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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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**FIELD MAINTENANCE**  
**60-MM MORTARS M2 AND M19**  
**60-MM MORTAR MOUNT M5**  
**60-MM MORTAR BASEPLATE**  
**M1; 81-MM MORTARS M1 AND**  
**M29; AND 81-MM MORTAR**  
**AND MOUNTS M4, M23A1**  
**M23A2, AND M23A3**

This copy is a reprint which includes current pages from Change 1.



**HEADQUARTERS, DEPARTMENT OF THE ARMY**  
**JANUARY 1958**

**AGO 3334B-Dec**

CHANGE

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 12 January 1967

No. 1

**Field Maintenance**  
**60MM MORTARS M2 AND M19, 60-MM MORTAR MOUNT**  
**MS, 60-MM MORTAR BASEPLATE MI; 81-MM MORTARS**  
**M1 AND M29 AND 81-MM MORTAR AND MOUNTS M4,**  
**M23A1, M23A2, AND M23A3**

TM 9-3071-1, 6 January 1958, is changed as follows:

Page 23.

**18. Inspection**

a. *Surfaces.*

(1) Painted surfaces will \* \* \* to be repainted (TM 9-213).

b. *Mortar.*

(1) (Superseded) Inspect the mortar tube in accordance with TM 9-1000-202-35. Tubes which have the following bore diameter or less are the only ones acceptable for oversea shipment.

(a) 60-min mortar tube bore diameter must not be greater than 2.406 inches.

(b) 81-MM mortar tube bore diameter must not be greater than 3.222 inches.

\* \* \* \* \*

c. *Mount.*

\* \* \* \* \*

(2) (Superseded) Elevating mechanisms must operate smoothly without binding, and backlash must not exceed a 45-degree turn of the handwheel.

(3) (Superseded) Traversing mechanisms must operate smoothly without binding, and backlash must not exceed a 45-degree turn of the handwheel.

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**19. Inspection**

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b. *Mortar.*

(1) (Superseded) Check mortar tube for pits or other damage in accordance with TM 9-1000-202-85. Pits not exceeding

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3/8-inch in length or width and up to 0.010-inch in depth will not be cause for condemnation. Mortar tubes having pits in excess of these dimensions will be replaced. The improvised tube and firing pin gage (figs. 9 or 10) shall fall freely in tube; any binding will be cause for replacement.

\* \* \* \* \*

e. (Added) Fire-Control Equipment. Inspect the fire-control equipment in accordance with the pertinent technical manuals listed below.

- Aiming Post Lights M114 and M41- ..... TM 9-6015.
- Fuze Setters M14, M'5, and M 7..... TM 9-1590.
- Instrument Light M42 . ..... TM 9-6017.
- Instrument Light M1.53 ..... TM 9-1290-328-35.<sup>1</sup>
- Sightunit M34A2 ..... TM 9-1240-298-35.<sup>1</sup>
- Sightunit M53 ..... TM 9-1240-287-34.<sup>1</sup>

<sup>1</sup> Refer to paragraph on Inspection of Materiel In the Hands of Troops. By Order of the Secretary of the Army:

HAROLD K. JOHNSON,  
*General, United States Army,*  
*Chief of Staff.*

Official:

KENNETH G. WICKHAM,  
*Major General, United States Army,*  
*The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12-40 (Unclas) requirements for Direct and General Support Maintenance applicable to the Mortar, 81MM, M29E1 on Mount M23A3.

**TAGO 1104B**  
**GPO 911-524**

*This manual is correct to 31 October 1957*

TECHNICAL MANUAL

HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
WASHINGTON 25, D. C., 6 January 1958

No. 93071-1

**60-MM MORTARS M2 and M19; 60-MM MORTAR MOUNT M5; 60-MM MORTAR BASEPLATE M1; 81-MM MORTARS M1 AND M29; AND 81-MM MORTAR AND MOUNTS M4, M23A1, M23A2, AND M23A3**

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\*This manual supersedes that portion of TM 9-1260, 14 March 1952, pertaining to field maintenance.

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# CHAPTER 1 INTRODUCTION

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## Section I. GENERAL

### 1. Scope

a. These instructions are published for the use of personnel responsible for field maintenance of this materiel. They contain information on maintenance which is beyond the scope of the tools, equipment, or supplies normally available to using organizations. This manual does not contain information which is intended primarily for the using organization, since such information is available to ordnance maintenance personnel in the pertinent operator's technical manuals or field manuals.

b. This manual contains a description of and procedures for removal, disassembly, inspection, repair, and assembly of the materiel listed below-

- 60-mm mortar M2
- 60-mm mortar M19
- 60-mm mortar mount M5
- 60-mm mortar baseplate M1
- 81-mm mortar M1
- 81-mm mortar M29
- 81-mm mortar mount M4
- 81-mm mortar mounts M23A1, M23A2, and M23A3

c. The appendix contains a list of current references, including supply manuals, technical manuals, and other available publications applicable to the materiel.

d. TM 9-3064, FM 23-85, and FM 23-90 contain operating and lubricating instructions for the materiel and contain all maintenance operations allocated to using organizations in performing maintenance work within their scope.

e. This manual differs from TM 9-1260 as follows:

- (1) Adds information on-
  - 81-mm mortar mount M23A2.
  - 81-mm mortar mount M23A3.
- (2) Revises information on-
  - Inspection.
  - 60-mm mortar mount M5.
  - 81-mm mortar mount M4.

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- (3) Deletes reference to-  
Depot maintenance.  
60-mm mortar mount M2.  
81-mm mortar mount M1.  
81-mm mortar mount M23.

## **2. Field Maintenance Allocation**

The publication of instructions for disassembly and repair is authority for the performance by field maintenance units of replacement and repair in accordance with allocation of maintenance parts listed in appropriate columns of the current ORD 8 supply manuals pertaining to these weapons.

## **3. Forms, Records, and Reports**

*a. General.* Responsibility for the proper execution of forms, records, and reports rests upon the officers of all units maintaining this equipment. The value of accurate records must be fully appreciated by all persons responsible for compilation, maintenance, and use. Records, reports, and authorized forms are normally utilized to indicate the type, quantity, and condition of materiel to be inspected, repaired, or used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops and for delivery of materiel requiring further repair to ordnance shops in arsenals, depots, etc. The forms, records, and reports establish the work required, the progress of the work within the shops, and the status of the materiel upon completion of its repair.

*b. Authorized Forms.* The forms generally applicable to units maintaining these weapons are listed in the appendix. For a listing of all forms, refer to DA Pam 310-2. For instructions on use of these forms, refer to FM 9-10.

*c. Field Report of Accidents.*

- (1) *Injury to personnel or damage to materiel.* The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in SR 385-10-40. These reports are required whenever accidents involving injury to personnel or damage to materiel occur.
- (2) *Ammunition.* Whenever an accident or malfunction involving the use of ammunition occurs, firing of the lot which malfunctions will be immediately discontinued. In addition to any applicable reports required in (1) above, details of the accident or malfunction will be reported as prescribed in SR 700-45-6.

*d. Report of Unsatisfactory Equipment or Materials.* Any deficiencies detected in the equipment covered herein which occur

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under the circumstances indicated in AR 700-38, should be immediately reported in accordance with the applicable instructions in cited regulation.

## Section II. DESCRIPTION AND DATA

### 4. Description

a. The mortars are smooth-bore, muzzle-loading, high angle-of fire weapons. The 60-mm mortar M2 and the 81-mm mortars M1 and M29 consist of a tube and base cap containing a fixed firing pin. The 60-mm mortar M19 contains a firing mechanism which can be set for either drop fire or lever fire.

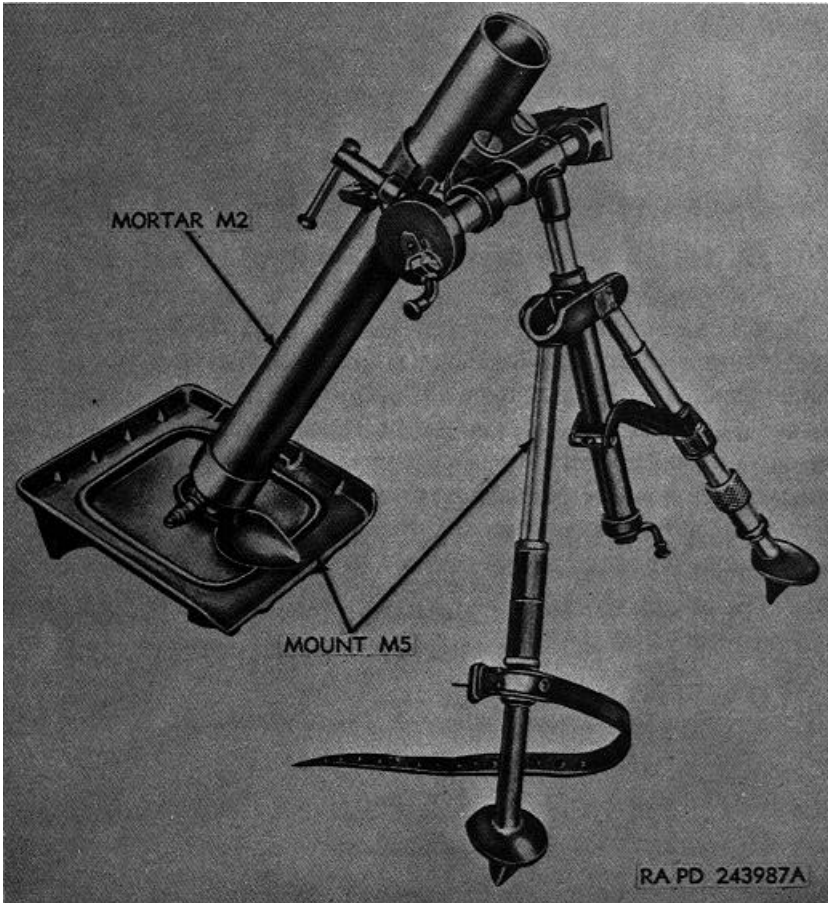
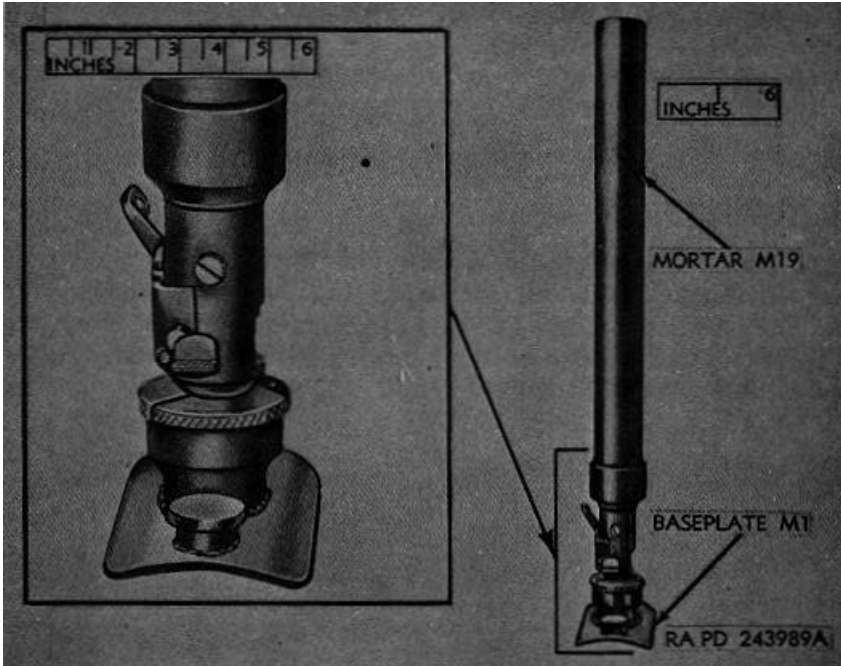


Figure 1. 60-mm mortar M2 and mount M5.

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**Figure 2. 60-mm mortar M19 and 60-mm mortar base plate M1.**

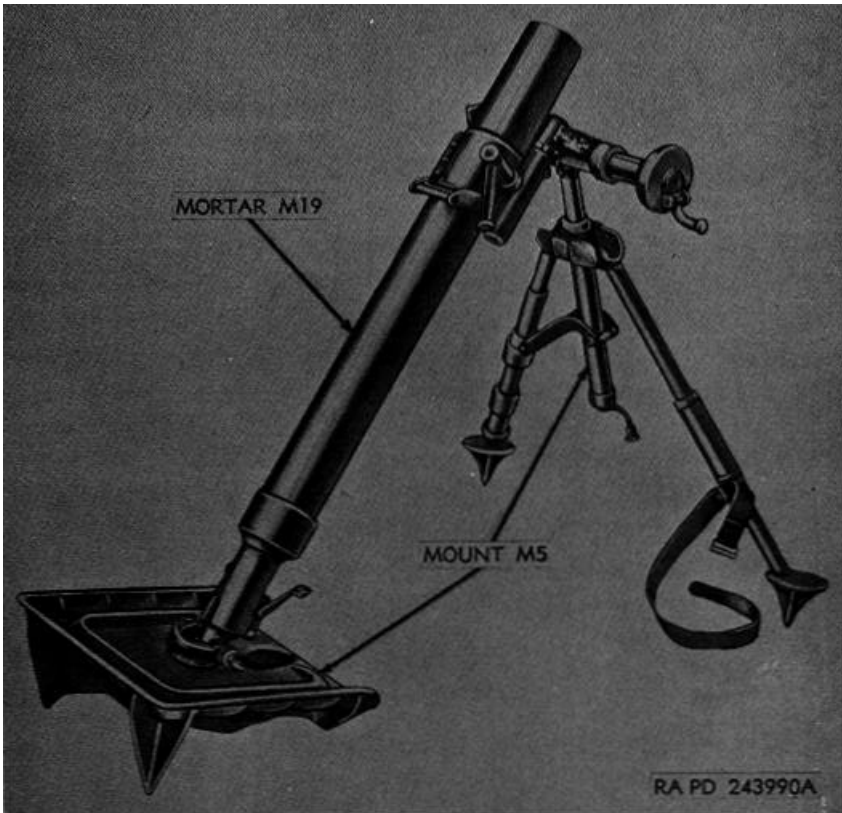
b. The 60-mm mortar M2 and M19 and the 81-mm mortar M1 and M29 are equipped with mounts which consist of a bipod and a yoke provided with screw-type elevating and traversing mechanisms to lay the mortar and a spring-type shock absorber to absorb the shock of recoil in firing. The 60-mm mortar M19 can be equipped with a mount M5 or secured in a suitable baseplate for the proper performance of the mortar. The various combinations of mortars and mounts are listed in table I.

c. The 81-mm mortar M1 and mount M4 (without the baseplate) can be secured in the baseplate of the mortar carriers M4A1 and M21.

Table 1. Combinations of Mortars and Mounts

Mortar	Mount	Figure
60-mm mortar M2	60-mm mortar mount M5	1
	60-mm mortar baseplate M1	2
60-mm mortar M19	60-mm mortar mount M5	3

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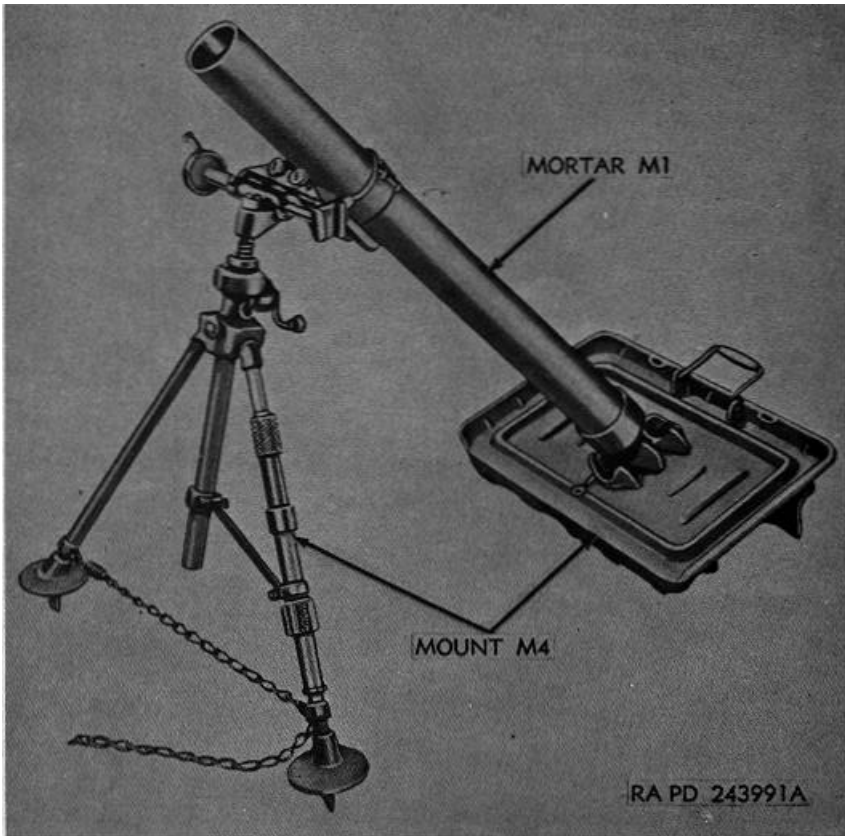


**Figure 3. 60-mm mortar M19 and mount M5.**

Table I-Continued

Mortar	Mount	Figure
81-mm mortar M1	31-mm mortar mount M4	4
	81-mm mortar mount M4 without baseplate, mounted on mortar carrier M4A1 or M21.	6
81-mm mortar M29	81-mm mortar mount M23A1 and 81-mm mortar baseplate M23A1	5
81-mm mortar M29	81-mm mortar mount M23A2	
81-mm mortar M29	81-mm mortar mount M23A3	

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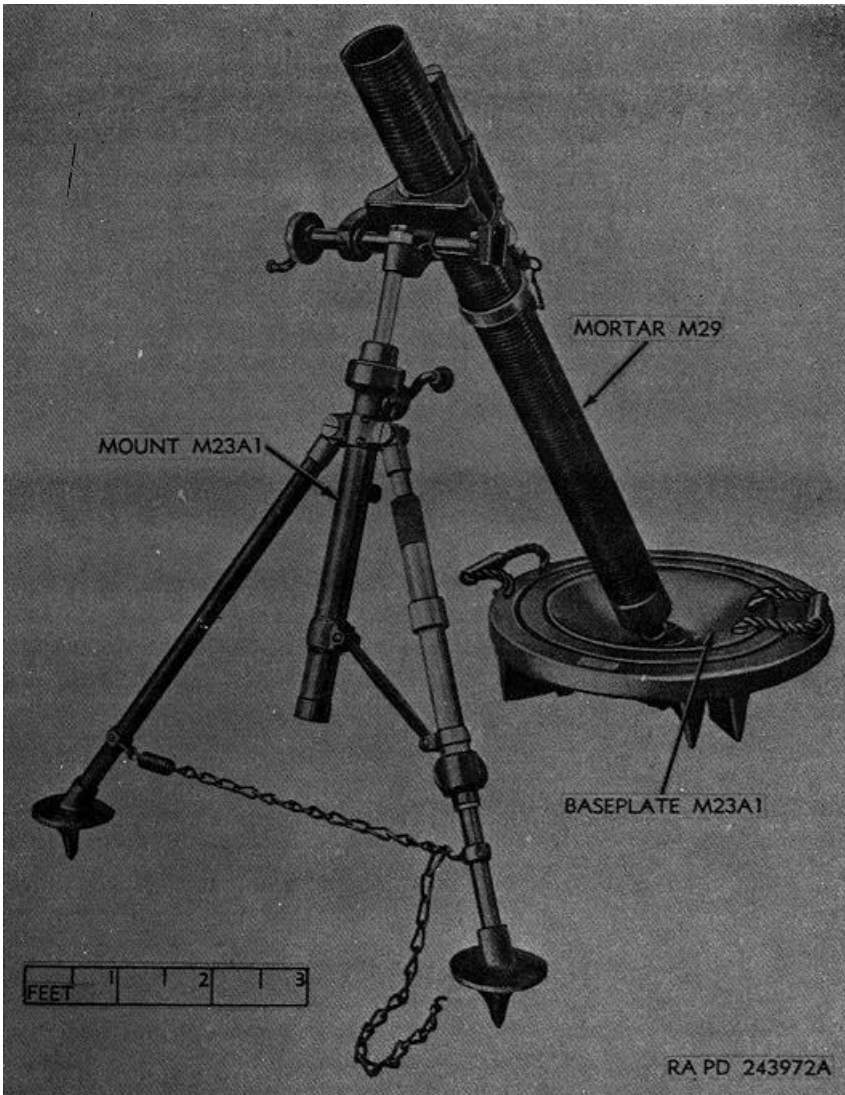
**Figure 4. 81 mm mortar M1 and mount M4.**

## **5. Differences Between Models**

*a. Differences Which Affect Troop Use.* Refer to FM 23-85, FM 23-90, and TM 9-3064.

*b. Differences Which Affect Ordnance Maintenance.*

- (1) The base cap of 60-mm mortar M2 is one piece with a removable firing pin; the combination base cap of 60-mm mortar M19 consists of a base cap extension and a base cap which houses a firing mechanism that can be set for either drop fire or lever fire. Some 60-mm mortars M2, upon designation by the Chief of Ordnance, are being converted to mortars M19 in accordance with MWO ORD A43-W4.
- (2) The 81-mm mortar mount M4 has two compression springs in the shock absorbing mechanism while the 81-mm mortar mounts M23A1, M23A2, and M23A3 have one spring.
- (3) When the 81-mortar M1 and mount M4 are used on mortar carriers, the removable baseplate of the mortar mount is

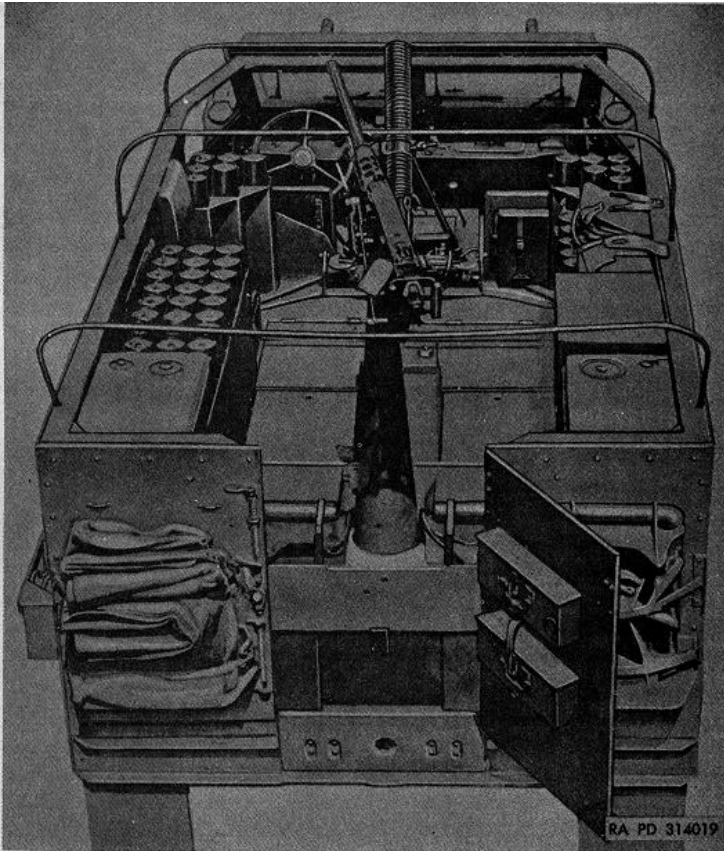


**Figure 5. 81-mm mortar M29, mount M23A1, and baseplate M23A1.**

replaced with a fixed baseplate which is a component of the vehicle body.

- (4) The mount M23A2 is identical with the mount M23A1 except that it is provided with a one-piece titanium baseplate.
- (5) The mount M23A3 is identical with the mount M23A1 except that it is provided with a one-piece aluminum baseplate.

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**Figure 6. 81-mm mortar M1 and mount M4 (without baseplate) on mortar carrier M21.**

**6. Tabulated Data**

*a. 60-mm Mortar M2 and Mount M5.*

Weight of mortar M2 and mount M5.....	42 lb
Weight of mortar M2 .....	12.8 lb
Weight of mount M5 less baseplate .....	16.4 lb
Weight of baseplate .....	12.8 lb
Length of mortar .....	28.58 in.
Elevation (approx.....)	40 to 86 deg
Traverse, right or left (approx).....	125 mils
One turn of traversing handwheel (approx). .....	15 mils

*b. 60-mm Mortar M19, Mount M5, and Baseplate M1.*

Weight of mortar and baseplate M1 .....	20.5 lb
Weight of mortar and mount M5 .....	45.2 lb

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Weight of mortar .....	16.0 lb
Weight of baseplate M1 .....	4.5 lb
Weight of mount M5 w/o baseplate .....	16.4 lb
Weight of baseplate (mount M5) .....	12.8 lb
Length of mortar .....	32.23 in.
Elevation, w/mount MS .....	40 to 85 deg
Elevation, w/baseplate M1 .....	up to 85 deg
Traverse, w/mount M5, right or left .....	125 mils
One turn of traversing handwheel (approx).....	15 mils

*c. 81-mm Mortar M1 and Mount M4.*

Weight of mortar M1 and mount M4 .....	132 lb
Weight of mortar M1 .....	44.5 lb
Weight of mount M4 less baseplate .....	42.5 lb
Weight of baseplate .....	45.0 lb
Length of mortar .....	49.82 in.
Elevation (approx) .....	40 to 85 deg
Traverse, right or left (approx).....	90 mils
One turn of traversing handwheel (approx).....	15 mils

*d. 81-mm Mortar M29, and Mount M2SA1, and Baseplates M23 and M23A1.*

Weight of mortar and mount .....	107.0 lb
Weight of mortar .....	28.0 lb
Weight of mount less baseplate .....	31.0 lb
Weight of baseplate .....	48.0 lb
Length of mortar .....	51.0 in.
Elevation (approx) .....	40 to 85 deg
Traverse, right or left (approx) .....	70 mils
One turn of traversing handwheel (approx) .....	7 mils

**CHAPTER 2**  
**PARTS, SPECIAL TOOLS, AND EQUIPMENT FOR**  
**FIELD MAINTENANCE**

---

**7. General**

Tools and equipment and maintenance parts over and above those available to the using organization are supplied to ordnance field maintenance units for maintaining and repairing the materiel.

**8. Parts**

Maintenance parts are listed in Department of the Army Supply Manuals ORD 8 SNL A33, ORD 8 SNL A-43, and ORD 8 SNL A-82 which are the authority for requisitioning replacements. Requisitions for ORD 9 parts will contain a complete justification of requirements.

**9. Common Tools and Equipment**

Standard and commonly used tools and equipment having general application to this materiel are listed in ORD 6 SNL J-10, Sec. 2. and are authorized for issue by TA and TOE.

**10. Special Tools and Equipment**

The special tools and equipment in table II are listed in Department of the Army Supply Manual ORD 6 SNL J-12. This tabulation contains only those special tools and equipment necessary to perform the operations described in this manual, is included for information only, and is not to be used as a basis for requisitions.

**Note.**

**Special tool sets in ORD 6 SNL J-12, in addition to special tools, also contain standard and commonly used tools and equipment specifically applicable to this materiel.**

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Table II. Special Tools and Equipment for Field Maintenance

Item	Identifying No.	References		Use
		Fig.	Par.	
CHEST, tool, metal w/tray, 7 in. h, 7 in. w, and 10 in. Lg	41-C-853	7	-----	To stow tools.
HANDLE, wrench, firing mechanism housing adapter, lg overall 18 in. (60-mm mortar M19 only).	7230831	7	29c, 32a(4)	Remove and install firing mechanism housing a adapter. Used with WRENCH 7230830
TOOL, cleaning, firing pin vent (81-mm mortar M1 only).	5025032	7	55, 59a	Clean firing pin vent.
TOOL, cleaning, firing pin vent (60-mm mortar M2 only).	5154575	7	27a	Clean firing pin vent.
WRENCH, adapter, firing mechanism housing (60-mm mortar M19 only).	7230830	8	29c, 32a(4)	Remove and install firing mechanism housing adapter. Used with HANDLE 7230831.
WRENCH, spanner, face flat key type, dia it in., lg 5 5/8 in. (60-mm mortar mount M5 only).	7228728	8	33b, 36	Remove and install traversing tube spindle nut assembly.
WRENCH, spanner, hook, dble-end, dia 2 5/8 to 3 1/8 in., lg 9 1/4 in. (81-mm mortar mounts M4, M23A1, M23A2, and M23A3).	6128199	8	65c, k; 68g, i	Remove and install top and side gear case covers.

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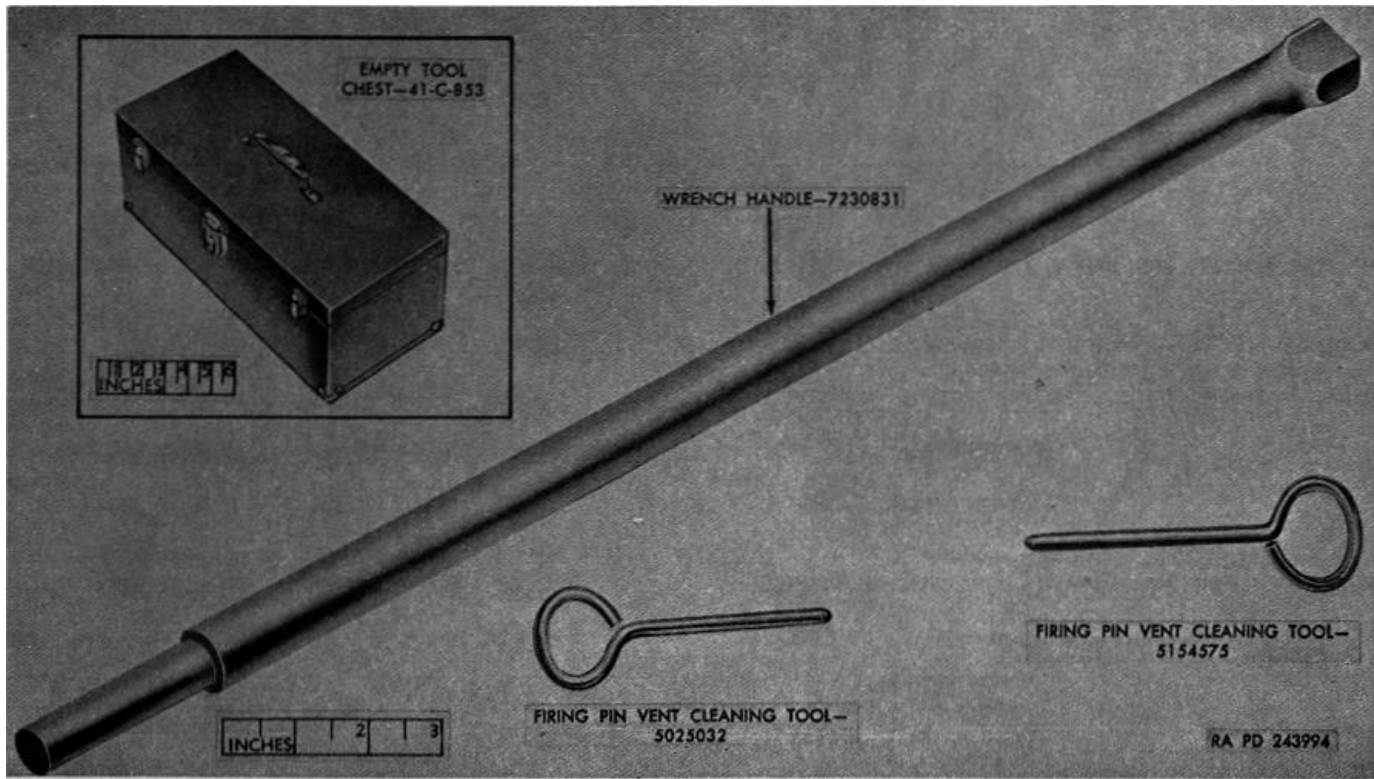


Figure 7. Special maintenance tools and tool chest for mortars.

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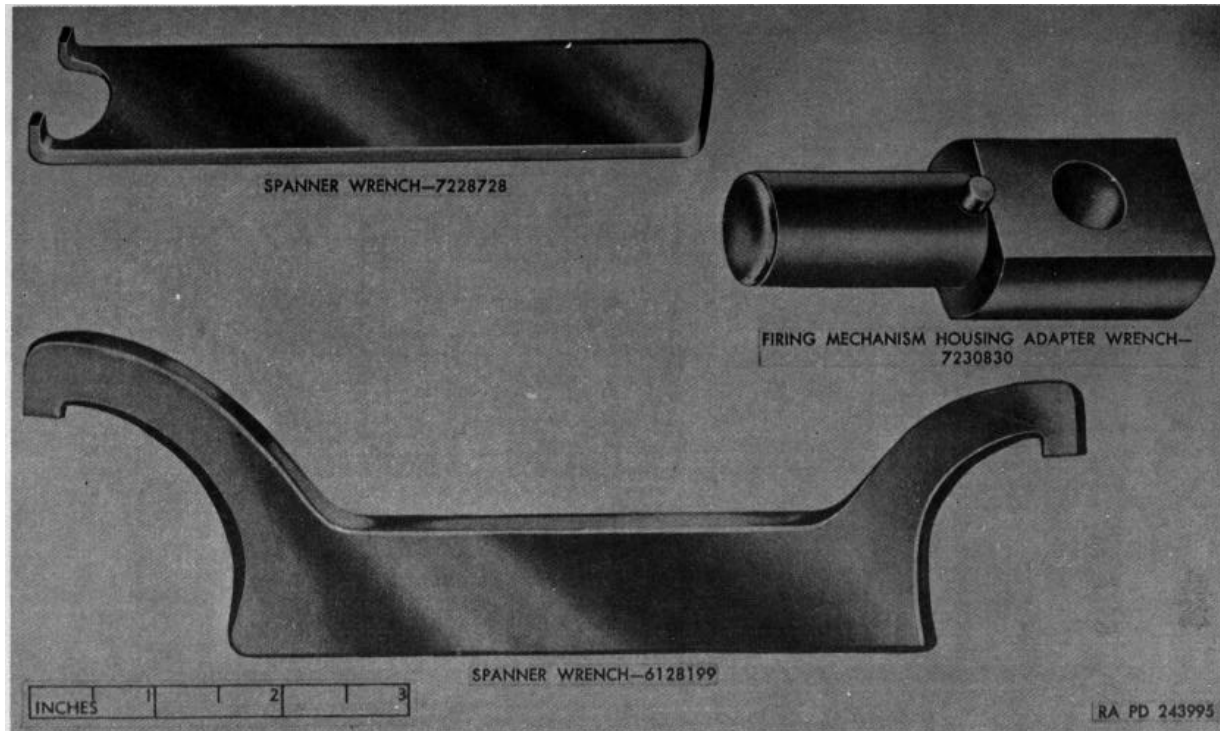


Figure 8. Special maintenance tools for mortars and mounts.

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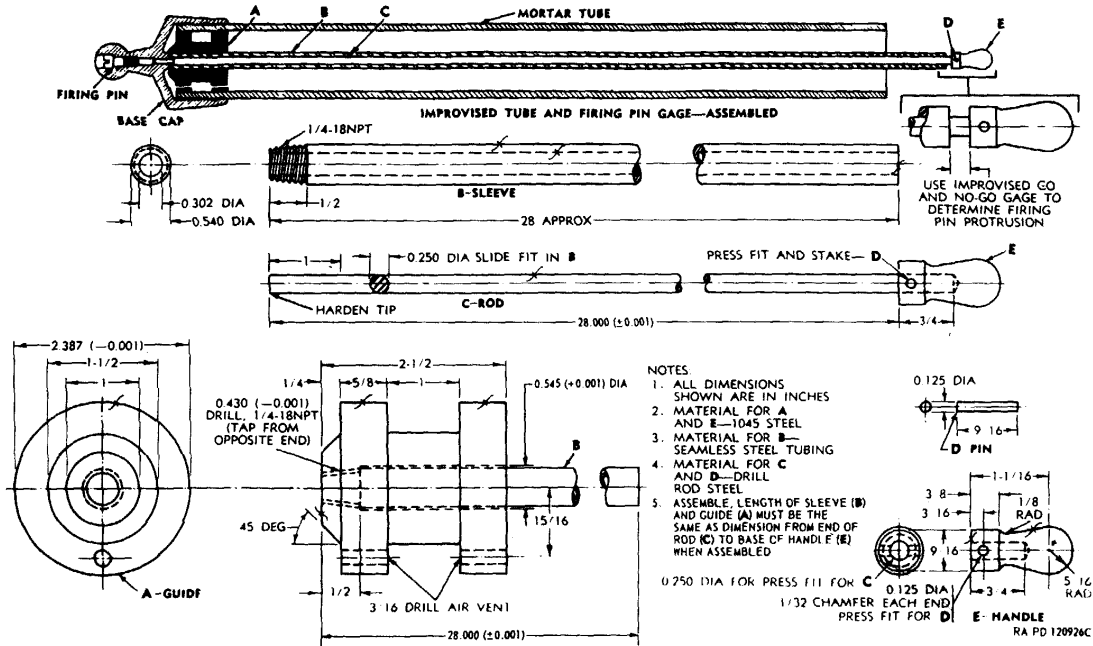


Figure 9. Improved tube and firing pin gage for 60-mm mortars.

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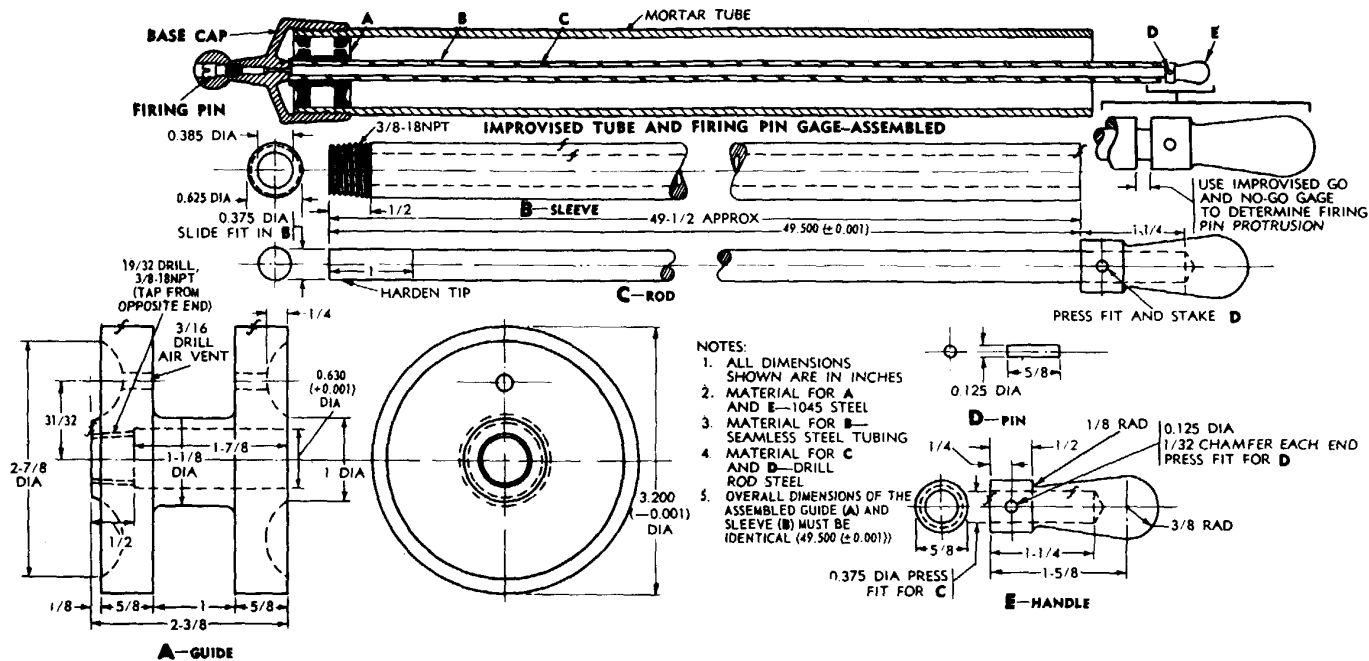


Figure 10. Improved tube and firing pin gage for 81-mm mortars.  
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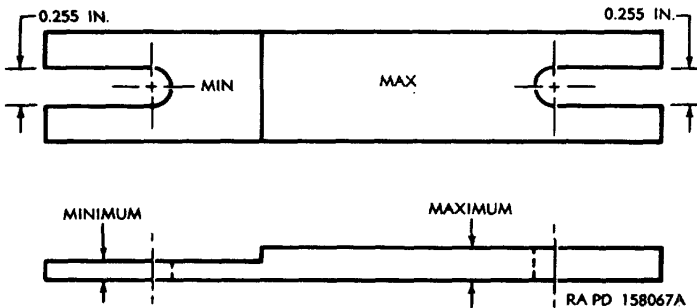
## 11. Improvised Tools

The list of improvised tools in table III applies only to field organizations engaged in reworking or repairing a large number of weapons. Illustrations giving dimensioned details are included to enable these maintenance organizations to fabricate these tools locally, if desired. These tools are not essential for repair and are not available for issue. The data furnished are for information only.

**Table III. Improvised Tools for Field Maintenance**

Item	References		Use
	Fig.	Par.	
GAGE, tube and firing pin, 60-mm.	9	26c, 30a	To check tube clearance and firing pin protrusion.
GAGE, tube and firing pin, 81-mm.	10	58	To check tube clearance and firing pin protrusion.
GAGE, go and no-go	11	26c, 30c	To check firing pin protrusion. Used with GAGE, tube and firing pin.

FIRING PIN PROTRUSION STANDARDS (USE FOR IMPROVISING GO AND NO-GO GAGE)		
MORTAR MODEL	DROP FIRE	
	MINIMUM (INCHES)	MAXIMUM (INCHES)
60-MM MORTAR M2	0.055	0.063
60-MM MORTAR M19	0.047	0.101
81-MM MORTAR M1	0.050	0.056
81-MM MORTAR M29	0.050	0.056
	LEVER FIRE	
	MINIMUM (INCHES)	MAXIMUM (INCHES)
60-MM MORTAR M19	0.085	0.101



**Figure 11. Improvised go and no-go gage for checking firing pin protrusion.**

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## CHAPTER 3 INSPECTION

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### Section I. GENERAL

#### 12. Scope

This chapter provides specific instructions for the inspection, by ordnance maintenance personnel, of the materiel in the hands of troops, in units alerted for oversea duty, and in ordnance shops.

#### 13. Purpose of Inspection

Inspections are made for the purposes of determining the condition of an item as to serviceability, recognizing conditions that would cause failure, assuring proper application of maintenance policies at prescribed levels, and determining the ability of a unit to accomplish its maintenance and supply missions.

#### 14. Categories of Inspection

In general, three categories of inspection are performed by ordnance field maintenance personnel.

*a. Inspection of Materiel in Hands of Troops.*

- (1) *Spot-check inspection.* A spot-check inspection is an annual inspection performed on a percentage of materiel in order to ascertain the adequacy and effectiveness of organizational maintenance and supply. Included within the scope of spot-check inspections is inspection of equipment to detect incipient failures before unserviceability occurs; inspection to ascertain the availability and use of technical and supply manuals and lubrication orders; inspection to determine the accuracy of records; authorized levels of equipment and supplies, practice of supply economy, preservation and safekeeping of tools, availability of repair parts and supplies, and knowledge of the proper procedures for requisitioning supplies and equipment and follow-up thereon.
- (2) *Command maintenance inspection.* Command maintenance inspection is performed annually on at least 50 percent of materiel within a unit or organization. The purpose of the inspection is to insure adequacy and effectiveness

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of organizational and supply procedures; determine condition of materiel; ascertain availability and use of technical manuals, supply manuals, and lubrication orders; determine the accuracy of records, authorized level of equipment and supplies, practice of supply economy, preservation and safekeeping of tools.

*b. Preembarkation Inspection.* This inspection is conducted on materiel in alerted units scheduled for oversea duty to insure that such materiel will not become unserviceable or worn out in a relatively short time. It prescribes a higher percentage of remaining usable life in serviceable materiel to meet a specific need beyond minimum serviceability.

*c. Ordnance Shop Inspection.*

(1) *Initial inspection.* This is an inspection of materiel received in ordnance shops for the purpose of determining the degree of repair and parts requirement. This includes determination of modification work orders to be applied.

(2) *In-process inspections.* These are inspections performed in the process of repairing the materiel as prescribed in chapter 5. This is to insure that all parts conform to the prescribed standards, that the workmanship is in accordance with approved methods and procedures, and that deficiencies not disclosed by the preliminary inspection are found and corrected.

(3) *Final inspection.* This is an acceptance inspection performed by a final inspector, after repair has been completed, to insure that the materiel is acceptable for return to user according to the standards established. Detailed instructions are contained in chapter 5.

## **Section II. INSPECTION OF MATERIEL IN HANDS OF TROOPS**

### **15. General**

#### **Warning:**

**Before starting the inspection, be sure that the mortar is cleared. Do not have live ammunition in the vicinity of the work.**

*a.* Check to see that the weapon 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.* Refer to TM 9-1100 for responsibilities and fundamental duties of inspecting personnel, the necessary notice and preparations to be made, forms to be used, and general procedures and methods to

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be followed by inspectors. Materiel to be inspected includes organizational spare parts and equipment and the stocks of cleaning and preserving materials. In the course of this technical inspection the inspector will accomplish the inspection in paragraph 16.

## **16. Inspection**

### *a. General.*

- (1) Determine serviceability; i.e., the degree of serviceability, completeness, and readiness for immediate use, with special reference to safe and proper functioning of the materiel. If the materiel is found serviceable, it will be continued in service. In the event it is found unserviceable or incipient failures are disclosed, the deficiencies will be corrected on the spot or advice given as to corrective measures, when applicable, or, if necessary, the materiel will be tagged for delivery to, and repair by, ordnance maintenance personnel.
- (2) Determine causes of mechanical and functional difficulties that troops may be experiencing and for apparent results of lack of knowledge, misinformation, neglect, improper handling and storage, security, and preservation.
- (3) Check to see that all authorized modifications have been applied, that no unauthorized alterations have been made, and that no work beyond the authorized scope of the unit is being attempted. Check the index in DA Pam 310-4 and the current modification work order files for applicable modification work orders.
- (4) Instruct the using personnel in proper preventive-maintenance procedures where found inadequate.
- (5) Check on completeness of the organizational maintenance allowances and procedures for obtaining replenishments.
- (6) Check storage conditions of general supplies and ammunition.
- (7) Initiate a thorough report on materiel on "deadline," with reasons therefor, for further appropriate action.
- (8) Report to the responsible officer any carelessness, negligence, unauthorized modifications, or tampering. This report should be accompanied by recommendations for correcting the unsatisfactory conditions.

### *b. Assembled Mortar and Mount.*

- (1) Record the serial numbers on the inspection form.
- (2) Make an overall inspection of the materiel for general appearance, condition, and loose, missing, or broken parts. Check castings and weldments for cracks or breaks.

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- (3) See if bearing and sliding surfaces, hinge joints, latches, and other movable parts are clean, free of rust and other foreign matter, and properly lubricated in accordance with LO 9-U3, LO 9-U4, LO 9-260, and LO 9-710-1.
  - (4) Check if paint has deteriorated or become damaged, leaving exposed portions of bare metal.
  - (5) Check elevating and traversing mechanisms for ease of operation and backlash. Backlash should not exceed one-eighth of a turn of handwheel.
  - (6) Check if cross leveling mechanism works freely, with locking sleeve loose. See if level vial is serviceable and scribe lines are distinct.
  - (7) Clamp should grip mortar firmly.
  - (8) Elevating and traversing mechanisms should have no bind and cranks should be undamaged.
- c. *Mortar.*
- (1) Spherical projection at bottom of mortar should be smooth and free of all rust, burs, and scores.
  - (2) Check inside of tube for dents and rough spots. Tube should permit free falling of a dummy round.
  - (3) Base cap should be screwed tight on the tube; on 81-mm mortar M29, the base plug is brazed to the tube.
  - (4) Firing pin should cause sufficient indentation on ignition cartridge for firing. Adjustable firing pin should retract and fire selector should be operative.
  - (5) Quadrant seat should be free of burs.
- d. *Mount.*
- (1) Check straps, chains, spring, buckles, and hooks for condition.
  - (2) Check dovetail sight socket for distortion and burs. Check fit of sight.
  - (3) See if lettering on nameplate is legible.
  - (4) Sliding bracket should grip leg; if loose, check if modified (par. 39b or 63c).
  - (5) Legs should be straight and rigid. Clevises should lock legs firmly in open position.
  - (6) Mortar clamp parts should not be bent. Guides should be smooth.
  - (7) Oil cups should be identified by a red circle.
  - (8) Clamp should retract on shock absorber and return to original position.
  - (9) Check if crank detent holds traversing handwheel crank in folded and extended positions.

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- (10) On 81-mm mortars of M23-series, mounting ring should be intact and air vent hole open.
- e. *Baseplate.*
- (1) Baseplates should not be warped or cracked and should not rock on a smooth and level surface.
  - (2) Latches should be operative and handles intact. Sockets should be smooth and free of all rust, burs, and scores.
  - (3) On baseplate M1, threads on baseplate body and hinged cap should be undamaged; link and pin on cap should not be distorted.
  - (4) On 60-mm mortar mount M5, the lock lever should secure base cap of mortar firmly.
  - (5) On 81-mm mortar mounts of series, the inner ring socket cap should have a snug fit but revolve by hand pressure.

### **Section III. PREEMBARKATION INSPECTION**

#### **17. General**

a. *Serviceable* materiel (materiel meeting the requirements of par. 16) will be inspected in accordance with the standards set forth in paragraph 18. These standards are not serviceability standards as such but reflect criteria to meet a specific need beyond minimum serviceability.

b. The standards prescribed in paragraph 18 provide for a high percentage of remaining usable life in serviceable materiel to insure that materiel being shipped overseas will not become unserviceable or worn out in a relatively short time.

c. Newly manufactured and issued materiel, which has been accepted in accordance with Department of the Army specifications, will not be rejected by an Army inspector except for well grounded reasons. All such rejections will be reported immediately to higher authority.

#### **18. Inspection**

a. *Surfaces.*

- (1) Painted surfaces will be carefully inspected for presence of rust under the paint. This condition is evidenced by rust particles coming through the coating of paint. If rust is detected, the painted surfaces will have to be repainted (TM 9-2851).
- (2) Rigid restrictions on shiny metal surfaces will not be carried to an extreme. A worn surface is objectionable from the standpoint of visibility when it is capable of reflecting

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light, somewhat as a mirror does. No weapon will be rejected for oversea shipment unless exterior parts have a distinct shine.

*b. Mortar.*

- (1) The policy is to ship overseas only those tubes which have the following bore diameters:
  - (a) 60-mm mortars -----2.392 to 2.410 in.
  - (b) 81-mm mortars -----3.205 to 3.226 in.
- (2) Any mortar tube which has been declared "serviceable" but fails to meet the above requirements will not be considered acceptable for oversea shipment.
- (3) Base cap should be gas tight on tube, ball smooth, and finish intact. Maximum clearance between ball and socket should not exceed one thirty-second inch.
- (4) Quadrant seat should be free of burs; clamp position marks and aiming lines should be legible.
- (5) Firing pin should cause sufficient indentation on ignition cartridge for firing. Adjustable firing pin should retract.

*c. Mount.*

- (1) All movable elements must perform smoothly, without binding. Shock absorber guides must be smooth.
- (2) Elevating mechanisms which bind, or on which backlash exceeds one-eighth of a turn of the handwheel when measured at an elevation of 1.075 mils (600), are unsatisfactory.
- (3) Traversing mechanisms which bind, or on which the backlash exceeds one-eighth of a turn of the handwheel when measured at an elevation of 1,075 mils (600), are unsatisfactory.
- (4) Bipod legs should be straight and feet secure to legs; clevis should lock legs firmly.
- (5) Chain or straps must be intact.
- (6) Finish must be intact.

*d. Baseplate.*

- (1) Finish must be intact and latches operative.
- (2) Threads on baseplate M1 should be clear.

## **Section IV. ORDNANCE SHOP INSPECTION**

### **19. Inspection**

*a. General.* A technical inspection similar to that in paragraph 16 is also made of materiel turned in to field maintenance shops for repair. In addition, the inspector performs the inspections listed

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below in order to determine the cause of unserviceability, the extent of required repairs, and an estimate of replacement parts. He also performs a troubleshooting inspection (table IV), as necessary, to localize and identify any malfunctions.

*b. Mortar.*

- (1) Check mortar tube for pits. Pits not exceeding  $\frac{1}{16}$  inch in length or width and 0.010 inch in depth are allowable. Such pits will not be cause for condemnation but such tubes will require honing. A dummy round or improvised tube and firing pin gage (fig. 9 or 10) should fall freely in tube; if not, it will be necessary to remove dents or replace tube or mortar.
- (2) Base cap should show no evidence of leakage. If it does and no distortion is evident, joint will have to be made tight. If distortion is evident, replacement of parts is required.
- (3) Maximum clearance between ball projections on base cap and socket in baseplate should not be over  $\frac{1}{42}$  inch for all models except 81-mm mortars of M23 series for which it is 0.039 inch; if clearance is excessive, it will require correction by placing base cap in socket and peening lips of socket against ball.
- (4) Check protrusion of firing pin by seating the improvised tube and firing pin gage (fig. 9 or 10) over the firing pin and measuring, with a feeler gage or improvised go and no-go gage (fig. 11), the distance between the handle and the tube of the gage. Firing pins not meeting the standards shown in table VII will require replacement.

*c. Mount.*

- (1) Play in elevating mechanism of 81-mm mortar mounts is the cumulative effect of wear between the working parts. As no integral adjustment is provided to take up this wear, parts will have to be replaced to reduce backlash. The likely order of wear and necessary replacement is elevating gear, elevating pinion, screw sleeve, and guide tube. The elevating gear bearing washer and elevating screw body are primarily important only as they affect the wear of other parts.
- (2) Backlash in 60-mm mortar mounts can be reduced by replacement of elevating screw and nut; wear may be found in elevating screw, elevating nut, and elevating nut lower bearing. If mechanism binds, elevating screw should be checked for straightness and corrected.

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- (3) If traversing mechanism binds, the traversing screw should be checked for straightness and corrected. Backlash can be reduced by adjustment and, if this is not sufficient, by replacement of defective parts (pars. 34-36).

*d. Baseplates.*

- (1) Check baseplates carefully for indications of incipient fracture. Small cracks may be welded but major repairs are not ordinarily practicable and a badly bent or cracked plate will require replacement.
- (2) Check sockets and latches of baseplates for smoothness and operation.

## **20. Troubleshooting**

The troubleshooting inspection in table IV is to be performed, as necessary, to localize and identify any malfunctions.

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**Table IV. Troubleshooting**

Malfunction	Probable causes	Corrective action
Failure to drop fire	Fixed firing pin loose, worn, or broken Firing pin worn, broken, or distorted- Firing pin bushing loose Dents in tube	Tighten or replace (pars. 25-28). Replace (pars. 29-33). Tighten. Remove dents (par. 27c) or replace mortar (pars. 29-32).
Failure to lever fire	Firing pin bushing plugged or loose Firing pin worn, broken, or distorted Firing spring set or broken Dents in tube	Clean or straighten. Replace (pars. 29-32). Replace (pars. 29-32). Remove dents (par. 27c) or replace mortar (pars. 29 and 32).
Failure of mount to return to prefiring position.	Shock absorber springs set or broken  Shock absorber guides burred or scored Air vent holes plugged (mounts M23A1, M23A2, and M23A3).	Replace (pars. 45-48, 73-76, and 89-92).  Remove burs and scores. Clean.
Binding in traversing mechanism	Traversing screw burred or not straight Expanding bearing too tight	Remove burs or straighten. Loosen bearing adjusting nut.
Excess backlash in traversing mechanism	Worn traversing screw or nut Expanding bearing loose or worn (60-mm mount M5 and 81-mm mounts M4, M23A1, M23A2, and M23A3).	Replace (pars. 33-36, 69-72, and 85-88). Tighten bearing adjusting nut or replace (pars. 33-36, 69-72, and 86588).
Binding in elevating mechanism	Elevating screw burred or not straight Lower nut bearing too tight (60-mm mount M5).  Elevating gear or pinion burred (81-mm mounts M4, M23A1, M23A2, and M23A3).	Remove burs or straighten. Loosen bearing adjusting nut.  Remove burs.

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**Table IV-Continued**

Malfunction	Probable causes	Corrective action
Excess backlash in elevating mechanism	<p>Elevating spindle, gear, or pinion worn (81-mm mounts M4, M23A1, M23A2, and M23A3).</p> <p>Elevating spindle, nut, or bearing worn (60-mm mount M5).</p> <p>Lower nut bearing too loose (60-mm mount M5).</p>	<p>Replace (pars. 65-68 and 81-84).</p> <p>Replace (pars. 41-44).</p> <p>Tighten adjusting nut.</p>
Cross-leveling adjustment cannot be maintained.	Operating parts worn; on all mounts, wear may be in sliding bracket, locking sleeve, locking ring, leg body, and adjusting nut.	Replace (pars. 37-40, 61-64).
Binding in cross-leveling mechanism	Working parts burred, scored, or distorted; this may occur in adjusting nut, leg body, sliding sleeve, locking ring, locking sleeve, and sliding turnbuckle clamp.	Remove burs and scores, restore shape, or replace (pars. 37-40, and 61-64).
Failure of legs to stay in open position (60-mm mount M5).	Clevis latch spring weak or broken	Replace (pars. 37-40).

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## CHAPTER 4 GENERAL MAINTENANCE

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### 21. Scope

- a. This chapter contains important general maintenance information.
- b. In chapters 5 and 6, major units are disassembled, repaired, or replaced. A final inspection is given in chapter 7. These instructions are supplementary to instructions for the using organizations contained in FM 23-85, FM 23-90, and TM 9-3064.

### 22. Processing

#### a. *Cleaning.*

- (1) *General.* Refer to FM 23-85, FM 23-90, and TM 9-3064 for using arms information on cleaning, cleaning agents, precautions to be observed in cleaning, and cleaning of materiel received from storage. Information for ordnance personnel is given below.
- (2) *Cleaning materiel received from storage.*
  - (a) Materiel received in ordnance shops from storage will be cleaned by one of the following processes, whichever is applicable or available: Process C-3, Petroleum solvent in two steps (TM 9-1005); Process C-7, Vapor degreasing (TM 9-1005); Process C-14, Steam cleaning (TM 9-1005).
  - (b) If some time is to elapse before the start of repair or rebuild operations, apply a light grade of oil to all polished metal surfaces to prevent rusting.
- (3) *Cleaning after repair.* After repair operations and prior to assembly, remove shop dirt and other foreign matter from all metal surfaces. This can be done by process C-3, process C-7, or process C-4 (Petroleum solvent applied by scrubbing or wiping) (TM 9-1005).
- (4) *Cleaning after shop inspection.* After shop inspection, dip in a tank containing fingerprint remover oil (type A), remove (use rubber gloves), and dry thoroughly with dry compressed air (provided with moisture filter traps) or by wiping with clean, lint-free, dry cloths.

#### b. *Application of Lubricants and Preservatives.*

- (1) Apply preservatives as soon as possible after cleaning (a above).

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- (2) Apply lubricating grease No. 0 (OG-O) to working parts of firing, elevating, traversing, shock absorbing, and cross-leveling mechanisms.
  - (3) Apply heated rust-preventive compound (heavy) to interior of tube and to all exterior finished surfaces and to all exposed nuts, bolts, screws, chains, etc., not already preserved.
- c. *Storing Mortar Materiel.*
- (1) Wrap mount in Grade C, Type I greaseproof barrier-material. Mounts may be boxed or stacked. If mounts are boxed, they may be stored one or more to a box.
  - (2) Segregate and store mortars on dunnage. Whenever wooden dunnage touches metal, place a layer of Grade C, Type I greaseproof barrier-material between wood and metal.
  - (3) Segregate and store base plates on dunnage. Whenever wooden dunnage touches metal, place a layer of Grade C, Type I greaseproof barrier-material between wood and metal.

## **23. General Repair Methods**

a. *Disassembly and Assembly Procedures.*

- (1) In disassembling a unit, remove the major subassemblies and assemblies whenever possible. Subassemblies may then be disassembled, as necessary, into individual parts.
- (2) During assembly, subassemblies should be assembled first and then installed to form a complete unit.
- (3) Exercise caution when removing and installing taper pins. Attempts to force a tapered pin in the wrong direction may result in damage to the mechanism.
- (4) Complete disassembly of a unit is not always necessary in order to make a required repair or replacement. Good judgment should be exercised to keep disassembly and assembly operations to a minimum.

b. *Replacements of Parts.*

- (1) Unserviceable and unrepairable assemblies will be broken down into items of issue and serviceable parts will be returned to stock.
- (2) When assembling a unit, replace taper pins and cotter pins with new ones, if possible. If screws or nuts are damaged, they should be replaced.
- (3) All springs should be replaced, if they are broken; kinked, cracked, fail to function properly, or fail to meet specific requirements listed in table VII.

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- (4) If a required new part is not available, reconditioning of the old part is required. Such parts should be examined carefully after reconditioning to determine their suitability. Parts which cannot be repaired or reclaimed to the required standards (chs. 5 and 6) will be replaced.

c. *Use of Tools.*

- (1) Care must be exercised to use tools that are suitable for the task to be performed in order to avoid unnecessary mutilation of parts and/or damage to tools.
- (2) A number of special tools (ch. 2) are provided for maintenance of the mortars and mounts. These tools should be used only for the purpose for which they are intended.

d. *Welding and Riveting.* For welding instructions and welding materials, refer to TM 9-2852 and Department of the Army Supply Catalog ORD 3 SNL K-2.

e. *Repairing Damaged Threads.* Damaged threads should be repaired by use of a thread restorer or by chasing on a lathe.

f. *Restoring Damaged Surfaces.* Damaged surfaces will be restored, using materials and tools consistent with tolerances given in chapters 5 and 6.

g. *Removal of Corrosion.*

- (1) There are various methods and materials for removing corrosion. These should be carefully selected in order that surfaces being processed will not be damaged beyond serviceability.
- (2) Crocus cloth will be used to remove corrosion from polished surfaces. Aluminum oxide abrasive cloth, files, or scrapers are permissible where critical dimensions will not be altered by their use and where the mechanic is fully instructed in their use and in the possible consequences of their improper use.
- (3) Sandblasting is permissible on surfaces of baseplate which require painting. Compressed air should be used to remove sand left after sandblasting. Do not dip material in water to remove sand.

## **24. Lubrication**

Prior to shop inspection, lubricate the elevating, traversing, cross-leveling, and firing mechanisms. This is necessary in order to permit proper functioning of these mechanisms during the final inspection. Do not overlubricate; use as little oil as is necessary for proper functioning.

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## CHAPTER 5 REPAIR OF 60-MM MORTAR MATERIEL

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### Section I. 60-MM MORTAR M2

#### 25. Disassembly

(fig. 12)

- a. Unscrew firing pin from rear end of base cap.
- b. In order to maintain a proper seal, do not remove base cap from mortar tube.

#### 26. Inspection

- a. Examine firing pin for cracks, burs, and deformation. Shoulders must be smooth so as to form a gastight seal.
- b. Inspect bore for dents, nicks, corrosion, and pits. A dummy round or improvised tube and firing pin gage (fig. 9) should pass freely through the length of the tube.
- c. If firing pin is not damaged, screw it into base cap, seat the improvised tube and firing pin gage (fig. 9) firmly over the firing pin, and measure with a feeler gage or improvised go and no-go gage (fig. 11) the distance the handle knob is raised above the gage tube. Pin protrusion should comply with standards in table VI.

#### 27. Repair

- a. Clean firing pin vent, using firing pin vent cleaning tool 5154575 (fig. 7).
- b. Remove all burs from the ball projection on base cap.
- c. Remove dents from tube, if possible, to permit a dummy round or the improvised tube and firing pin gage (fig. 9) to pass freely through length of tube; otherwise replace mortar. Pits in tubes not exceeding 8/8 inch in length or width and 0.010 inch in depth are allowable. Such pits will not be cause for condemnation but it is desirable to have pitted tubes honed to remove as much of the pit as practicable and still maintain tube diameter within the allowable limits. Tube will be returned to depot maintenance.
- d. If base cap and tube cannot form a gastight joint or if either is distorted, replace mortar.

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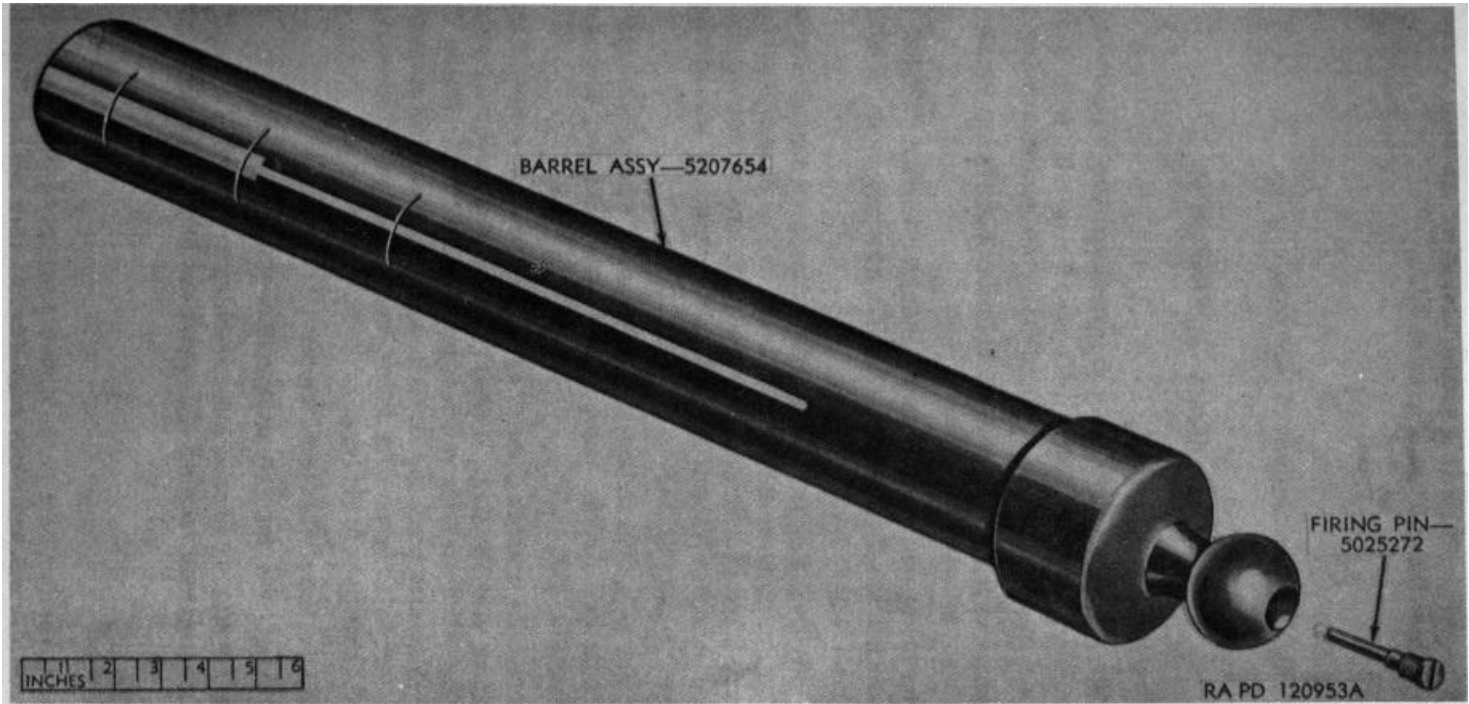


Figure 12. 60-mm mortar M2-exploded view.

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e. Replace firing pin, if it is pitted, distorted, cracked, broken, or if it fails to meet the standards in table VI.

## **28. Assembly**

(fig. 12)

Screw firing pin into rear end of base cap.

## **Section II. 60-MM MORTAR M19**

## **29. Disassembly**

**Note.** They key letters shown below in parentheses refer to figure 13.

a. Clamp mortar tube (E) in formed jaws and, with a strap wrench, remove the base cap (G) and firing mechanism housing (S).

b. Loosen knurled setscrew (L) and unscrew the firing mechanism housing from the base cap.

c. Using firing mechanism housing adapter wrench 7230830 (fig. 8) and wrench handle 7230831 (fig. 7), unscrew housing adapter (F) from the base cap.

d. Unscrew the firing pin bushing from the firing mechanism housing adapter and remove the firing pin (fig. 14) with assembled parts. Remove firing pin lock by pressing it slightly against the spring and then remove the pin retracting spring and retracting spring washer from the firing pin (fig. 14).

e. Lift out firing pin striker (H). Drive out striker pawl pin and remove firing pin striker pawl, striker pawl plunger, and striker pawl spring (fig. 15).

f. Depress the selector plunger (P), raise housing cover (D), and remove firing selector (Q). Withdraw the firing lever (A) slightly over one-eighth of an inch to disengage the firing lever spring (M), rotate slightly and push the lever in again to eject the spring and withdraw the firing lever. Pry firing lever spring out of lever spring sleeve (N), using the firing lever.

g. Shake out the striker pawl tripper (B).

h. Drive out cover pin (C) and remove cover (D).

i. Chip off staking around selector plunger (P) with a small rod through other side of housing (S); drive out plunger (P) and spring (R).

## **30. Inspection**

a. Check whether tube permits easy passage of dummy round or improvised tube and firing pin gage (fig. 9) through length of tube.

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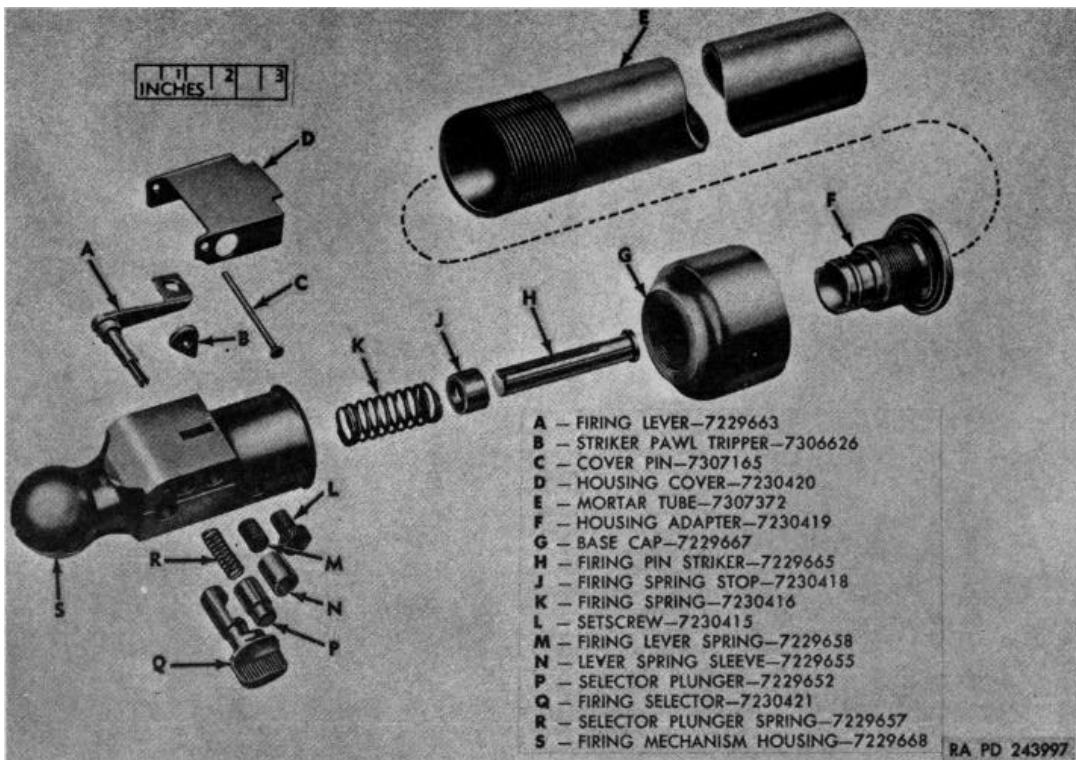


Figure 13. Firing mechanism assembly 7229669--exploded view.

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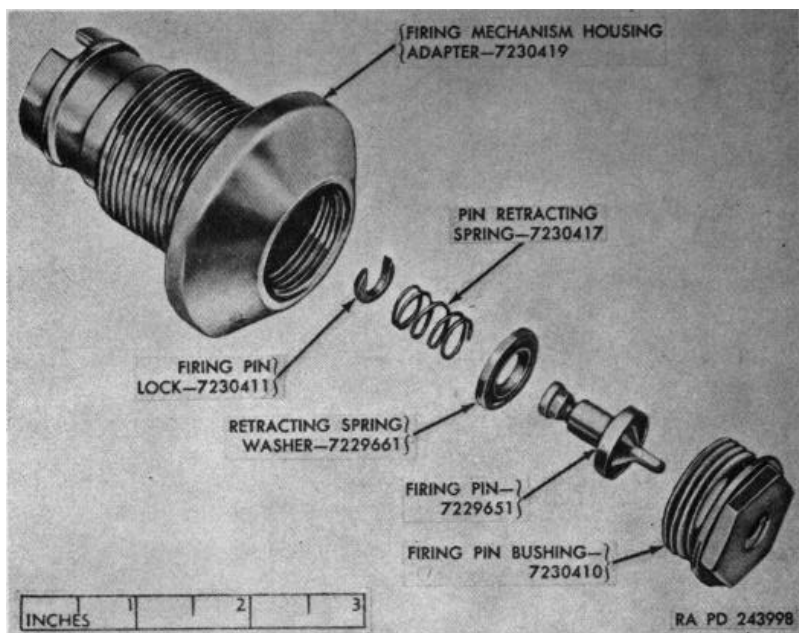


Figure 14. Firing mechanism housing adapter and related parts.

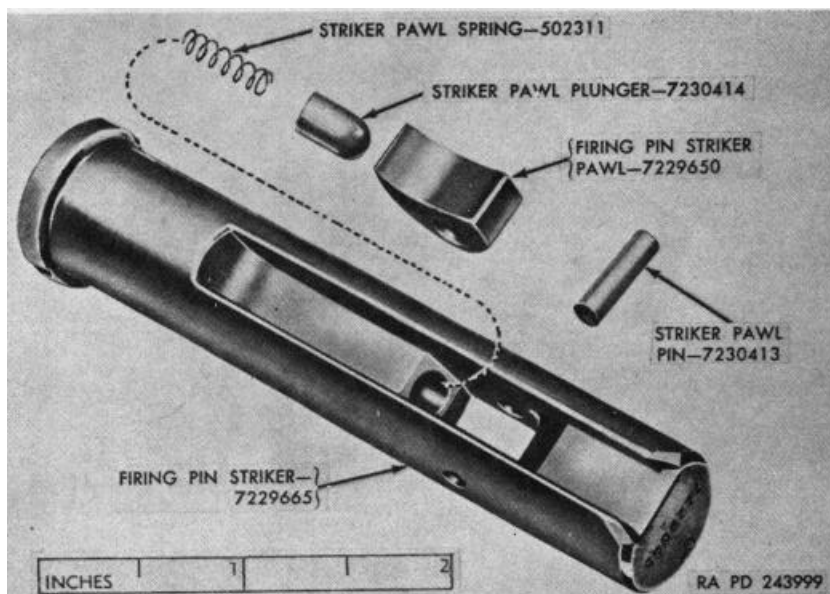


Figure 15. Firing pin striker and related parts.

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b. Check whether the three 3/32-inch luminous paint stripes, parallel to the axis of the barrel, are intact and clear. Inspect bore for dents, ricks, corrosion, and pits.

c. Inspect the base cap for signs of gas leakage past damaged threads.

d. Check all threaded parts and surfaces for burrs, galls, or wear.

e. Assemble and adjust firing pin for drop fire, seat the improvised tube and firing pin gage firmly over the firing pin, and measure with a feeler gage or improvised go and no-go gage (fig. 11) the distance the handle knob is raised above the gage tube. Pin protrusion should comply with standards in table VI.

f. Check striker pawl tripper and striker pawl for signs of wear, corrosion, or damage.

g. Check all springs for kinks, set, corrosion, cracks, and distortion. Springs should meet standards in table VII.

h. Examine firing pin for wear, distortion, pitting, corrosion, and signs of fracture.

### 31. Repair

a. Proceed as in paragraph 27b through e.

b. Clean and polish scored surfaces to remedy sluggish action and sticking.

**Note. Do not remove more metal than is absolutely necessary and do not alter critical surfaces.**

c. Replace springs if kinked or broken, or if they fail to meet the standards in table VII.

d. If any other parts, except base cap and tube, are cracked, distorted, broken, or worn, they should be replaced. If base cap or tube is damaged, replace mortar.

### 32. Assembly

**Note. The key letters shown below in parentheses refer to figure 13.**

a. Assemble firing pin unit as outlined in (1) through (4) below.

(1) Place retracting spring washer on firing pin and follow with pin retracting spring (fig. 14).

(2) Press firing pin lock over the spring until open ends of lock engage small undercut in firing pin and then press lock inward until it snaps back into position on firing pin (fig. 14).

(3) Set the firing pin with assembled parts into the firing mechanism housing adapter and screw the firing pin bushing into the firing mechanism housing adapter (fig. 14).

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- (4) Screw the housing adapter (F), through the base cap (G), using firing mechanism housing adapter wrench 7230830 (fig. 8) and wrench handle 7230831 (fig. 7).
- b. Assemble firing pin striker unit as outlined in (1) and (2) below.
  - (1) Insert striker pawl spring and striker pawl plunger in their seat in the firing pin striker (fig. 15).
  - (2) While compressing the spring, insert firing pin striker pawl, higher side against plunger, and secure with striker pawl pin (fig. 15).
- c. Slide the firing spring stop (J) over the firing pin striker (H) and follow with the firing spring (K).
- d. Insert the selector plunger spring (R) and selector plunger (P) into the middle side hole of the firing mechanism housing (S) and peen lightly.
- e. Press in the selector plunger (P) and press housing cover (D) into position so as to permit insertion of cover pin (C) from plunger side of firing mechanism housing (S). With cover pin in position, leave the cover open.
- f. Assemble firing lever spring (M) in the lever spring sleeve (N), loading the spring about one-half turn and latching the shorter end with the notch in end of sleeve. Push this unit into the firing mechanism housing (S).
- g. Place striker pawl tripper (B) in slot in top of firing mechanism housing, with flat side of long end facing base cap (G). Insert firing lever (A) from left side of housing so that it mates with opening in striker pawl tripper. With one finger over the lever spring sleeve (N), press in the firing lever (A) until the slot on its end engages the short leg of the firing lever spring (M).
- h. Insert firing selector (Q) in the firing mechanism housing and close the housing cover (D).
- i. Slide firing pin striker (H) with assembled parts into the firing mechanism housing (S) by aligning grooved lines on striker and housing.
- j. Screw the firing mechanism housing with assembled parts onto the housing adapter (F) and tighten the setscrew (L).
- k. Set firing selector (Q) for lever fire and check for proper operation.
- l. Holding mortar tube (E) in formed jaws, screw on the base cap and firing mechanism housing, drawing up gastight.

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### Section III. TRAVERSING MECHANISM ASSEMBLY-MOUNT 5

**Note.** A small percentage of the 60-mm mortar mount MS was modified to include the new type handwheel assembly 7308325. However, the old type handwheel assembly 7228737, is still used on a large number of units that were not modified. For these units, follow instructions in paragraph 69 for disassembly and paragraph 72 for assembly.

#### 33. Disassembly

**Note.** The key letters shown below in parentheses refer to figure 16.

a. Drive out straight pin (A5) and slide traversing spindle assembly (A3) with traversing handwheel assembly (A2) out of shock absorbers, mortar clamp, and yoke assembly group (A4).

b. Unscrew traversing bearing screw (B). Using spanner wrench 7228728 (fig. 8), back off traversing spindle tube nut assembly (C) from elevating mechanism group (J).

c. Hold traversing spindle assembly in a vise with soft jaws, drive out tapered pin (A1), and unscrew traversing handwheel assembly (A2).

d. To disassemble traversing spindle assembly, remove flange screw, unscrew traversing spindle tube cap assembly, and remove thrust bushing spring and thrust bushing (fig. 17).

e. Unscrew traversing screwnut from traversing screw (fig. 17). Remove the following, in order listed, from the traversing screwnut (fig. 17).

- (1) Adjusting nut.
- (2) Expanding bearing lockwasher.
- (3) Expanding bearing ring.
- (4) Expanding bearing.

f. To disassemble traversing handwheel assembly, remove two crank detent screws and traversing crank detent from handwheel body; then drive out tapered pin that retains the headless straight pin and remove pin and traversing crank (fig. 18).

#### 34. Inspection

a. Check condition of tube nut packing. If packing is defective, replace tube nut as an assembly.

b. Check traversing screw for straightness and nut for ease of travel. The nut should slide easily in traversing tube. Examine screw at handwheel end for cracks; breakage at this point is common.

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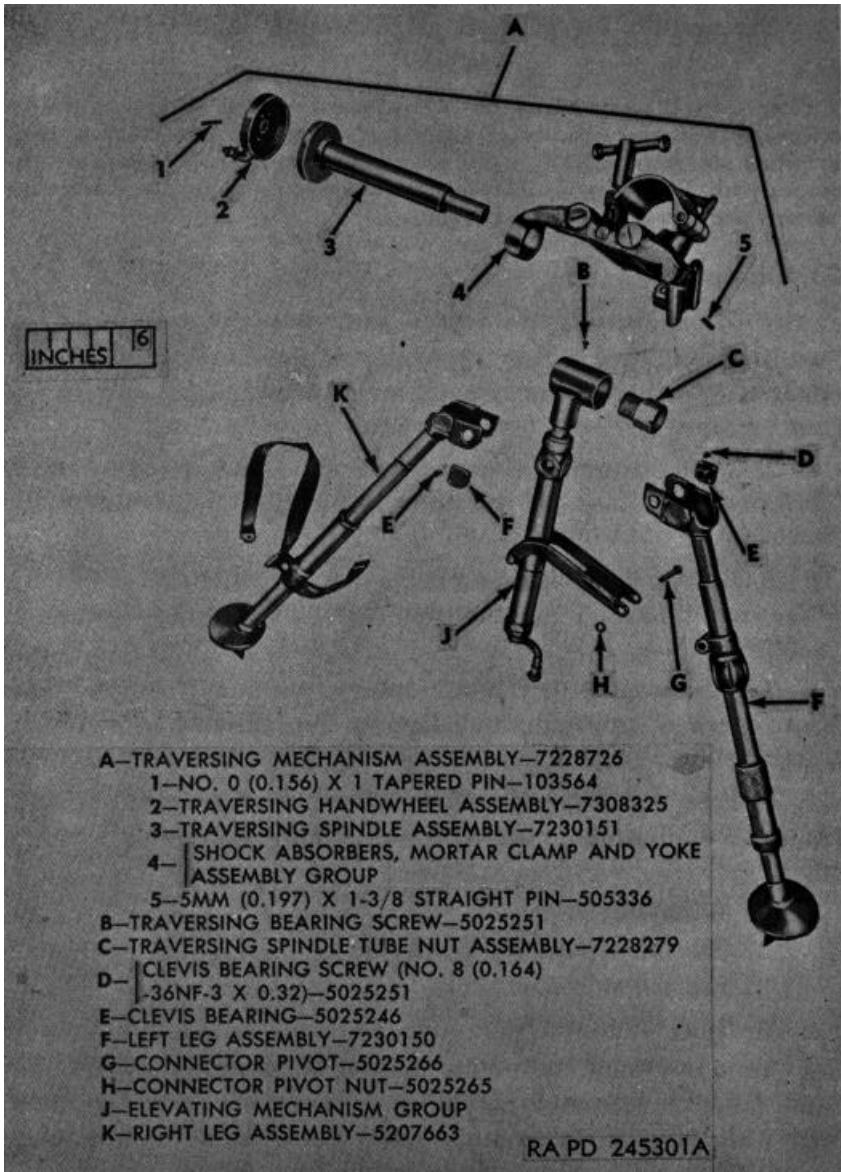


Figure 16. 60-mm mortar mount M5-exploded view.

c. Wear may be found in traversing screw, traversing screwnut, expanding bearing, and traversing spindle tube. Wear in the expanding bearing can be compensated by tightening adjusting nut.

d. Check action of handwheel crank detent.

e. Check dovetail sight seat for damage.

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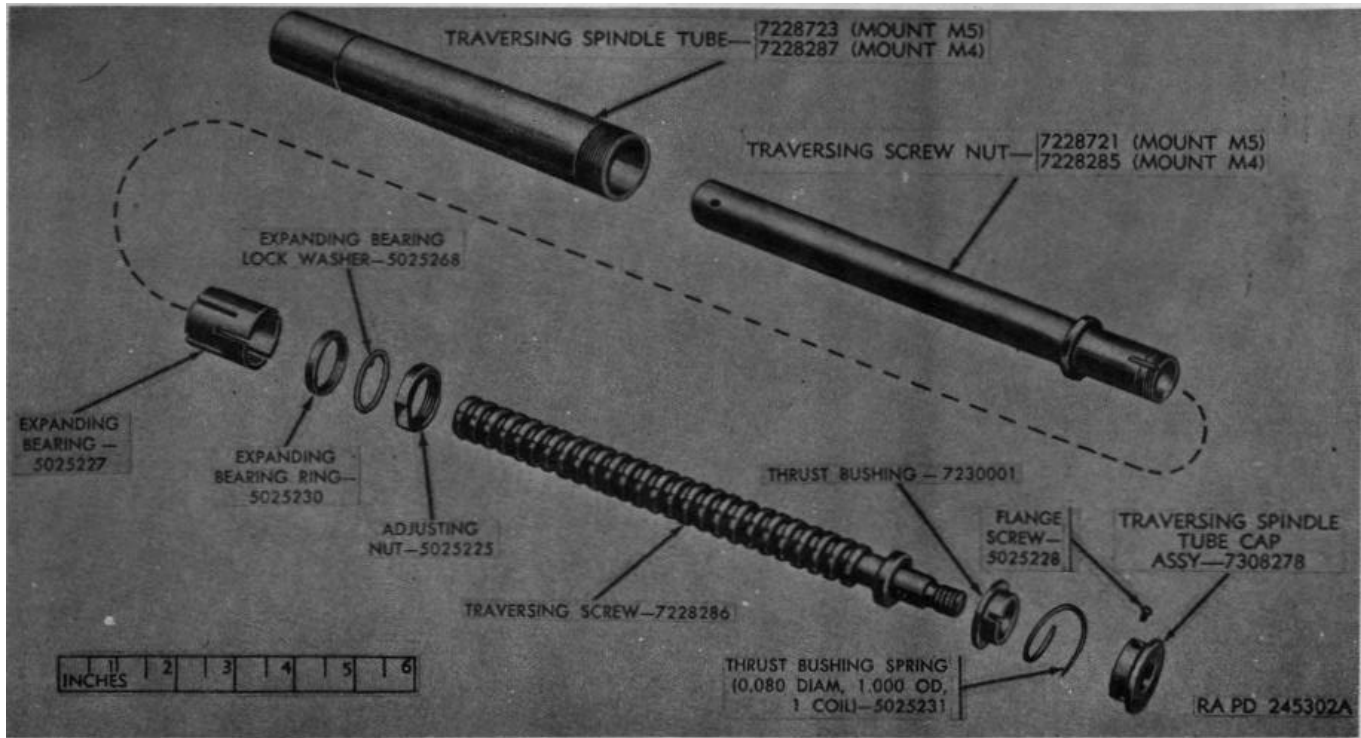


Figure 17. Traversing spindle assembly 7230151-exploded view.

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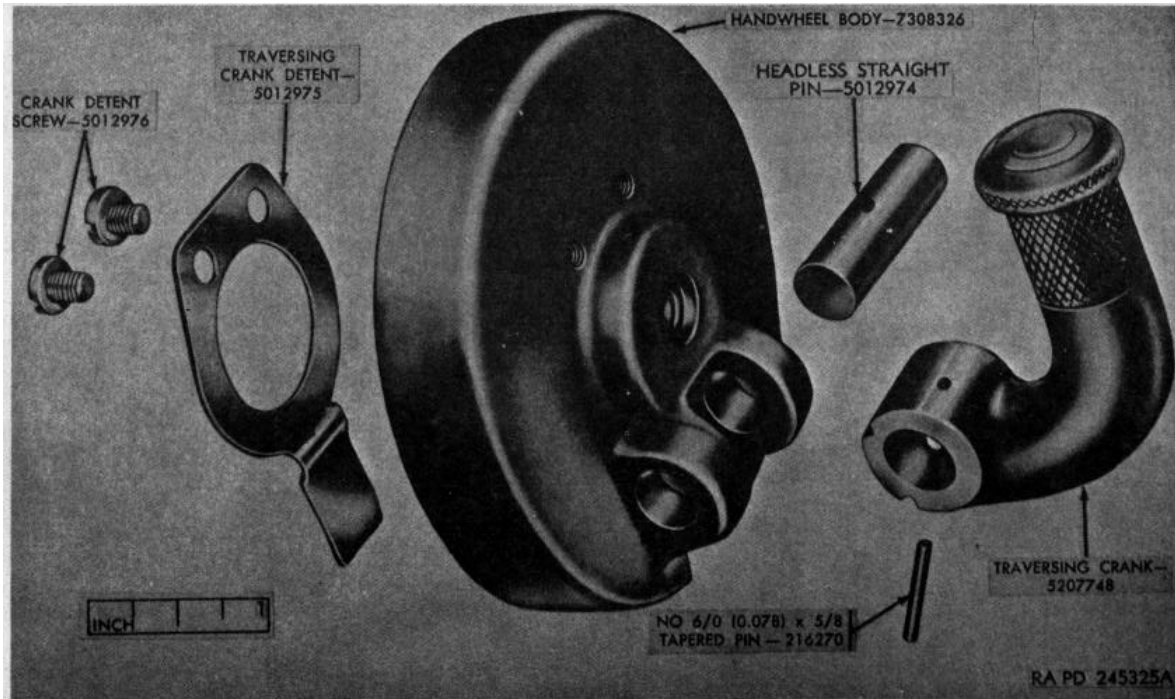


Figure 18. Traversing handwheel assembly-60-mm mount M5, 81-mm mount M4.

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### 35. Repair

a. Remove burrs and foreign matter and discard worn or damaged screws and bushings.

b. Breakage of the traversing screw (fig. 19) near the handwheel can be repaired as outlined in (1) through (3) below.

- (1) Machine broken end, and drill and tap.
- (2) Fabricate stud to given dimensions.
- (3) Assemble stud to screw and secure with straight pin.

### 36. Assembly

**Note.** The key letters shown below in parentheses refer to figure 16.

a. To assemble traversing handwheel assembly (fig. 18), secure traversing crank detent to the handwheel body with the two crank detent screws; then assemble traversing crank to handwheel body by means of the headless straight pin and drive in No. 6/0 (0.078) x 5/8 tapered pin.

b. Hold traversing screw in a vise with soft jaws. Place thrust bushing (flanged end leading) over screw and follow with thrust bushing spring (0.080 diam, 1.000 od, 1 coil) (fig. 17). Press the traversing spindle tube cap assembly down against spring, making certain the spring pin in the flange fits in the cut in the thrust bushing (fig. 17). Hold cap down in this position and screw the traversing handwheel assembly (A2) on the traversing screw until the holes in the screw and handwheel align and drive in No. 0 (0.156) x 1 tapered pin (A1) to secure handwheel to screw.

c. Assemble the following, in the order listed in (1) through (3) below, on the traversing screw nut (fig. 17).

- (1) Expanding bearing.
- (2) Expanding bearing ring (tapered end leading).
- (3) Expanding bearing lockwasher (stud leading and engaging slot of traversing screwnut).
- (4) Adjusting nut.

d. Screw traversing screwnut (assembled end leading) on traversing screw (fig. 17).

e. Screw traversing spindle tube into traversing spindle tube cap assembly until the holes in the tube and cap align and screw in the flange screw (fig. 17).

f. Pass the traversing spindle assembly (A3) through hole in the shock absorbers, mortar clamp end yoke assembly (A4), and the elevating mechanism group (J) (smaller opening leading).

g. Screw the traversing spindle tube nut assembly (C) into

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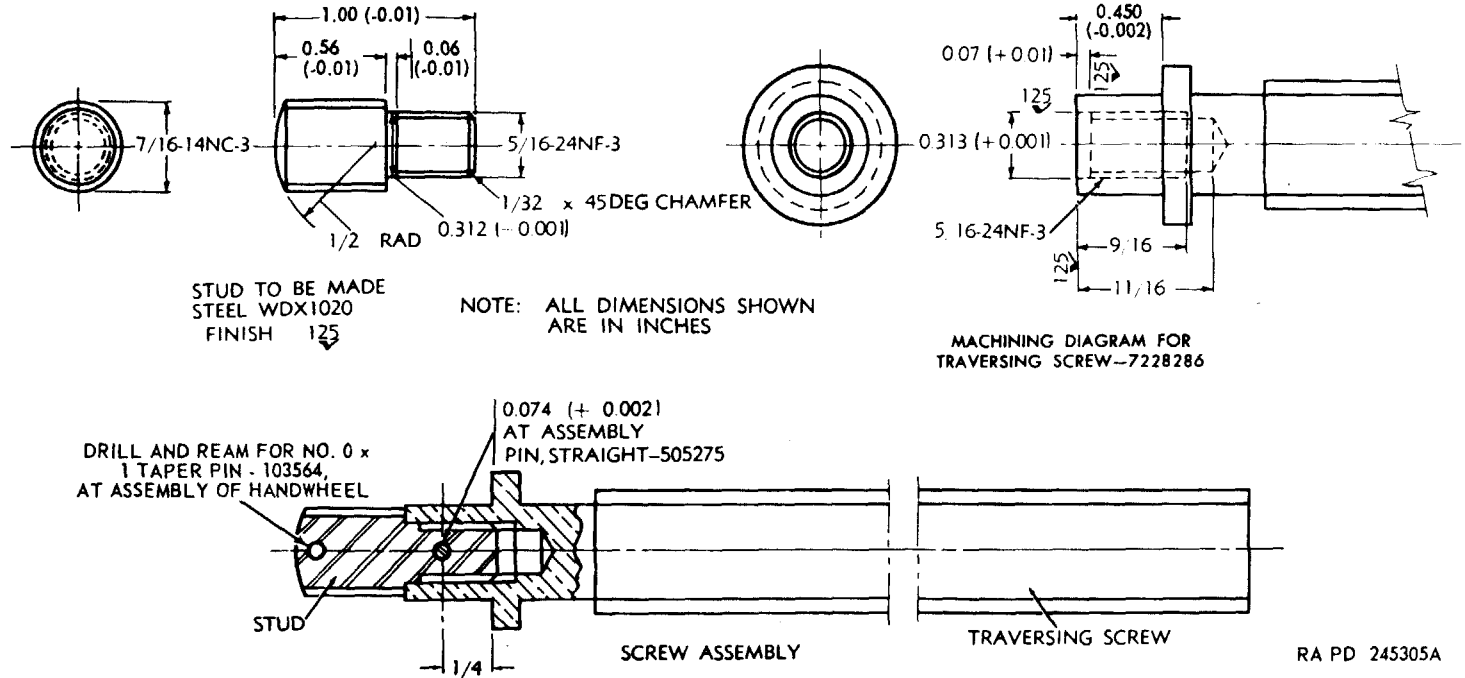


Figure 19. Repair of traversing screw 7228286.

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traversing spindle assembly, using spanner wrench 7228728 (fig.8); align holes and secure with traversing bearing screw (B).

*h.* Position the end of the traversing spindle assembly (A3) into its seat in the yoke assembly and secure with 5-mm (0.197) x 1 3/8 straight pin (A5).

#### **Section IV. LEG GROUP-MOUNT M5**

### **37. Disassembly**

#### **Note**

**The key letters shown in a and b below in parentheses refer to figure 16.**

*a.* To separate right and left leg from elevating mechanism group, remove pin from threaded end of connector pivot (G), unscrew connector pivot nut (H), and remove connector pivot. Unscrew the six clevis bearing screws (D) and pry out the two clevis bearings (E). Mark to facilitate assembly.

*b.* Remove both leg assemblies (F and K) from elevating mechanism group (J) by pulling apart.

*c.* To disassemble right leg assembly (fig. 20), proceed as outlined in (1) through (7) below.

- (1) Drive out straight pin that passes through right leg clevis and leg body. Unscrew right leg clevis, marking beforehand to facilitate assembly.
- (2) Unscrew the three oval-head cover screws and remove clevis latch cover.
- (3) Lift out clevis latch and clevis latch spring. The latch must be lifted straight up because its lateral movement is limited by a pin. The latch spring is slightly compressed when assembled and care must be exercised to prevent the spring from jumping out.
- (4) Remove bipod foot by driving out the two straight pins, heat to unsolder, and drive off.

#### **Note**

**Most mortars in the field have soldered joints on the feet; however, current production is not soldered.**

- (5) Remove strap by driving out straight pin and removing the lower grip collar.
- (6) Remove right leg handle grip by driving out straight pin and removing upper grip collar.
- (7) Remove center grip collar by driving out straight pin.

*d.* To disassemble left leg assembly, proceed as outlined in (1) through (10) below

#### **Note**

**The key letters shown below in parentheses refer to figure 21.**



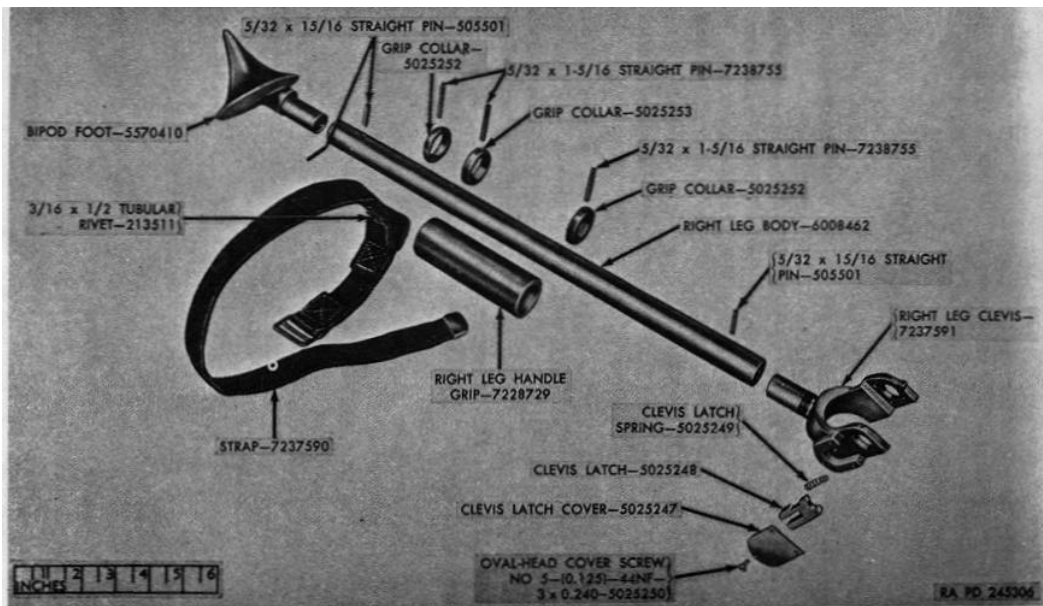


Figure 20. Right leg assembly 5207663-exploded view.

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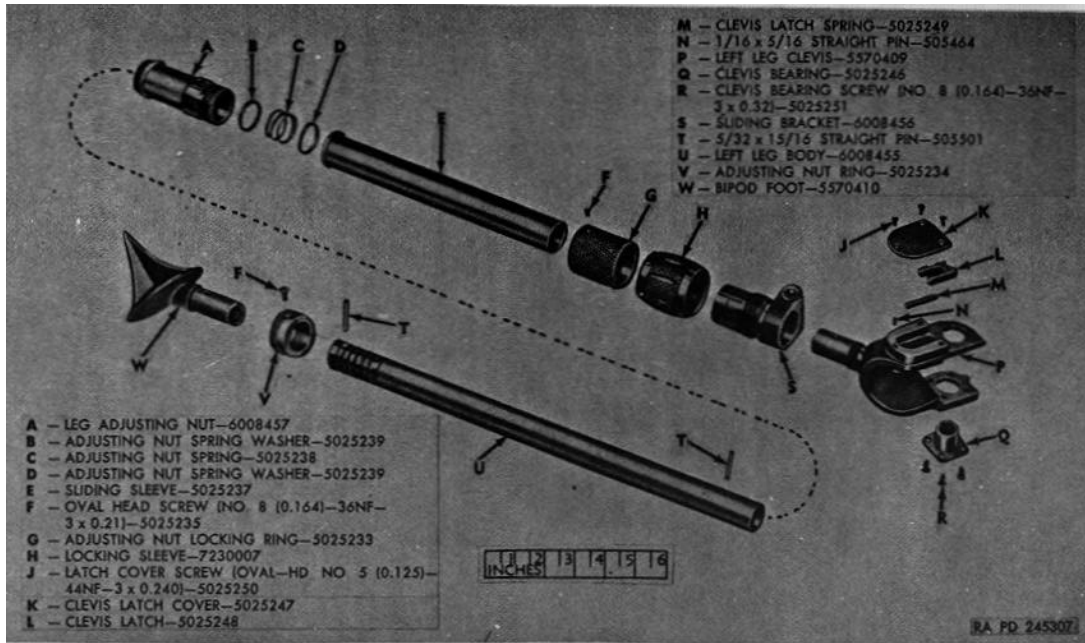


Figure 21. Left leg assembly 7230150-exploded view.

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- (1) Unscrew the three latch cover screws (J) and remove clevis latch cover (K).
- (2) Lift out clevis latch (L) and clevis latch spring (M). The latch must be lifted straight up because its lateral movement is limited by a straight pin (N). The latch spring is slightly compressed when assembled and care must be exercised to prevent the spring from jumping out.
- (3) Drive out straight pin (T) that passes through left leg clevis (P) and left leg body. (U) and unscrew left leg clevis, marking beforehand to facilitate assembly.
- (4) Loosen locking sleeve (H) and remove it with sliding bracket (S).
- (5) Remove one oval-head screw (F) from adjusting nut ring (V) and another from adjusting nut locking ring (G).  
Unscrew the adjusting nut ring and nut locking ring from leg adjusting nut (A).
- (6) Lift sliding sleeve (E) from the left leg body (U).
- (7) Unscrew leg adjusting nut (A) and slide it off leg body, together with adjusting nut spring (C) and two adjusting nut spring washers (B and D).
- (8) To remove bipod foot (W), drive out two straight pins (T), heat to unsolder, and drive off.

#### **Note**

**Most mortars in the field have soldered joints on the feet; however, current production is not soldered.**

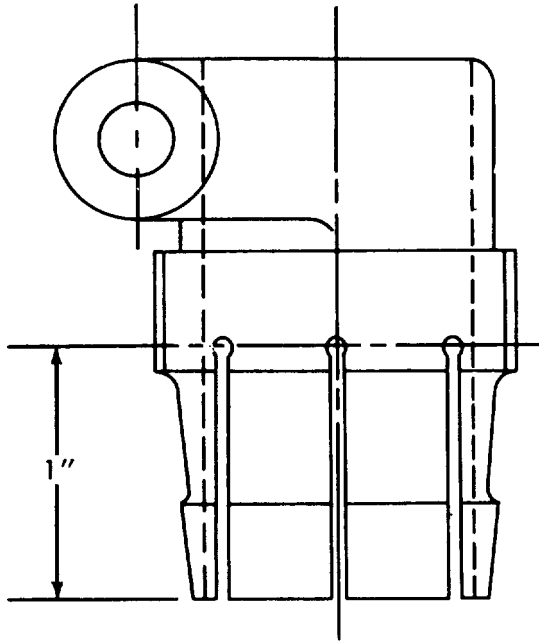
- (9) Slide off adjusting nut ring (V).
- (10) Unscrew locking sleeve (H) from sliding bracket (S).

### **38. Inspection**

- a. Check whether the modification to increase clamping action of the sliding bracket on the left leg has been applied (par. 39b).
- b. Inspect notch in clevis latch; it should be sharp and not worn.  
Clevis bearing should fit snugly in clevis latch.
- c. Check all threaded, sliding, and bearing parts for damage, burs, or wear.
- d. Sliding sleeve should slide freely over left leg body. The leg adjusting nut should thread easily and without play over the left leg body threads.
- e. Check whether adjusting nut spring is cracked or broken and conforms to standards in table VII.

### **39. Repair**

- a. Remove burs from sliding and bearing parts and polish with crocus cloth.



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**Figure 22. Modified sliding bracket.**

*b.* Increase the clamping action of the sliding bracket (fig. 22) by extending the slots with a hacksaw to one inch. Remove burrs caused by saw. This will permit the bracket to be drawn tight on the sliding sleeve.

*c.* Repair damaged threads.

*d.* Replace adjusting nut spring and clevis latch springs, if cracked, broken, or if they fail to meet the requirements listed in table VII.

*e.* With the exception of the left and right leg bodies, all parts of the leg group shown in figures 20 and 21 are replaced by field maintenance, if cracked, broken, or otherwise unserviceable. If a leg body is unserviceable, the whole leg assembly is replaced by depot maintenance.

#### **40. Assembly**

*a.* To assemble left leg assembly, proceed as outlined in (1) through (9) below.

#### **Note**

**The key letters shown below in parentheses refer to figure 21.**

- (1) If bipod foot and adjusting nut ring have been removed, install adjusting nut ring (V) (open end leading); then

install bipod foot (W) in end of left leg body (U) and secure with two new 5/32 x 15/16 straight pins (T).

- (2) Thread leg adjusting nut (A) (short thread leading) on left leg body as far as it will go, screw adjusting nut ring (V) on leg adjusting nut until holes aline and lock with oval-head screw (No. 8 (0.164)-36NF-3 x 0.21) (F).
- (3) Install adjusting nut spring washer (B), adjusting nut spring (C), and other nut spring washer (D) on left leg body.
- (4) Install sliding sleeve (E) (flange leading) on left leg body.
- (5) Slide adjusting nut locking ring (G) over sliding sleeve (E), screw it on leg adjusting nut (A) until holes aline, and lock with oval-head screw (No. 8 (0.164)-36NF-3 x 0.21) (F).
- (6) Slide locking sleeve (H) (smooth end leading) over sliding sleeve (E) and screw sliding bracket (S) into the locking sleeve.
- (7) Install clevis latch (L) and clevis latch spring (M), making certain clevis is held in place by 1/16 x 5/16 straight pin (N) in clevis.
- (8) Install clevis latch cover (K) and secure with three latch cover screws (oval-hd No. 5 (0.125)-44NF-3 x 0.240) (J).
- (9) Screw left leg clevis (P) into left leg body (U) until holes aline and drive in 5/32 x 15/16 straight pin (T).

*b.* To assemble right leg assembly (fig. 20), proceed as outlined in (1) through (8) below.

- (1) If bipod foot has been removed, install bipod foot in end of right leg body and secure with two new 5/32 x 15/16 straight pins.
- (2) Install lower grip collar and drive in 5/32 x 15/16 straight pin.
- (3) Install right leg strap on right leg body.
- (4) Install center grip collar on right leg body, drive in the 5/32 x 15/16 straight pin, and slide on right leg handle grip.
- (5) Install upper grip collar and drive in the 5/32 x 15/16 straight pin.
- (6) Install clevis latch and clevis latch spring, making certain clevis is held in place by straight pin in clevis.
- (7) Install clevis latch cover and secure with three oval-head cover screws (No. 5 (0.125)-44NF-3 x 0.240).
- (8) Screw right leg clevis into right leg body until holes aline and drive in 5/32 x 15/16 straight pin.

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- c. To assemble leg group, proceed as outlined in (1) through (4) below.

**Note**

**The key letters shown below in parentheses refer to figure 16.**

- (1) Position right leg assembly (K) and left leg assembly (F) onto elevating mechanism group (J) so that holes in leg devices are aligned and install clevis bearings (E).
- (2) Secure each clevis bearing with three clevis bearing screws (D).
- (3) Align holes in connector and left leg assembly and insert connector pivot (G).
- (4) Secure with connector pivot nut (H) and peen threaded end of pivot over nut.

**Section V. ELEVATING MECHANISM GROUP-MOUNT M5**

**41. Disassembly**

- a. Drive out the straight pin from traversing bearing and unscrew from elevating mechanism assembly (fig. 23).
- b. Remove peen from threaded end of connector link pivot, unscrew connector pivot nut, and remove connector link pivot and connector (fig. 23).
- c. Remove ring screw from the elevating mechanism ring (fig. 24). Back off the ring, turn the elevating screw crank, and remove the elevating screw from the elevating screwnut (fig. 24).
- d. Drive the tapered pin out of the elevating screw crank (fig. 24); unscrew the crank. Drive out straight pin and remove the elevating mechanism ring, thrust bushing, and thrust bushing spring from the elevating screw (fig. 24).
- e. Back off the elevating mechanism retainer and pull the elevating tube off the elevating screwnut (fig. 24).
- f. Back off the adjusting nut and remove the screwnut lockwasher, expanding bearing ring, and expanding bearing from the elevating screwnut (fig. 24).
- g. The elevating mechanism retainer and the elevating bearing will slide off the elevating screwnut (fig. 24). The bearing may have to be tapped off lightly with a soft metal hammer or a wooden block and hammer.

**42. Inspection**

- a. Slide elevating screwnut up and down in the elevating tube and check for binding and backlash.

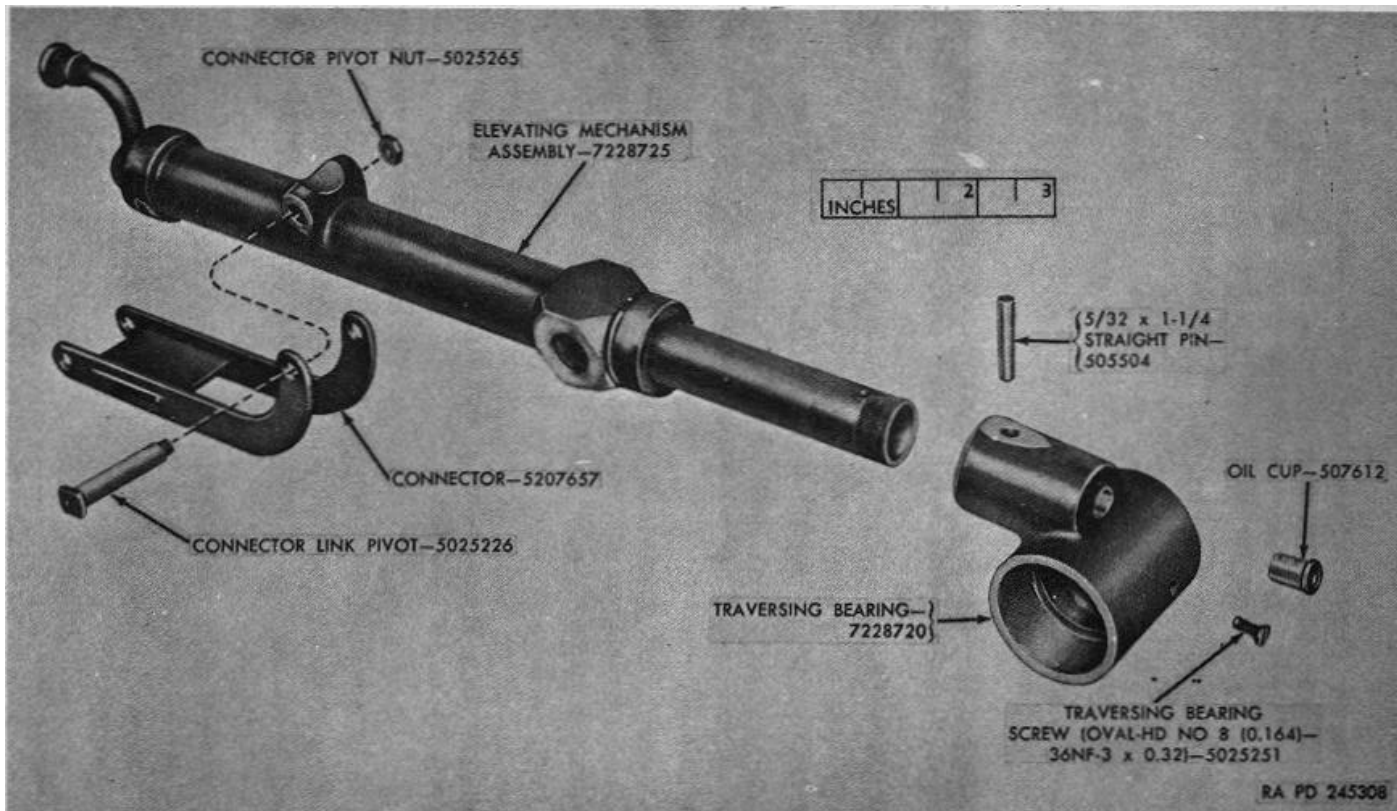


Figure 23. Elevating mechanism group--exploded view.

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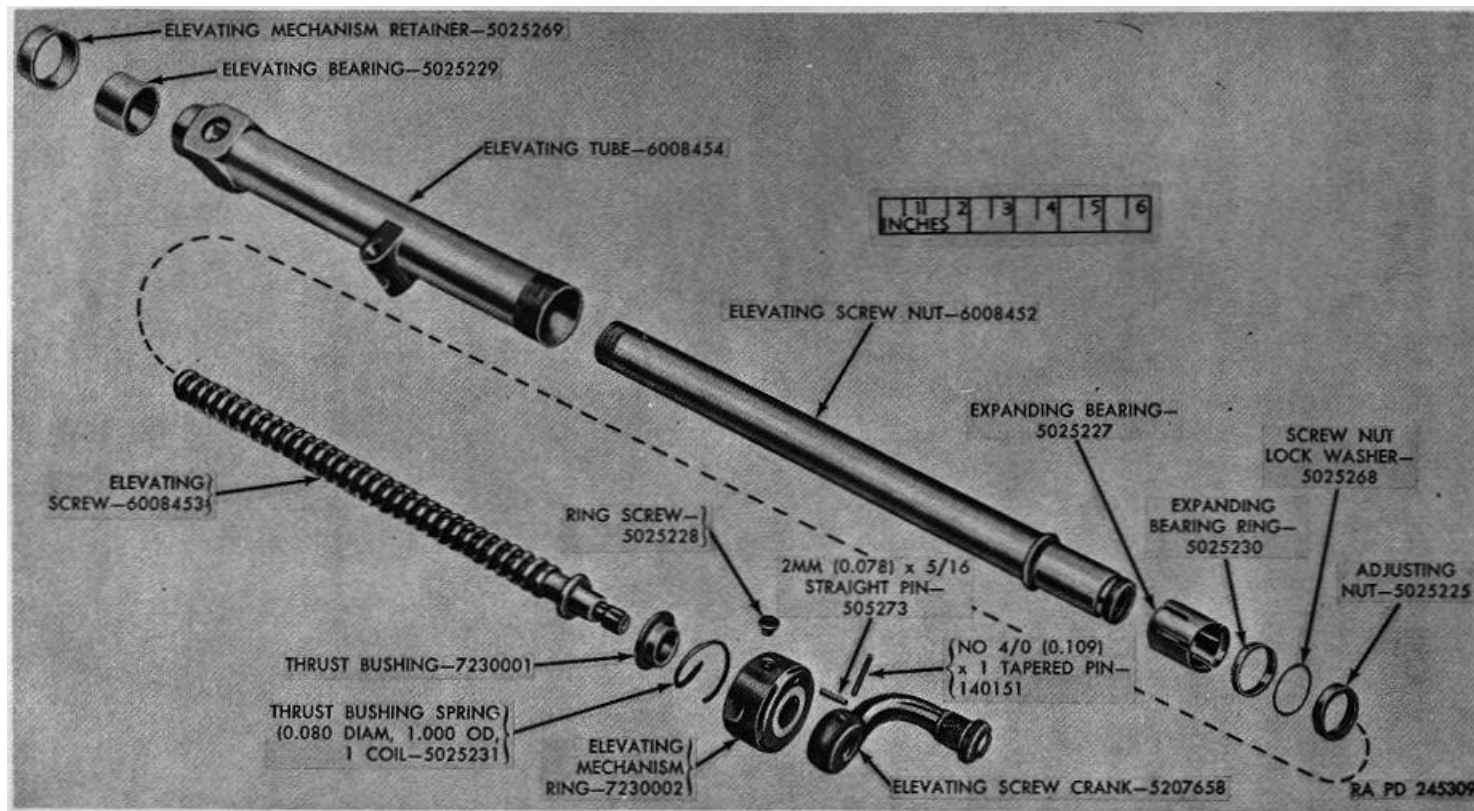


Figure 24. Elevating mechanism assembly—exploded view.

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- b. Examine the elevating screw for wear, straightness, and burs.
- c. Examine the expanding bearing for cracks and signs of fracture.
- d. Note condition of elevating screw nut lockwasher; it should have stud for engaging slot in elevating nut.
- e. Check condition of thrust bushing spring.
- f. Note condition of straight pin in elevating mechanism ring. Pin should be 0.078 x 5/16.
- g. Check all threaded parts of elevating mechanism for condition of threads.

### **43. Repair**

- a. Clean and polish all sliding parts to remove foreign matter, rust, and burs.
- b. Repair damaged threads.
- c. Replace thrust bushing spring if it is broken or corroded, or if it fails to meet the standards in table VII.
- d. Replace all broken, distorted, cracked, or worn parts.
- e. Breakage of elevating screw near the crank can be corrected as outlined in (1) through (3) below.
  - (1) Machine broken end and drill and tap (fig. 25).
  - (2) Fabricate stud to given dimensions (fig. 25).
  - (3) Assemble stud to screw and secure with straight pin (fig. 25).

### **44. Assembly**

- a. Slip expanding bearing on elevating screw nut and follow with expanding bearing ring (tapered end leading) and screw nut lockwasher (fig. 24) (stud on washer should lead and fit into recess in nut). Screw on adjusting nut andpeen lockwasher over the flat of nut (fig. 24).
- b. Secure elevating screw in vise with soft jaws. Place thrust bushing (flanged end leading) over elevating screw and follow with thrust bushing spring (0.080 diam. 1.000 od, 1 coil) (fig. 24). Place elevating mechanism ring over elevating screw (fig. 24); press ring down against the spring, making certain the 2-mm (0.078) x 5/16 straight pin in ring fits in the cut in the bushing. Hold ring in this position and screw elevating screw crank (fig. 24) on the elevating screw until holes in the crank and screw align.
- c. Drive in No. 4/0 (0.109) x 1 tapered pin to secure elevating screw crank to elevating screw (fig. 24).

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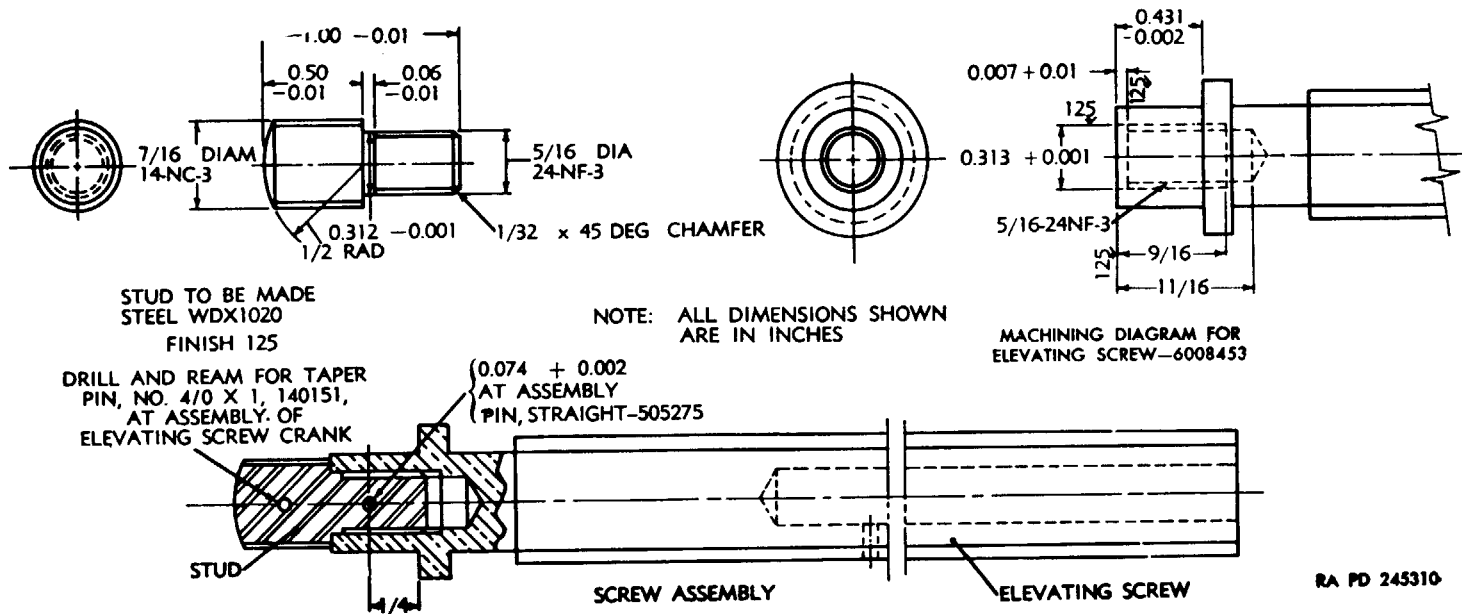


Figure 25. Repair of elevating screw 6008453.

d. Screw elevating screw into elevating screwnut (fig. 24) as far as it will go. Insert the unit into elevating tube (through bottom). Screw tube into elevating mechanism ring until screw holes align and screw in ring screw (fig. 24).

e. Place elevating bearing in elevating tube (fig. 24) over elevating screwnut. Screw elevating mechanism retainer on elevating tube (fig. 24).

f. Screw traversing bearing onto elevating mechanism assembly (fig. 23) until holes align and drive in 5/32 x 1 1/4 straight pin.

g. Secure connector to elevating mechanism assembly by means of connector pivot and connector pivot nut (fig. 23). Peen threaded end of connector pivot over the pivot nut. Connector should pivot freely.

## **Section VI SHOCK ABSORBERS, MORTAR CLAMP, AND YOKE GROUP-MOUNT M5**

### **45. Disassembly**

a. Remove shock absorber plug setscrews and back out shock absorber plugs (fig. 26); mark plugs and guides to facilitate assembly.

b. Withdraw shock absorbers and mortar clamp group from yoke body (fig. 26).

c. Remove retainer setscrews (fig. 27) and back out shock absorbers. Disassemble shock absorbers by removing shock absorber screws, front bushings, springs, rear bushings, and guides (fig. 27). Unscrew shock absorber retainers (fig. 27) (mark to facilitate assembly).

d. To disassemble the clamp assembly, proceed as outlined in (1) through (3) below.

(1) Rotate mortar clamp nut until the hole in the nut aligns with the tapered pin in the clamp stud; then drive out the tapered pin and unscrew mortar clamp nut from the clamp stud (fig. 27).

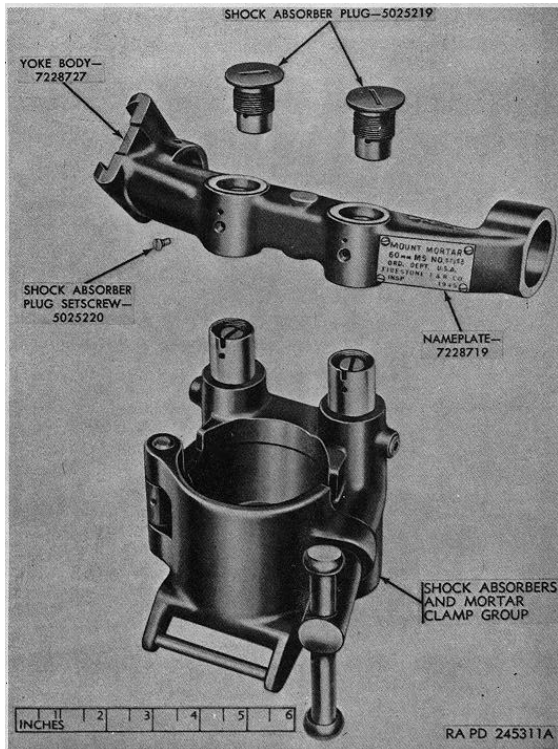
(2) Drive out tapered pin which secures collar pin to lower half collar; then drive out collar pin (fig. 27) to separate upper and lower half collars.

(3) Drive out tapered pin from lower half collar and unscrew clamp stud (fig. 27).

### **46. Inspection**

a. Check condition of shock absorber springs; springs should meet standards in table VII.

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**Figure 26. Shock absorbers, mortar clamp, and yoke assembly group—partial exploded view.**

- b.* Check condition of all threaded surfaces.
- c.* See whether clamp surfaces are smooth, not distorted, and grip mortar securely.
- d.* See whether guides are smooth and free of galls.

**47. Repair**

- a.* Clean and polish all sliding parts to remove foreign matter, rust, and burs. Remove any galling from the guides.

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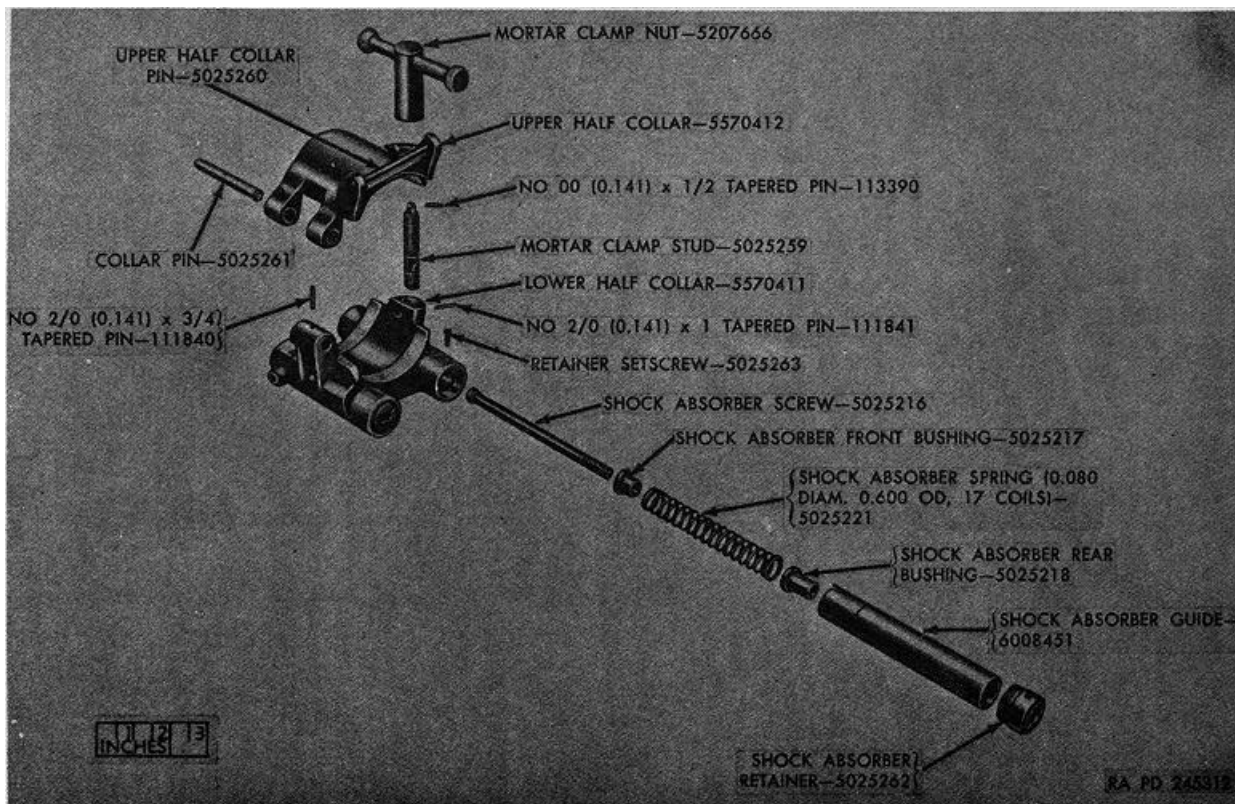


Figure 27. Shock absorber and mortar clamp group--exploded view.

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- b. Repair damaged threads.
- c. Replace shock absorber springs if they are broken, corroded, or if they fail to meet the standards in table VII.
- d. If lower half or upper half collar is distorted or broken, replace the saddle assembly.
- e. Replace all other parts if broken, cracked, or distorted.

#### **48. Assembly**

a. Insert shock absorber rear bushing into shock absorber guide (small end leading) and then follow with shock absorber spring, shock absorber front bushing (small end leading), and shock absorber screw (fig. 27).

b. Slip the shock absorber guides into the pockets of the lower half collar so that slot in each guide aligns with a pin located in the yoke body; slip the yoke down over the guides and align screw holes in yoke body with screw holes in guides (fig. 27).

c. Screw each shock absorber retainer (fig. 27) into its pocket in the lower half collar until screw holes align. Screw in the retainer setscrews (fig. 27) part way.

d. Turn the shock absorber screw into each shock absorber retainer until the screw holes of the screw align with holes in the shock absorber retainer (fig. 27) and lower half collar. Screw in the retainer setscrews completely.

e. Screw the shock absorber plugs into their proper pockets of the yoke body as marked until the holes in the plugs align with the holes in the shock absorber guides and yoke body (fig. 26). Screw in the shock absorber plug setscrews (fig. 26).

f. To assemble the mortar clamp assembly, proceed as outlined in (1) through (3) below.

- (1) Screw mortar clamp stud tight into lower half collar and drive in No. 2/0 (0. 141) x 1 tapered pin (fig. 27).
- (2) Hold the upper half collar so that slotted hole of collar is over the mortar clamp stud, and mesh the hinge of the upper and lower half collars (fig. 27). Drive in collar pin until holes align and drive in No. 2/0 (0. 141) x 3/4 tapered pin (fig. 27).
- (3) Screw mortar clamp nut on mortar clamp stud until holes align and then drive in No. 00 (0. 141) x 1/2 tapered pin (fig. 27).

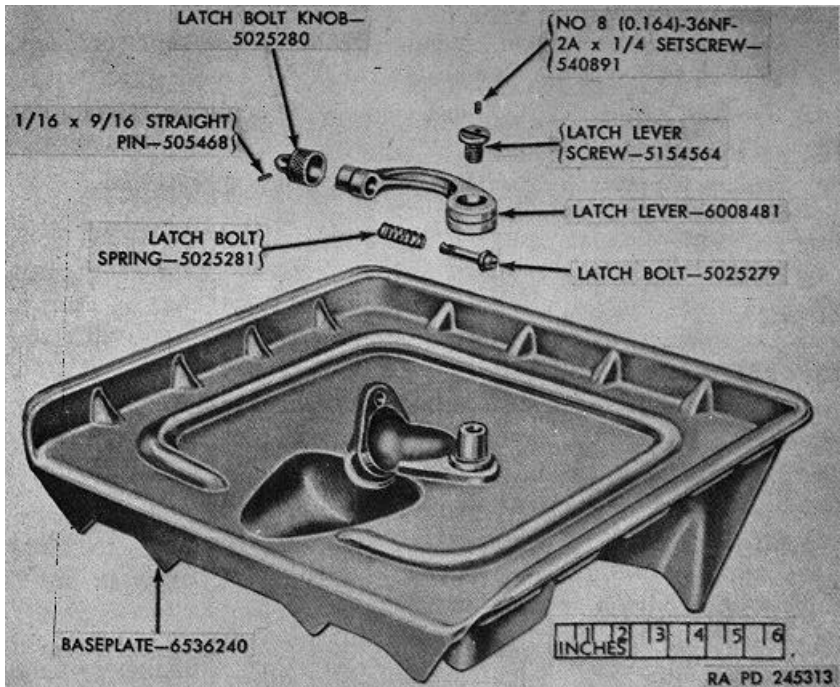
### **Section VII. BASEPLATES-60-MM MORTAR MATERIEL**

#### **49. Disassembly**

a. *Baseplate of Mount M5* (fig. 28).

- (1) Remove setscrew from head of latch lever screw, back out

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**Figure 28. Baseplate-60-mm mortar mount M5--partial exploded view.**

latch lever screw (mark for assembly in the same baseplate), and lift off latch lever with assembled parts from baseplate.

- (2) Drive straight pin from latch bolt knob, insert a rod through loop of knob, hold knob in place, and unscrew latch bolt. Remove latch bolt and latch bolt spring.

*b. Baseplate M1 (fig. 29).*

- (1) Unscrew hinged cap assembly from baseplate body.
- (2) Hinged cap assembly can be disassembled by removing the button-head rivets which secure the hinged cap link.

**50. Inspection**

*a. Baseplate of Mount M5.*

- (1) Check socket for smoothness and plate for soundness and indications of fracture.
- (2) Check latch for damage.

*b. Baseplate M1.*

- (1) Check body for cracks and bending and socket for roughness and damaged threads.

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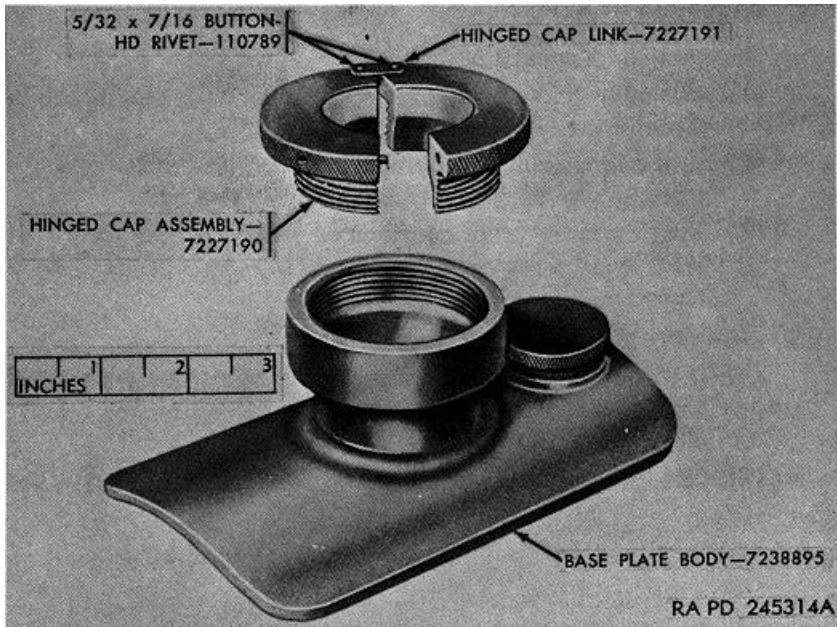


Figure 29. M1 baseplate assembly 7238892-60-mm mortar mount.

- (2) Check cap assembly for damage to threads, pin, and link.
- (3) Examine welding for soundness.

## 51. Repair

### a. Baseplate of Mount M5.

- (1) Remove burrs from socket, using die grinder and stone, if available.
- (2) Weld cracks.
- (3) Replace damaged latch parts.

### b. Baseplate M1.

- (1) Clean and chase threads until they run by hand pressure.
- (2) Remove scores from the socket with a die grinder or stone.
- (3) Provide reinforcement for the baseplate body, if not yet provided, as outlined in (a) through (c) below.
  - (a) Shape two pieces of strip steel, approximately  $3/4 \times 1/4 \times 4 \frac{1}{4}$ , to the curvature of the baseplate body.
  - (b) With C-clamps, hold the strips on the bottom side of the baseplate body and weld completely around the strips.
  - (c) Remove corrosion and repaint.
- (4) Replace pin if damaged.

### c. Baseplate T1. If authorized, apply MWO ORD A43-W5.

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## 52. Assembly

### a. *Baseplate of Mount M5* (fig. 28).

- (1) Assemble latch bolt spring on latch bolt and insert bolt through hole in latch lever.
- (2) Screw latch bolt into latch bolt knob and drive 1/16 x 9/16 straight pin through latch bolt knob and bolt.
- (3) Position latch lever on pivot of baseplate and secure with latch lever screw and No. 8 (0. 164)-36 NF-2A x 1/4 set-screw.

### b. *Baseplate M1* (fig: 29).

- (1) If hinged cap assembly was disassembled, rivet hinged cap link to both cap hinges. Draw up 5/32 x 7/16 button-hd rivets securely.
- (2) Close hinged cap assembly and screw into baseplate body.

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**CHAPTER 6**  
**REPAIR OF 81-MM MORTAR MATERIEL**

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**Section I. 81-MM MORTAR M1**

**53. Disassembly**

(fig. 30)

- a. Unscrew firing pin and remove from rear end of base cap.
- b. In order to maintain a proper seal, base cap should not be disassembled from the mortar tube.

**54. Inspection**

Proceed as in paragraph 26 but use the 81-mm improvised tube and firing pin gage (fig. 10).

**55. Repair**

Proceed as in paragraph 27 but use firing pin vent cleaning tool 5025032 (fig. 7) to clean firing pin vent and improvised tube and firing pin gage, shown in figure 10, to check tube diameter.

**56. Assembly**

(fig. 30)

Screw firing pin into rear end of base cap and draw up gastight.

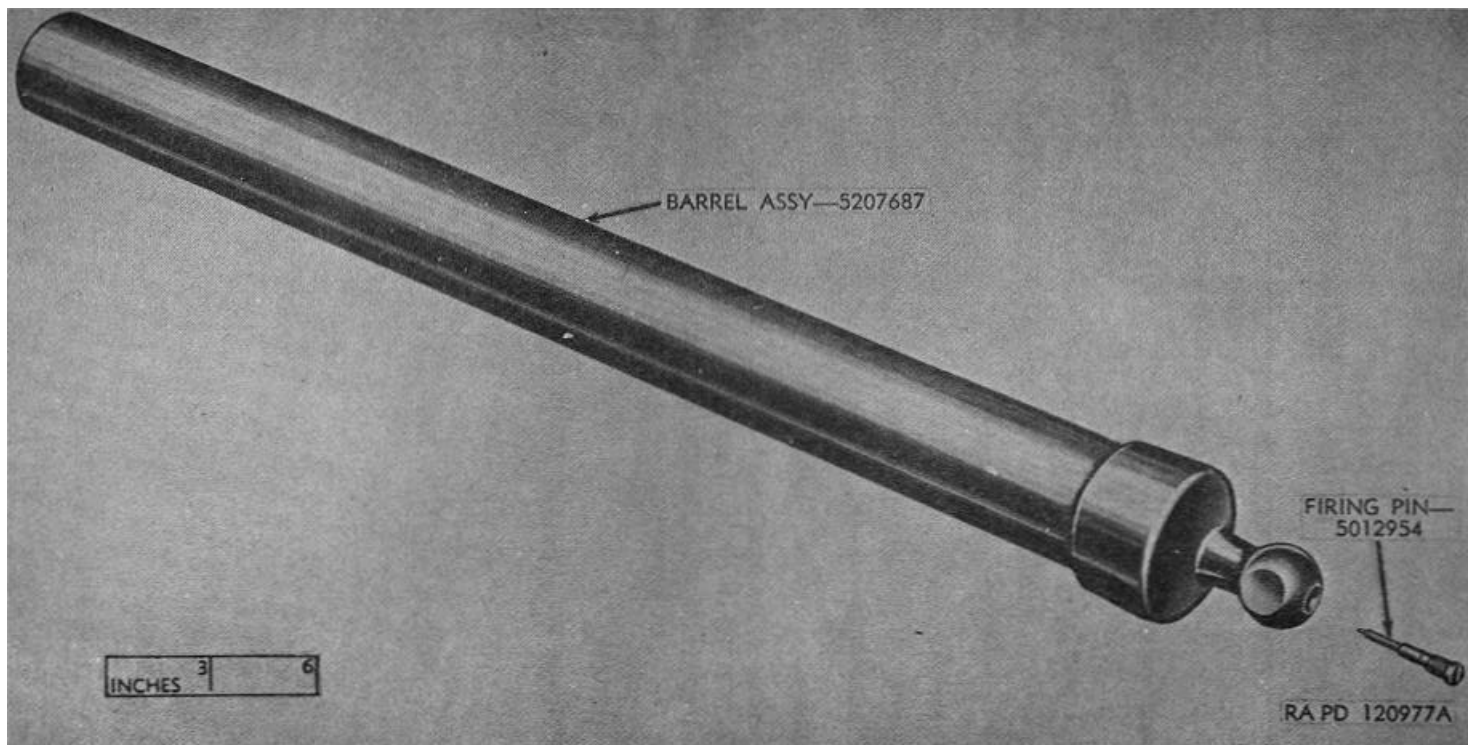


Figure 30. 81-mm mortar M1-exploded view.

## Section II. 81-MM MORTAR M29

### 57. Disassembly

(fig. 31)

- a. Unscrew firing pin from rear end of mortar barrel base plug.
- b. Unscrew barrel ring until it is free of the mortar barrel.
- c. The mortar barrel consists of a base plug and tube, brazed together, and cannot be disassembled.

### 58. Inspection

Proceed as in paragraph 26, but use improvised tube and firing pin gage shown in figure 10, to check tube diameter.

### 59. Repair

- a. Proceed as in paragraph 27 but use firing pin vent cleaning tool 5025032 (fig. 7) to clean firing pin vent, and improvised tube and firing pin gage shown in figure 10, to check tube diameter.
- b. Replace barrel ring, if damaged.

### 60. Assembly

(fig. 31)

- a. Screw firing pin into rear end of mortar barrel base plug and tighten.
- b. Screw on barrel ring, about 18 inches from muzzle end of mortar barrel.

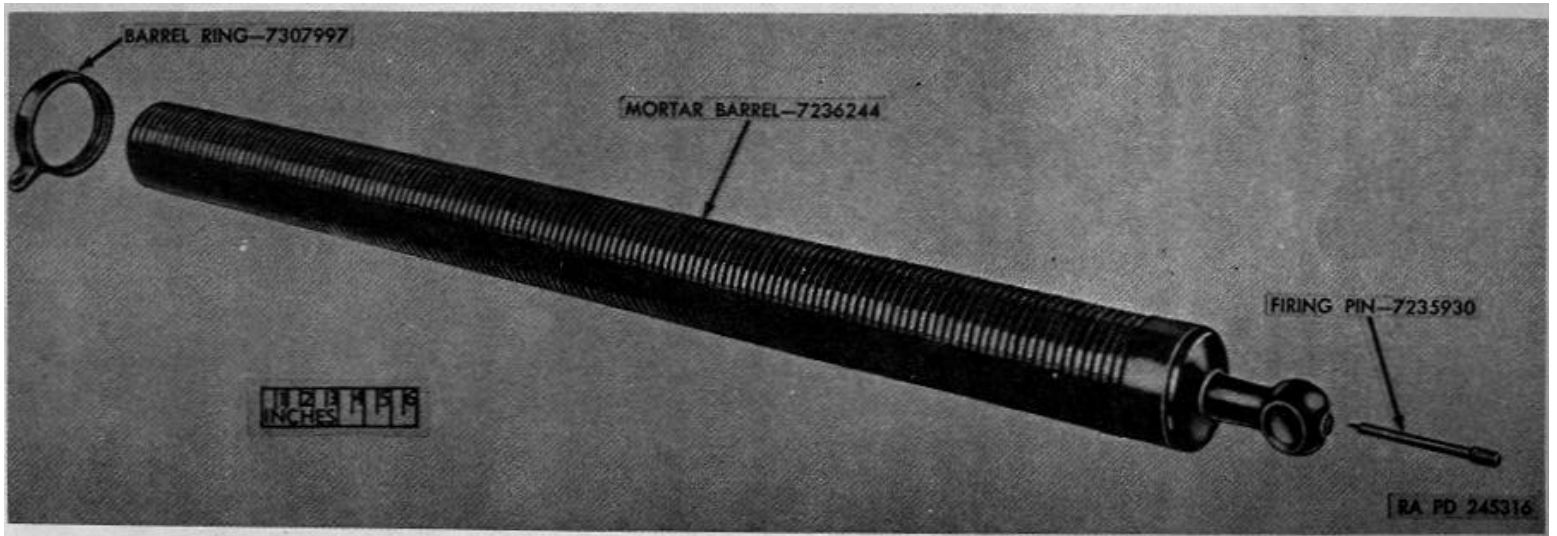


Figure 31. 81 mm mortar M29— exploded view.

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### Section III. LEG GROUP-MOUNT M4

#### 61. Disassembly

a. Remove cotter pin and unscrew castellated nut (fig. 32). Remove leg group from traversing spindle tube bearing (fig. 32) by carefully tapping it with a soft metal hammer.

b. Remove stake and unscrew connecting rod shoulder bolts from both ends of the connecting rod (fig. 33). Remove chain, chain hook, and chain spring from left and right leg assemblies (fig. 33). Drive out the tapered pin at top of each leg assembly and remove the legs from the elevating mechanism assembly (fig. 33).

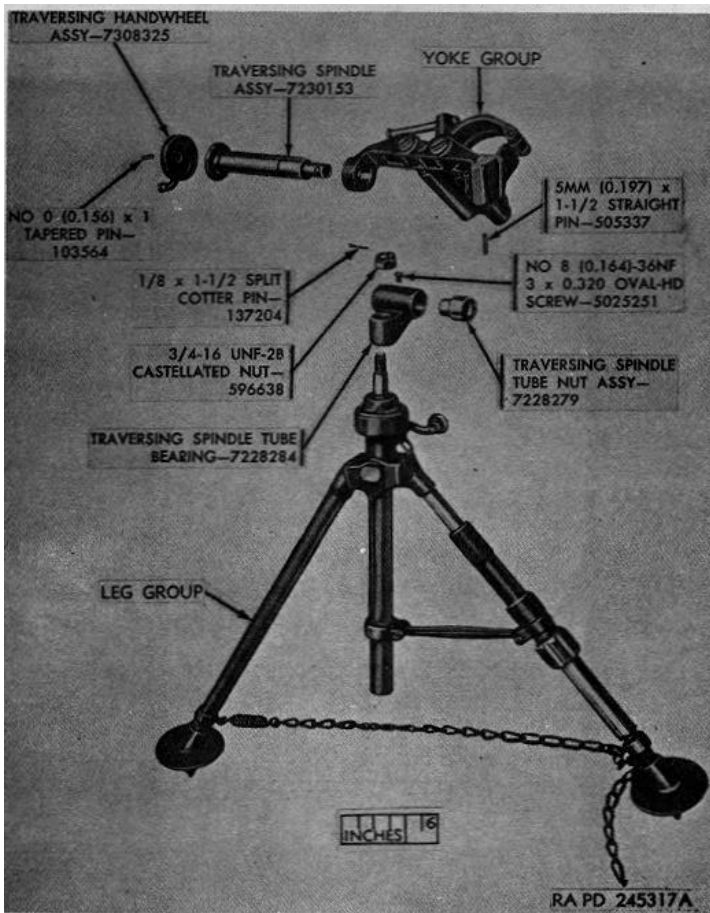
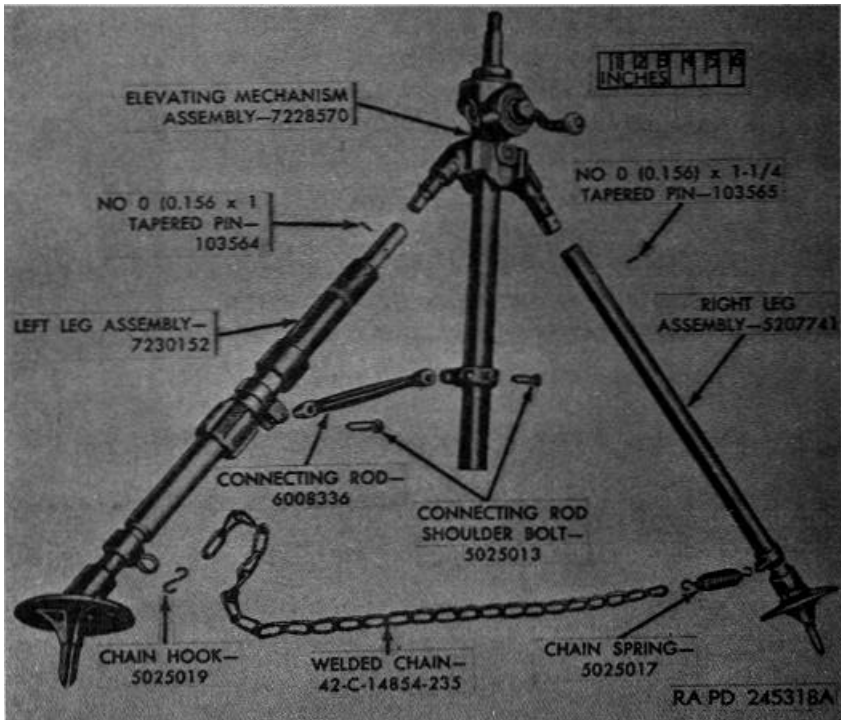


Figure 32. 81-mm mortar mount M4.

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**Figure 33. Leg group--81-mm mortar mount M4--exploded view.**

c. To disassemble left leg assembly, proceed as outlined in (1) through (4) below.

**Note.**

**The key letters shown in (1) through (4) below in parentheses refer to figure 34.**

- (1) Remove the locking ring setscrew (J) and unscrew the adjusting nut locking ring (H).
- (2) Unscrew adjusting nut (A) from leg body (B).
- (3) Drive out the straight pins (D) which secure the left leg foot (C) and chain collar (E); heat foot and collar until the solder is melted and slide them off the leg body.
- (4) Slide the locking sleeve (F), sliding bracket (G), adjusting nut locking ring (H), sliding tube sleeve (L) with lower and upper bushings (K and N), adjusting nut spring (Q), and adjusting nut spring washers (P) off the left leg body.

d. To disassemble the right leg assembly, drive out the straight pins which secure the right leg foot and chain collar, heat foot and collar until the solder is melted, and slide them off right leg body (fig. 35).

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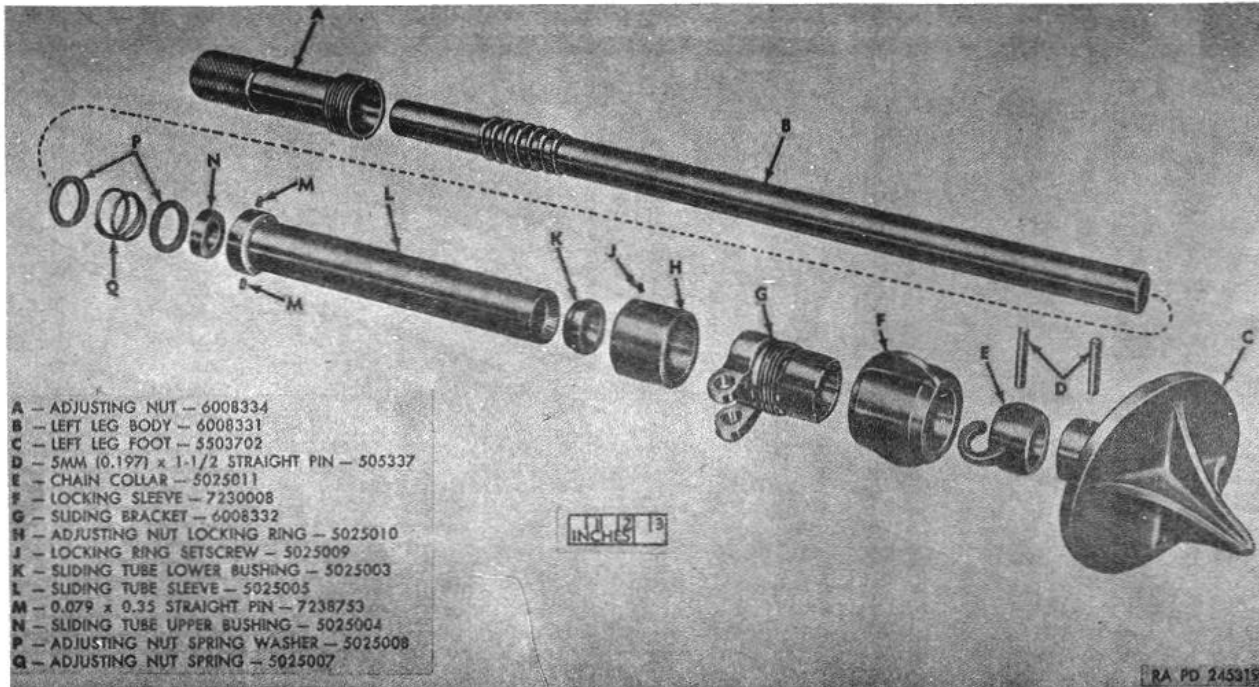


Figure 34. Left leg assembly 7250152-exploded view.

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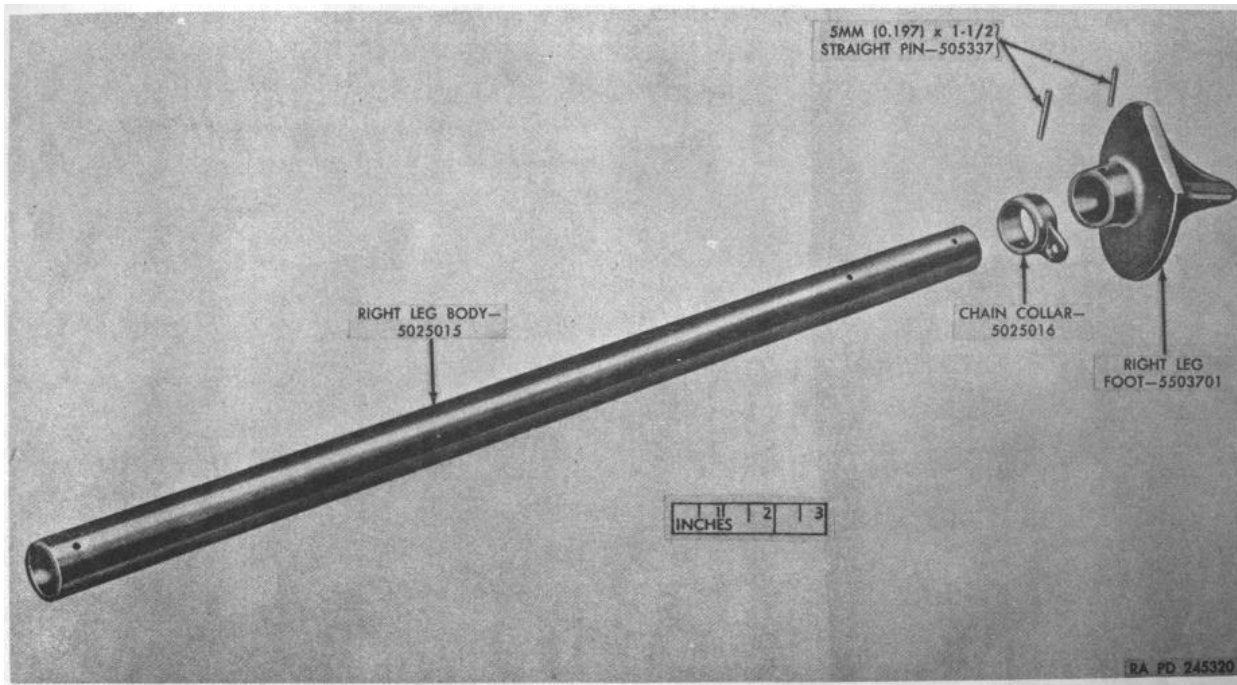


Figure 35. Right leg assembly 5207741-exploded view.

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## 62. Inspection

- Check whether modification to increase clamping action of the sliding bracket on the left leg has been completed (par. 63c).
- Check all threaded parts and bushings for damage, burs, or wear.
- Left leg sliding tube sleeve should slide over left leg body easily and adjusting nut thread easily over the leg body.
- Examine all parts for cracks, galling, or wear.

## 63. Repair

- Remove burs from telescoping parts of legs and polish with crocus cloth.
- If feet have been removed, discard old pins.
- Increase clamping action of sliding bracket on left leg by extending the slots in the bracket to 1 inch long (fig. 36). Also, extend one slot up through the portion of the bracket which clamps around the connecting link and turn back the shoulder on the connecting rod shoulder bolt one-eighth of an inch.
- Replace pins (M), if damaged.

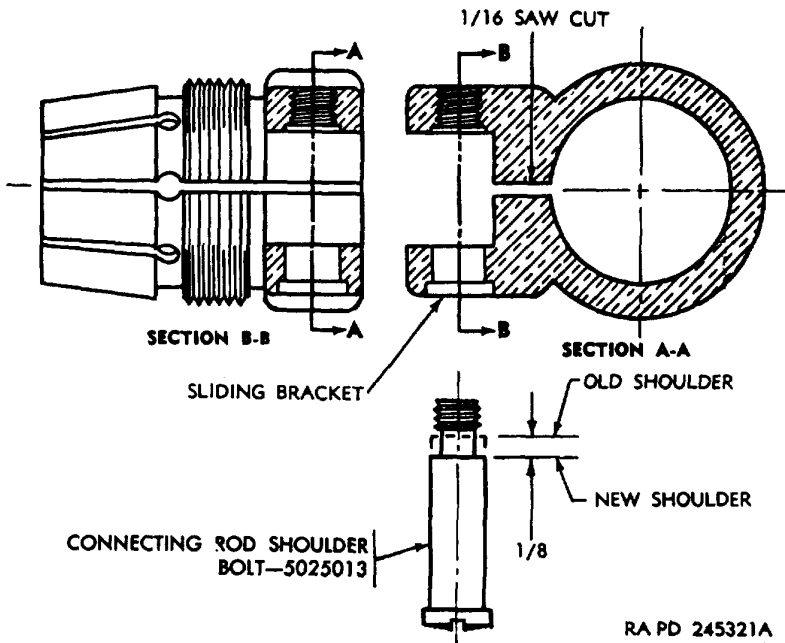


Figure 36. Sliding bracket modification.

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## 64. Assembly

- a. To assemble right leg assembly (fig. 35), proceed as outlined in (1) and (2) below.
  - (1) Assemble chain collar and right leg foot with new 5-mm (0.197) x 11/2 straight pins on right leg body and then solder.
  - (2) Secure right leg assembly to elevating mechanism assembly (fig. 33) with new No. 0 (0.156) x 11/4 tapered pin.
- b. To assemble left leg assembly, proceed as outlined in (1) through (9) below.

**Note.** The key letters shown below in parentheses refer to figure 34.

- (1) Slide the following on the left leg body, in the order listed: adjusting nut spring washer (P), adjusting nut spring (Q), adjusting nut spring washer (P), sliding tube sleeve (L) with sliding tube lower and upper bushings (K and N) assembled and pinned (flanged end leading), adjusting nut locking ring (H) (larger opening leading), sliding bracket (G) (solid end leading), and locking sleeve (F) (threaded end leading).
  - (2) Screw locking sleeve (F) on sliding bracket (G).
  - (3) Slide chain collar (E) (open end of hook leading) on leg body. Drive in 5-mm (0.197) x 11/2 straight pin (D) through chain collar and leg body.
  - (4) Slide left leg foot (C) on left leg body (B) (spike pointing same direction as chain hook on collar) and drive in 5-mm (0.197) x 11/2 straight pin (D) through foot and leg.
  - (5) Solder chain collar (E) and left leg foot to left leg body.
  - (6) Slide adjusting nut (A) (external threaded end leading) on left leg body. Screw adjusting nut into adjusting nut locking ring (H) and secure with locking ring setscrew (J).
  - (7) Secure left leg assembly to elevating mechanism assembly (fig. 33) with new No. 0 (0.156) x 1 1/4 and No. 0 (0.156) x 1 tapered pin.
  - (8) Secure connecting rod (fig. 33) with connecting rod shoulder bolts (fig. 33); stake bolts.
  - (9) Install welded chain with chain hook to left leg assembly and chain spring to right leg assembly (fig. 33).
- c. Insert threaded end of leg group through traversing spindle tube bearing (fig. 32), and secure with 3/4-16UNF-2B castellated nut and 8 x 1 1/2 split cotter pin.

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## Section IV. ELEVATING MECHANISM ASSEMBLY- MOUNT M4

### 65. Disassembly

a. Remove cotter pin and unscrew castellated nut (fig. 32). Remove leg group from traversing spindle tube bearing (fig. 32) by carefully tapping it with a soft metal hammer.

b. Remove stake and unscrew connecting rod shoulder bolts from both ends of the connecting rod (fig. 33). Remove chain, chain hook, and chain spring from left and right leg assemblies (fig. 33). Drive out tapered pin at top of each leg assembly and remove legs from the elevating mechanism assembly (fig. 33).

c. Remove setscrew which secures gear case top cover (fig. 37) to gear case and unscrew gear case top cover, using spanner wrench 6128199 (fig. 8). Remove felt washer.

d. Unscrew elevating bevel gear from elevating screw body (fig. 37). Lift out gear bearing washer (fig. 37).

e. Pull elevating screw body completely out of the elevating screw guide tube (fig. 37).

f. Drive out straight pin and remove elevating screw sleeve front elevating screw body (fig. 37).

g. Drive out tapered pin and unscrew guide tube plug from bottom of guide tube (fig. 37).

h. Unscrew guide tube (fig. 37) from gear case only if absolutely necessary because they are bead-soldered.

i. The connecting rod bracket (fig. 37) is sweated to the guide tube and should not be removed unless absolutely necessary.

**Note. The key letters shown in j, k, and l below in parentheses refer to figure 33.**

j. Remove clevis setscrew (A) from rear clevis retainer (M) and unscrew retainer. Remove clevis setscrew (A) from front clevis bolt (B) and unscrew front clevis bolt. Remove the right and left leg clevis screws (C1 and P2) and remove four devises (C2, C3, P3, and P4).

k. Remove setscrew (F) which secures gear case side-cover (J) to gear case (E) and unscrew gear case side cover with assembled parts, using spanner wrench 6128199 (fig. 8).

l. Drive out tapered pin (K) and unscrew elevating crank (L) from elevating bevel pinion (G) (threads on pinion are left-hand). Separate gear case side cover (J), washer (H), and elevating pinion (G).

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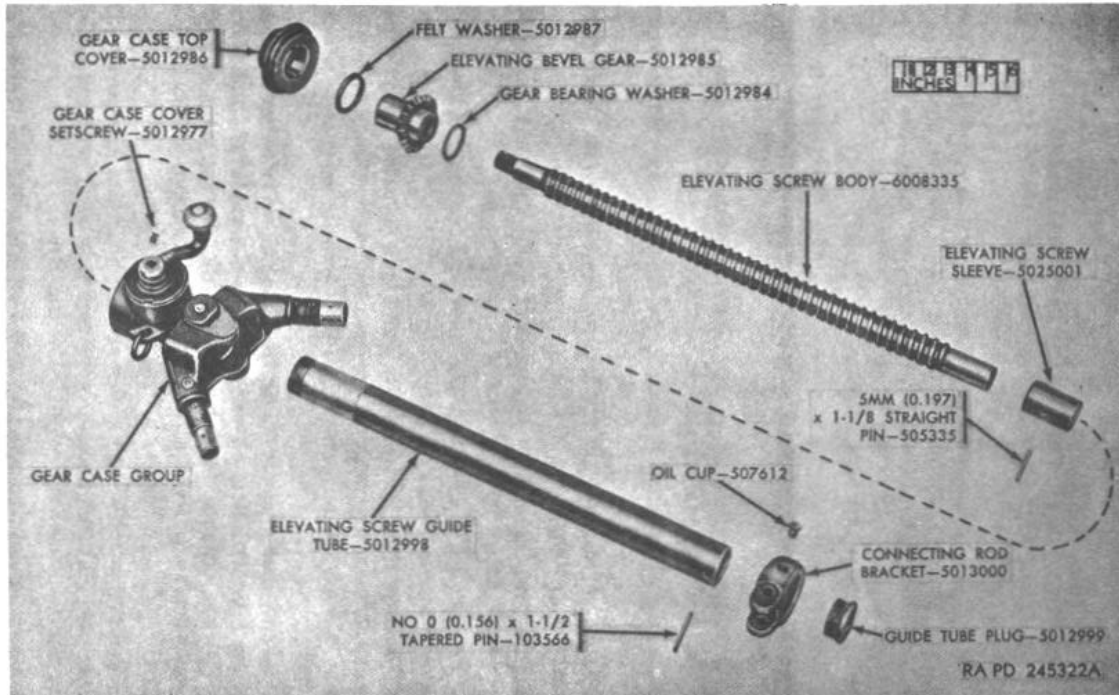


Figure 37. Elevating mechanism assembly 7228570-exploded view

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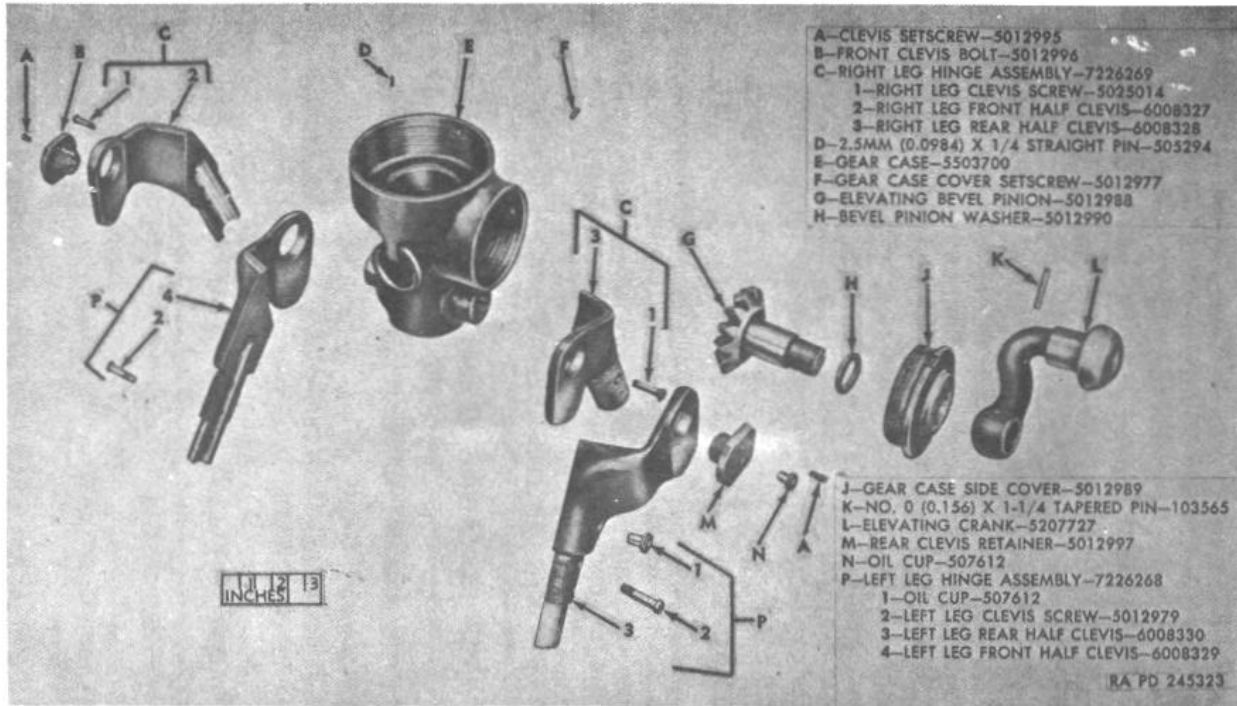


Figure 38. Gear case group-exploded view.

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## 66. Inspection

a. Examine elevating bevel gear and elevating bevel pinion for wear. Examine gear bearing washer; excessive wear on this washer will affect the mesh of the teeth on the gear and pinion.

b. Examine elevating screw for straightness, wear, and burs.

c. The pin 505294 in the top of the gear case should project upward 0.025 inch.

d. Examine threads on gear case and covers for burs and damage.

e. Examine all four segments of the leg devices for wear and damage to threads and mating surfaces.

f. Check whether all oil cups are clear and circled with red paint.

g. The likely order of wear and necessary replacement is as follows: elevating bevel gear, elevating bevel pinion, elevating screw sleeve, and guide tube. Elevating gear bearing washer and elevating screw body are primarily important only as they affect the wear of the other parts.

## 67. Repair

a. Replacement of damaged guide tube and elevating screw is a function of depot maintenance only; if connecting rod bracket is to be replaced, tin its inside surface and the surface of the guide tube around the area of the oil hole in the tube, sweat-solder, taking care to align oil holes, and press oil cup into bracket. If any clevis is damaged, replace the hinge assembly; replace all other damaged parts, as required.

b. Remove burs and foreign matter.

c. Remove corrosion and repaint, as required.

d. Chase or carefully file damaged threads.

## 68. Assembly

a. Screw elevating screw guide tube (fig. 37) into gear case group and bead-solder to case.

b. Align holes for oil cup of connecting rod bracket to elevating screw guide tube (fig. 37), if removed, and solder. Install oil cup.

c. Screw guide tube plug into guide tube until holes align and drive in No. 0 (0.156) x 1 1/2 tapered pin.

d. Align elevating screw sleeve on elevating screw body and secure with 5-mm (0.197) x 1 1/2 8 straight pin (fig. 37). Insert into guide tube.

e. Install gear bearing washer (side with single slot leading and slot engaging stud) in gear case (fig. 37).

f. Place felt washer on elevating bevel gear and screw elevating bevel gear on elevating screw body (teeth leading) (fig. 37).

g. Screw gear case top cover (fig. 37) into gear case group, using spanner wrench 6128199 (fig. 8), and secure with gear case cover setscrew (fig. 37).

**Note. The key letters shown below in h and i in parentheses refer to figure 38.**

h. Assemble devises (C2, C3, P3, and P4) to gear case (E) and secure with rear clevis retainer (M) and right and left leg clevis screws (C1 and P2).

i. To assemble gear case side cover parts, assemble bevel pinion washer (H), gear case side cover (J), and elevating crank (L) on elevating bevel pinion (G) (threads on pinion are left-hand), aline holes in pinion and crank, and drive in No. 0 (0.156) x 11/4 tapered pin (K). Screw side cover with assembled parts into gear case (E), using spanner wrench 6128199 (fig.8), and secure with gear case cover setscrew (F).

j. Secure right and left leg assemblies to elevating mechanism assembly (fig. 33) with new No. 0 (0.156) x 11/ and No. 0 (0.156) x 1 tapered pins.

k. Insert threaded end of leg group through traversing spindle tube bearing and secure with 3/4-16UNF-2B castellated nut and 1/8 x 11/2 split cotter pin (fig. 32).

l. Secure connecting rod with connecting rod shoulder bolts (fig.33); stake bolts.

## **Section V. TRAVERSING MECHANISM GROUP MOUNT M4**

### **69. Disassembly**

a. Drive out tapered pin that secures traversing handwheel assembly to the traversing spindle assembly and unscrew the handwheel assembly (fig. 32).

b. Drive out straight pin that secures traversing spindle tube nut assembly to the yoke assembly (fig. 32).

c. Remove the oval-headed screw from the traversing spindle tube bearing (fig. 32) and, using spanner wrench 7228728 (fig. 8), unscrew the traversing spindle tube nut assembly (fig. 32). Remove the traversing spindle tube bearing and slide the traversing spindle assembly out of the yoke group (fig. 32).

d. To disassemble the traversing spindle assembly, remove the flange screw from the traversing tube spindle cap assembly, unscrew



the cap assembly, and remove the thrust bushing spring and the traversing screw thrust bushing (fig. 17).

e. Remove the traversing screw from the traversing screwnut (fig. 17).

f. Unscrew the expanding bearing adjusting nut and remove the expanding bearing lockwasher, expanding bearing ring, and expanding bearing (fig. 17).

g. To disassemble the traversing handwheel assembly, remove the two crank detent screws and the traversing crank detent from handwheel body (fig. 18). Drive out the tapered pin that retains the straight pin and remove the straight pin and traversing crank (fig.18).

**Note. Do not disassemble traversing spindle tube nut assembly as replacement of the complete assembly is authorized when the packing is damaged or worn.**

## **70. Inspection**

a. Check the tube nut packing in the traversing spindle tube nut assembly.

b. Check traversing screw for straightness and traversing screwnut for ease of travel. The nut should slide easily in the traversing spindle tube. Examine screw at handwheel end for cracks.

c. Check for wear in the traversing screw, traversing screwnut, and expanding bearing, and if such wear can be compensated by tightening the expanding bearing adjusting nut (fig. 17).

d. Check holding action of traversing crank detent (fig. 18).

## **71. Repair**

a. Remove burrs and foreign matter. Replace worn or damaged parts, as required. Thrust bushing spring (fig. 17) must conform with standards in table VII.

b. Breakage of the traversing screw near the handwheel can be repaired as outlined in (1) through (3) below.

(1) Machine broken end and drill and tap (fig. 19).

(2) Fabricate stud to given dimensions (fig. 19).

(3) Assemble stud to screw and secure with pins (fig. 19).

## **72. Assembly**

a. Secure traversing crank detent with two crank detent screws to handwheel body. Assemble traversing crank to handwheel body by means of headless straight pin, and drive in No. 6/0 (0.078) x r/8 tapered pin (fig. 18).

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b. Hold traversing screw in a vise with soft jaws. Place traversing screw thrust bushing (flanged end leading) over the screw and follow with thrust bushing spring (fig. 17). Place traversing cap flange over traversing screw and press it against the spring, making certain that the 0.062 x  $\frac{1}{8}$  spring pin in the traversing cap flange fits in the cut in the bushing (fig. 17). Hold traversing cap flange in this position and screw traversing handwheel assembly (fig. 32) on traversing screw (fig. 17) of traversing spindle assembly (fig. 32) until holes in the handwheel and screw align. Drive in No. 0 (0.156) x 1 tapered pin to secure traversing handwheel assembly to traversing screw.

c. Assemble the following on traversing screwnut (fig. 17) in the order listed in (1) through (4) below.

- (1) Expanding bearing.
- (2) Expanding bearing ring.
- (3) Expanding bearing lockwasher (stud leading and engaging slot in traversing screwnut).
- (4) Expanding bearing adjusting nut.

d. Screw traversing screwnut (assembled end leading) on traversing screw (fig. 17).

e. Screw traversing spindle tube into traversing spindle tube cap assembly and install flange screw (fig. 17).

f. Insert assembled traversing handwheel and spindle mechanism through hole in yoke assembly and through traversing spindle tube bearing (fig. 32). Screw traversing spindle tube nut assembly into the tube and install No. 8 (0.164)-36NF-3 x 0.320 oval-headed screw (fig. 32).

g. Position traversing spindle assembly (fig. 32) in its seat in the opposite end of the yoke assembly, making certain lubricating hole aligns with oil cup in yoke, and drive in 5-mm (0.197) x 12 straight pin (fig. 32) to secure nut to yoke.

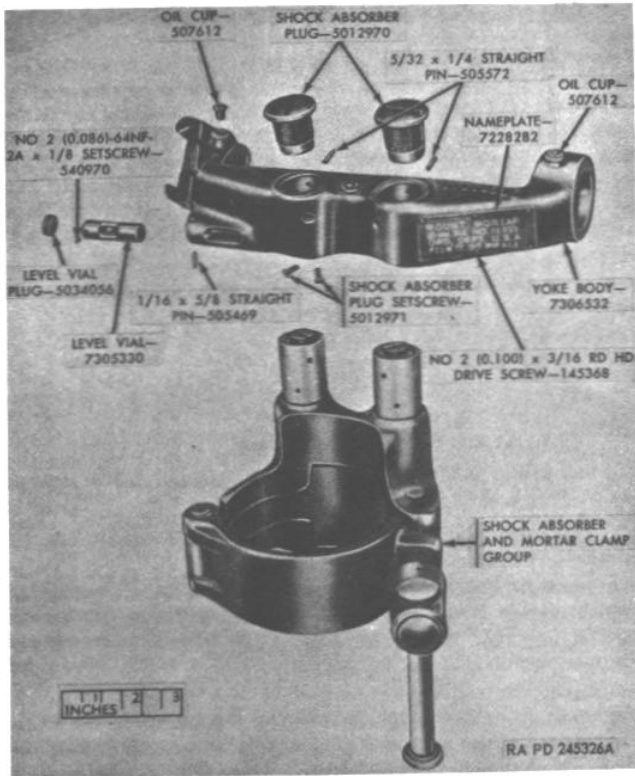
h. Test the mechanism for play. Backlash should not exceed one-eighth turn.

## **Section VI. SHOCK ABSORBERS, MORTAR CLAMP, AND YOKE GROUP-MOUNT M4**

### **73. Disassembly**

a. Unscrew the two shock absorber plug setscrews and shock absorber plugs from yoke body (mark to facilitate assembly) and then pull shock absorber and mortar clamp group away from yoke body (fig. 39).

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**Figure 39. Shock absorbers, mortar clamp, and yoke assembly group.**

*b.* Level vial should not be removed, unless necessary. To remove, drive out straight pin and unscrew level vial plug, loosen adjusting setscrews of level, and remove from yoke body (fig. 39).

*c.* Remove cotter pin from bottom of shock absorber screw and back out the screw (fig. 40). Slide out shock absorber guide with front bushing, shock absorber spring, and rear bushing from lower half collar (fig. 40). Remove setscrew and unscrew shock absorber retainer from lower half collar (fig. 40) (mark to facilitate assembly).

*d.* Oil cups and pins are not removed, unless damaged.

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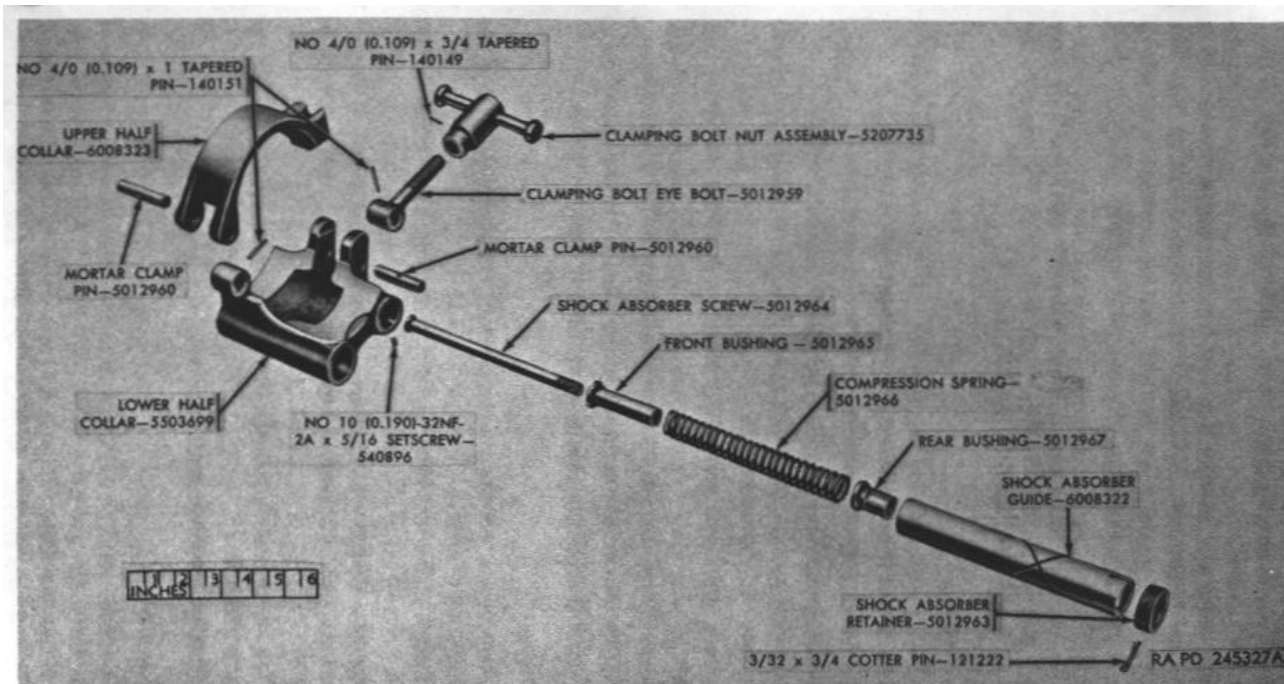


Figure 40. Shock absorbers and mortar clamp group-exploded view.

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e. To disassemble mortar clamp, proceed as outlined in (1) through (3) below.

- (1) Drive out tapered pin and remove mortar clamp pin to separate upper half collar from lower half collar (fig. 40).
- (2) Drive out tapered pin and remove mortar clamp pin to separate clamping bolt eye bolt and lower half collar (fig. 40).
- (3) Unscrew clamping bolt nut assembly until holes in body align with tapered pin in eye bolt, drive out pin, and unscrew clamping bolt eye bolt (fig. 40).

#### **74. Inspection**

a. Check shock absorber springs for set, corrosion, and signs of fracture. Test for conformance with standards in table VII.

b. Check all threaded parts for cross threads and burs.

c. See if shock absorber guides are smooth and not worn.

d. See if upper and lower collars are free of cracks and roughness where they seat on mortar tube.

e. Check front and rear shock absorber bushings for wear and damage.

f. Inspect level vial (fig. 39) for damage and indistinct markings.

g. Check the dovetail sight seat of the yoke for damage (fig. 39).

h. Check if all oil cups are clear and circled with red paint.

#### **75. Repair**

a. Remove any scoring or roughness of the inside surface of the upper and lower collars.

b. Polish guides with crocus cloth to remove any scoring or corrosion.

c. Replace absorber retainer and shock absorber screw, if threads are not as good as new. Replace other unserviceable parts, as required.

d. Repair damaged threads of the clamping bolt eye bolt and clamping bolt nut.

e. Repaint indistinct level vial lines.

#### **76. Assembly**

a. Assemble upper half collar to lower half collar by means of mortar clamp pin and drive in No. 4/0 (0.109) x 1 tapered pin (fig.40). Screw clamping bolt eye bolt into clamping bolt nut assembly until holes align and drive in No. 4/0 (0.109) x 8/4 tapered pin (fig.82)

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40) Secure eyebolt to lower half collar by means of mortar clamp pin and drive in No. 4/0 (0.109) x 1 tapered pin (fig. 40).

b. Screw shock absorber retainer into pocket in lower half collar and secure with No. 10 (0.190) 32NF-2A x 5/16 setscrew (fig. 40). Slide shock absorber guide into pocket of lower half collar (fig. 40).

c. Insert into the shock absorber guide the rear bushing (small end leading), compression spring, front bushing (small end leading), and shock absorber screw (threaded end leading). Screw in screw and secure with 3/32 x 3/4 cotter pin (fig. 40).

d. Assemble shock absorber and mortar clamp to yoke body so that slots in guides engage pins in yoke (fig. 39). Screw in shock absorber plugs in yoke body until holes align and secure with setscrews (fig. 39).

e. If level vial was removed, insert level vial in yoke body so that level window is aligned with viewing hole and tighten adjusting setscrews (fig. 39) so bubble of level vial is centered with horizontal line of traversing spindle holes. Screw in level vial plug with hole aligned with hole in yoke and drive in 1/16 x 5/8 straight pin (fig. 39).

## **Section VII. BIPOD ASSEMBLY-MOUNTS M23A1, M23A2, AND M23A3**

### **77. Disassembly**

a. Remove cotter pin and unscrew castellated nut (fig. 41). Remove bipod assembly from bipod connector of the traversing mechanism assembly (fig. 41) by carefully tapping it with a soft metal hammer.

b. Remove stake and unscrew connecting rod and bipod connector shoulder bolts from both ends of the connecting rod (fig. 41). Remove welded chain, chain hook, and chain spring from right and left leg groups (fig. 42).

c. Unscrew the hinge pin screws (fig. 42) from the hinge pins and carefully pry the hinge pins from the elevating mechanism assembly to withdraw the right and left leg groups. Do not remove straight pins (0.156 x 1.31), unless they are to be replaced.

d. To disassemble the left leg group, proceed as outlined in (1) through (5) below.

**Note.** The key letters shown below in parentheses refer to figure 43.

- (1) Drive out straight pin (B) which secures the rod end clevis (A) to the left leg body (D) and remove the clevis.
- (2) Remove the locking ring setscrew (M) and unscrew the adjusting nut locking ring (L).

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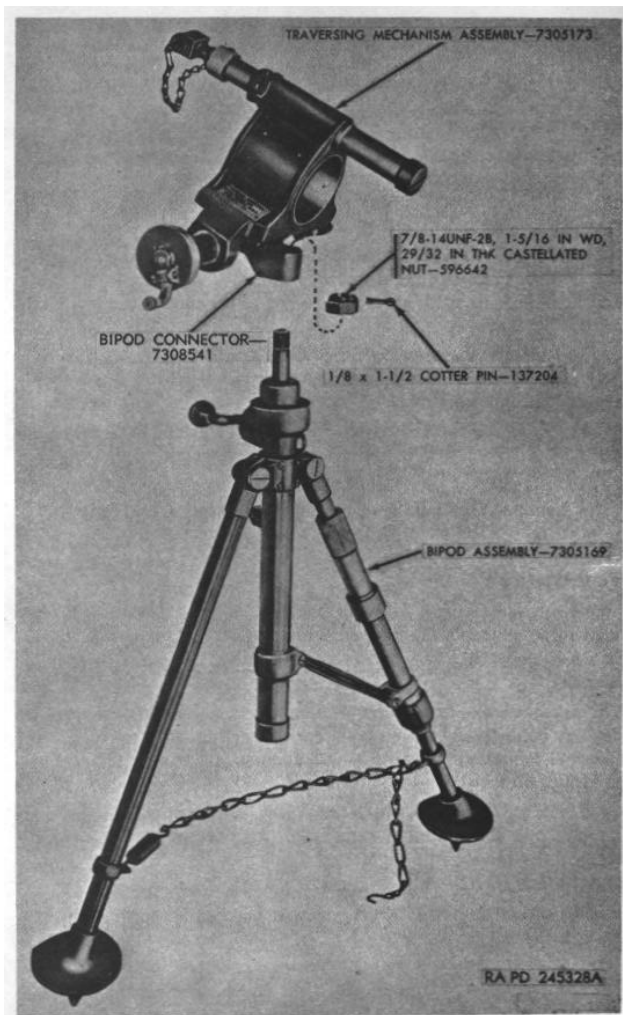


Figure 41. 81-mm mortar mount M23A1.

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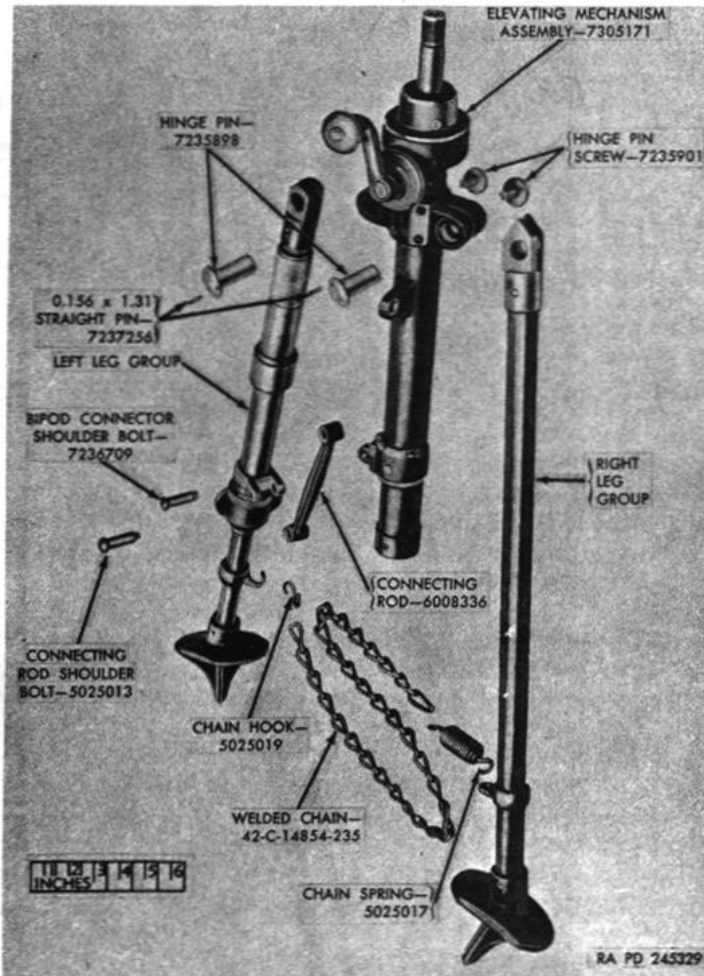


Figure 42. Bipod assembly 73505169-81-mm mortar mount M23A1-exploded view.

- (3) Unscrew adjusting nut (C) from left leg body (D).
- (4) Drive out straight pins (H and E) which secure the left leg foot (F) and chain collar (G), heat foot and collar until the solder is melted, and pull them off the left leg body (D).

#### Note

Most mortars in the field have soldered joints on the feet; however, current production is not soldered.

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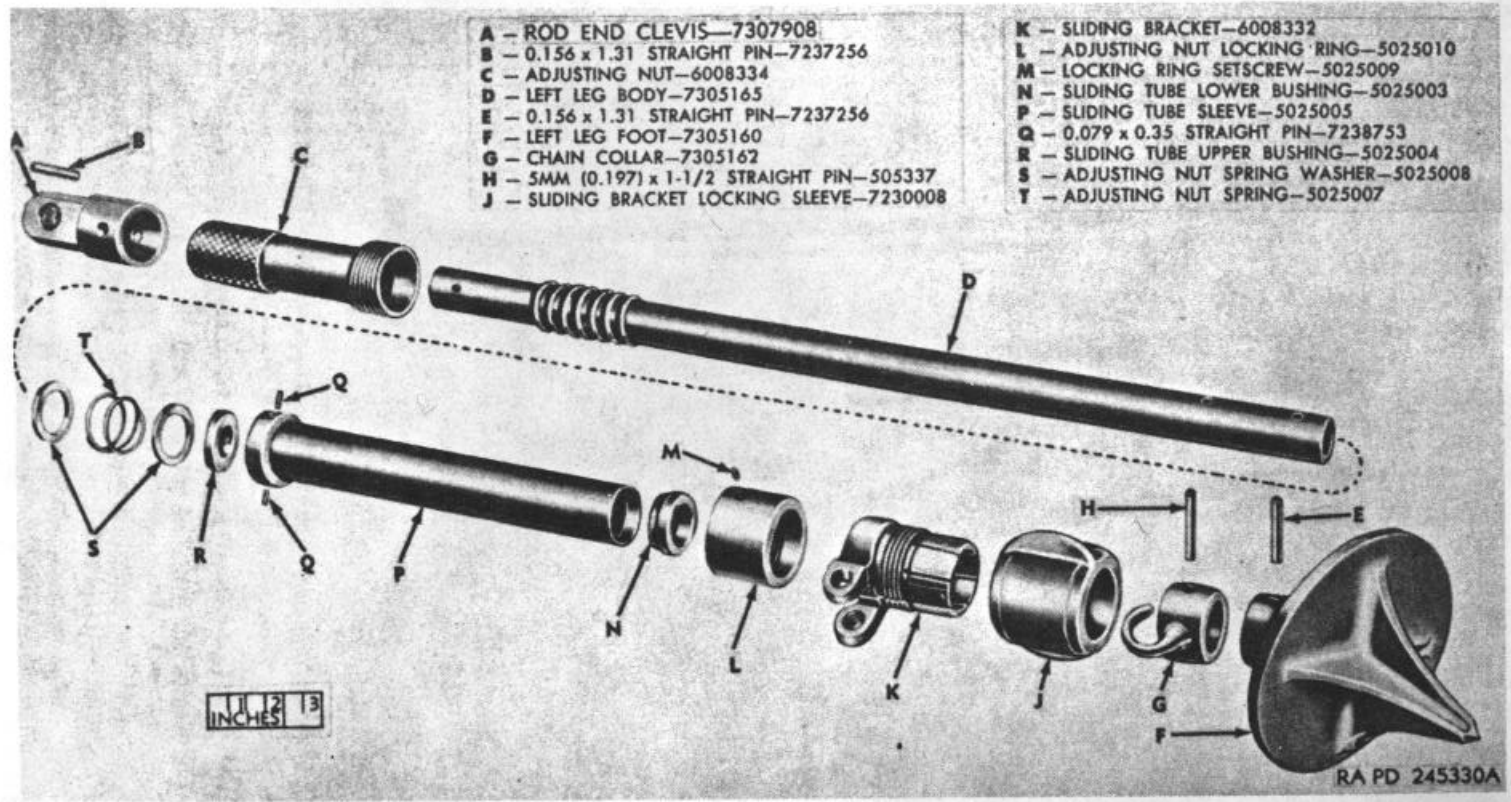


Figure 43. Left leg group-81-mm mortar mount M23A1-exploded view.

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- (5) Slide the sliding bracket locking sleeve (J), sliding bracket (K), adjusting nut locking ring (L), sliding tube sleeve (P) with lower and upper bushings (N and R), adjusting nut spring (T), and adjusting nut spring washers (S) off the left leg body (D).
- e. To disassemble the right leg group, drive out the straight pins which secure the right leg foot, chain collar, and rod end clevis; heat leg foot and chain collar until the solder is melted, and pull them off right leg body (fig. 44).

**Note**

**Most mortars in the field have soldered joints on the feet; however, current production is not soldered.**

Slide rod end clevis off right leg body (fig. 44).

**78. Inspection**

Follow procedures described in paragraph 62.

**79. Repair**

Follow procedures described in paragraph 63.

**80. Assembly**

- a. To assemble right leg group, proceed as outlined in (1) and (2) below.
  - (1) Install rod end clevis on right leg body (fig. 44), aligning pin hole in clevis with pin hole in leg body. Secure with new 0.156 x 1.31 straight pin (fig. 44).
  - (2) Assemble chain collar and right leg foot with new 5-mm (0.197) x 1 1/2 straight pins (fig. 44).
- b. To assemble left leg group, proceed as outlined in (1) through (7) below.

**Note**

**The key letters shown below in parentheses refer to figure 43.**

- (1) Slide the following on the left leg body (D), in the order -listed: adjusting nut spring washer (S), adjusting nut spring (T), adjusting nut spring washer (S), sliding tube sleeve (P) with sliding tube lower and upper bushings (N and R) assembled (flanged end leading), adjusting nut locking ring (L) (larger opening leading), sliding bracket (K) (solid end leading), and sliding bracket locking sleeve (J) (threaded end leading).
- (2) Screw sliding bracket locking sleeve (J) on sliding bracket -(K).
- (3) Slide chain collar (G) (open end of hook leading) on left leg body (D). Drive in 5-mm (0.197) x 1 1/2 straight pin (H) through chain collar (G) and left leg body (D).
- (4) Slide left leg foot (F) on left leg body (D) (spike pointing in same direction as chain hook on collar) and drive in

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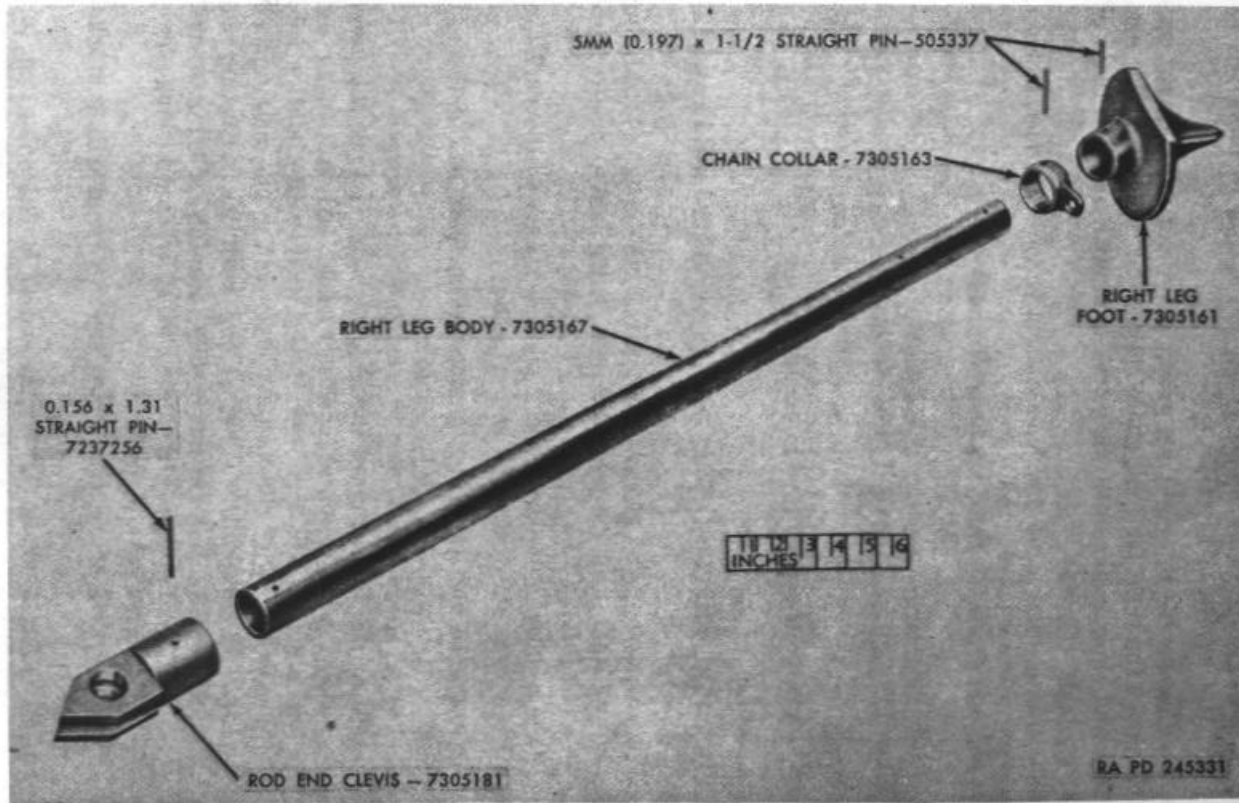


Figure 44. Right leg group - 81mm mortar mount M23A1-exploded view.  
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0.156 x 1.31 straight pin (E) through left leg-foot and left leg body.

(5) Slide adjusting nut (C) (external threaded end leading) on left leg body (D). Screw adjusting nut into adjusting nut locking ring (L) and secure with locking ring setscrew (M).

(6) Secure rod end clevis (A) to left leg body (D) with new 0.156 x 1.31 straight pin (B).

c. Secure left leg group and right leg group to elevating mechanism assembly with hinge pins and hinge pin screws (fig. 42). Make certain that hinge pin is held secure by 0.156 x 1.31 straight pin through pin hole in hinge pin head. Screw hinge pin screw into hinge pin.

d. Secure connecting rod to left leg group and elevating mechanism assembly with connecting rod and bipod connector shoulder bolts (fig. 42). Stake threaded end of both bolts.

e. Install welded chain with chain hook to left leg group and chain spring to right leg group (fig. 42).

f. Insert threaded end of bipod assembly through bipod connector and secure with 7/8-14UNF-2B, 1 5/16-inch wide, 29/32-inch thick castellated nut and 1/8 x 1 1/2 cotter pin (fig. 41).

## **Section VIII. ELEVATING MECHANISM ASSEMBLY-MOUNTS M23A1, M23A2, AND M23A3**

### **81. Disassembly**

a. Follow procedures in paragraph 77a through c.

b. Remove setscrew which locks top cover body to elevating mechanism housing and unscrew top cover body (fig. 45), using spanner wrench 6128199 (fig. 8). Remove top cover washer from inside of top cover body.

c. Grasp top of elevating spindle and withdraw spindle, with elevating spindle tube (fig. 45) from housing. Screw spindle downward through tube (left-hand thread) and withdraw it through bottom of tube. Remove spindle tube washer (fig. 45) from base of top gear seat in housing.

d. Remove setscrew which locks housing side cover to elevating mechanism housing (fig. 45) and unscrew side cover with assembled parts, using spanner wrench 6128199 (fig. 8). Punch out straight pin and unscrew elevating crank from bevel pinion (left-hand thread), slide side cover off at bevel pinion, and remove housing side cover washer (fig. 45) from interior of cover.

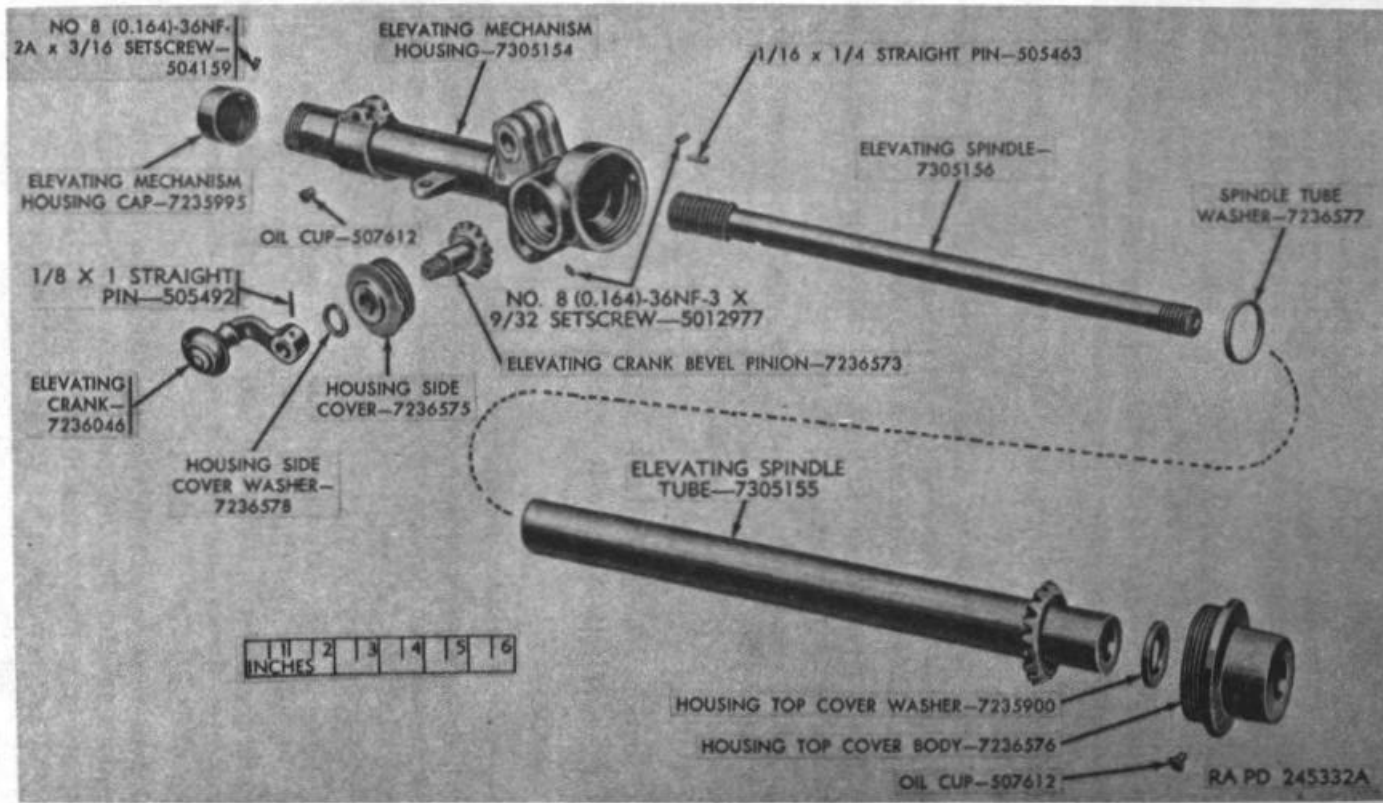


Figure 45. Elevating mechanism assembly-81-mm mortar mounts M23 and M23A1.

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e. Remove setscrew from elevating mechanism housing cap (fig. 45) and unscrew cap from housing.

## **82. Inspection**

- a. Inspect bevel gears for signs of improper meshing.
- b. Elevating tube should move easily in housing and elevating spindle thread easily into tube.
- c. Inspect spindle tube washer in upper surface of housing; excessive wear affects meshing of bevel teeth.
- d. Check housing side cover for wear which could affect bevel gear meshing.
- e. Examine elevating spindle for thread wear, straightness, and burs.
- f. Check if all oil cups are clear and circled with red paint.

## **83. Repair**

- a. Remove burs and foreign matter.
- b. Remove corrosion and repaint, as required.
- c. Repair damaged threads.
- d. Replace damaged and unserviceable parts, as required.

## **84. Assembly**

a. Screw elevating mechanism housing cap on lower end of elevate ing mechanism housing, aline setscrew holes, and screw in No. 8 (0.164)-36NF-2A x 3/16, setscrew (fig. 45).

b. Install housing side cover washer and slide housing side cover on shaft of elevating crank bevel pinion (fig. 45), threaded end first. Screw elevating crank onto bevel pinion (left-hand thread), aline pin holes, and drive in 1/8 x 1 straight pin (fig. 45). Screw housing side cover, with elevating crank bevel pinion and elevating crank (fig. 45) into side of elevating mechanism housing, using spanner wrench 6128199 (fig. 8). Aline cover screw holes and screw in No. 8 (0.164)-36NF-3 x 9/32 setscrew (fig. 45).

c. Insert elevating spindle into lower end of elevating spindle tube (fig. 45), narrower end first, and screw it into tube (left-hand thread) so that lower threads are completely covered. Position spindle tube washer (fig. 45) on top gear seat so that it rests on rim at base of seat, oil grooves up, and key in rim of seat engaged in its slot. Lower the elevating spindle tube (fig. 45) with assembled parts into the housing until the bevel gear on the tube rests on the spindle tube washer and engages the elevating crank bevel pinion. It may be necessary to rotate the tube slightly in order to mesh gear teeth properly.

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d. Place housing top cover washer in housing top cover-body, slide cover down over top of elevating spindle, and screw it into top of housing (fig. 45), using spanner wrench 6128199 (fig. 8). Align setscrew holes and screw in the No. 8 (0.164)-36NF-3 x 9/32 setscrew (fig. 45).

e. Follow procedures in paragraph 80c through *f* to complete assembly.

### **Section IX. TRAVERSING MECHANISM ASSEMBLY-MOUNTS M23A1, M23A2, AND M23A3**

#### **85. Disassembly**

a. Drive out straight pin that secures traversing handwheel assembly to the traversing spindle assembly and unscrew the handwheel assembly (fig. 46).

b. Drive out straight pin that secures traversing spindle assembly to the shock absorber and yoke group (fig. 46).

c. Remove oval-head screw from bipod connector and, using spanner wrench 7228728 (fig. 8) back off the traversing spindle tube bearing assembly (fig. 46). Remove the bipod connector and slide out the traversing spindle assembly (fig. 46).

d. Remove the oval-head screw and unscrew the traversing spindle tube cap assembly from traversing spindle tube and remove traversing screw spring and traversing screw bushing (fig. 47).

e. Remove traversing screw from traversing screwnut (fig. 47).

f. Unscrew expanding bearing ring nut, and remove expanding bearing ring nut washer, expanding bearing ring, and expanding bearing (fig. 47).

g. Remove the crank detent screws and traversing crank detent (fig. 48). Drive out straight pin that retains the crank pin and remove the crank pin and traversing crank assembly from the handwheel body (fig. 48).

#### **Note**

**Do not disassemble traversing spindle tube bearing assembly as replacement of the complete assembly is authorized when the packing is worn.**

#### **86. Inspection**

a. Check bearing fiber packing in traversing spindle tube bearing assembly.

b. Check for wear in the traversing screw, traversing screwnut, and expanding bearing, and check whether wear can be compensated by tightening the expanding bearing ring nut.

c. Check traversing screw for straightness and traversing screw

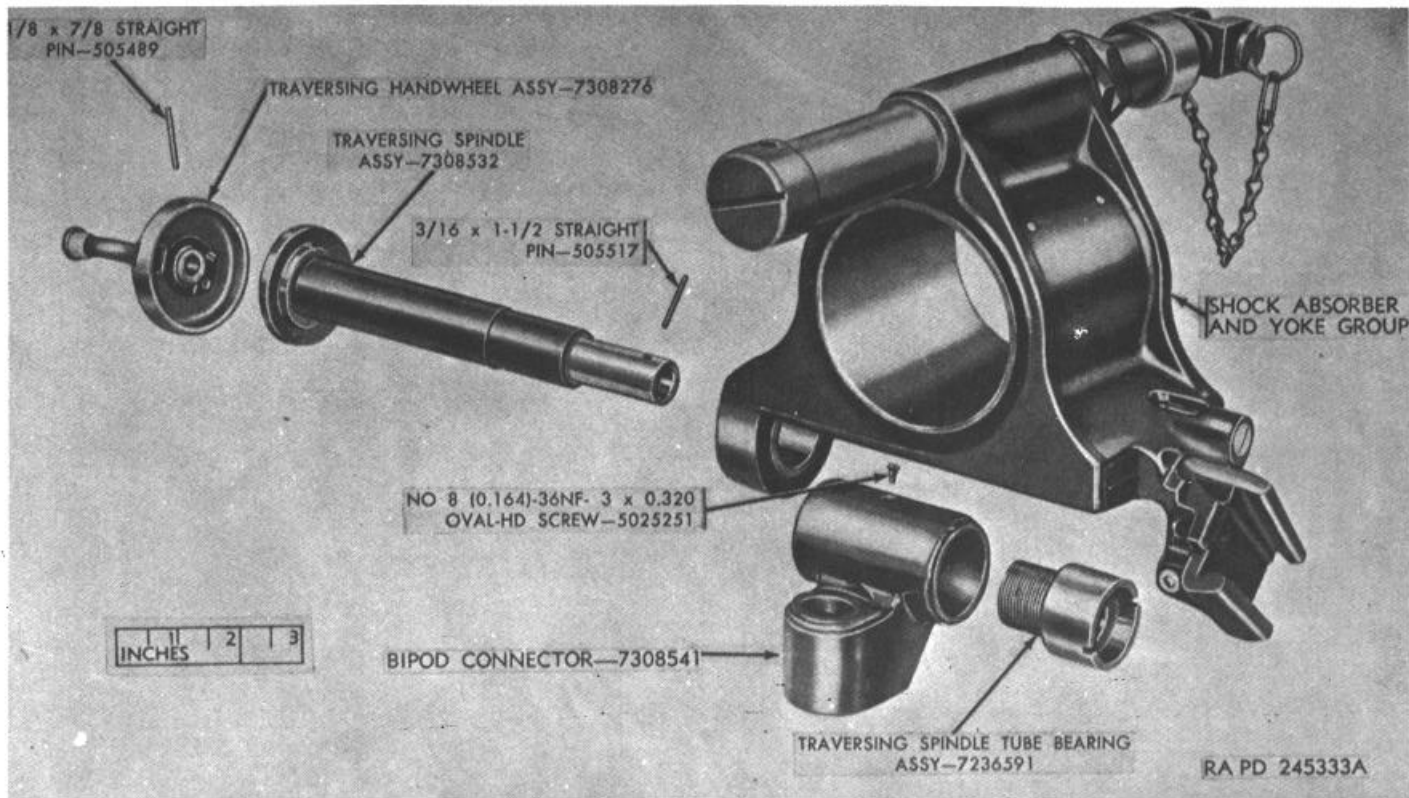


Figure 46. Traversing mechanism assembly-81-mm mortar mount M23A1-partial exploded view.

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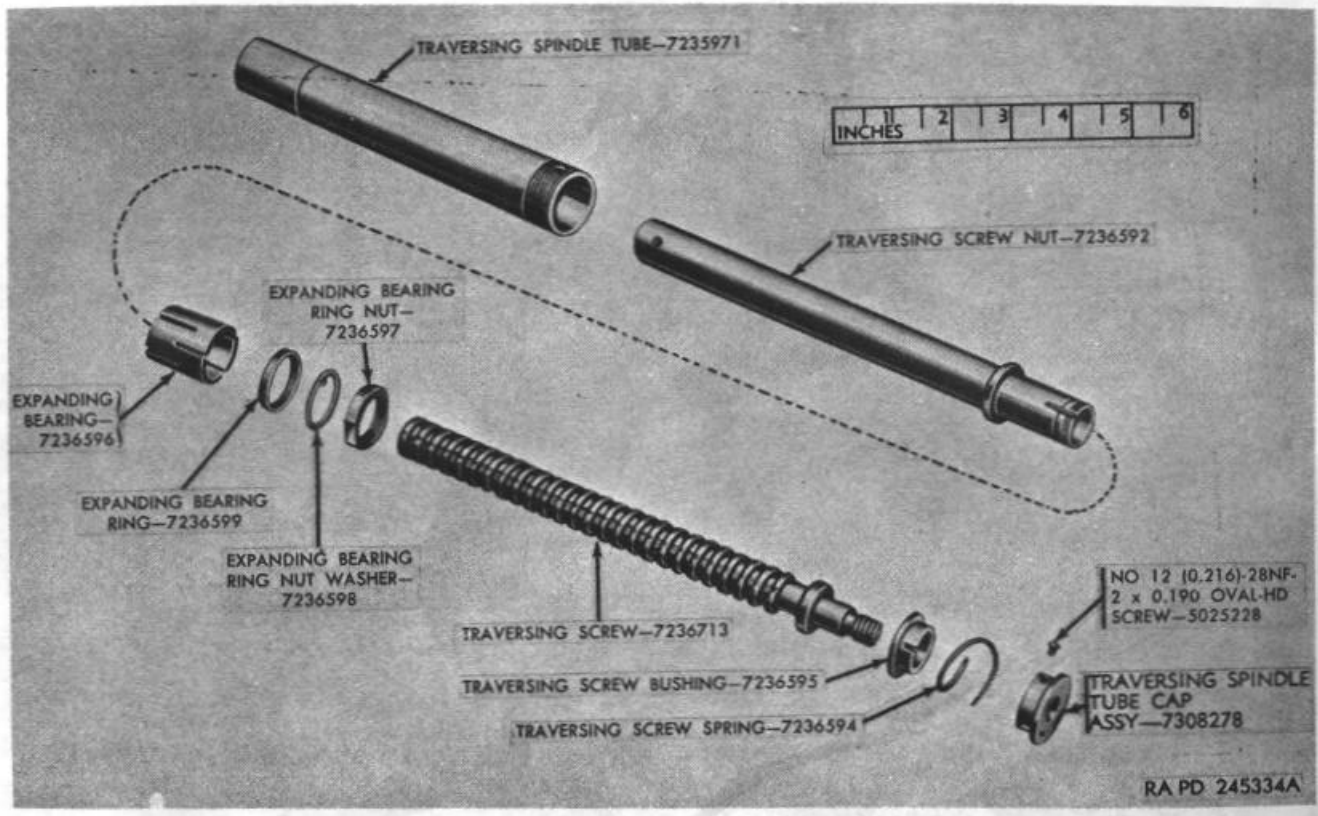


Figure 47. Traversing spindle assembly 7308532-81-mm mortar mount M23A1-exploded view.

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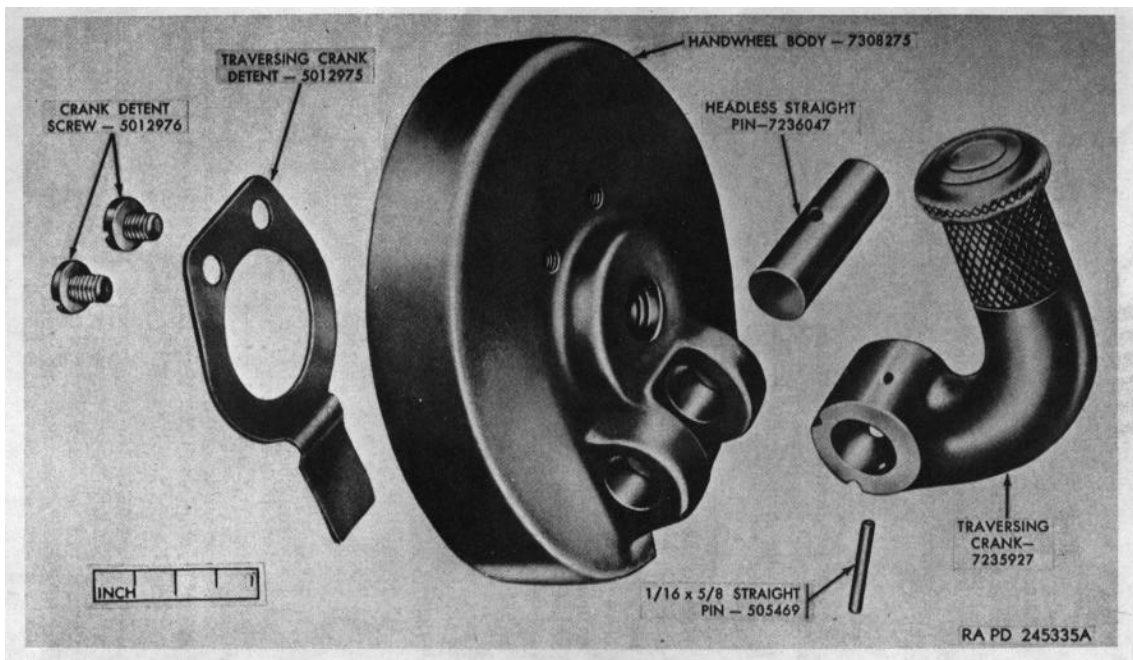


Figure 48. Traversing handwheel assembly 7308276---81-mm mortar mount M23A1---exploded view.

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nut for ease of travel. The nut should slide easily in the traversing spindle tube. Examine screw at handwheel for cracks.

- d. Check holding action of traversing crank detent.

## 87. Repair

- a. Remove burrs and foreign matter.
- b. Replace worn or damaged parts as required.
- c. Traversing screw spring must conform with standards in table VII.

## 88. Assembly

a. Secure traversing crank detent with two crank detent screws (fig. 48). Assemble traversing crank assembly to the handwheel body by means of the crank pin and drive in 1/16 x 5/8 straight pin (fig. 48).

b. Hold traversing screw in a vise with soft jaws. Place traversing screw bushing (flanged end leading) over the screw and follow with the traversing screw spring (fig. 47). Place traversing spindle tube cap assembly over traversing screw and press it against the traversing screw spring, making certain that 0.062 x 5/16 spring pin in cap flange fits in the cut in the bushing (fig. 47). Hold traversing handwheel assembly on traversing screw until holes in the handwheel and screw align and drive in 1/8 x 7/8 straight pin to secure handwheel assembly to traversing spindle assembly (fig. 46).

c. Assemble the following on traversing screwnut in the order listed in (1) through (4) below.

- (1) Expanding bearing (fig. 47).
- (2) Expanding bearing ring (fig. 47) (tapered end leading).
- (3) Expanding bearing ring nut washer (fig. 47) (stud leading and engaging slot in traversing screwnut).
- (4) Expanding bearing ring nut (fig. 47).

d. Screw traversing screwnut (assembled end leading), on traversing screw (fig. 47).

e. Screw traversing spindle tube into the traversing spindle tube cap assembly, and install No. 12 (0.216)-28NF-2 x 0.190 oval-head screw (fig. 47).

f. Insert assembled traversing spindle through hole in yoke assembly and through bipod connector (fig. 46). Screw traversing spindle tube bearing assembly into the spindle tube, using spanner wrench 7228728, align holes and install No. 8 (0.164)-36NF-3 x 0.320 oval-head screw in the bipod connector (fig. 46).

- g. Position traversing spindle (small end leading) in its seat in

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the opposite end of the yoke, making certain lubricating hole aligns with oil cup in yoke, and drive in 3/ 6 x 11/2 straight pin to secure nut to yoke (fig. 46).

*h.* Test the mechanism for play. Backlash should not exceed one eighth turn.

## **Section X. SHOCK ABSORBER AND YOKE ASSEMBLIES 81-MM MORTAR MOUNTS M23A1, M23A2, AND M23A3**

### **89. Disassembly**

*a.* Unscrew oval-head screw from shock absorber spring cap and unscrew cap from rear of shock absorber tube (fig. 49).

*b.* Withdraw shock absorber shaft (fig. 49), with assembled parts from tube.

*c.* Drive out straight pin which secures shock absorber clevis to shock absorber shaft and unscrew clevis (fig. 49) with assembled parts from the shaft, taking care to release spring slowly so that it will not throw the shock absorber clevis and spring cap rearward.

*d.* Remove clevis pin, with chain, clip, and ring from absorber clevis (fig. 49).

*e.* Remove shock absorber compression spring from absorber shaft (fig. 49). Drive out straight pin which retains shaft nut on shaft, unscrew shaft nut, and remove shock absorber compression cup and shaft bearing from shaft (fig. 49).

*f.* Unscrew oval-head screw from shock absorber bumper cap and unscrew cap from shock absorber tube (fig. 49). Shock absorber bumper and shock absorber plate may be removed together with bumper cap because suction created in bumper causes it to cling to cap and plate. A slight twisting force will separate these parts. Should bumper and plate remain in tube after cap is removed, use shaft to remove them.

*g.* Unscrew absorber locking nut from shock absorber tube and withdraw tube from yoke assembly (fig. 49).

*h.* Disassembly of the yoke assembly (fig. 50) should not be attempted except to replace broken vial or worn bushing. To remove level vial, drive out straight pin which retains level vial plug in level housing of yoke and unscrew plug, loosen adjusting setscrews of level, and remove level from its housing. To remove traversing spindle tube bushing, drive out straight pin and push out bushing (fig. 50).

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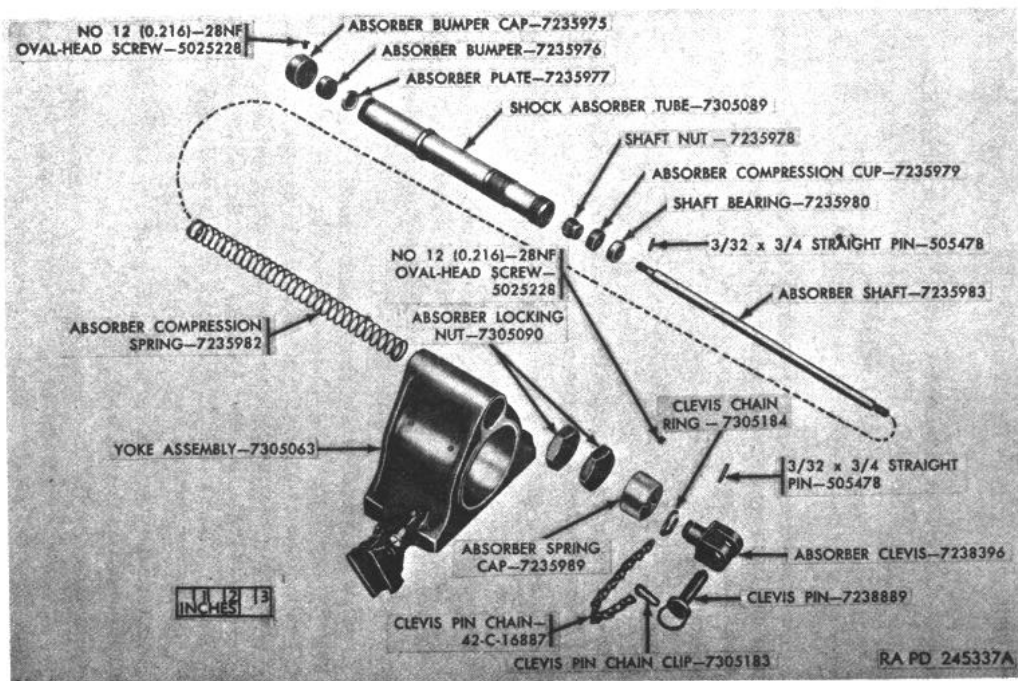


Figure 49. Shock absorber assembly 7305092---81-mm mortar mount M23A1--- exploded view.

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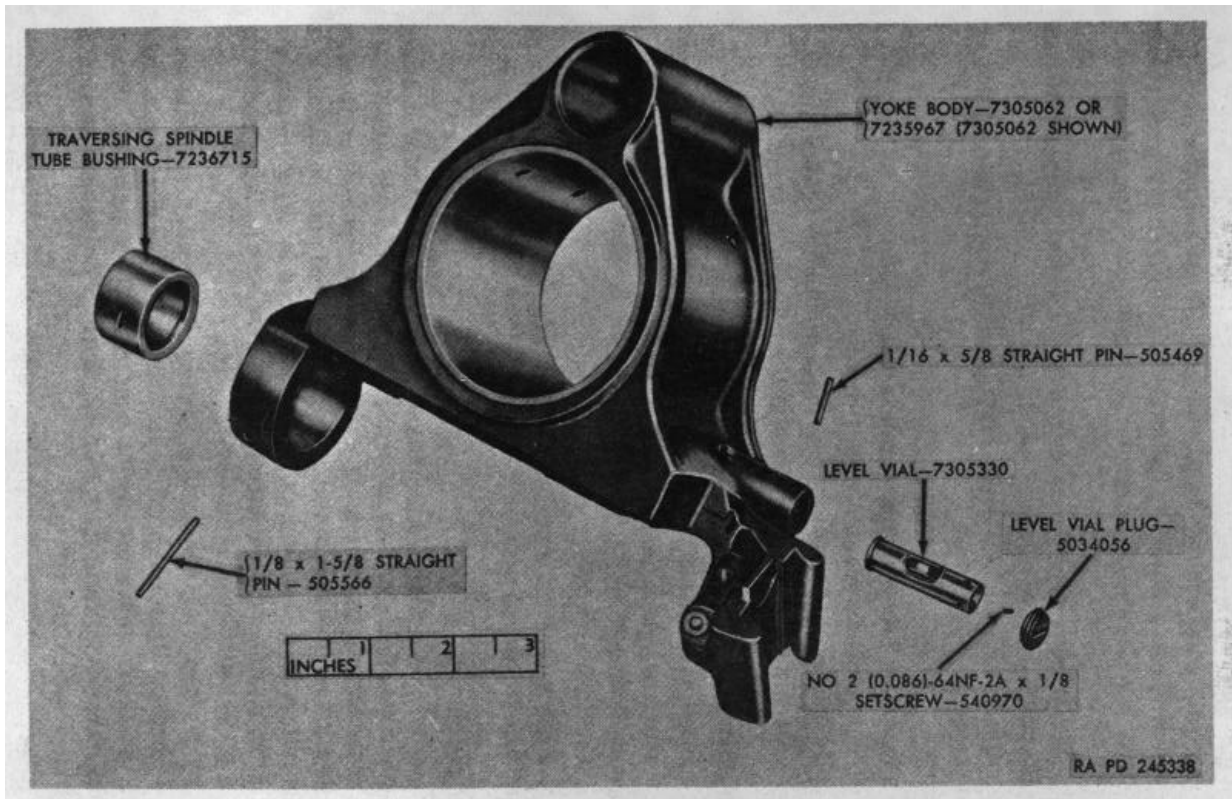


Figure 50. Yoke assembly 7236091 or 7305063-exploded view.

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## **90. Inspection**

- a. Check whether shock absorber tube slides easily through upper opening in yoke.
- b. Examine all threaded parts for cross threads and burs.
- c. Check shock absorber compression spring for set, corrosion, and signs of fracture. Check for conformance with standards in table VII.
- d. See whether yoke adapter rings are smooth and permit the mortar tube to move easily.
- e. Check whether clevis pin seats easily in clevis and detent action holds it in place.
- f. See whether shock absorber bumper is intact and air vent hole in shock absorber bumper cap is clear.
- g. Check all surfaces for galling or burs.
- h. Inspect sight level vial for damage and indistinct markings.
- i. Check the dovetail sight seat of the yoke for damage.

## **91. Repair**

- a. Repaint indistinct level vial lines.
- b. Remove burs from all surfaces and, in particular, on dovetail sight seat of yoke body.
- c. Clean air vent holes.
- d. Repair threads. Condition of threads on shaft, nut, and caps should be as good as new.

## **92. Assembly**

- a. Insert level vial into yoke body so that level window is aligned with viewing hole, tighten small adjusting No. 2 (0.086)-64NF-2A x 1/8 setscrews so bubble is centered when centerline through spindle lug holes is horizontal, screw in level vial plug so that hole in plug aligns with that in yoke body, and drive in 1/16 X 5/8 straight pin (fig. 50). Insert new traversing spindle tube bushing and drive in 1/8 x 1 5/8 straight pin (fig. 50).
- b. Pass shock absorber tube (adjacent threaded sections leading), through upper hole of yoke assembly (fig. 49), from front face, until external shoulder of tube contacts yoke body. Screw shock absorber locking nuts (fig. 49) over first threaded section of tube until locked tightly.
- c. Insert shock absorber plate into shock absorber tube, through front end, seating it solidly against internal shoulder, follow with shock absorber bumper (fig. 49), and press firmly against plate so that end of tube and bumper are flush. Screw shock absorber

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bumper cap (fig. 49) on tube threads. Aline screw holes and screw in No. 12 (0.216)-28NF oval-head screw (fig. 49).

d. Slide shaft bearing on shock absorber shaft, from drilled end, follow with shock absorber compression cup, base first, screw shaft nut on shock absorber shaft, aline holes, and drive in 3/32 x 3/4 straight pin (fig. 49). Slide shock absorber compression spring on shaft (fig. 49).

e. Assemble clevis pin, with chain clip and ring, on absorber clevis (fig. 49).

f. Mount shock absorber spring cap on absorber shaft, compressing absorber compression spring, and screw shock absorber clevis (fig. 49) with assembled parts on absorber shaft. Aline holes in clevis and shaft and drive in 3/32 x 3/4 straight pin (fig. 49).

g. Insert absorber shaft with assembled parts into shock absorber tube (fig. 49), making certain that cup enters tube uncurled. (A blunt pointed tool may be used to insert lip of cup into tube.)

h. Screw absorber spring cap on shock absorber tube, aline screw holes, and screw in No. 12 (0.216)-28NF oval-head screw (fig. 49).

## Section XI. BASEPLATES---81-MM MORTAR MATERIEL

### 93. Baseplate or Mount M4

(fig. 51)

a. The baseplate is of welded construction, with the carrying handle sprung into place.



Figure 51. Baseplate---1-mm mortar mount M4.

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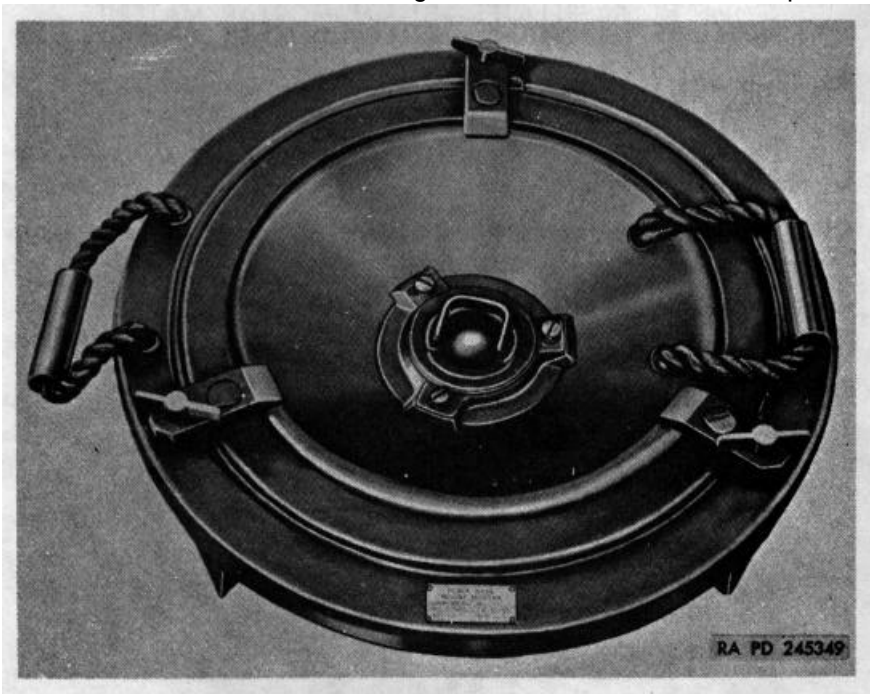


- b.* Check sockets for smoothness, and baseplate and handle for cracks and deformation. Remove burrs from sockets. Weld cracks and straighten parts, if practicable; if not, replace baseplate.
- c.* Check for corrosion and damaged finish. Remove rust and repaint.

**94. Baseplates of Mounts M23A1, M23A2, and M23A3**

(figs. 52, 53, and 54)

- a.* For instructions on disassembly and assembly, refer to TM 9-3064.
- b.* Check inner and outer rings for fit, cracks, and deformation. Weld cracks and straighten parts, if practicable; if not, replace damaged parts, as required.
- c.* Check socket for burrs and roughness. Remove burrs and rough spots.
- d.* Check for corrosion and damaged finish. Remove rust and repaint.



**Figure 52. 81-mm mortar mount M23A1---baseplate assembly 7230730----assembled view.**

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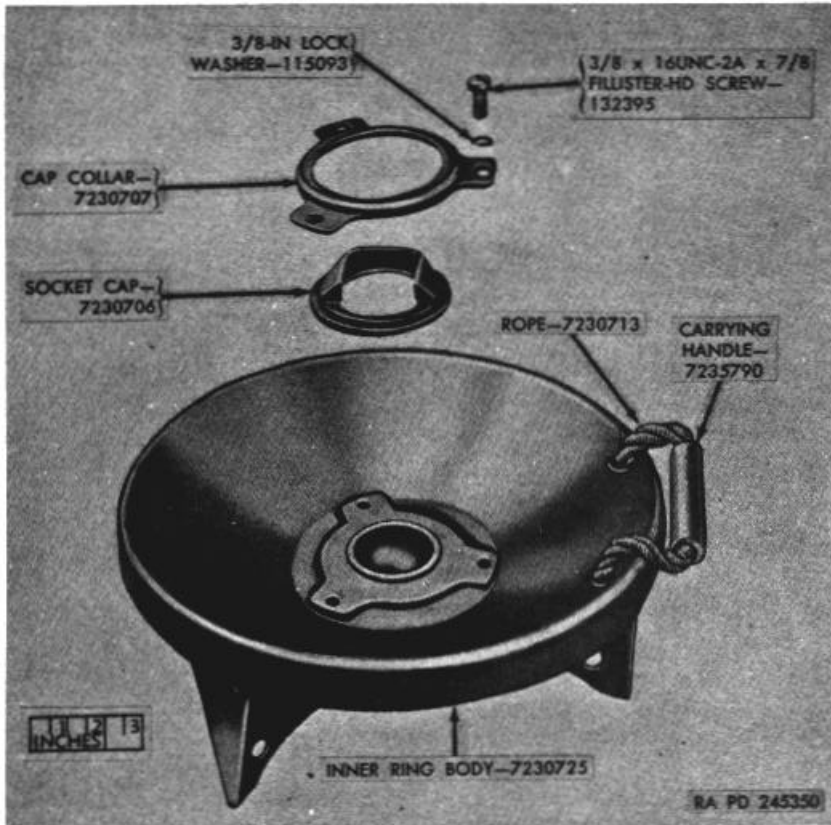


Figure 53. 81-mm mortar mount M23A1---baseplate---inner ring assembly 7230727.

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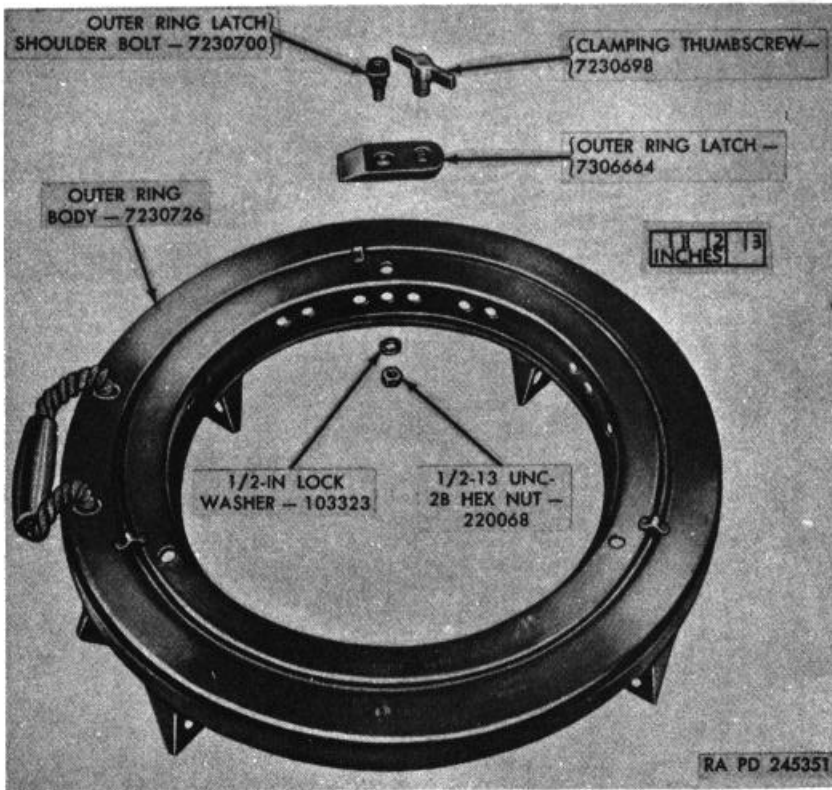


Figure 54. 81-mm mortar mount M23A1---baseplate---outer ring assembly 7230729.

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**CHAPTER 7**  
**FINAL INSPECTION**

**95. General**

Repaired materiel must be given a final inspection prior to return to user.

**96. Inspection**

Final inspection will be in accordance with inspection guide for mortars and mounts (table V).

*Table V. Inspection Guide for Mortars and Mounts*

Points to be inspected	Final inspection - field maintenance
Base cap.....	Gastight on tube. Ball smooth.
Mortar tube .....	Shell drops freely. Quadrant seat free of burs. Clamp position marks and aiming lines legible.
Fixed firing pin	Gastight in base cap. Sufficient indentation.
Firing mechanism (60-mm mortar M19).	Firing pin retracts. Sufficient indentation.
Baseplate.....	Latches operative. Not warped or deformed. Threads clear on baseplate M1.
Elevating mechanism.....	Backlash must not exceed one-eighth turn of handwheel
Bipod leg group.....	No binding. Legs straight. Chain or straps intact. Feet secure to legs. Clevis must lock legs firmly.
Traversing mechanism.....	Backlash must not exceed one-eighth turn of handwheel.
Shock absorber and mortar clamp...	Worn parts replaced. Guides smooth. Smooth functioning.
Shock absorber and mount attachment ring (81-mm mortar mount M23A1).	Worn components replaced. Clevis and mounting ring undamaged. Worn components replaced.

## CHAPTER 8 REPAIR STANDARDS

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### 97. General

The standards included herein give the minimum and maximum measurements of new parts. Normally, all parts that have not been worn beyond the dimensions or limits indicated or damaged from corrosion will be approved for service; those beyond the dimensions or limits will be replaced.

### 98. Firing Pin Protrusion Standards

The standards for firing pin protrusion in this materiel are listed in table VI.

*Table VI. Firing Pin Protrusion Standards*

Model	Drop fire (in.)	Lever fire (in.)
60-mm mortar M19	0.047-0.101	0.085-0.101
60-mm mortar M2	0.055-0.063	
81-mm mortar M1	0.050-0.056	
81-mm mortar M29	0.050-0.056	

### 99. Coil Spring Standards

The manufacturing standards for coil springs in this materiel are listed in table VII.

Table VII. Coil Spring Standards

Name	Part No.	No. of coils	Free height (in.) (approx.)	Solid height (in.) (Not more than)	Load at height of-	Load at height of-
SPRING, adjusting nut.....	5025007	2 1/2	0.67		0.4 in.-19 to 21 lb.	
SPRING, clevis latch.....	5025249	12	1.04	0.73	0.87 in.-27.9 to 34.1 lb.	0.77 in.-44.1 to 53.9 lb.
SPRING, elevating screw bushing.	5025231	1			0.20 in.-15.75 to 19.25 lb.	0.18 in.-17.1 to 20.9 lb.
SPRING, firing.....	7230416	8	2 3/16	1.00	11/8 in.-10.8 to 13.2 lb.	1 1/8 in.-24.3 to 29.7 lb.
SPRING, firing lever.....	7229658	9 3/4				
SPRING, firing lever plunger.....	7157622	27	1.41	0.90	1.25 in.-2.1 to 2.3 lb.	1.0 in.-5.0 to 5.9 lb.
SPRING, firing pin retracting.....	7280417	3 1/2	19/32	0.20	0.39 in.-2.7 to 3.3 lb.	
SPRING, latch bolt.....	5025281	7	1.05	it	0.7 in.-9.36 to 11.44 lb.	0.47 in.-15.3 to 18.7 lb.
SPRING, leg adjusting nut.....	5025238	1	1/2	0.29	0.32 in.-25.2 to 30.8 lb.	
SPRING, selector plunger.....	7229657	11	1 5/32	0.50	0.92 in.-1.8 to 2.2 lb.	0.62 in.-4.05 to 4.95 lb.
SPRING, shock absorber.....	65025221	17	4 1/4	1.55	3.5 in.-9.9 to 12.1, lb. <sup>1</sup>	3.0 in.-16.2 to 19.8 lb. <sup>2</sup>
SPRING, shock absorber.....	5012966	25	5 7/8	2t1	4.86 in.-18.63 to 22.77 lb. <sup>3</sup>	4.17 in.-31.32 to 38.28 lb. <sup>4</sup>
SPRING, shock absorber.....	7235982	31	12 1/4	3.10	9.60 in.-12.24 to 14.96 lb.	3.10 in.-42.12 to 51.48 lb.
SPRING, traversing screw.....	7236594	1	7/16	5/32	0.20 in.-15.75 to 19.25 lb.	0.18 in.-17.1 to 20.9 lb.

<sup>1</sup> Minimum permissible load 9.5 lb.

<sup>2</sup> Minimum permissible load 16.5 lb.

<sup>3</sup> Minimum permissible load 18 lb.

<sup>4</sup> Minimum permissible load 80 lb.

## APPENDIX

### REFERENCES

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#### 1. Publication Indexes

The following indexes should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to materiel covered in this technical manual.

Index of Army Motion Pictures, Television Re- DA Pam 108-1cordings, and Film Strips.

Military Publications:

Index of Administrative Publications .....	-DA Pam 310-1
Index of Blank Forms.....	-DA Pam 310-2
Index of Graphic Training Aids and Devices.....	-DA Pam 310-5
Index of Supply Manuals Ordnance Corps .....	DA Pam 310-29
Index of Technical Manuals, Technical Bulle- .....	-DA Pam 310-4
tins, Supply Bulletins, Lubrication Orders and Modification Work Orders.	
Index of Training Publications .....	--DA Pam 3103

#### 2. Supply Manuals

The following manuals of the Department of the Army supply manual pertain to this materiel:

*a. Destruction to Prevent Enemy Use.*

Ammunition, over 30 millimeter up to 75 millimeter.....	SM 9-1310
Ammunition, 75 millimeter through 125 millimeter.....	SM 9-1315
Fuzes and Primers .....	SM 9-5-1390

*b. General.*

Authorized Abbreviations .....	AR 320-50
Dictionary of United States Army Terms.....	SR 320-5-1
Introduction .....	ORD 1
Military Symbols.....	FM 2140
	AFM 55-3
Military Training .....	FM 21-5
Ordnance Major Items and Combinations, and Pertinent.....	SB 9-1
Publications.	
Techniques of Military Instruction .....	FM 21-6

*c. Repair.*

Abrasives, Adhesives, Cleaners, Preservatives, ORD 3 SNL K-1  
Recoil Fluids, Special Oils, and Related Items.

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Lubricating Fittings, Oil Filters, and Oil Filter Elements.	ORD 5 SNL H-16
Miscellaneous Hardware .....	ORD 5 SNL H-2
Shop Set, Artillery, Field Maintenance	ORD 6 SNL J-8, Sec. 9
Soldering, Metallizing, Brazing, and Welding .....	RD 3 SNL K-2
Materials; Gases and Related Items.	
Special Tool Sets for Small Arms and Automatic Weapons (SNL Groups A and B).	ORD 6 SNL J-12
Standard Hardware	ORD 5 SNL H-1
Tool Set, Artillery Repairman (Ordnance).	ORD 6 SNL J-10, Sec. 5
Tool Set, Small Arms Repairman (Ordnance).	ORD 6 SNL J-10, Sec. 2
<i>d. Weapon.</i>	
Mortar, 81-mm, M1; Mount, Mortar, 81-mm, M4.	ORD (*) SNL A33
Mortar, 60-mm, M2, M19, and T18E6; Mount, Mortar, 60-mm, MS.	ORD (*) SNL A-43
Mortar, 81-mm, M29 (T106); Mount Mortar, 81-mm, M23 (T62 Unmodified) w/Baseplate; Mount, Mortar, 81-mm, M23A1 (T62 Modified) w/Baseplate.	ORD (*) SNL A-82

### 3. Forms

The following forms pertain to this materiel:

- DA Form 9-13, Weapon Record Book-Part I-Major Item Complete Record
- DA Form 9-13-1, Weapon Record Book-Part II-Cannon Data
- DA Form 9-71, Locator and Inventory Control Card
- DA Form 9-76, Request for Work Order
- DA Form 9-77, Job Order Register
- DA Form 9-78, Job Order
- DA Form 9-79, Parts Requisition
- DA Form 9-80, Job Order File
- DA Form 9-81, Exchange Part or Unit Identification Tag
- DA Form 446, Issue Slip
- DA Form 447, Turn-in Slip
- DA Form 468, Unsatisfactory Equipment Report
- DA Form 811, Work Request and Job Order (4 part)
- DA Form 828, Job Time Ticket-Individual
- DA Form 829, Rejection Memorandum
- DA Form 865, Work Order
- DA Form 866, Consolidation of Parts

(\*) See DA Pam 310-29, Index of Supply Manuals-Ordnance Corps, for published types of manuals of the Ordnance section of the Department of the Army supply manual.



#### 4. Other Publications

The following publications contain information pertinent to this materiel and associated equipment:

- a. *Camouflage.*
  - Camouflage, Basic Principles..... FM 5-20
  - Camouflage of Individuals and Infantry Weapons ..... FM 5-20A
- b. *Decontamination.*
  - Decontamination ..... TM 3-220
  - Defense Against CBR Attack..... FM 21-40
- c. *Destruction to Prevent Enemy Use.*
  - Explosives and Demolitions ..... FM 5-25
  - Ordnance Service in the Field..... FM 9-5
- d. *General.*
  - 60-mm Mortar M19 ..... FM 23-85
  - 81-mm Mortar M1 and M29..... FM 23-90
  - Color and Marking of Vehicles and Equipment ..... AR 746-2300-1
  - Inspection of Ordnance Materiel in the Hands of ..... TM 9-1100  
Troops.
  - Report of Malfunctions and Accidents Involving .....SR 700-45-6  
Ammunition and Explosives (During Training or Combat).
  - Unsatisfactory Equipment Report .....AR 700-38
  - Ordnance Maintenance and General Supply in the Field..... FM 9-10
  - Accident Reporting .....SR 385-10-40
  - Regulations for Firing Ammunition for Training, .....AR 385-63  
Target Practice, and Combat.
  - Common Classification Code .....AR 711-50
- e. *Repair.*
  - Carrier, 81-mm Mortar, Half Track, M4, M4A1,.....LO 9-710-1  
M21.
  - Instruction Guide: Welding Theory and Application ..... TM 9-2852
  - Lubrication ..... TM 9-2835
  - Maintenance and Care of Hand Tools ..... TM 9-867
  - Maintenance, Responsibilities and Shop Operation .....AR 750-5
  - Mortar, 60-mm, M19; Mount, Mortar, 60-mm, M..... LO 9-U3
  - Mortar, 81-mm, M1, and Mount, Mortar, 81-mm, M4 - ..... LO 9-U4
  - Mortar, 81-mm, T106, and Mount, Mortar, 81-mm, T62.....LO 9-260
  - Ordnance Maintenance: Materials used for Cleaning,..... TM 9-1007  
Preserving, Abrading, and Cementing Ordnance  
Materiel and Related Materials Including Chemi-  
cals, Lubricants, Indicators, and Hydraulic Fluids.
  - Painting Instructions for Field Use ..... TM 9-2851

*f. Shipment and Standby or Long-Term Storage.*

Instruction Guide: Ordnance Preservation, Packaging, Packing, Storage and Shipping.	TM 9-1005
Report of Damaged or Improper Shipment.....	AR 700-58
Marking of Oversea Supply .....	SR 746-30-5
Army Shipping Document.....	TM 38-705
Protection of Ordnance General Supplies in Open Storage.	TB ORD 379
Standards for Overseas Shipment and Domestic Issue of Ordnance Materiel Other Than Ammunition and Army Aircraft.	TB ORD 385

*g. Weapons.*

81-mm Mortar M29, 81-mm Mortar Mounts M23 and M23A1, and 81-mm Mortar Baseplates M23 and M23A1.	M 9-3064
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**AGO 3334B**

[AG 473.4 (7 Nov 57)]

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NG: State AG; units-same as Active Army.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

☆U. S. GOVERNMENT PRINTING OFFICE : 1988 0 - 201-421(80042)

**AGO 3334B**

**PIN: 018468-000**