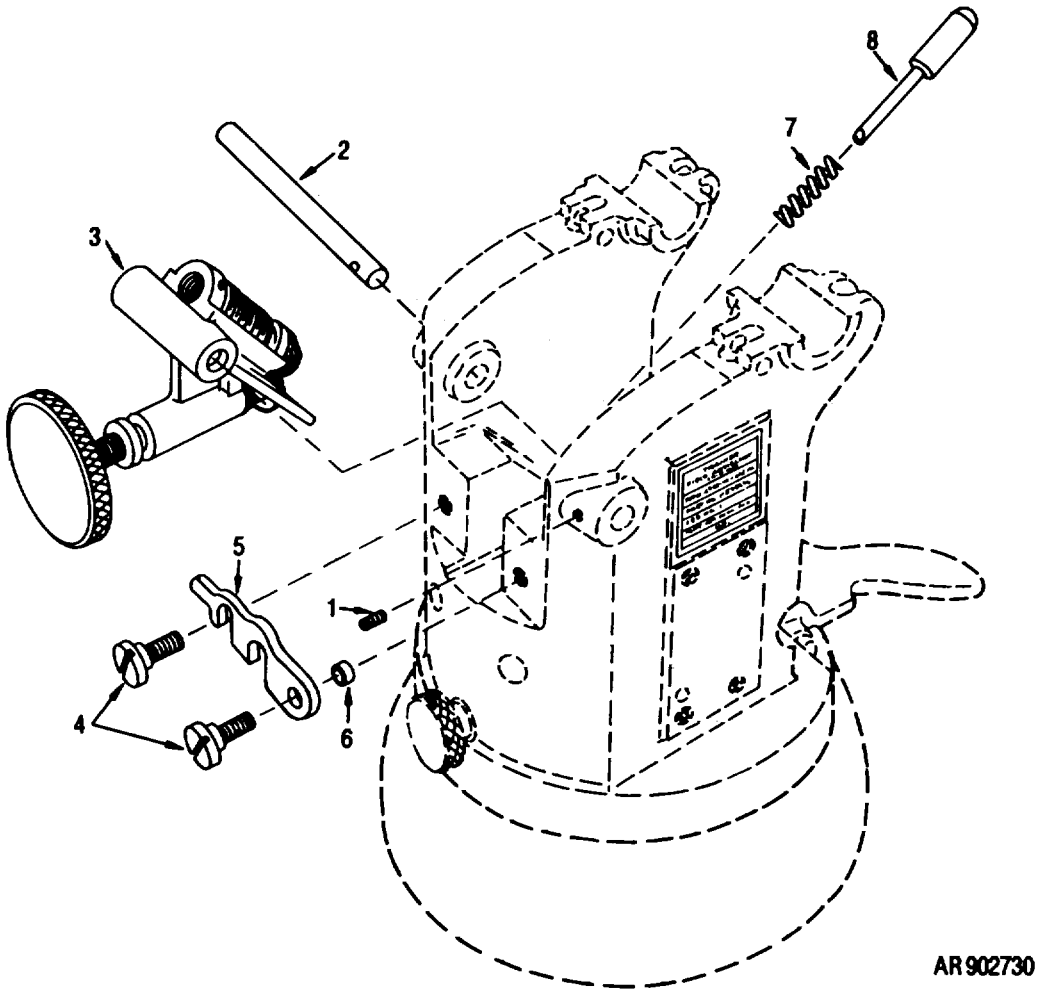



*Figure C-8. Mount assembly - partial exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | MOUNT ASSEMBLY | | |
| C-8 | 1 | PAFZZ | 6920-00-867-5270 | 11578669 | 19206 | SETSCREW, ELEVATING BRACKET SHAFT: pivot | EA | 1 |
| C-8 | 2 | PAFZZ | 6920-00-867-5269 | 11578655 | 19206 | SHAFT, ELEVATING BRACKET: | EA | 1 |
| C-8 | 3 | AFFZZ | | 11578754 | | BRACKET ASSEMBLY: elevating | EA | 1 |
| C-8 | 4 | PAFZZ | 5305-00-069-8698 | 11578636 | 19206 | SCREW, LOCKING: elevating plate | EA | 2 |
| C-8 | 5 | PAFZZ | 6920-00-867-5285 | 11578648 | 19206 | PLATE, LOCKING: rapid elevating | EA | 1 |
| C-8 | 6 | XBFZZ | | 11578713 | | SLEEVE, LOCKING: | EA | 2 |
| C-8 | 7 | PAFZZ | 5360-00-867-5257 | MS24585-C282 | 96906 | SPRING, HELICAL COMPRESSION | EA | 2 |
| C-8 | 8 | XBFZZ | 6920-00-867-5304 | 11578649 | 19206 | PLUNGER, ELEVATING BRACKET | EA | 2 |

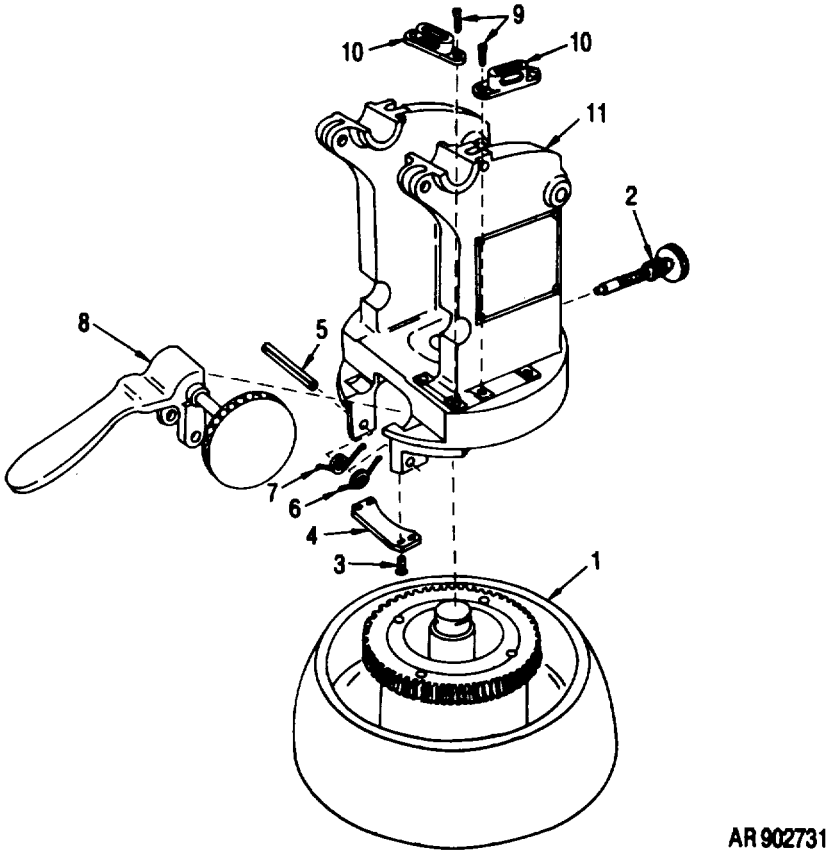



*Figure C-9. Mount assembly - partial exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | MOUNT ASSEMBLY | | |
| C-9 | 1 | AFFFF | | 11578756 | | FIXED BASE MOUNT ASSEMBLY | EA | 1 |
| C-9 | 2 | AFFFF | | 11578757 | | PLUNGER LOCKING ASSEMBLY | EA | 1 |
| C-9 | 3 | PAFZZ | 5305-00-069-8694 | 11578662 | 19206 | SCREW, PLATE | EA | 4 |
| C-9 | 4 | PAFZZ | 6920-00-867-8878 | 11578644 | 19206 | PLATE | EA | 1 |
| C-9 | 5 | PAFZZ | 6920-00-867-5276 | 11578615 | 19206 | PIN, SPRING | EA | 1 |
| C-9 | 6 | PAFZZ | 5360-00-867-5280 | 11578642 | 19206 | SPRING, HELICAL, TORSION: traversing lever, left | EA | 1 |
| C-9 | 7 | PAFZZ | 5360-00-867-5281 | 11578641 | 19206 | SPRING, HELICAL, TORSION: | EA | 1 |
| C-9 | 8 | AFFFF | | 11578755 | | LEVER, RAPID TRAVERSE, ASSY | EA | 1 |
| C-9 | 9 | PAFZZ | 5305-00-069-8691 | 11578679 | 19206 | SCREW, LEVEL VIAL | EA | 4 |
| C-9 | 10 | PAFZZ | 6920-00-867-5286 | 11578654 | 19206 | VIAL, LEVEL, ARTILLERY TRAINER | EA | 2 |
| C-9 | 11 | XAOZZ | | 11578620 | 19206 | MOUNT, UPPER | EA | 1 |

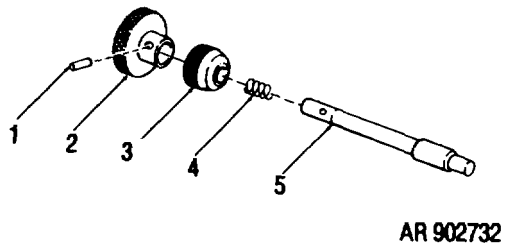



*Figure C-10. Plunger locking assembly - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | PLUNGER LOCKING ASSY | | |
| C-10 | 1 | PAFZZ | 6920-00-867-5259 | 11578680 | 19206 | PIN, SPRING | EA | 1 |
| C-10 | 2 | PAFZZ | 6920-00-867-5249 | 11578618 | 19206 | KNOB, PLUNGER LOCKING | EA | 1 |
| C-10 | 3 | PAFZZ | 6920-00-867-5246 | 11578637 | 19206 | BUSHING, PLUNGER LOCKING | EA | 1 |
| C-10 | 4 | PAFZZ | 5360-00-867-5251 | 11578660 | 19206 | SPRING, HELICAL COMPRESSION | EA | 1 |
| C-10 | 5 | PAFZZ | 6920-00-867-5248 | 11578619 | 19206 | PLUNGER, MOUNT LOCKING | EA | 1 |

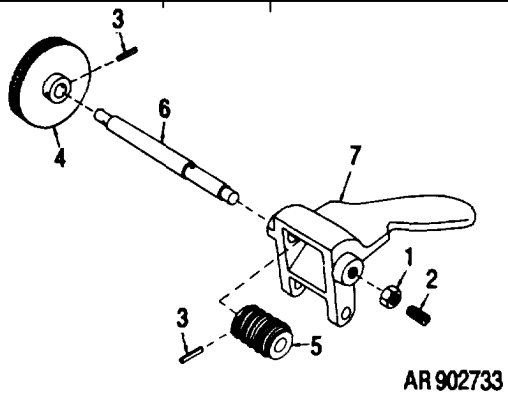



*Figure C-11 Rapid traverse lever assembly - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| C-11 | 1 | PAFZZ | 6920-00-867-5279 | 11578664 | 19206 | NUT, TRAVERSING SHAFT | EA | 1 |
| C-11 | 2 | PAFZZ | 6920-00-867-5278 | 11578665 | 19206 | SETSCREW, TRAVERSING SHAFT | EA | 1 |
| C-11 | 3 | PAFZZ | 6920-00-867-5259 | 11578680 | 19206 | PIN, SPRING | EA | 2 |
| C-11 | 4 | PAFZZ | 6920-00-867-5258 | 11578651 | 19206 | HANDWHEEL: elevating and traversing | EA | 1 |
| C-11 | 5 | PAFZZ | 3020-00-867-5282 | 11578635 | 19206 | GEAR, WORM | EA | 1 |
| C-11 | 6 | PAFZZ | 6920-00-867-5277 | 11578639 | 19206 | SHAFT, TRAVERSING | EA | 1 |
| C-11 | 7 | PAFZZ | 6920-00-867-6588 | 11578661 | 19206 | LEVER, RAPID TRAVERSING | EA | 1 |

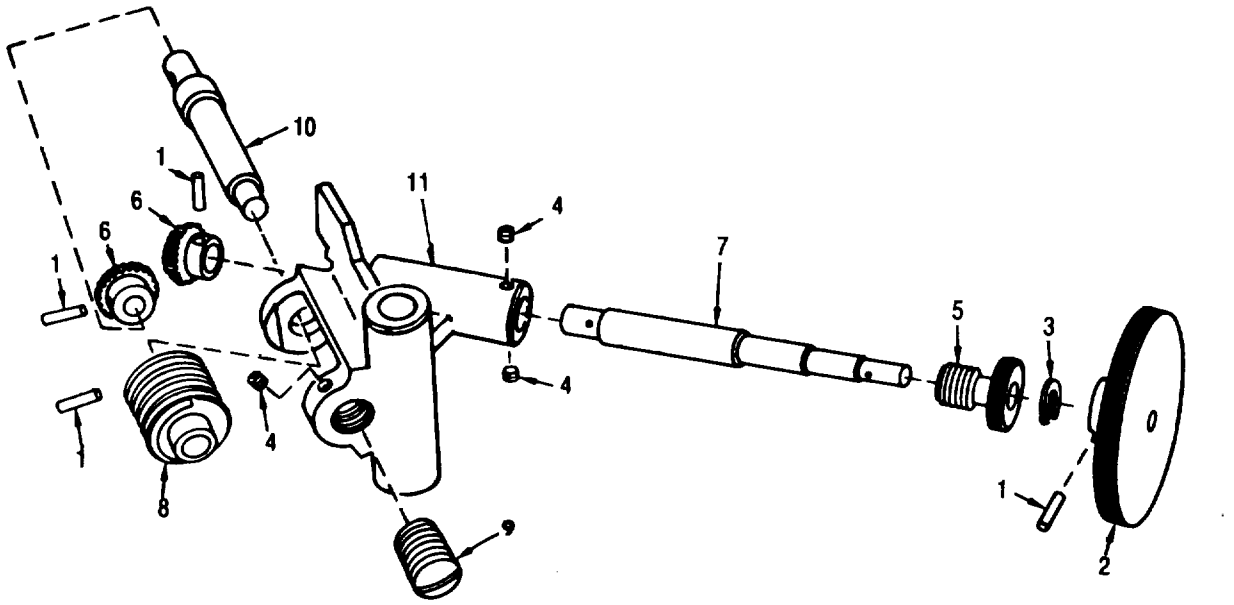



*Figure C-12. Elevating worm glow bracket assembly- exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ELEVATING WORM GEAR BRACKET ASSY | | |
| C-12 | 1 | PAFZZ | 6920-00-867-5259 | 11578680 | 19206 | PIN, SPRING | EA | 4 |
| C-12 | 2 | PAFZZ | 6920-00-867-5258 | 11578651 | 19206 | HANDWHEEL, ELEVATING AND TRAVERSING | EA | 1 |
| C-12 | 3 | PAFZZ | 6920-00-867-5261 | 11578673 | 19206 | SNAP RING: elevating shaft | EA | 1 |
| C-12 | 4 | PAFZZ | 6920-00-867-5264 | 11578672 | 19206 | SETSCREW, ELEVATING SHAFT | EA | 3 |
| C-12 | 5 | PAFZZ | 6920-00-867-5262 | 11578658 | 19206 | BUSHING, ELEVATING SHAFT | EA | 1 |
| C-12 | 6 | PAFZZ | 3020-00-867-5265 | 11578650 | 19206 | GEAR, BEVEL: elevating shaft & worm | EA | 2 |
| C-12 | 7 | PAFZZ | 6920-00-867-5260 | 11578652 | 19206 | SHAFT, ELEVATING | EA | 1 |
| C-12 | 8 | PAFZZ | 3020-00-867-5268 | 11578656 | 19206 | GEAR, WORM: elevating | EA | 1 |
| C-12 | 9 | PAFZZ | 5305-00-069-8700 | 11578657 | 19206 | SCREW, ADJUSTING, WORM | EA | 1 |
| C-12 | 10 | PAFZZ | 6920-00-867-5267 | 11578653 | 19206 | SHAFT, ELEVATING WORM | EA | 1 |
| C-12 | 11 | PAFZZ | 6920-00-867-5263 | 11578709 | 19206 | BRACKET, ELEVATING | EA | 1 |

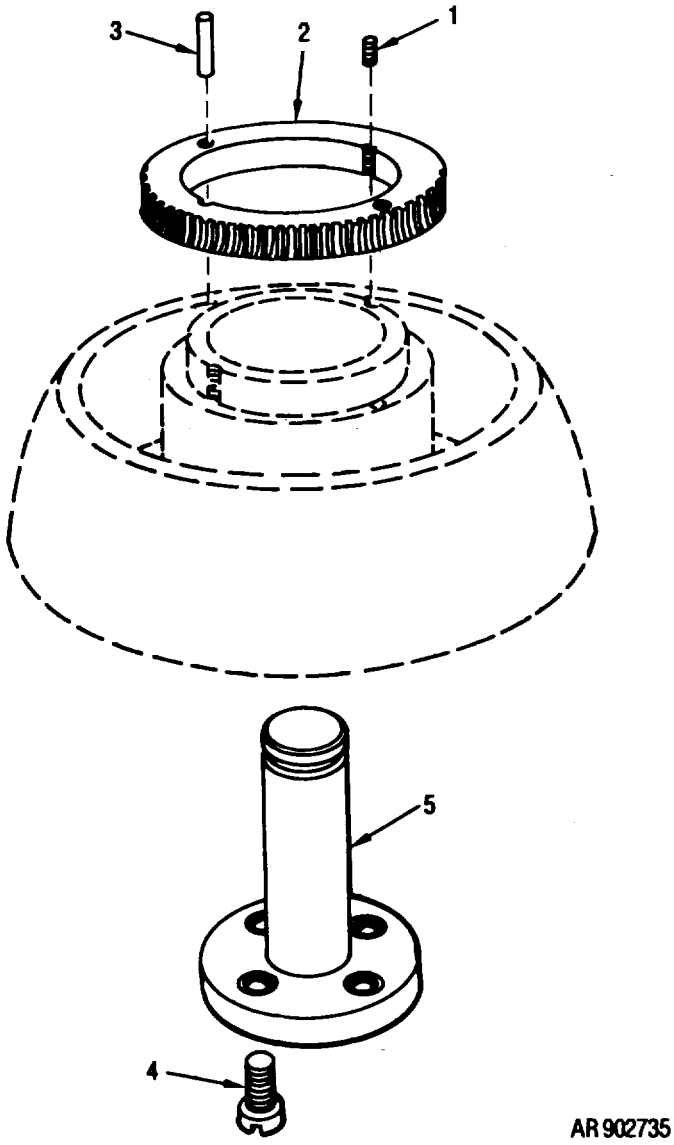



*Figure C-13. Fixed mount base assembly - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | FIXED BASE MOUNT ASSEMBLY | | |
| C-13 | 1 | PAFZZ | 6920-00-867-5272 | 11578667 | 19206 | SETSCREW, BOTTOM CARRIAGE | EA | 2 |
| C-13 | 2 | PAFZZ | 3020-00-867-5274 | 11578643 | 19206 | GEAR, WORM WHEEL | EA | 1 |
| C-13 | 3 | PAFZZ | 6920-00-867-5273 | 11578668 | 19206 | PIN, SPRING | EA | 2 |
| C-13 | 4 | PAFZZ | 5305-00-069-8693 | 11578666 | 19206 | SCREW, PINTLE PIN | EA | 4 |
| C-13 | 5 | PAFZZ | 6920-00-867-5275 | 11578621 | 19206 | PIN. PINTLE | EA | 1 |

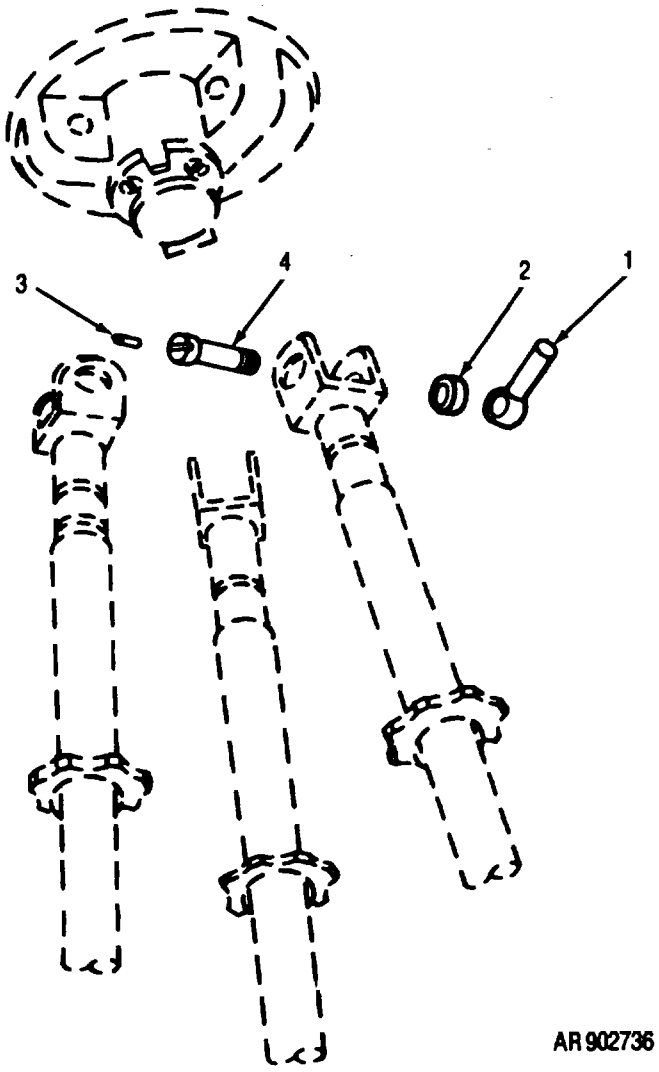



*Figure C-14. Tripod locking lever group - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | TRIPOD MOUNT ASSEMBLY | | |
| C-14 | 1 | PAFZZ | 6920-00-867-5324 | 11578691 | 19206 | LEVER, LEG LOCKING | EA | 3 |
| C-14 | 2 | PAFZZ | 6920-00-867-5323 | 11578681 | 19206 | SPACER, LOCKING LEVER | EA | 3 |
| C-14 | 3 | PAFZZ | 6920-00-867-5272 | 11578667 | 19206 | SETSCREW, LOCKING BOLT | EA | 3 |
| C-14 | 4 | PAFZZ | 5306-00-871-8488 | 11578693 | 19206 | BOLT, LOCKING | EA | 3 |

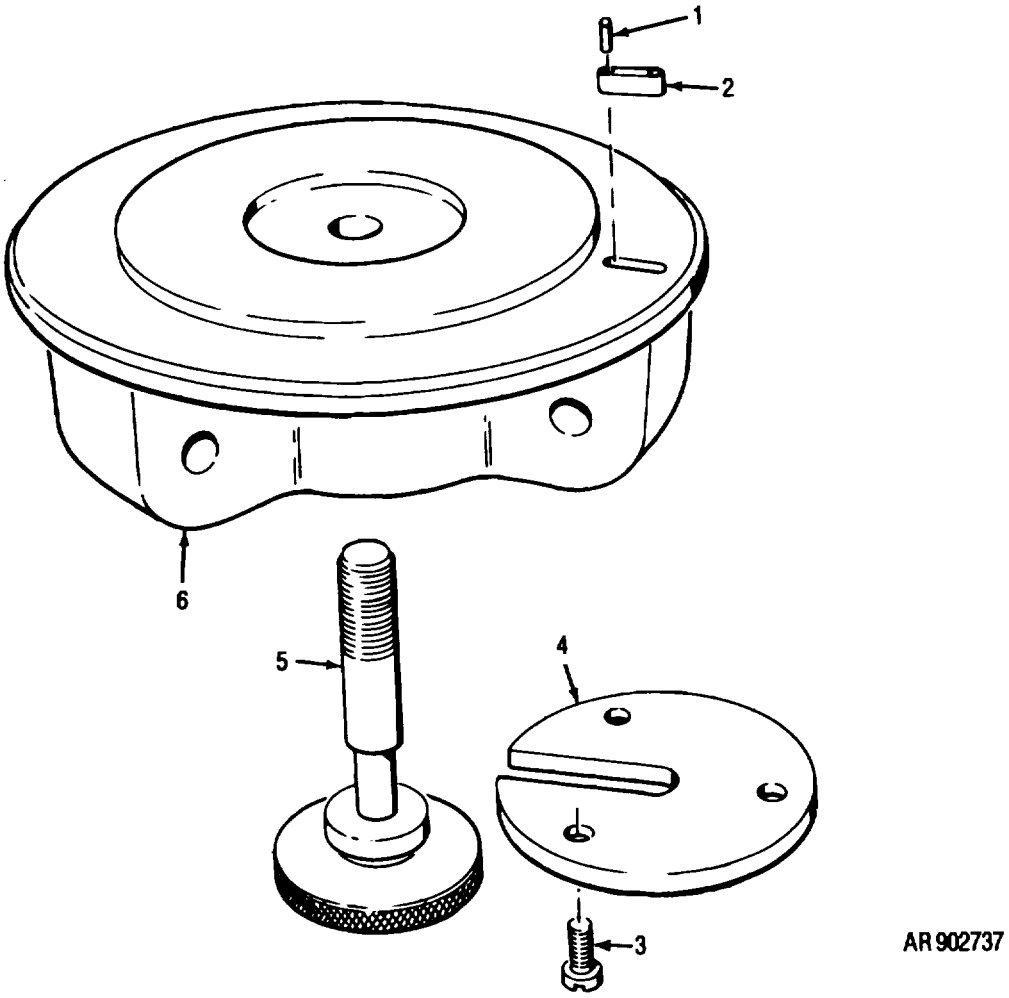



*Figure C-15. Tripod base assembly - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | TRIPOD BASE GROUP | | |
| C-15 | 1 | PAFZZ | | 11578715 | 19206 | PIN, SPRING | EA | 2 |
| C-15 | 2 | PAFZZ | 6920-00-867-5334 | 11578716 | 19206 | KEY, TRIPOD BASE | EA | 1 |
| C-15 | 3 | PAFZZ | 5305-00-069-8705 | 11578717 | 19206 | SCREW, RETAINER: mount locking screw | EA | 3 |
| C-15 | 4 | PAFZZ | 6920-00-867-5335 | 11578683 | 19206 | RETAINER, CARRIAGE MOUNTING SCREW: tripod base | EA | 1 |
| C-15 | 5 | PAFZZ | 5305-00-069-8706 | 11578682 | 19206 | SCREW, MOUNT LOCKING: tripod base | EA | 1 |
| C-15 | 6 | PAFZZ | 6920)00-867-5333 | 11578689 | 19206 | BASE, TRIPOD | EA | 1 |

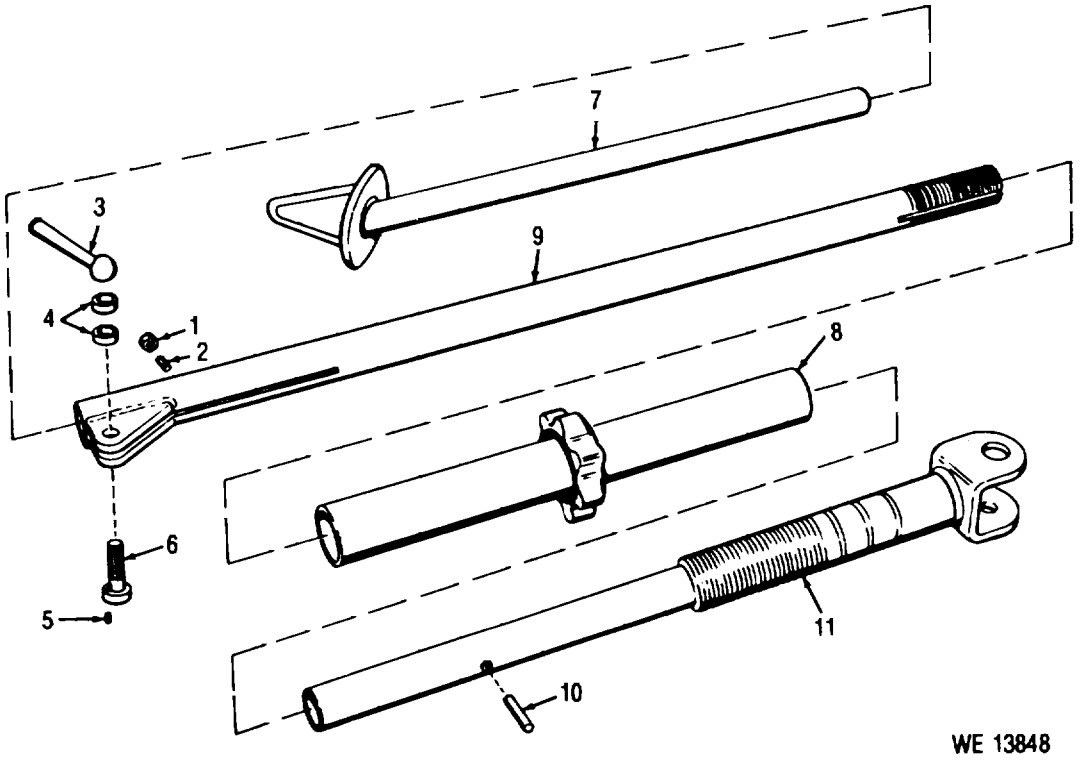



*Figure C-16. Tripod lower rear leg group - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | TRIPOD LOWER REAR LEG GROUP | | |
| C-16 | 1 | PAOZZ | 6920-00-867-5330 | 11578712 | 19206 | NUT, GUIDE SCREW: lower rear leg | EA | 1 |
| C-16 | 2 | PAOZZ | 5305-00-069-8704 | 11578711 | 19206 | SCREW, GUIDE: lower rear leg | EA | 1 |
| C-16 | 3 | PAFZZ | 6920-00-867-5324 | 11578691 | 19206 | LEVER, LEG LOCKING | EA | 3 |
| C-16 | 4 | PAFZZ | 6920-00-867-5323 | 11578681 | 19206 | SPACER, LOCKING LEVER: upper | EA | 3 |
| C-16 | 5 | PAFZZ | 6920-00-867-5272 | 11578667 | 19206 | SETSCREW, BOLT LOCKING | EA | 3 |
| C-16 | 6 | PAFZZ | 5306-00-871-8490 | 11578694 | 19206 | BOLT, REAR EXTENSION LEG: tripod | EA | 1 |
| C-16 | 7 | PAFZZ | 6920-00-867-5332 | 11578684 | 19206 | LEG, EXTENSION, REAR | EA | 1 |
| C-16 | 8 | PAFZZ | 6920-00-867-5326 | 11578692 | 19206 | SLEEVE, LEG ADJUSTING | EA | 1 |
| C-16 | 9 | PAFZZ | 6920-00-867-5329 | 11578690 | 19206 | LEG, LOWER REAR | EA | 1 |
| C-16 | 10 | PAFZZ | 6920-00-867-5325 | 11578710 | 19206 | PIN, SPRING | EA | 1 |
| C-16 | 11 | PAFZZ | 6920-00-867-5321 | 11578688 | 19206 | LEG, UPPER | EA | 3 |

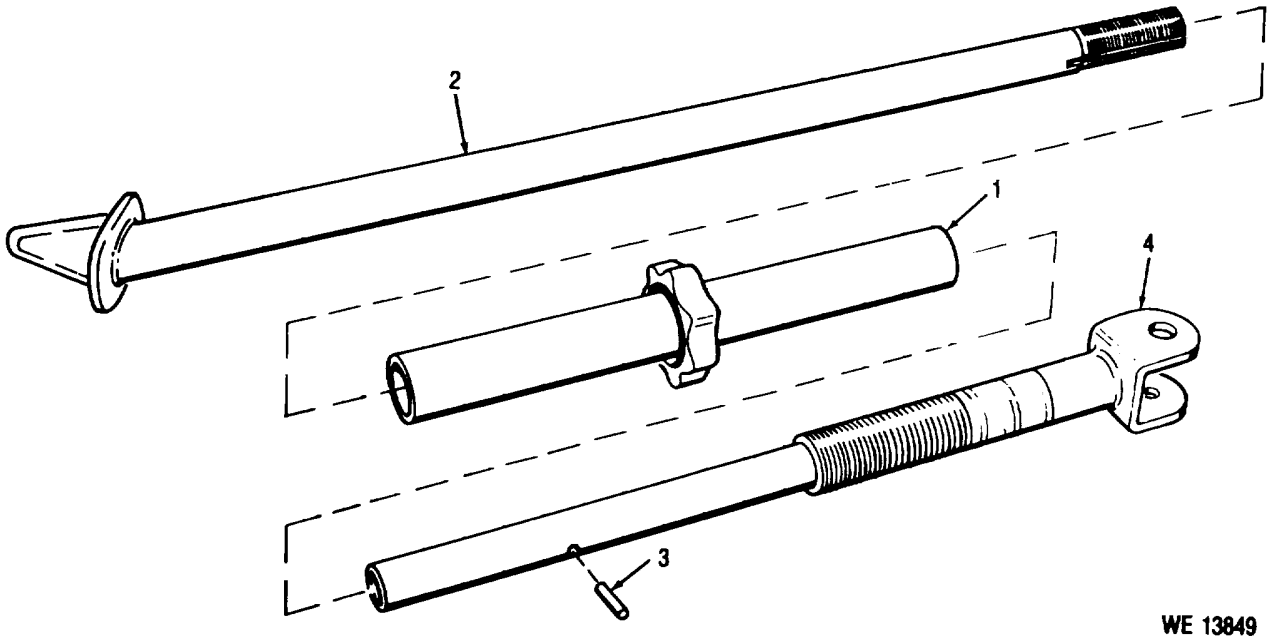



*Figure C-17. Tripod lower front leg group - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | TRIPOD LOWER FRONT LEG GROUP | | |
| C-17 | 1 | PAFZZ | 6920-00-867-5326 | 11578692 | 19206 | SLEEVE, LEG ADJUSTING | EA | 3 |
| C-17 | 2 | PAFZZ | 6920-00-867-5328 | 11578685 | 19206 | LEG, LOWER FRONT | EA | 2 |
| C-17 | 3 | PAFZZ | 6920-00-867-5325 | 11578710 | 19206 | PIN, SPRING | EA | 3 |
| C-17 | 4 | PAFZZ | 6920-00-867-5321 | 11578688 | 19206 | LEG, UPPER | EA | 3 |

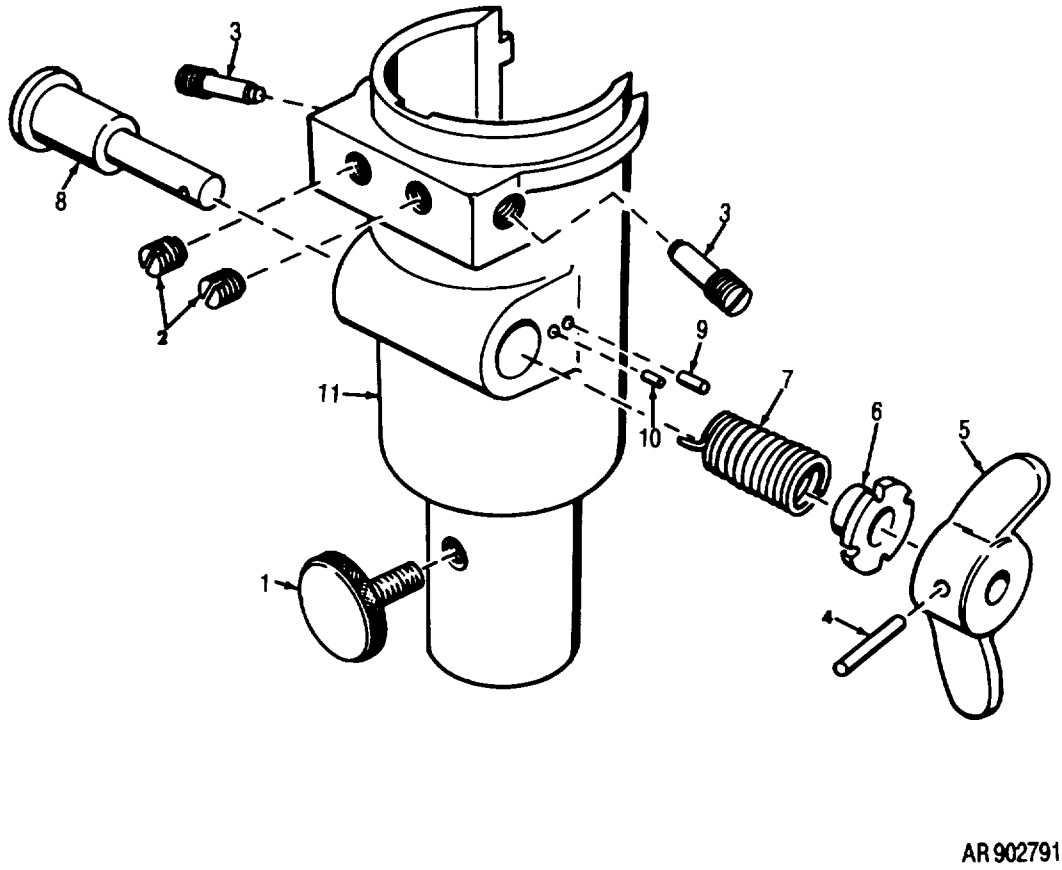



*Figure C- 18. Telescope socket assembly or M12 series telescopes - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION | USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | TELESCOPE SOCKET ASSEMBLY | | | |
| C-18 | 1 | PAOZZ | 5305-00-069-8697 | 11578705 | 19206 | SCREW, LOCKING, | PLN | EA | 1 |
| C-18 | 2 | PAOZZ | 6920-00-867-5293 | 11578704 | 19206 | SETSCREW, TANGENT | PLN | EA | 2 |
| C-18 | 3 | PAOZZ | 5305-00-069-8699 | 11578698 | 19206 | SCREW, TANGENT | PLN | EA | 2 |
| C-18 | 4 | PAFZZ | 6920-00-867-5291 | 11578708 | 19206 | PIN, SPRING | PLN | EA | 1 |
| C-18 | 5 | PAFZZ | 6920-00-867-5305 | 11578702 | 19206 | HANDLE, TELESCOPE | PLN | EA | 1 |
| C-18 | 6 | PAFZZ | 6920-00-867-5290 | 11578701 | 19206 | RETAINER, SPRING | PLN | EA | 1 |
| C-18 | 7 | PAFZZ | 6920-00-867-5292 | 11578703 | 19206 | SPRING, TELESCOPE LOCK | PLN | EA | 1 |
| C-18 | 8 | PAFZZ | 6920-00-867-5289 | 11578697 | 19206 | LOCK, TELESCOPE | PLN | EA | 1 |
| C-18 | 9 | PAFZZ | 6920-00-867-5287 | 11578706 | 19206 | PIN, SPRING | PLN | EA | 1 |
| C-18 | 10 | PAFZZ | 6920-00-867-5288 | 11578707 | 19206 | PIN, SPRING | PLN | EA | 1 |
| C-18 | 11 | XA | | 11578699 | 19206 | SOCKET, TELESCOPE | PLN | EA | 1 |

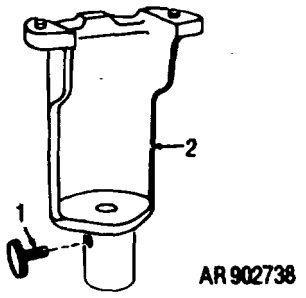



*Figure C-19. Telescope support assembly for M11S/M115 telescopes - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | TELESCOPE SUPPORT ASSEMBLY | | | |
| C C-19 | 1 | XBOZZ | | 11727518 | 19206 | SCREW, LOCKING, TELESCOPE | PLL | EA | 1 |
| C-19 | 2 | XA | | 11727519 | 19206 | HOLDER, TELESCOPE | PLL | EA | 1 |

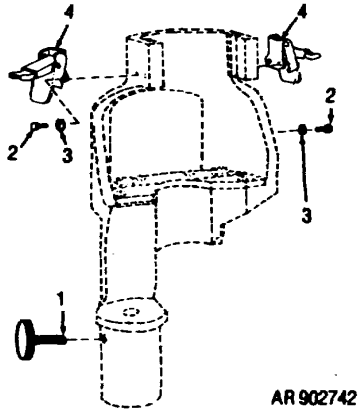



*Figure C-20. Telescope support assembly for M117 telescopes - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | TELESCOPE SUPPORT ASSEMBLY | | | |
| **C** C-20 | 1 | XBOZZ | | 11727518 | 19206 | SCREW, LOCKING, TELESCOPE | PLE | EA | 1 |
| **C** C-20 | 2 | PAFZZ | 5305-00-054-6650 | MS51957-26 | 96906 | SCREW | PLE | EA | 4 |
| **C** C-20 | 3 | PAFZZ | 5310-00-616-3555 | MS35333-71 | 96906 | WASHER | PLE | EA | 4 |
| **C** C-20 | 4 | PAFZZ | 5340-00-984-5206 | 10531763-4 | 19200 | CATCH | PLE | EA | 2 |

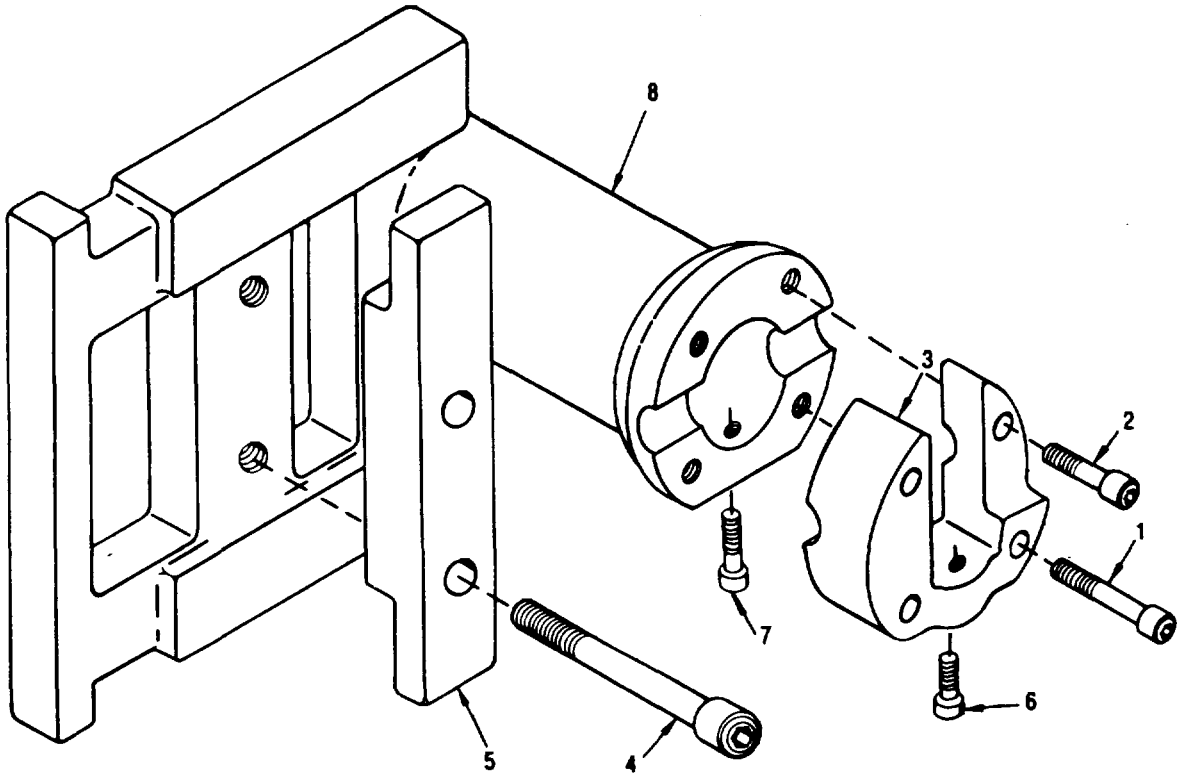



*Figure C-21. Adapter assembly for M101A1- exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ADAPTER ASSEMBLY FOR M101A1I | | | |
| C-21 | 1 | PAOZZ | 5305-00-983-6625 | MS16997-84 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 3 |
| C-21 | 2 | PAOZZ | 5305-00-983-6622 | MS16997-81 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| C-21 | 3 | XBOZZ | | 11578778 | 19206 | CAP | PLD | EA | 1 |
| C-21 | 4 | PAOZZ | 5305-00-983-7469 | MS16997-152 | 96906 | SCREW, SOCKET HEAD | PLB | EA | 2 |
| C-21 | 5 | XBOZZ | | 11578839 | 19206 | BAR, LOCKING CAP | PLB | EA | 1 |
| C-21 | 6 | PAOZZ | 5305-00-983-6663 | MS16998-45 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| C-21 | 7 | PAOZZ | 5305-00-983-6663 | MS1699846 | 96906 | SCREW, SOCKET HEAD | PLD | EA | 1 |
| C-21 | 8 | XBOZZ | | 11578838 | 19206 | BODY, ADAPTER | PLB | EA | 1 |

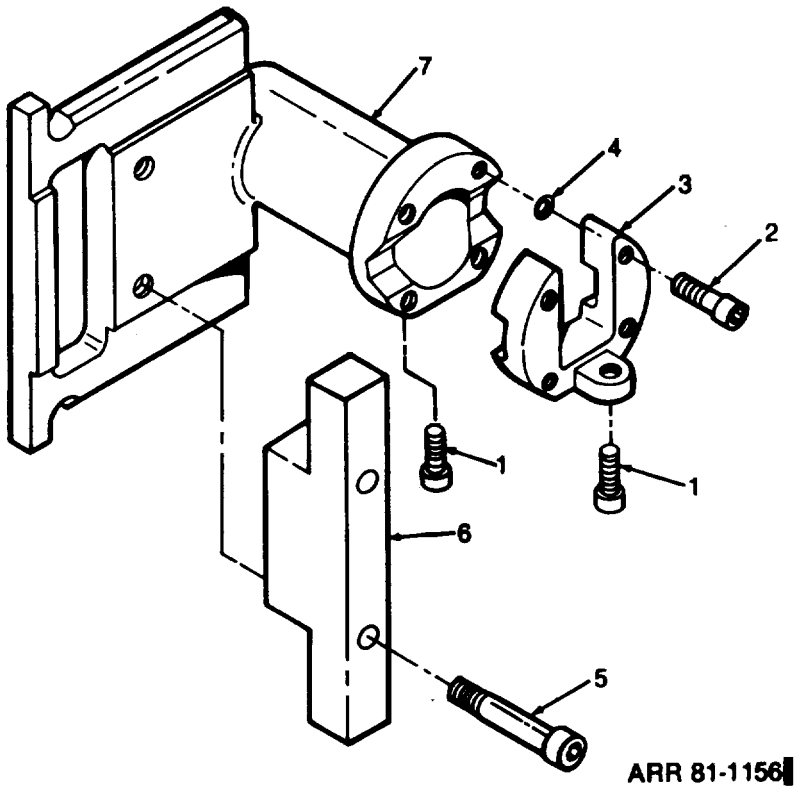



*Figure C-21A. Adapter assembly for M101A1 - optional manufacture*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ADAPTER ASSEMBLY FOR M101A1 | | | |
| NC-21A | 1 | PAOZZ | 5305-00-983-6625 | MS16998-45 | 96906 | SCREW, SOCKET HEAD: 1/4-28x1 | PLD | EA | 2 |
| NC-21A | 1 | PAOZZ | 5305-00-983-6662 | MS16998-45 | 96906 | SCREW,SOCKET HEAD: 5/16-18x1-1/4 | PLD | EA | 4 |
| NC-21A | 3 | XBOZZ | | 11578868 | 19206 | CAP | PLQ | EA | 1 |
| NC-21A | 4 | PAOZZ | 5365-01-114-0186 | 11578950 | 19206 | RING,SCREW RETAINING | PLR | EA | 4 |
| NC-21A | 5 | PAOZZ | 5305-00983-7469 | MS16997-152 | 96906 | SCREW, CAP SOCKET HEAD | PLB | EA | 2 |
| NC-21A | 6 | XBOZZ | | 11578866 | 19206 | BAR,LOCKING | PLB | EA | 1 |
| NC-21A | 7 | XBOZZ | | 11578865 | 19206 | BODY,ADAPTER | PLB | EA | 1 |

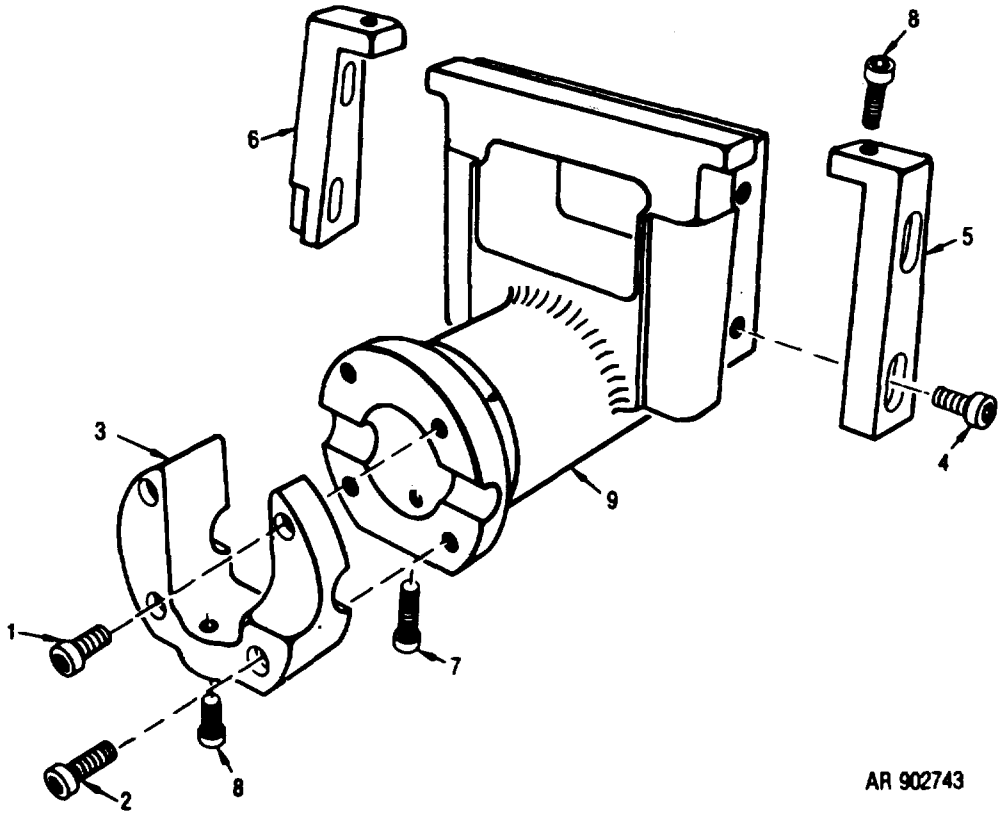



*Figure C-22. Adapter assembly for M102 - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ADAPTER ASSEMBLY FOR M102 | | | |
| C-22 | 1 | PAOZZ | 5305-00-983-6625 | MS16997-84 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 3 |
| C-22 | 2 | PAOZZ | 5305-00-983-6622 | MS16997-81 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| C-22 | 3 | XBOZZ | | 11578778 | 19206 | CAP | PLD | EA | 1 |
| R C-22 | 4 | PAOZZ | 5305-00914-3818 | MS51985-8 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| C-22 | 5 | XBOZZ | | 11578777-1 | 19206 | GIB, RIGHT | PLK | EA | 1 |
| C-22 | 6 | XBOZZ | | 11578777-2 | 19206 | GIB, LEFT | PLK | EA | 1 |
| C-22 | 7 | PAOZZ | 5305-00-983-6663 | MS1699846 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| C-22 | 8 | PAOZZ | 5305-00-983-6662 | MS16998-45 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 3 |
| C-22 | 9 | XBOZZ | | 11578776 | 19206 | BODY, ADAPTER | PLK | EA | 1 |

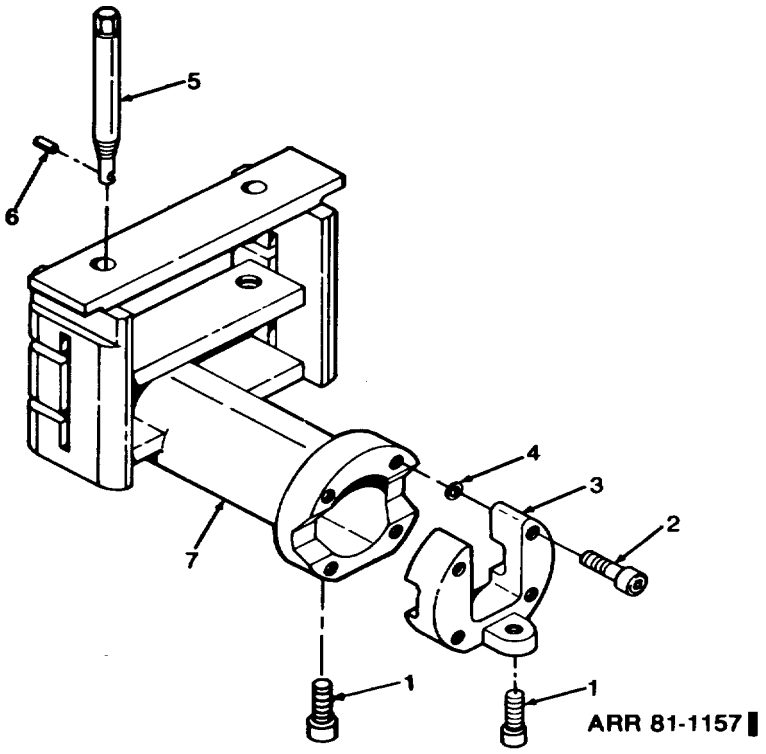



*Figure C-22A. Adapter assembly for M102 - optional manufacture*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ADAPTER ASSEMBLY FOR M102 | | |
| N C-22A | 1 | PAOZZ | 5305-00-983-6662 | MS16998-45 | 96906 | SCREW, SOCKET HEAD: 1/4-28x1 PLD | EA | 2 |
| N C-22A | 2 | PAOZZ | 5306-00-983-6622 | MS16997-81 | 96906 | SCREW, SOCKET HEAD: 5/16-18x1-1/4 PLD | EA | 4 |
| N C-22A | 3 | XBOZZ | | 11578868 | 19206 | CAP PLQ | EA | 1 |
| N C-22A | 4 | PAOZZ | 5365-01-114-0186 | 11578950 | 19206 | RING, SCREW PLR | EA | 4 |
| N C-22A | 5 | XBOZZ | | 11578969 | 19206 | SCREW, LOCK PLK | EA | 2 |
| N C-22A | 6 | PAOZZ | 5315-00-710-2735 | MS16562-122 | 96906 | PIN, SPRING PLK | EA | 2 |
| N C-22A | 7 | XBOZZ | | 11578968 | 19206 | BODY, ADAPTER PLK | EA | 1 |

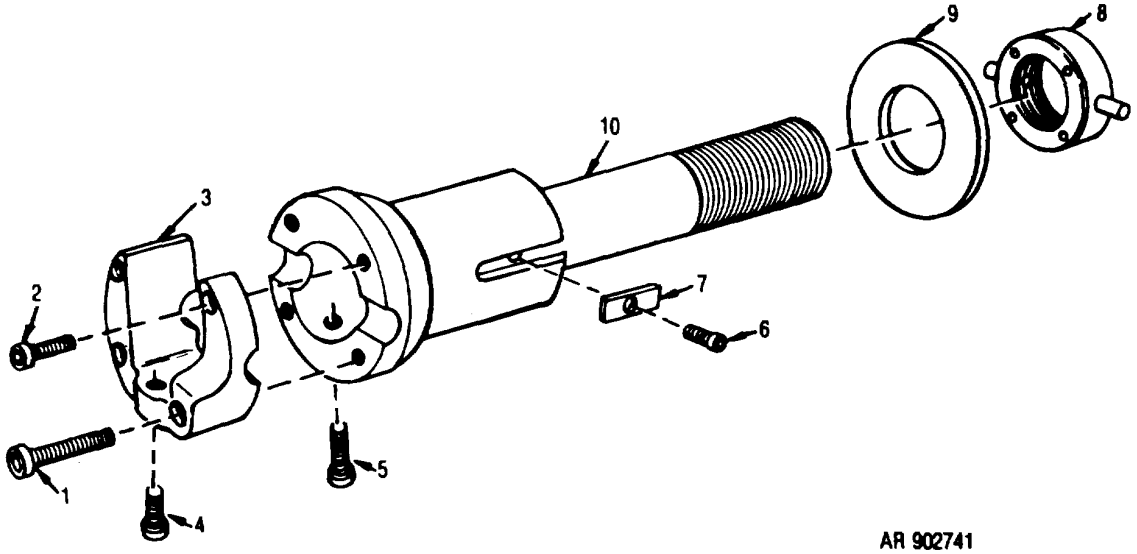
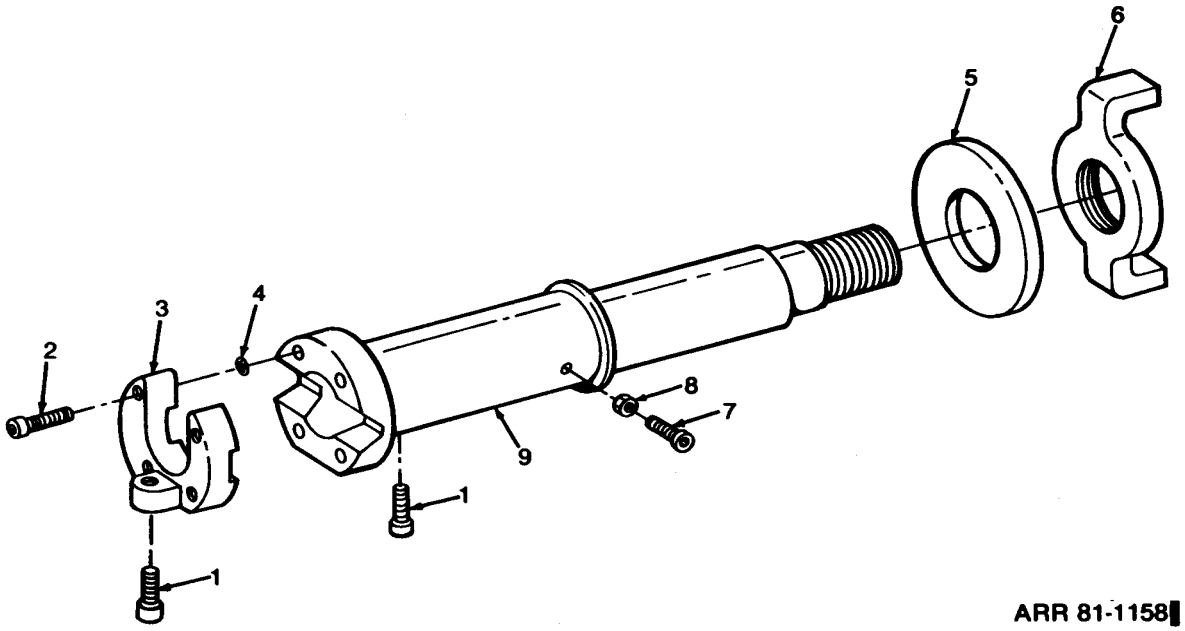



*Figure C-23. Adapter assembly for M 14 and MII4AI - exploded view*

| | (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | ADAPTER ASSEMBLY FOR M114 AND M114A1 | | | |
| I | C-23 | 1 | PAOZZ | 5305-00-983-6625 | MS16997-84 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 3 |
| | C-23 | 2 | PAOZZ | 5305-00-983-6622 | MS16997-81 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| C | C-23 | 3 | XBOZZ | | 11578778 | 19206 | CAP | PLD | EA | 1 |
| | C-23 | 4 | PAOZZ | 5305-00-983-6662 | MS1699845 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| | C-23 | 5 | PAOZZ | 5305-00-983-6663 | MS1699846 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| | C-23 | 6 | PAOZZ | 5305-00-983-6648 | MS16998-9 | 96906 | SCREW, SOCKET HEAD CAP | PLP | EA | 1 |
| R | C-23 | 7 | PAOZZ | 6920-01-020-7832 | 11578836 | 19206 | KEY | PLM | EA | 1 |
| | C-23 | 8 | XBOZZ | | 11578834 | 19206 | NUT ASSEMBLY | PLM | EA | 1 |
| | C-23 | 9 | XBOZZ | | 11578837 | 19206 | WASHER | PLM | EA | 1 |
| | C-23 | 10 | XBOZZ | | 11578835 | 19206 | BODY ASSEMBLY | PLM | EA | 1 |




ARR 81-1158

*Figure C-23A. Adapter assembly for M114A - optional manufacture*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ADAPTER ASSEMBLY FOR M114A1 | | | |
| NC-23A | 1 | PAOZZ | 5305-00-983-6662 | MS1699845 | 96906 | SCREW, SOCKET HEAD: 1/4-28x1 | PLD | EA | 2 |
| FC-23A | 2 | PAOZZ | 5305-00-983-6622 | MS16997-81 | 96906 | SCREW, SOCKET HEAD: 5/16-18x1-114 | PLD | EA | 4 |
| C-23A | 3 | XBOZZ | | 11578868 | 19206 | CAP | PLQ | EA | 1 |
| NC-23A | 4 | PAOZZ | 5365-01-114-0186 | 11578960 | 19206 | RING, SCREW RETAINING | PLR | EA | 4 |
| NC-23A | 5 | XBOZZ | | 11578871-2 | 19206 | WASHER | PLM | EA | 1 |
| NC23A | 6 | XBOZZ | | 11678869-2 | 19206 | NUT | PLM | EA | 1 |
| NC-23A | 7 | PAOZZ | | 11578878 | 19206 | SCREW(MODIFIED) | PLM | EA | 1 |
| NC-23A | 8 | PAOZZ | | MS35691-526 | 96906 | NUT, JAM | PLM | EA | 1 |
| NC-23A | 9 | XBOZZ | | 11578877 | 19206 | BODY, ADAPI'ER | PLM | EA | 1 |

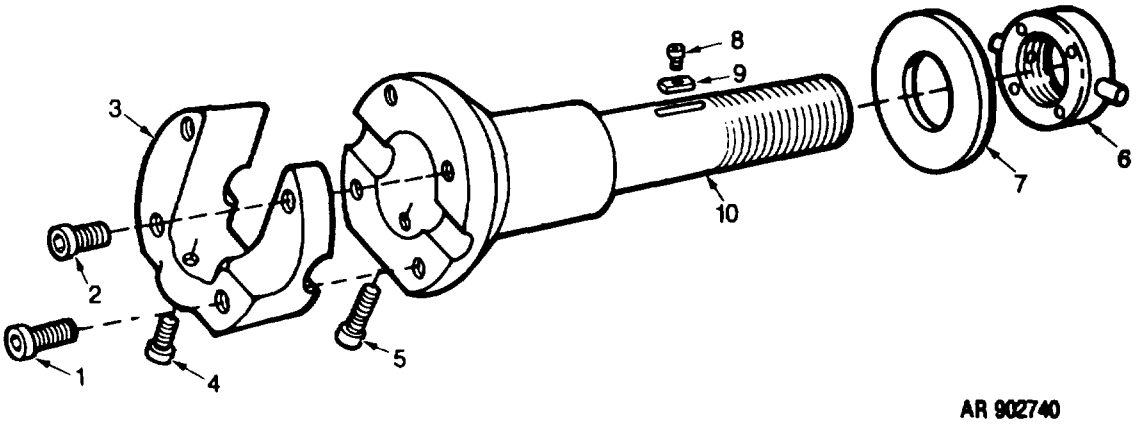



*Figure C-24. Adapter assembly for M107/M109/M109A1/M110 - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION | USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ADAPTER ASSEMBLY FOR M107/M109/M109A1/M110 | | | |
| C-24 | 1 | PAOZZ | 5305-00-983-6625 | MS16997-84 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 3 |
| C-24 | 2 | PAOZZ | 530-00-983-6622 | MS16997-81 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| C-24 | 3 | XBOZZ | | 11578778 | 19206 | CAP | PLA | EA | 1 |
| C-24 | 4 | PAOZZ | 5305-00-983-662 | MS1699845 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| C-24 | 5 | PAOZZ | 5305-00-983-6663 | MS1699846 | 96906 | SCREW, SOCKET HEAD CAP | PLD | EA | 1 |
| C-24 | 6 | XBOZZ | | 11578779 | 19206 | NUT ASSEMBLY | PLA | EA | 1 |
| C-24 | 7 | XBOZZ | | 11578783 | 19206 | WASHER | PLA | EA | 1 |
| C-24 | 8 | PAOZZ | 5305-00-983-6648 | MS16998-9 | 96906 | SCREW, SOCKET HEAD CAP | PLP | EA | 1 |
| **R** C-24 | 9 | PAOZZ | 6920-01-011-8156 | 11578784 | 19206 | KEY | PLM | EA | 1 |
| C-24 | 10 | XBOZZ | | 11578781 | 19206 | BODY, ADAPTER | PLA | EA | 1 |

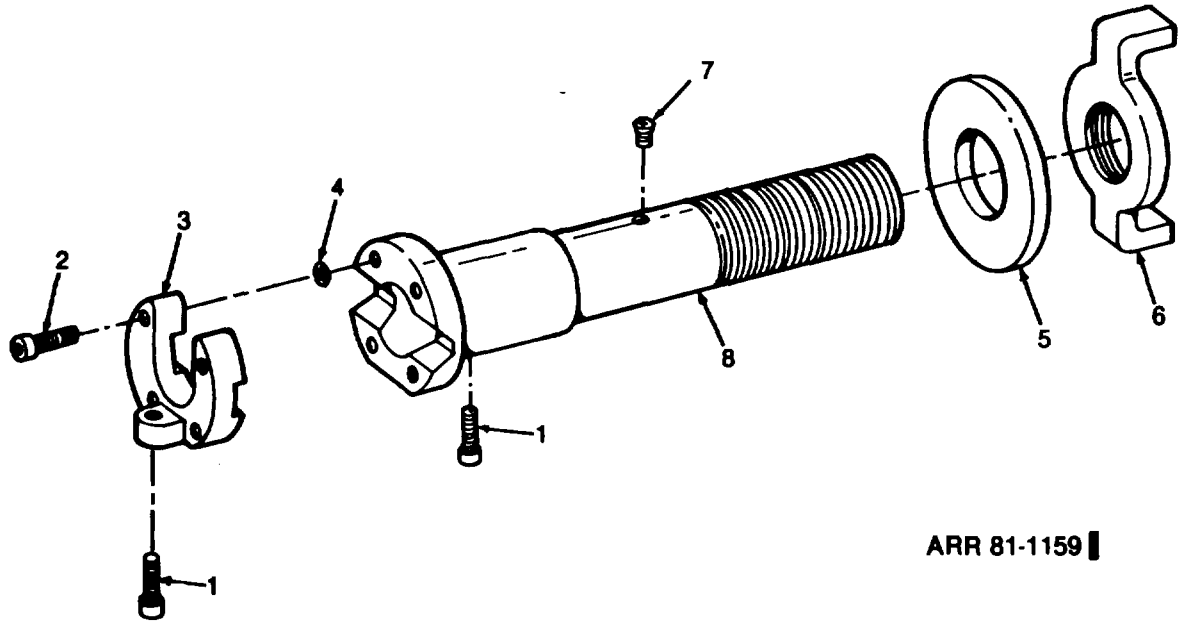



*Figure C-24A. Adapter assembly for M109/M109A1/M110 - optional manufacture*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ADAPTER ASSEMBLY FOR M109/M109A1/ M109A2/M110A2 | | | |
| **N** C-24A | 1 | PAOZZ | 5305-00-983-6662 | MS16998-45 | 96906 | SCREW, SOCKET HEAD: 1/4-28x1 | PLD | EA | 2 |
| **N** C-24A | 2 | PAOZZ | 5305-00-983-6622 | MS16997-81 | 96906 | SCREW, SOCKET HEAD: 5/16-18x1-114 | PLD | EA | 4 |
| **N** C-24A | 3 | XBOZZ | | 11578868 | 19206 | CAP | PLQ | EA | 1 |
| **N** C-24A | 4 | PAOZZ | 5366-01-114-0186 | 11578950 | 19206 | RING, SCREW RETAINING | PLR | EA | 4 |
| **N** C-24A | 5 | XBOZZ | | 11578871-1 | 19206 | WASHER | PLA | EA | 1 |
| **N** C-24A | 6 | XBOZZ | | 11578869-1 | 19206 | NUT | PLS | EA | 1 |
| **N** C-24A | 7 | PAOZZ | | 11578872 | 19206 | SCREW(MODIFIED) | PLA | EA | 1 |
| **N** C-24A | 8 | XBOZZ | | 11578867 | 19206 | BODY, ADAPTER | PLA | EA | 1 |

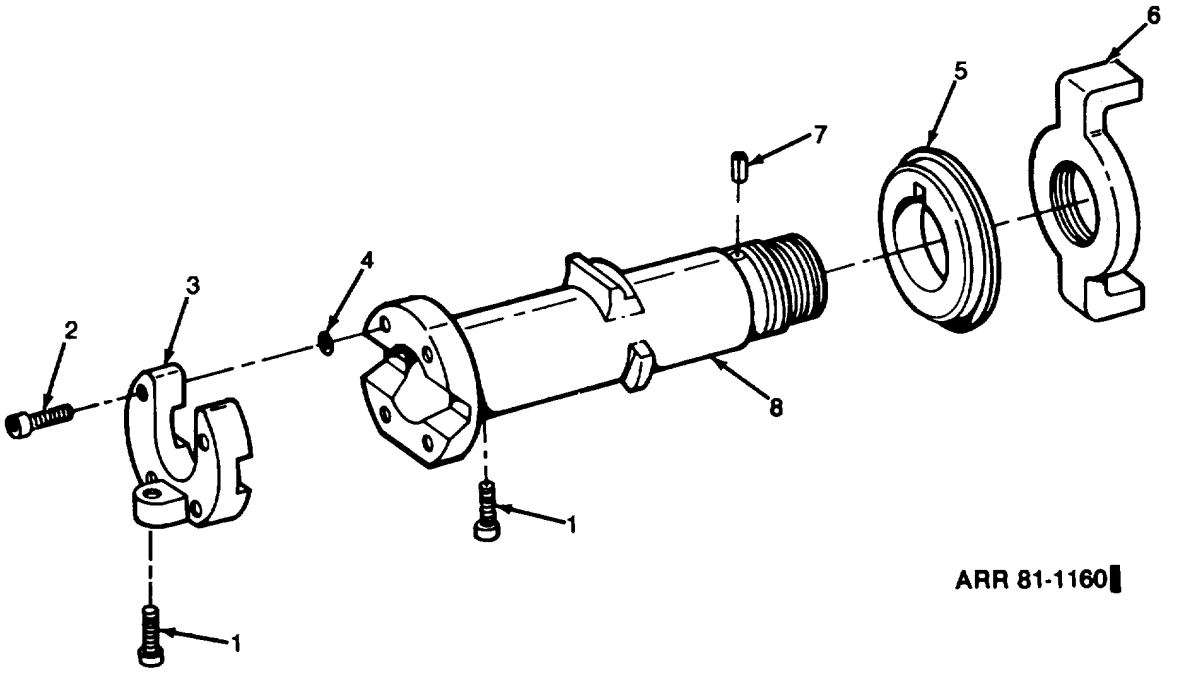
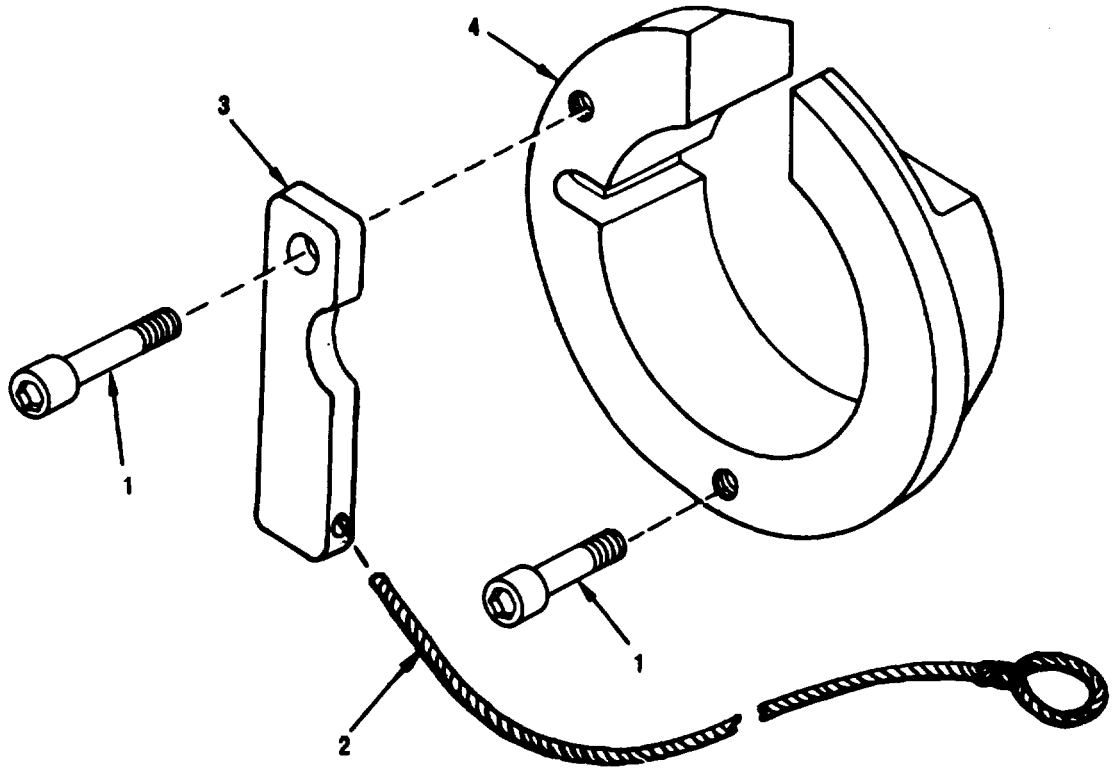



*Figure C-24B. Adapter assembly for M198*

| (1) ILLUSTRATION (a) FIG NO. UNIT | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ADAPTER ASSEMBLY FOR M198 | | | |
| NC-24B | 1 | PAOZZ | 5305-00-983-6662 | MS16998-45 | 96906 | SCREW, SOCKET HEAD: 1/4-28x1 | PLD | EA | 2 |
| NC-24B | 2 | PAOZZ | 5305-00-983-6622 | MS16997-81 | 96906 | SCREW, SOCKET HEAD: 5/16-18x1-1/4 | PLD | EA | 4 |
| NC-24B | 3 | XBOZZ | | 11578868 | 19206 | CAP | PLQ | EA | 1 |
| NC-24B | 4 | PAOZZ | 5365-01-114-0186 | 11578950 | 19206 | RING, SCREW | PLR | EA | 4 |
| NC-24B | 5 | XBOZZ | | 11579603 | 19206 | WASHER, STEP | PLQ | EA | 1 |
| NC-24B | 6 | XBOZZ | | 11578869-1 | 19206 | NUT | PLS | EA | 1 |
| NC-24B | 7 | PAOZZ | 5315058-6111 | MS16562-140 | 96906 | PIN, SPRING | PLQ | EA | 1 |
| NC-24B | 8 | XBOZZ | | 11579604 | 19206 | BODY, ADAPTER | PLQ | EA | 1 |




AR 902739

*Figure C-25. Lanyard ring assembly, 14.5mm gun - exploded view*

| (1) ILLUSTRATION (a) FIG NO. | (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | LANYARD RING ASSEMBLY | | | |
| C-25 | 1 | PAOZZ | 5305-00-939-0661 | MS1975-1 | 96906 | SCREW, SOCKET HEAD CAP: 10-24UNC-3/8 | PLD | EA | 2 |
| R C-25 | 2 | PAOZZ | 6920-01-011-8155 | 11578774 | 19206 | LANYARD, BRAIDED | PLD | EA | 1 |
| C-25 | 3 | XBOZZ | | 11578773 | 19206 | LEVER | PLD | EA | 1 |
| C-25 | 4 | XDOZZ | | 1578771 | 19206 | HOLDER | PLD | EA | 1 |

## Section V. SPECIAL TOOLS LIST

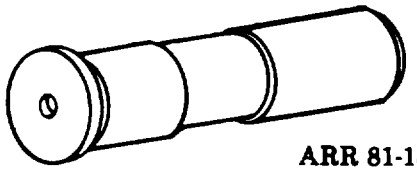



*Figure C-26. Headspace gage*

| (1) ILLUSTRATION (a) FIG NO. | (1) ILLUSTRATION (b) ITEM NO. | (2) SMR CODE | (3) NATIONAL STOCK NUMBER | (4) PART NUMBER | (5) FSCM | (6) DESCRIPTION USABLE ON CODE | (7) U/M | (8) QTY INC IN UNIT |
|---|---|---|---|---|---|---|---|---|
| **N** C-26 | 1 | PAFZZ | 6920-01-025-4596 | 11578863 | 19206 | HEADSPACE GAGE | EA | 1 |

## Section VI. NATIONAL STOCK NUMBER AND PART NUMBER INDEX

| STOCK NUMBER | FIG. No. | ITEM No. | STOCK NUMBER | FIG. No. | ITEM No. |
|---|---|---|---|---|---|
| 1005-00-508-2589 | C-1 | 2 | 5305-00-983-6622 | C24A | 2 |
| 1005-00-653-5441 | C-1 | 4 | 5305-00-983-6622 | C-24B | 2 |
| 3020-00-867-5265 | C-12 | 6 | 5305-00-983-6625 | C-21 | 1 |
| 3020-00-867-5268 | C-12 | 8 | 5305-00-983-6625 | C-22 | 1 |
| 3020-00-867-5274 | C-13 | 2 | 5305-00-983-6625 | C-23 | 1 |
| 3020-00-867-5282 | C-11 | 5 | 5305-00-983-6625 | C-24 | 1 |
| 5305-00-054-6650 | C-20 | 2 | 5305-00-983-6648 | C-23 | 6 |
| 5305-00-069-8691 | C-9 | 9 | 5305-00-983-6648 | C-24 | 8 |
| 5305-00-069-8692 | C-6 | 6 | 5305-00-983-6662 | C-21 | 6 |
| 5305-00-069-8693 | C-13 | 4 | 5305-00-983-6662 | C-21A | 1 |
| 5305-00-069-8694 | C-9 | 3 | 5305-00-983-6662 | C-22 | 8 |
| 5305-00-069-8695 | C-7 | 1 | 5305-00-983-6662 | C-22A | 1 |
| 5305-00-069-8697 | C-18 | 1 | 5305-00-983-6662 | C-23 | 4 |
| 5305-00-069-8698 | C-8 | 4 | 5305-00-983-6662 | C-23A | 1 |
| 5305-00-069-8699 | C-18 | 3 | 5305-00-983-6662 | C-24 | 4 |
| 5305-00-069-8700 | C-6 | 1 | 5305-00-983-6662 | C-24A | 1 |
| 5305-00-069-8700 | C-12 | 9 | 5305-00-983-6662 | C-24B | 1 |
| 5305-00-069-8701 | C-4 | 1 | 5305-00-983-6663 | C-21 | 7 |
| 5305-00-069-8702 | C-5 | 8 | 5305-00-983-6663 | C-22 | 7 |
| 5305-00-069-8703 | C-5 | 1 | 5305-00-983-6663 | C-23 | 5 |
| 5305-00-069-8704 | C-16 | 2 | 5305-00-983-6663 | C-24 | 5 |
| 5305-00-069-8705 | C-15 | 3 | 5305-00-983-7469 | C-21 | 4 |
| 5305-00-069-8706 | C-15 | 5 | 5305-00-983-7469 | C-21A | 5 |
| 5305-00-914-3818 | C-22 | 4 | 5306-00-871-8488 | C-14 | 4 |
| 5305-00-939-0661 | C-25 | 1 | 5306-00-871-8490 | C-16 | 6 |
| 5305-00-983-6622 | C-21 | 2 | 5310-00-616-3555 | C-20 | 3 |
| 5305-00-983-6622 | C-21A | 2 | 5315-00-058-6111 | C-24B | 7 |
| 5305-00-983-6622 | C-22 | 2 | 5315-00-236-8345 | C-5 | 3 |
| 5305-00-983-6622 | C-22A | 2 | 5315-00-710-2735 | C-22A | 6 |
| 5305-00-983-6622 | C-23 | 2 | 5340-00-984-5206 | C-20 | 4 |
| 5305-00-983-6622 | C-23A | 2 | 5360-00-867-5251 | C-10 | 4 |
| 5305-00-983-6622 | C-24 | 2 | | | |

| STOCK NUMBER | FIG. No. | ITEM No. |
|---|---|---|
| 5360-00-867-5257 | C-8 | 7 |
| 5360-00-867-5280 | C-9 | 6 |
| 5360-00-867-5281 | C-9 | 7 |
| 5360-00-867-5303 | C-4 | 4 |
| 5360-00-867-5311 | C-5 | 12 |
| 5360-00-950-2997 | C-5 | 6 |
| 5360-00-950-2997 | C-5 | 10 |
| 5360 00-993-7572 | C-4 | 9 |
| 5360-00-993-7572 | C-4 | 14 |
| 5365-01-114-0186 | C-21A | 4 |
| 5365-01-114-0186 | C-22A | 4 |
| 5365-01-114-0186 | C-23A | 4 |
| 5365-01-114-0186 | C-24A | 4 |
| 5365-01-114-0186 | C-24B | 4 |
| 6920-00-095-2576 | C-3 | 4 |
| 6920-00-095-2578 | C-3 | 1 |
| 6920-00-345-8947 | C-3 | 2 |
| 6920-00-345-8949 | C-3 | 3 |
| 6920-00-378-9823 | C-2 | 1 |
| 6920-00-378-9824 | C-2 | 2 |
| 6920-00-456-5968 | C-2 | 3 |
| 6920-00-867-5246 | C-10 | 3 |
| 6920-00-867-5248 | C-10 | 5 |
| 6920-00-867-5249 | C-10 | 2 |
| 6920-00-867-5252 | C-6 | 5 |
| 6920-00-867-5253 | C-6 | 4 |
| 6920-00-867-5255 | C-6 | 7 |
| 6920-00-867-5258 | C-11 | 4 |
| 6920-00-867-5258 | C-12 | 2 |
| 6920-00-867-5259 | C-10 | 1 |
| 6920-00-867-5259 | C-11 | 3 |
| 6920-00-867-5259 | C-12 | 1 |
| 6920-00-867-5259 | C-12 | 2 |
| 6920-00-867-5260 | C-12 | 7 |
| 6920-00-867-5261 | C-12 | 3 |
| 6920-00-867-5262 | C-12 | 5 |
| 6920-00-867-5263 | C-12 | 11 |
| 6920-00-867-5264 | C-12 | 4 |
| 6920-00-867-5267 | C-12 | 10 |
| 6920-00-867-5269 | C-8 | 2 |
| 6920-00-867-5270 | C-8 | 1 |
| 6920-00-867-5271 | C-6 | 3 |
| 6920-00-867-5272 | C-13 | 1 |
| 6920-00-867-5272 | C-14 | 3 |
| 6920-00-867-5272 | C-16 | 5 |
| 6920-00-867-5273 | C-13 | 3 |
| 6920-00-867-5275 | C-13 | 5 |
| 6920-00-867-5276 | C-9 | 5 |
| 6920-00-867-5277 | C-11 | 6 |
| 6920-00-867-5278 | C-11 | 2 |
| 6920-00-867-5279 | C-11 | 1 |
| 6920-00-867-5283 | C-7 | 6 |
| 6920-00-867-5284 | C-7 | 3 |
| 6920-00-867-5285 | C-8 | 5 |
| 6920-00-867-5286 | C-9 | 10 |
| 6920-00-867-5287 | C-18 | 9 |
| 6920-00-867-5288 | C-18 | 10 |
| 6920-00-867-5289 | C-18 | 8 |
| 6920-00-867-5290 | C-18 | 6 |
| 6920-00-867-5291 | C-18 | 4 |
| 6920-00-867-5292 | C-18 | 7 |
| 6920-00-867-5293 | C-18 | 2 |
| 6920-00-867-5294 | C-5 | 11 |
| 6920-00-867-5296 | C-4 | 12 |
| 6920-00-867-5297 | C-4 | 7 |
| 6920-00-867-5299 | C-4 | 11 |
| 6920-00-867-5300 | C-4 | 10 |
| 6920-00-867-5301 | C-4 | 6 |
| 6920-00-867-5302 | C-4 | 5 |
| 6920-00-867-5304 | C-8 | 8 |
| 6920-00-867-5305 | C-18 | 5 |
| 6920-00-967-5306 | C-5 | 9 |
| 6920-00-867-5308 | C-4 | 2 |
| 6920-00-867-5309 | C-5 | 13 |
| 6920-00-867-5310 | C-5 | 15 |
| 6920-00-867-5313 | C-5 | 14 |
| 6920-00-867-5314 | C-5 | 7 |
| 6920-00-867-5317 | C-5 | 4 |
| 6920-00-867-5318 | C-5 | 5 |
| 6920-00-867-5320 | C-5 | 2 |
| 6920-00-867-5321 | C-16 | 11 |
| 6920-00-867-5321 | C- 17 | 4 |
| 6920-00-867-5323 | C-14 | 2 |
| 6920-00-867-5323 | C-16 | 4 |
| 6920-00-867-5324 | C-14 | 1 |
| 6920-00-867-5324 | C-16 | 3 |
| 6920-00-867-5325 | C-16 | 10 |
| 6920-00-867-5325 | C-17 | 3 |
| 6920-00-867-5326 | C-16 | 8 |
| 6920-00-867-5326 | C-17 | 1 |
| 6920-00-867-5328 | C-17 | 2 |
| 6920-00-867-5329 | C-16 | 9 |
| 6920-00-867-5330 | C-16 | 1 |
| 6920-00-867-5332 | C-16 | 7 |
| 6920-00-867-5333 | C-15 | 6 |
| 6920-00-867-5334 | C-7 | 5 |
| 6920-00-867-5334 | C-15 | 2 |
| 6920-00-867-5335 | C-15 | 4 |
| 6920-00-867-6588 | C-11 | 7 |
| 6920-00-867-8878 | C-9 | 4 |
| 6920-00-867-8879 | C-4 | 8 |
| 6920-00-868-5662 | C-4 | 3 |
| 6920-00-927-1157 | C-4 | 13 |
| 5310-01-056-7463 | C-6 | 2 |
| 6920-01-011-8155 | C-25 | 2 |
| 6920-01-011-8156 | C-24 | 9 |
| 6920-00-020-7832 | C-23 | 7 |
| 6290-01-025-4596 | C-26 | 1 |

| STOCK NUMBER | FIG. No. | ITEM No. |
|---|---|---|
| 6920-01-040-1486 | C-1 | 3 |
| 6920-01-117-3637 | C-3 | 5 |

| STOCK NUMBER | FIG. No. | ITEM No. |
|---|---|---|
| 7520-00-935-9815 | C-1 | 1 |

| PART NUMBER | FSCM | FIG. NO. | ITEM NO. |
|---|---|---|---|
| L-B-00565 | 81348 | C-1 | 1 |
| MS16562-122 | 96906 | C-22A | 6 |
| MS16562-140 | 96906 | C-24B | 7 |
| MS16997-152 | 96906 | C-21 | 4 |
| MS16997-152 | 96906 | C-21A | 5 |
| MS16997-81 | 96906 | C-21 | 2 |
| MS16997-81 | 96906 | C-21A | 2 |
| MS16997-81 | 96906 | C-22 | 2 |
| MS16997-81 | 96906 | C-22A | 2 |
| MS16997-81 | 96906 | C-23 | 2 |
| MS16997-81 | 96906 | C-23A | 2 |
| MS16997-81 | 96906 | C-24 | 2 |
| MS16997-81 | 96906 | C-24A | 2 |
| MS16997-81 | 96906 | C-24B | 2 |
| MS16997-84 | 96906 | C-21 | 1 |
| MS16997-84 | 96906 | C-22 | 1 |
| MS16997-84 | 96906 | C-23 | 1 |
| MS16997-84 | 96906 | C-24 | 1 |
| MS16998-45 | 96906 | C-21 | 6 |
| MS16998-45 | 96906 | C-21A | 1 |
| MS16998-45 | 96906 | C-22 | 8 |
| MS16998-45 | 96906 | C-22A | 1 |
| MS16998-45 | 96906 | C-23 | 4 |
| MS16998-45 | 96906 | C-23A | 1 |
| MS16998-45 | 96906 | C-24 | 4 |
| MS16998-45 | 96906 | C-24A | 1 |
| MS16998-45 | 96906 | C-24B | 1 |
| MS16998-46 | 96906 | C-21 | 7 |
| MS16998-46 | 96906 | C-22 | 7 |
| MS16998-46 | 96906 | C-23 | 5 |
| MS16998-46 | 96906 | C-24 | 5 |
| MS16998-9 | 96906 | C-23 | 6 |
| MS16998-9 | 96906 | C-24 | 8 |
| MS24585-C10 | 96906 | C4 | 9 |
| MS24585-C10 | 96906 | C4 | 14 |
| MS24585-C12 | 96906 | C4 | 11 |
| MS24585-C282 | 96906 | C-8 | 7 |
| MS24585-C49 | 96906 | C-5 | 12 |
| MS24585-C80 | 96906 | C-5 | 6 |
| MS24585-C80 | 96906 | C-5 | 10 |
| MS24665-5 | 96906 | C-5 | 3 |
| MS35333-71 | 96906 | C-20 | 3 |
| MS35691-526 | 96906 | C-23A | 8 |
| MS51957-26 | 96906 | C-20 | 2 |
| MS51975-1 | 96906 | C-25 | 1 |
| MS51985-8 | 96906 | C-22 | 4 |

| PART NUMBER | FSCM | FIG. NO. | ITEM NO. |
|---|---|---|---|
| 10531763-4 | 19206 | C-20 | 4 |
| 11578578 | 19206 | C-4 | 2 |
| 11578600 | 19206 | C-4 | 12 |
| 11578601 | 19206 | C4 | 3 |
| 11578604 | 19204 | C-5 | 15 |
| 11578606 | 19206 | C-4 | 6 |
| 11578607 | 19206 | C-5 | 14 |
| 11578608 | 19206 | C-4 | 8 |
| 11578609 | 19206 | C-4 | 10 |
| 11578610 | 19206 | C-4 | 5 |
| 11578611 | 19206 | C-4 | 13 |
| 11578612 | 19206 | C-4 | 1 |
| 11578613 | 19206 | C-4 | 4 |
| 11578615 | 19206 | C-9 | 5 |
| 11578617 | 19206 | C-5 | 4 |
| 11578618 | 19206 | C-10 | 2 |
| 11578619 | 19206 | C-10 | 5 |
| 11578620 | 19206 | C-9 | 11 |
| 11578621 | 19206 | C-13 | 5 |
| 11578622 | 19206 | C-5 | 8 |
| 11578623 | 19206 | C-5 | 5 |
| 11578624 | 19206 | C-5 | 7 |
| 11578628 | 19206 | C-5 | 13 |
| 11578630 | 19206 | C-5 | 11 |
| 11578631 | 19206 | C-4 | 7 |
| 11578632 | 19206 | C-5 | 9 |
| 11578635 | 19206 | C-11 | 5 |
| 11578636 | 19206 | C-8 | 4 |
| 11578637 | 19206 | C-10 | 3 |
| 11578638 | 19206 | C-6 | 6 |
| 11578639 | 19206 | C-11 | 6 |
| 11578640 | 19206 | C-6 | 3 |
| 11578641 | 19206 | C-9 | 7 |
| 11578642 | 19206 | C-9 | 6 |
| 11578643 | 19206 | C-13 | 2 |
| 11578644 | 19206 | C-9 | 4 |
| 11578645 | 19206 | C-6 | 4 |
| 11578646 | 19206 | C-6 | 5 |
| 11578647 | 19206 | C-6 | 7 |
| 11578648 | 19206 | C-8 | 5 |
| 11578649 | 19206 | C-8 | 8 |
| 11578650 | 19206 | C-12 | 6 |
| 11578651 | 19206 | C- 1 | 4 |

| PART NUMBER | FSCM | FIG. NO. | ITEM NO. |
|---|---|---|---|
| | 19206 | C-12 | 2 |
| 11578652 | 19206 | C-12 | 7 |
| 11578653 | 19206 | C-12 | 10 |
| 11578654 | 19206 | C-9 | 10 |
| 11578655 | 19206 | C-8 | 2 |
| 11578656 | 19206 | C-12 | 8 |
| 11578657 | 19206 | C-6 | 1 |
| 11578657 | 19206 | C-12 | 9 |
| 11578658 | 19206 | C-12 | 5 |
| 11578659 | 19206 | C-7 | 6 |
| 11578660 | 19206 | C-10 | 4 |
| 11578661 | 19206 | C-11 | 7 |
| 11578662 | 19206 | C-9 | 3 |
| 11578664 | 19206 | C-11 | 1 |
| 11578665 | 19206 | C-11 | 2 |
| 11578666 | 19206 | C-13 | 4 |
| 11578667 | 19206 | C-13 | 1 |
| 11578667 | 19206 | C-14 | 3 |
| 11578667 | 19206 | C-16 | 5 |
| 11578668 | 19206 | C-13 | 3 |
| 11578669 | 19206 | C-8 | 1 |
| 11578672 | 19206 | C-12 | 4 |
| 11578673 | 19206 | C-12 | 3 |
| 11578678 | 19206 | C-6 | 2 |
| 11578679 | 19206 | C-9 | 9 |
| 11578080 | 19206 | C-10 | 1 |
| 11578680 | 19206 | C-11 | 3 |
| 11578680 | 19206 | C-12 | 1 |
| 11578681 | 19206 | C-14 | 2 |
| 11578681 | 19206 | C-16 | 4 |
| 11578682 | 19206 | C-15 | 5 |
| 11578683 | 19206 | C-15 | 4 |
| 11578684 | 19206 | C-16 | 7 |
| 11578685 | 19206 | C-17 | 2 |
| 11578688 | 19206 | C-16 | 11 |
| 11578688 | 19206 | C-17 | 4 |
| 11578689 | 19206 | C-15 | 6 |
| 11578690 | 19206 | C-16 | 9 |
| 11578691 | 19206 | C-14 | 1 |
| 11578691 | 19206 | C-16 | 3 |
| 11578692 | 19206 | C-16 | 8 |
| 11578692 | 19206 | C-17 | 1 |
| 11578693 | 19206 | C-14 | 4 |
| 11578694 | 19206 | C-16 | 6 |
| 11578695 | 19206 | C-5 | 2 |
| 11578697 | 19206 | C-18 | 8 |
| 11578698 | 19206 | C-18 | 3 |
| 11578699 | 19206 | C-18 | 11 |
| 11578700 | 19206 | C-2 | 1 |
| 11578701 | 19206 | C-18 | 6 |
| 11578702 | 19206 | C-18 | 5 |
| 11578703 | 19206 | C-18 | 7 |
| 11578704 | 19206 | C-18 | 2 |
| 11578705 | 19206 | C-18 | 1 |
| 11578706 | 19206 | C-18 | 9 |
| 11578707 | 19206 | C-18 | 10 |
| 11578708 | 19206 | C-18 | 4 |
| 11578709 | 19206 | C-12 | 11 |
| 11578710 | 19206 | C-16 | 10 |
| 11578710 | 19206 | C-17 | 3 |
| 11578711 | 19206 | C-16 | 2 |
| 11578712 | 19206 | C-16 | 1 |
| 11578713 | | C-8 | 6 |
| 11578714 | 19206 | C-7 | 2 |
| 11578715 | 19206 | C-7 | 4 |
| 11578715 | 19206 | C-15 | 1 |
| 11578716 | 19206 | C-7 | 5 |
| 11578716 | 19206 | C-15 | 2 |
| 11578717 | 19206 | C-15 | 3 |
| 11578718 | 19206 | C-23 | 3 |
| 11578746 | 19206 | C-7 | 1 |
| 11578747 | 19206 | C-7 | 3 |
| 11578749 | 19206 | C-3 | 2 |
| 11578750 | 19206 | C-3 | 1 |
| 11578752 | 19206 | C-3 | 3 |
| 11578754 | 19206 | C-8 | 3 |
| 11578755 | | C-9 | 8 |
| 11578756 | | C-9 | 1 |
| 11578757 | | C-9 | 2 |
| 11578763 | 19206 | C-1 | 3 |
| 11578764 | 19206 | C-5 | 1 |
| 11578771 | 19206 | C-25 | 4 |
| 11578773 | 19206 | C-25 | 3 |
| 11578774 | 19206 | C-25 | 2 |
| 11578776 | 19206 | C-22 | 9 |
| 11578777-1 | 19206 | C-22 | 5 |
| 11578777-2 | 19206 | C-22 | 6 |
| 11578778 | 19206 | C-21 | 3 |
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By Order of the Secretary of the Army:

FRED C. WEYAND
*General, United States Army*
*Chief of Staff*

Official:

PAUL T. SMITH
*Major General, United States Army*
*The Adjutant General*

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# THE METRIC SYSTEM AND EQUIVALENTS

## NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

## WEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

## LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

## SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

## CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

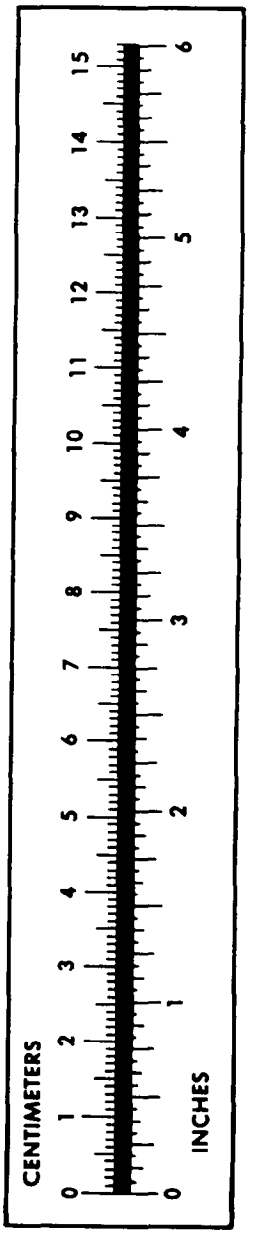
## TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

## APPROXIMATE CONVERSION FACTORS

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

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



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