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COAST ARTILLERY  
FIELD MANUAL

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ANTIAIRCRAFT ARTILLERY  
SERVICE OF THE PIECE  
3-INCH ANTIAIRCRAFT GUN

1946

**FM 4-125**

**COAST ARTILLERY  
FIELD MANUAL**



**ANTI-AIRCRAFT ARTILLERY  
SERVICE OF THE PIECE  
3-INCH ANTI-AIRCRAFT GUN**

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**Prepared under direction of the  
Chief of Coast Artillery**



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BY ORDER OF THE SECRETARY OF WAR:

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*The Adjutant General.*

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# COAST ARTILLERY FIELD MANUAL

## ANTIAIRCRAFT ARTILLERY

### SERVICE OF THE PIECE

#### 3-INCH ANTIAIRCRAFT GUN

(The matter contained herein supersedes TR 435-205, September 23, 1935.)

#### CHAPTER 1

#### INTRODUCTION

■ 1. SCOPE.—*a.* This manual prescribes a systematic procedure to be followed by gun crews of 3-inch antiaircraft guns manning matériel of the following types:

(1) The 3-inch antiaircraft guns, M1917, M1917MI, and M1917MII on the fixed mounts, M1917, M1917MI, and M1917MII.

(2) The 3-inch antiaircraft gun, M3, on the mobile mounts, M2A1 and M2A2.

(3) The 3-inch antiaircraft gun, M4, on the fixed mount, M3A1.

*b.* The matter contained in this manual is intended only as a guide in the assignment of individuals and duties; changes may be made to meet variations in the matériel manned.

■ 2. REFERENCES.—The references listed in the Appendix should be consulted, especially those pertaining to ammunition and to the operation, care, and maintenance of matériel.

## CHAPTER 2

## ORGANIZATION OF GUN SECTION

■ 3. GUN SECTION.—Each anti-aircraft gun is manned by a gun section consisting of a gun squad and an ammunition squad. The gun commander, who is included in the gun squad, serves as chief of section. Two artillery mechanics are assigned to the firing section of four guns. Mechanics are normally assigned to the second and fourth gun section for purposes of supervision and formation.

■ 4. GUN SQUAD.—The gun squad (11 enlisted men) is the same under the peace strength or war strength organization, and consists of the gun commander (a sergeant), the fuze range setter (a corporal), the gunner (a corporal), the azimuth setter, the elevation setter, and 6 cannoneers numbered from 1 to 6, inclusive. It includes the number of men required to man the 3-inch anti-aircraft gun of either mobile, semi-mobile, or fixed batteries.

■ 5. AMMUNITION SQUAD, MOBILE UNITS.—*a. War strength.*—Under the war strength organization the ammunition squad consists of the chief of ammunition (a corporal) and 7 cannoneers numbered from 7 to 13, inclusive. Nos. 7, 8, and 9 are chauffeurs in addition to being cannoneers.

*b. Peace strength.*—Under the peace strength organization the ammunition squad consists of 3 cannoneers (also chauffeurs), Nos. 7, 8, and 9.

■ 6. AMMUNITION SQUAD, SEMIMOBILE UNITS.—*a. War strength.*—Under the war strength organization the ammunition squad consists of the chief of ammunition (a corporal) and 4 cannoneers, Nos. 7 to 10, inclusive.

*b. Peace strength.*—Under the peace strength organization no cannoneers are available to perform the duties otherwise charged to the ammunition squad. Prior to target practice, when action is imminent, and during lulls in action, members of the gun squad unpack and place projectiles near the piece in numbers based on expected needs.

■ 7. FORMATION (fig. 1).—The battery is formed as prescribed in FM 4-120. The gun section assembles in two ranks, with 4 inches between files and 40 inches between ranks. After forming the section, the gun commander takes post in the front rank 1 pace to the right of his section. Mechanics take post in the front rank on the left of their respective sections. At the firing point, at the command FALL IN, the section normally faces the piece.

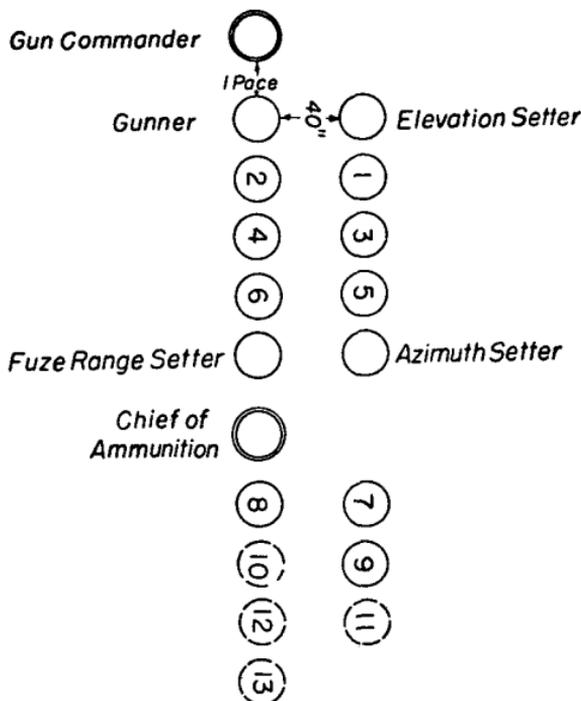


FIGURE 1.—Formation of anti-aircraft artillery gun section, mobile units.

NOTE.—Cannoneers Nos. 10 to 13, inclusive, are not included in the peace strength organization.

## CHAPTER 3

### DUTIES OF PERSONNEL

■ 8. **BATTERY EXECUTIVE.**—*a.* The battery executive commands the firing section (4 gun sections and the artillery mechanics) and is in general charge of all gun emplacements. He is responsible to the battery commander for—

- (1) The training and efficiency of the personnel.
- (2) The condition of the matériel under his charge.
- (3) The police of the emplacements.
- (4) The emplacement and removal from position of the guns.
- (5) The observance of all safety precautions.

*b.* He inspects the matériel under his charge and personally verifies the adjustment of all pointing devices as frequently as necessary to insure accuracy.

*c.* At the command **PREPARE FOR ACTION**, given while the guns are on the road in march order, the battery executive designates the individual positions to be occupied by the guns and supervises the movements into position and the preparation for immediate action.

*d.* He receives the reports of the gun commanders and reports to the battery commander, "Sir, gun sections in order," or reports any defects he is unable to remedy without delay.

*e.* After the emplacements have been reported ready, should circumstances arise which in his opinion would make it unsafe to fire, he commands: **STAND FAST**, and reports his action to the battery commander.

*f.* At the conclusion of the drill or firing he commands: **REPLACE EQUIPMENT**, inspects the gun positions, and reports to the battery commander.

*g.* Being in position, at the command **MARCH ORDER**, the battery executive indicates the point of assembly for the guns on the road and supervises the operation.

■ 9. ASSISTANT BATTERY EXECUTIVE.—*a.* The assistant battery executive is in command of the machine-gun detail and supervises this detail in its preparation for defense against low-flying airplanes and ground attack.

*b.* During the preparation for firing he is normally in charge of the service of ammunition for the battery.

*c.* During firing he is normally assigned to supervise two guns, while the battery executive supervises the other two.

*d.* On the march or during withdrawal from position he performs such duties as may be delegated to him by the battery executive.

■ 10. GUN COMMANDER.—*a.* The gun commander (a noncommissioned officer) is in charge of the gun section and is also chief of the gun squad. He is responsible to the battery executive for—

(1) The training and efficiency of the personnel of his section.

(2) The condition, care, and preparation for action of all matériel, including ammunition, under his charge.

(3) The observance of all safety precautions pertaining to the service of the piece.

(4) The police of his gun position.

(5) A record of the number of rounds fired from his gun.

(6) The care and correct return of empty ammunition cases to the proper agency.

*b.* At the command **PREPARE FOR ACTION**, given while the gun is on the road in march order, he directs the maneuver of the gun into the designated position and supervises the preparation of the position. After the gun is emplaced, ready for firing, or the section arrives at the gun position, he commands: 1. **DETAILS**, 2. **POSTS** and supervises the procurement of equipment. After all details have reached their posts, he commands: **EXAMINE GUN**. He then personally makes an inspection of the gun, carriage, and other matériel, assuring himself that the gun is properly emplaced for firing, that the data transmission system is properly adjusted, that the recoil cylinder is properly filled, and that all moving parts are lubricated. In addition, on the M1 and M3 guns, he makes sure that the oil reserve in rear of the floating piston and the air pressure in the recuperator are sufficient and

that the equilibrators are in proper adjustment. He then commands: **REPORT**, receives the reports of the members of the gun section as called for in the drill table (ch. 11), and reports to the battery executive, "Sir, No. ——— in order," or reports any defects he is unable to remedy without delay.

c. He supervises the service of the piece and the service of ammunition and personally directs the work of care and preservation of all matériel. He takes his post at any point from which he may conveniently supervise the work of the section.

d. When necessary to verify the section, he commands: **CALL OFF**. The cannoneers of the section call off their titles or numbers in succession, beginning with the unnumbered members of the section, followed by the numbered members in order.

e. At the command **TARGET**, he repeats the command and target designations and sees that all personnel take post on the run if not already at their posts. When data are being received and set on the gun he verifies roughly the pointing of the gun by sighting along the gun barrel; when the gun is ready for firing he reports or signals, "No. ——— ready," to the battery executive.

f. At the command **COMMENCE FIRING**, he commands: **LOAD** for the first round only, succeeding rounds being fired without further command, and supervises the work of the section. If a limited number of rounds has been prescribed, he cautions the loader, "(So many) rounds only," and commands or signals: **SUSPEND FIRING** when that number of rounds has been fired. He then reports to the battery executive, "Sir, No. ——— (so many) rounds fired."

g. At the command **SUSPEND FIRING**, he repeats the command, sees that the details remain posted, and that the gun continues to follow the target. He directs the clearing away of empty shell cases and preparation of matériel for further firing.

h. At the command **CEASE FIRING**, he repeats the command and proceeds as at **SUSPEND FIRING**, except that the following of the target is discontinued.

*i.* At the command **REST**, he repeats the command and allows the members of the section to leave their posts but not the immediate vicinity of the gun.

*j.* At the command **REPLACE EQUIPMENT**, he supervises the replacing of equipment, sees that the emplacement is policed, and forms his section.

*k.* In case of misfire he commands: **STAND FAST** and sees that the precautions prescribed in paragraph 22 are observed.

*l.* At the command **MARCH ORDER**, for mobile guns he supervises the withdrawal of the gun from position and the placing of the piece on the road at the designated point.

■ **11. CHIEF OF AMMUNITION.**—*a.* The chief of ammunition (a noncommissioned officer) is in charge of the ammunition squad. He is responsible to the gun commander for—

(1) The training and efficiency of the personnel under his charge.

(2) The proper care of the ammunition pertaining to the gun.

(3) The observance of all safety precautions in the care and service of the ammunition.

(4) The correct recording of required ammunition data.

(5) The cleaning and disposition of empty cartridge cases.

(6) The uninterrupted service of ammunition to the gun position during the course of action.

*b.* At the command **PREPARE FOR ACTION**, he supervises the ammunition squad in the unloading and preparation of ammunition for service and in other duties connected with the preparation of the emplacement as may be directed by the gun commander.

*c.* At the command **1. DETAILS, 2. POSTS**, he posts the members of the ammunition squad and assigns them duties to facilitate ammunition handling.

*d.* At the command **EXAMINE GUN**, he inspects the ammunition for possible defects (especially the fuzes for missing lugs, corrosion, and injury), gives the necessary instructions for preparing and arranging the ammunition for firing, and reports to the gun commander, "Ammunition service in order," or reports defects he is unable to remedy without delay.

*e.* During practice or action he supervises the ammunition squad in replenishing the ammunition supply at the gun posi-

tion, in disposing of empty cases, and in the handling and storing of any additional supply received. He should be prepared at all times to furnish replacements for the gun squad when members of that squad become casualties.

*f.* At the command **REPLACE EQUIPMENT**, he directs the ammunition squad in the securing and covering of all ammunition pertaining to the gun, makes certain that all fuzes that have been cut but not fired have been set back to positions of "safe," helps in the police of the equipment, and forms his squad unless otherwise directed.

*g.* At the command **MARCH ORDER**, he supervises the ammunition squad in their normal duties in connection with packing and loading ammunition and in such other duties as may be ordered by the gun commander.

■ **12. ARTILLERY MECHANICS.**—The chief artillery mechanic is the custodian of the supplies pertaining to the emplacements to which assigned. He is responsible to the battery executive for the condition and serviceability of the supplies and tools under his charge. He maintains an up-to-date inventory of all tools, equipment, spare parts, and supplies under his charge. He or his assistant issues such equipment, tools, oils, paints, and cleaning materials to the members of the gun sections as may be necessary for the service and care of the guns and accessories. The artillery mechanics, assisted by members of the gun sections, make such minor repairs as can be made with the means at hand.

## CHAPTER 4

### NOTES ON SERVICE OF THE PIECE

■ 13. GENERAL INSTRUCTIONS.—The service of the piece should be conducted with dispatch and precision and with as few orders as possible. Except for the necessary orders, reports, and instructions, no talking should be permitted. Cannoneers change positions at a run. Loading with dummy ammunition and pointing the piece as for firing is the normal practice at drills. The commands or signals ELEVATE, DEPRESS, RIGHT, and LEFT refer to the direction of motion of the muzzle of the gun. Commands should be given in the prescribed form, but should be replaced by signals whenever practicable.

■ 14. SIGNALS.—The following whistle signals are authorized:

- a. 1. DETAILS, 2. POSTS, a series of short blasts.
- b. COMMENCE FIRING, one long blast.
- c. CEASE FIRING, one or more long blasts until the firing has been stopped.

■ 15. OPERATION OF BREECH MECHANISMS.—*a.* The breech mechanisms on all guns discussed in this manual are fully automatic. Inserting a cartridge trips the extractors and allows the block to close. The breechblock is opened by the action of the operating cam and the operating shaft in counterrecoil.

*b.* The breech mechanisms are furnished with operating handles and may be set for hand operation by rotating the operating cam so that it does not come in contact with the operating shaft. In normal operation the operating handle is fastened to the shaft in such a way that when the handle is rotated to the rear and down it causes the breechblock to open. Movement of the handle back to the vertical position, however, does not move the block. A clutch is provided to fasten the operating handle rigidly to the shaft if desired.

■ 16. METHOD OF RAMMING CARTRIDGE.—The gunner rams the cartridge into the gun with his left hand. He places his gloved fist on the base of the cartridge case, wrist practically vertical, and sweeps the round smartly into the breech, applying continuous pressure, until the closing breechblock knocks his hand clear. The cartridge is rammed with the side of the fist, the pressure being applied through the back of the thumb and the side of the index finger. In this manner continuous pressure can be applied, and the hand cannot be caught in the breech. Figure 2 illustrates the proper method of ramming.

■ 17. METHOD OF HANDLING AMMUNITION AND FUZE SETTER, M8.—*a.* (1) Nos. 4, 1, and 3 relay ammunition to the fuze setter. No. 3, takes a round from the stack near the piece, right hand grasping the projectile, left hand near the base, turns to the right, and passes it to No. 1. He then repeats the operation. No. 1 takes the round from No. 3, the round resting in his upturned palms, right hand near the base, left hand near the projectile, turns to the left, and lifting the round to the level of his eyes passes it to No. 4, who is stationed on the mount platform. He then turns to the right and receives another round from No. 3, repeating the operation. No. 4, stationed on the mount platform slightly to the rear and left of the fuze setter guide, turns to the right and takes the round from No. 1, fuze toward the setter, left hand grasping the projectile and right hand cupped over the cartridge base. He turns to the left, advancing a step toward the setter as he raises the base end to align the round with the axis of the setter. As the fuze enters the setter guide his left hand is withdrawn, and with his right hand launching the round downward to its final seating in the setter, he leans forward and, being balanced by his right hand, which is *pressing against* the base end of the case, brings his left hand over and strikes a quick slap against the release lever on the top side of fuze setter. At the release of the setting mechanism *No. 4 maintains momentarily his right hand pressure on the base of the completely inserted round* to permit the setting operator, No. 6, time to complete one turn of the crank and call out, "Cut." No. 4 then straightens

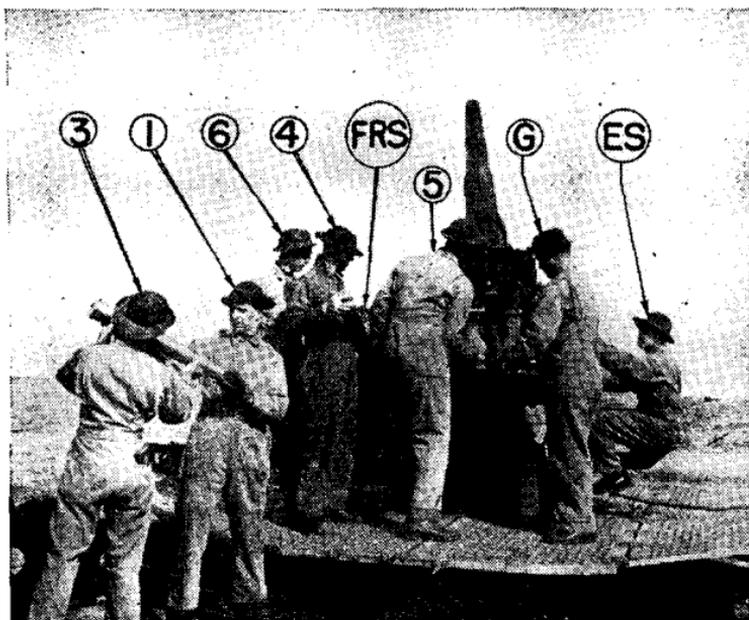


FIGURE 2.—Round being rammed, M3 gun on M2A1 mount

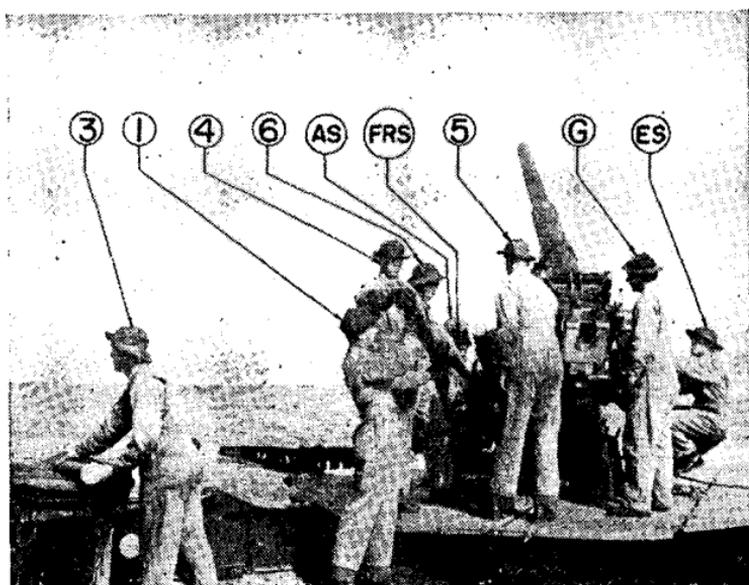


FIGURE 3.—Round leaving continuous fuze setter, M8  
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up, steps back, and, receiving another round from No. 1, repeats the operation.

(2) No. 5 serves ammunition from the fuze setter to the gun, and is stationed between the gun and No. 4. When No. 6 commands, "Cut," and No. 4 steps back from the round in the setter, No. 5 steps into the position vacated by No. 4 and, withdrawing the round from the setter, steps toward the gun and holds the round in loading position for the gunner.

b. No. 6, standing on platform alongside of the seated fuze range setter, maintains a downward pressure on the handle of the fuze setter crank. When No. 4 seats the round and trips the setting release, No. 6 operates the crank one complete turn counterclockwise until the crank relocks and then calls out, "Cut." The fuze range setter, seated on the one seat of the setter, maintains pointer coincidence in the data indicator by manipulating the adjusting handwheel.

c. Points of importance in the foregoing procedures are—

(1) No. 4 maintaining pressure against the cartridge case base until No. 6 commands, "Cut." The use of a heavy glove on the right hand of No. 4 will greatly reduce the friction against his hand produced by the rotating case.

(2) No. 4 executing the release of the crank with a *glancing* slap at the release lever so that the latter will instantly recover and re-arm itself before No. 6 has completed a full revolution of the crank.

(3) No. 6 must maintain sufficient downward pressure on crank so rotation will start the instant the release is tripped. Otherwise, No. 4 would have to hold the release lever "open" and possibly fail to let it re-arm in time for the crank at the end of its one revolution. When setting original or reconditioned Mk. III or Mk. IIIA1 powder train fuzes, the setting crank of the fuze setter should be turned at a moderate speed until the setting pawls have engaged the body lug of the fuze, after which the crank may be speeded up for the remaining 180° or so of the setting cycle. The body lug in the above type fuzes will not withstand the pick-up force which may be applied by the high speed of the M8 fuze setter.

d. Figures 2 and 3 illustrate the service of ammunition to the fuze setter and to the breech. Figure 2 shows No. 5 holding the round in position for loading, with the gunner in

position to load. In this figure, No. 4 is completing the insertion of a round into the fuze setter and No. 1 is receiving a round from No. 3. Figure 3 shows No. 5 turning to the left in the act of removing a round from the fuze setter, while No. 4 is receiving a round from No. 1, and No. 3 is taking a round from the ammunition rack used in this case.

■ 18. SERVICE OF DRILL AMMUNITION.—When using drill ammunition, the procedure is identical with that given in paragraph 17, except as follows:

a. No. 2 takes post to the right of the piece opposite the operating handle and facing the rear. He opens the breech after each round is fired, and immediately raises the operating handle to the vertical position.

b. Two additional cannoneers (Nos. 7 and 8) are necessary. When a round is fired, No. 2 opens the breech smartly and as the round is ejected it is caught by No. 7 (8), left hand against the base and right hand underneath the case. He clears the breech immediately for No. 8 (7) and places the dummy round on the ammunition rack.

c. An alternate method is as follows: No. 2 takes such a position that he can catch each round as it is ejected and pass it to No. 3; No. 3 passes the round to No. 1 who relays it to No. 4. The gunner operates the operating handle to open the breech after each round is fired. In this method the lanyard is not pulled.

■ 19. ELEVATING GUN (M1917, M1917MI, AND M1917MII).—When the gun mounted on the 3-inch antiaircraft gun mount, M1917, is depressed with a perceptible jar against the stop which limits depression, it is very difficult to start the gun in elevation. This is caused by the elevating worm becoming locked with the worm gear. The elevation setter should depress gently when approaching this stop.

## CHAPTER 5

### SAFETY PRECAUTIONS

■ 20. GENERAL.—The safety precautions described herein are prescribed for peacetime, but under war conditions should be interpreted by the proper officers according to the circumstances.

■ 21. AMMUNITION.—*a.* All ammunition at the firing point must be so placed that it will be protected against explosion in case of an accident at the gun position. It should be in a dry place and protected from the direct rays of the sun by a tarpaulin or other covering. Erratic shots and possibly dangerously high powder pressures may result from overheated ammunition.

*b.* Any alteration of loaded ammunition, except in accordance with specific instructions from the chief of the supply service concerned, is hazardous and is therefore prohibited. Specifically, the alteration of time fuzes assembled to ammunition is forbidden.

*c.* When checking the accuracy of fuze setting by cutting trial fuzes, do not cut the fuze on any one projectile more than twice.

■ 22. MISFIRES.—In case of a misfire, at least three attempts to fire the primer will be made. The breechblock will not be opened until at least 2 minutes after the last attempt to fire the piece, and the gun will be kept laid on a safe place in the field of fire.

■ 23. UNLOADING LIVE ROUNDS.—*a.* After unfired rounds are unloaded, powder train fuzes are set back to *S* and mechanical fuzes to position with "set" line on lower cap in line with edge of slot in body.

b. If a round cannot be extracted in the normal manner, it should be fired, safety precautions permitting. If this is impossible, it should be removed under the direct supervision of an officer, a rammer being used which bears only on the projectile and provides for clearance around the fuze (see \*TM 9-360).

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\*See Appendix.

## CHAPTER 6

### MAINTENANCE OF MATÉRIEL

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#### SECTION I

#### GENERAL

■ 24. CARE OF MATÉRIEL.—The proper maintenance of matériel is the direct responsibility of battery personnel. The gun and mount should be thoroughly cleaned and lubricated at intervals not exceeding 2 weeks and as soon as possible after firing. Care should be taken to keep all parts free from rust as rust is the starting point of serious injury. All bearing surfaces, elevating racks and screws, and unpainted parts must be kept clean at all times.

■ 25. GENERAL INSTRUCTIONS.—*a.* Disconnecting the gun from the recoil mechanism will not be attempted by the using personnel.

*b.* Replace and open cotter pins after replacing nuts.

*c.* Do not strike any metal part directly with a hammer; interpose a buffer of wood or copper.

*d.* Oil holes which have become clogged with oil should be opened with a piece of wire. Wood should never be used for this purpose, as splinters are likely to break off in the hole.

*e.* As an aid to ready identification, grease and oil nozzles and oil hole covers are painted red. Oil holes have a red ring painted around them.

*f.* In case the gun and carriage are to be stored or left unused for any considerable length of time, all bright and unpainted surfaces should be thoroughly cleaned with dry-cleaning solvent so as to be free from rust, water, and lubricating oil, and coated with rust-preventive compound. Dry-

cleaning solvent is used in preference to kerosene for cleaning the matériel as it is difficult to remove all traces of kerosene, the presence of which tends to cause the formation of rust underneath the rust-preventive compound.

■ 26. DAILY INSPECTION.—Daily inspection should be made by the gun crew to discover any parts which need adjustment or attention. This includes the following:

- a. Open and close the breech to see that it operates freely.
- b. Examine the breech recess and bore to see that they are clean.
- c. See that the firing mechanism works freely.
- d. Elevate and depress the gun to see that the mechanism operates without binding or undue lost motion.
- e. Traverse the gun to the right and left through the full extent of its travel to see that the mechanism operates without binding or undue lost motion.
- f. See that the sliding surfaces of the gun and cradle are clean and well lubricated.
- g. See that all working parts are thoroughly lubricated.
- h. Examine recoil system for oil leaks.
- i. Examine all keys, thongs, and hinges to see that they are in serviceable condition.
- j. Check tools and accessories to see that they are in their proper position and that none are missing.

## SECTION II

### MAINTENANCE OF PARTICULAR PARTS AND ASSEMBLIES

■ 27. GUN TUBE.—*a.* As soon as possible after firing, it is important that the bore be cleaned to remove all powder fouling and then thoroughly oiled. Using the sponge, wash the bore with a solution made by dissolving  $\frac{1}{2}$  to 1 pound of soda ash (depending on strength desired) to 1 gallon of boiling water. A piece of burlap doubled over the bell of the rammer may prove more satisfactory than the sponge. Special attention should be given that portion of the bore extending from the origin of the rifling to a point about 24 inches forward, as most of the fouling takes place

in that area. Cleaning should be followed by thorough drying, after which the bore is oiled. A coating of grease should be applied if the gun is not to be fired immediately. The bore should be cleaned and new grease applied often enough to assure its freedom from rust at all times.

b. The surfaces of the leveling plates sunk into the top of the breech ring should be protected from injury. Tools or other articles must never be laid upon them.

c. When the gun is not in use the various covers provided for protecting it must be placed in position.

■ 28. BREECH MECHANISM.—a. The breech mechanism should be kept clean and well lubricated at all times with class D lubricating oil, light. The mechanism should be disassembled periodically (and always immediately after firing) and cleaned and oiled. In case the mechanism is to be left unused for a considerable length of time all bright surfaces should be coated with rust-preventive compound.

b. Vigilance must be maintained to detect any abrasions forming on the pressure side of the wearing surfaces in the various grooves of the breechblock and the breech recess and on the trunnions of the extractors. The removal of such abrasions must be done at once by ordnance personnel.

■ 29. FIRING MECHANISM.—a. The firing mechanism should be disassembled frequently from the breechblock for the purpose of cleaning and for oiling with light lubricating oil.

b. The use of an oil that is thicker than authorized will cause the mechanism to absorb the energy of the firing spring and result in misfires. This is especially true in cold weather when unsuitable oil congeals and becomes gummy.

■ 30. RECOIL MECHANISM.—a. Under no circumstances should an attempt be made to take the recoil mechanism apart.

b. The proper amount and *kind* (recoil, heavy) of oil should be maintained at all times in the recoil mechanism.

c. Every precaution should be taken to prevent the entrance of foreign matter into the recoil mechanism.

d. Strain the oil used in filling the recoil mechanism through a fine clean cloth, and be sure that the receptacles used in handling the oil are clean and dry. Receptacles that have been used for other oils or materials should not be used for this purpose.

e. The gun commander should constantly verify the complete return of the gun into battery. If the gun does not return to battery, or does so irregularly by jerks or jumps, he should command **CEASE FIRING** and look for the cause.

■ 31. **GUN SLIDES.**—The gun slides will be thoroughly cleaned frequently and covered with a film of grease, medium, U. S. A. Spec. 2-29D.

■ 32. **MOUNT.**—The exposed portions of the elevating rack, and on mobile mounts the exposed parts of the leveling screws and guides, will be kept clean and covered with a film of grease. Great care will be taken to make sure that the traversing and elevating mechanisms are clean and properly lubricated.

## CHAPTER 7

### EMPLACEMENT OF M3 GUN ON M2A1 OR M2A2 MOUNT

■ 33. GENERAL.—The duties of the various members of the gun section in emplacing the M3 guns on mobile mounts are given in section II, chapter 11, and are shown diagrammatically in figure 4. The explanation given below is descrip-

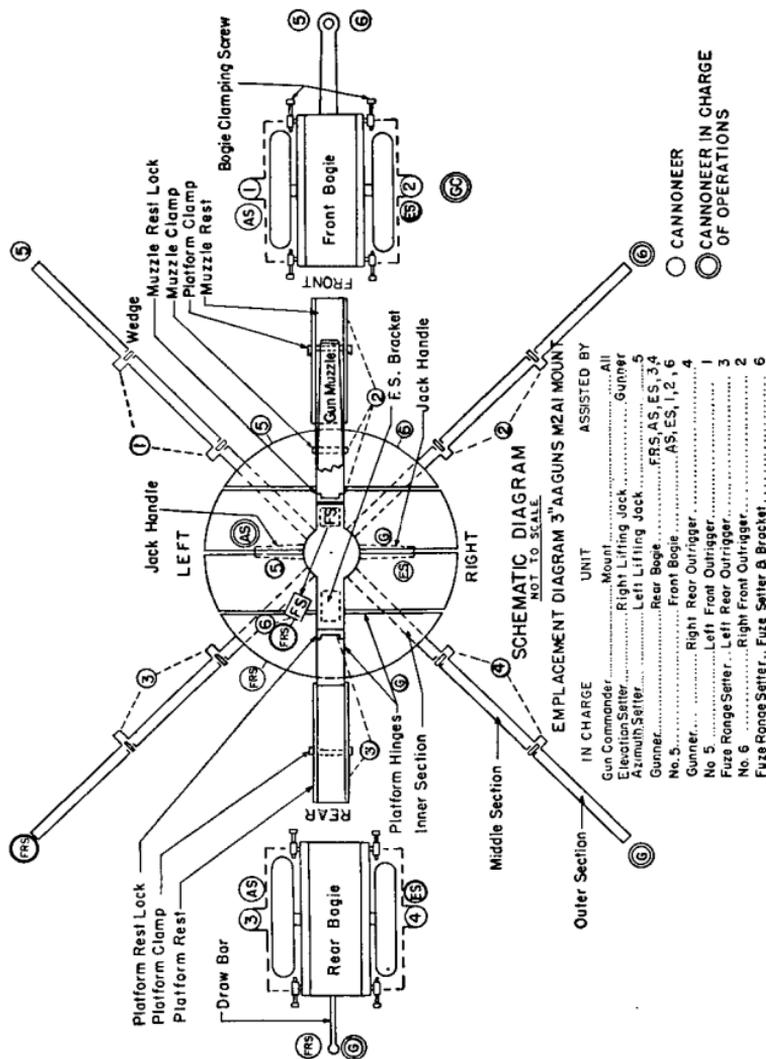
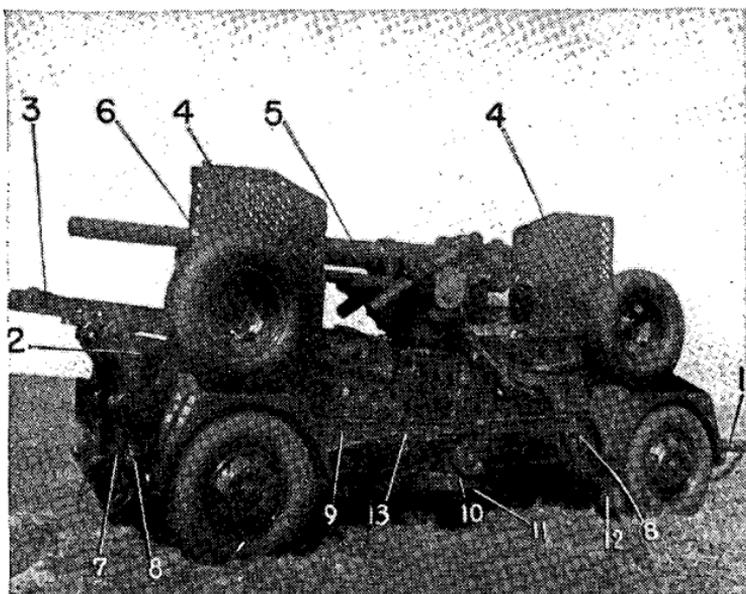


FIGURE 4.—Emplacement diagram, 3-inch gun on M2A1 mount.

tive of the operation of maneuvering the mount into and out of position. *In this description the end of the mount equipped with the muzzle rest is considered the front of the mount.* The right and left are determined by the right and left of an observer at the rear of the mount facing the front. *The bogie which is in position at the front of the mount is called the front bogie, and that at the rear, the rear bogie, regardless of whether they are towing or trailing bogies.* This is done because it is better to remove last and replace first that bogie which is at the muzzle end of the mount, due to the preponderance of weight at that end.

■ 34. PROCEDURE TO PREPARE FOR ACTION (see fig. 5 for names of parts).—The following is an explanation in chronological order of the maneuver of preparing for action:



- |   |                              |
|---|------------------------------|
| 1. Lunette.                                 | 7. Rear (trailing) bogie.    |
| 2. Outrigger, intermediate section.         | 8. Bogie clamp screws.       |
| 3. Outrigger, outer section.                | 9. Platform support bracket. |
| 4. Platform.                                | 10. Pedestal spade.          |
| 5. Gun (M3).                                | 11. Jack.                    |
| 6. Platform traveling support and gun lock. | 12. Front (towing) bogie.    |
|   | 13. Jack ratchet wrench.     |

FIGURE 5.—3-inch anti-aircraft gun, M3, on M2A1 mount in traveling position.

a. At the command PREPARE FOR ACTION, given by the gun commander, the jack supporting channel is put in place, the jack lever ratchets are put in neutral, and the lifting jacks are run down by means of the fast motion handwheels until the floats are in contact with the channel. The jack lever ratchets are then set for "jacks down." While this is being done all bogie and outrigger clamping screws are unlocked.

b. At the command JACKS DOWN, the two lifting jacks are run down *together* by means of the jack levers until the mount has been raised sufficiently to remove the rear bogie.

c. At the command JACKS HALT, the elevation and azimuth seats are unlocked from the traveling position and swung out from the mount, and the rear bogie is removed. The rear outriggers are unfolded, wedged, and swung outward to their stops. The mount is then tipped by means of the unfolded outriggers, and the front bogie is removed. The front outriggers are then unfolded, wedged, and swung outward to their stops.

d. At the command JACKS UP, the lever ratchet is shifted and the mount is lowered to the ground. The jack levers should be operated until stops are reached. Care should be taken to keep the mount approximately level while lowering.

NOTE.—The overhung weight of the lifting jack levers introduces a clamping action on, and effects a torsional resistance in, the jackscrews; the resulting added effort required on the fast motion handwheels to operate the screws can be greatly reduced by lifting up on the levers somewhat when turning the handwheels. If, due to negligence in following instructions relative to positioning the ratchet latch, either jack should begin to run down under the load, sufficient resistance can be applied to the screw to check this movement by bearing down heavily on the lever end, thus increasing its clamping action. To save time all movement of the jackscrews, either up or down, when not loaded, should be made with the fast motion mechanism.

e. The platform sections are unlocked, unfolded, and locked in their firing positions. The muzzle clamp is then unlocked, the gun elevated, and both muzzle rest and platform rest are unlocked from the mount and laid out on the ground. As soon as the platform is unfolded, the azimuth and elevation seats are locked into their firing positions. When the muzzle and platform rests are clear of the mount, the fuze setter bracket is removed from its traveling position

and installed in its firing position, and the fuze setter is installed on the fuze setter bracket.

*f.* The mount is leveled until the level bubbles remain centered when mount is traversed.

*g.* If at the conclusion of the emplacing maneuver the under surfaces of the four outriggers do not have contact with the ground for their full length, loose dirt is shoveled underneath them so as to provide continuous contact with the ground.

■ **35. DUTIES OF GUN COMMANDER IN EMLACING MOUNT.**—At the command **PREPARE FOR ACTION**, the gun commander repeats the command, directs the maneuvering of the gun into the designated place, and supervises the emplacing of the gun. When both lifting jacks are down with the floats in contact with the jack supporting channel and the bogie clamping screws are released, he commands: **JACKS DOWN**. After the mount has been raised sufficiently to remove the rear bogie, he commands: **JACKS HALT**. When the bogies have been withdrawn and the outriggers unfolded, wedged, and swung to their stops, he commands: **JACKS UP**, and sees that the mount is kept level during the operation. When the mount is resting on the ground, he directs the details of completing the emplacement and leveling the mount.

■ **36. PROCEDURE TO TAKE UP MARCH ORDER.**—It may be stated as a general principle that the details handle the same elements of matériel in preparing the gun for the road (march order) as they handle in preparing it for firing. The following is an explanation in chronological order of the maneuver of taking up march order:

*a.* At the command **MARCH ORDER**, given by the gun commander, the fuze setter and fuze setter bracket are removed from their firing positions and replaced in their traveling positions, and the azimuth and elevation seats are unlocked from their firing positions. The muzzle and platform rests are replaced and locked into their traveling positions, and the gun is traversed and depressed until the muzzle clamp can be locked. The platform sections are unlocked from their firing positions, folded up, and locked to the muzzle

and platform rests. The lifting jack lever ratchets are shifted, and at the command **JACKS DOWN** the jacks are run down until the mount has been raised sufficiently to break the outriggers loose from the ground. At the command **JACKS HALT**, the wedges are driven from the front outriggers, which are folded, swung against the mount, and locked.

b. At the further command **JACKS DOWN**, both lifting jacks are run down together until the mount has been raised sufficiently to allow replacing of the front bogie.

c. At the command **JACKS HALT**, the lifting jacks are stopped and the front bogie is run into position and locked to the mount. The rear outriggers are then folded, swung against the mount, and locked. The rear bogie is then run into position.

d. At the command **JACKS UP**, the mount is lowered until it rests on the rear bogie, and is locked thereto. If equipped with air brakes, both bogies should be coupled to the mount air line. The jacks are then raised by means of the fast motion handwheels until the stops are reached. The jack supporting channel and the azimuth and elevation seats are secured in their traveling positions.

■ **37. DUTIES OF GUN COMMANDER IN TAKING UP MARCH ORDER.**—At the command **MARCH ORDER**, the gun commander repeats the command and supervises the maneuver. After the platform sections have been locked in their traveling positions, he commands: **JACKS DOWN**. When the outriggers are broken loose from the ground, he commands: **JACKS HALT**. After the front outriggers have been locked in their traveling position, he commands: **JACKS DOWN**. When the mount has been raised sufficiently to allow replacing the bogies, he commands: **JACKS HALT**. When the bogies have been locked into position, he commands: **JACKS UP**. He then directs the details of completing the maneuver and the maneuvering of the gun to its designated place in the column.

■ **38. PRECAUTIONS.**—a. The gun should be emplaced on turf or soft ground such as a plowed field whenever possible. The terrain should be examined to insure that no rocks or other unyielding substances are concealed under the areas

where the pedestal spade and the outriggers rest. The presence of such obstructions will cause the mount to shift badly during firing. If necessary to emplace on hard ground, the ground should be loosened with a pick over an area sufficient to engage the spade and outriggers of the mount; two settling shots should be fired at approximately the maximum elevation of the gun to drive the spade into the ground, and the mount should be releveled. On uneven ground, with a slope greater than  $5^\circ$ , the area under the spade and outriggers should be roughly leveled, as the leveling mechanism of the mount is limited to an adjustment of  $5^\circ$ .

b. The outriggers should not bear firmly on the ground during firing. They are not intended to absorb any of the shock of firing, but to prevent the overturning or shifting of the mount. When filling in under outriggers, loose dirt should be used and no effort should be made to pack it in.

c. In removing the bogies, the screws fastening the bogie frames to the mount should be released just before the load is taken by the lifting jacks. This is to prevent the bogies' being raised off the ground and jamming. In removing and replacing the bogies, the mount may be maneuvered by the extended outriggers.

d. Before firing be sure that the lifting jacks are fully raised.

e. The mount should be releveled (and reoriented) after firing the first few shots.

f. When the mount is provided with air brakes, dummy couplings are provided near all air couplings for sealing the latter when not in use. Whether the air couplings between the mount proper and the bogies are manually or automatically disengaged, the coupling halves should be manually sealed with these dummies to prevent fouling of the coupling gaskets and interior of the air system. Malfunction of the brake air chambers or quick release valve on rear bogies will result if air lines are not kept free from dirt and other foreign substances.

## CHAPTER 8

### 3-INCH ANTI-AIRCRAFT GUN, M3, ON MOBILE MOUNT

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III. Check and replacement of oil and gas in recuperator and equilibrators.....	51-57
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#### SECTION I

#### GENERAL

■ 39. INTRODUCTION.—This chapter contains special information for the use of gun crews of antiaircraft batteries manning M3 guns on mobile mount. It is intended that the instructions be used as a guide in the proper care and handling of this particular type of matériel.

#### SECTION II

#### DISASSEMBLY AND ASSEMBLY OF BREECH AND FIRING MECHANISMS

■ 40. TO REMOVE AND DISASSEMBLE BREECHBLOCK.—*a.* Remove one of the cap screws from the breech lamp bracket, loosen the other cap crew, and swing the lamp assembly clear of the breech recess. Unscrew plugs (5) (fig. 7) and remove extractor springs and plungers (6) and (9). Screw an eyebolt in the top of the breechblock for use in lifting the block. Open the breech and insert a pin or punch in the opening in the spring piston rod (27) (fig. 6) at the rear face of the closing spring cylinder (22), thereby releasing the tension of the spring on the breechblock. (See note

below.) Screw in the clutch (11) (fig. 8), and close the breech. Remove the cotter pin which retains the chain terminal and unhook the chain from the operating shaft.

b. Draw the trigger shaft detent (1) (fig. 7) to the left by the handle (2) and draw out the trigger shaft (13) (fig. 8). Remove the firing case (41) (fig. 9) by turning until the locating lugs are disengaged. Remove the split pin from the lock plate key (2) (fig. 6) and drive out the key. Remove the lock plate (4).

c. Rotate the operating shaft (3) (fig. 8) as in opening the breech. When the arm of the operating shaft turns out of the breechblock, draw the shaft to the rear out of the breech ring. It may be necessary to raise or lower the breechblock slightly while removing the shaft. Lower the breechblock sufficiently to remove the extractors.

d. Raise and remove the breechblock from the breech ring. Remove the detent spring (3) (fig. 7) by first removing screw (4) holding the spring. The detent (1) may then be removed.

e. The bushing (28) (fig. 6), which is screwed very tightly in the front face of the breechblock, is assembled during manufacture and will not be removed by the using service personnel.

NOTE.—If it is desired to disassemble the closing spring cylinder mechanism, do not insert pin in the spring piston rod. With breech closed, unscrew piston rod nut (25) (fig. 6) and withdraw spring piston (24). The closing spring may then be removed from the front and the spring piston rod from the rear.

■ 41. TO DISASSEMBLE FIRING CASE.—a. With the firing case assembly withdrawn from the breechblock as explained in paragraph 40, insert a screw driver in small hole in the firing case and push the trigger fork (45) (fig. 9) from the case.

b. Remove the firing pin holder assembly (42) by pressing the sear (48) against the spring (47) with a finger at the front of the case, and by pushing the entire firing pin holder assembly from the rear with the fingers of the other hand.

c. Remove the sear (48) and the sear spring (47).

■ 42. TO DISASSEMBLE FIRING PIN HOLDER ASSEMBLY.—a. Separate the holder (42) (fig. 9) from the sleeve (46) by pressing inward on the end of the firing pin holder, thus dis-

engaging the irregularly formed end of the firing pin holder from the beveled surface on the inside of the sleeve. The sleeve should then slip off under the action of the spring.

b. Remove the spring by unscrewing the coils from the irregularly formed end of the holder.

c. Remove spring stop (50) and the cotter pin (49) from the holder (42), and unscrew the firing pin (44) from the firing pin holder (42).

■ 43. TO DISASSEMBLE OPERATING HANDLE AND OPERATING SHAFT.—Unscrew the clutch lock (10) (fig. 8) to disengage the clutch from the shaft, and remove retaining ring lock screw (2). Unscrew the retaining ring (7) from the operating shaft (3) and remove the operating handle assembly. Unscrew retaining ring from the operating handle hub. Remove the clutch lock bearing lock screw (8) and unscrew the bearing from the handle hub. The method of disassembling the remaining parts needs no explanation.

■ 44. TO ASSEMBLE FIRING PIN HOLDER ASSEMBLY.—a. Insert the firing pin (44) (fig. 9) into the firing pin holder (42) until it fits tightly against the shoulder. Insert the cotter pin (49) through the holder and spread the ends to clear the firing case bore. Assemble spring stop (50) and firing spring (43) on the firing pin holder (42). Place the firing pin holder sleeve (46) over the firing spring and firing pin holder, and force it against the spring until the beveled surface on the inner part of the sleeve and the irregularly formed end of the firing pin holder hook together, retaining the parts.

b. Pressing the parts together can be best accomplished in the following manner: grasp the holder in one hand, guiding the sleeve with the other. Then place the rear edge of the sleeve against the sharp edge of a bench or convenient part of the carriage, and push the parts together by leaning the weight of the body against the hand holding the front end of the firing pin holder.

■ 45. TO ASSEMBLE FIRING CASE.—a. Turn the spring stop (50) (fig. 9) on the firing pin holder (42) until the flat edges of the fork are in a plane parallel to that of the flat surface

at the forward edge of the firing pin holder. Failure to do this will make it almost impossible for the forward end of the sear (48) to engage the firing pin holder (42) as shown in the diagram of the assembled mechanism.

b. Insert the sear spring (47) into its seat inside the firing case (41). Insert the sear (48) into the case, placing the stud on the bottom of the sear into the sear spring (47). With a finger hold the rear end of the sear (48) up, and with the other hand insert the firing pin holder assembly about halfway into the case. Then press the rear end of the sear down and push the firing pin holder assembly fully into the case.

c. Insert the trigger fork (45) into the opening in the side of the case, with the rounded projections on the fork ends toward the front of the case, in which position the ends rest against the rear face of the firing pin holder sleeve (46). Push the trigger fork in as far as it will go, slapping it with the palm of the hand if necessary.

■ 46. TO ASSEMBLE BREECHBLOCK.—*a.* Assemble the trigger shaft detent (1) (fig. 7) into the detent hole in the lower left-hand side of the block. As the detent passes into the slot in the bottom of the block, slip the detent handle (2) over the small diameter of the detent up to the shoulder. Place the detent spring (3) in the hole and insert screw (4).

b. Insert the firing case assembly into the breechblock and turn it until the indicating lines or the words "TOP" on the firing case and breechblock coincide. Do not assemble the trigger shaft until after the breechblock has been assembled to the gun.

■ 47. TO ASSEMBLE OPERATING HANDLE.—*a.* The grip position is made hollow to reduce its weight, the hole in the end being closed by screwing in the handle plug (4) (fig. 8). The oil cup (6) is pressed into the hub of the handle. These parts are assembled during manufacture and are not intended to be removed.

b. Screw the clutch lock (10) (fig. 8) through the clutch spring (12) into the clutch (11), and insert them into the handle, locating the key and keyway together. Now screw the bearing fully into the handle. Locate the nearest hole

in the bearing directly over the tapped hole in the handle hub, and secure the bearing with the clutch lock bearing lock screw (8).

c. Screw the retaining ring on the hub of the handle until it strikes the shoulder. It must then be unscrewed nearly one full turn (lacking about one-half inch measured on the circumference) in order to locate the ring so that the handle will slide on the operating shaft without interference.

■ 48. TO ASSEMBLE OPERATING SHAFT.—Slide the operating handle assembly on the operating shaft, pushing it on until the projections on the shaft pass through the openings in the retaining ring (7). Retain the handle on the shaft by screwing the retaining ring fully against the shoulder, and insert the retaining ring lock screw (2). The lock screw should seat in the depressions in the ring and handle. Screw the clutch lock fully to the right to engage the clutch with the shaft.

■ 49. TO ASSEMBLE BREECH MECHANISM.—*a.* Insert the operating shaft into its bearings, and allow it to rest with the operating handle down.

*b.* Place the extractors (7) and (8) (fig. 7) in position in the breech recess, and press upward from the bottom so that they lie flat against the face of the breech.

*c.* Grip the eyebolt screwed in the top of the breechblock, and lower the block about halfway into the breech recess.

*d.* Raise the operating handle, at the same time lowering the breechblock, working the arm of the operating shaft into the T-slot in the breechblock during the operation. It will be necessary to withdraw partially the operating shaft from its bearing seat while engaging the arm of the operating shaft into its position in the T-slot. Then close the breech.

*e.* Slide the lock plate into its seat in the bottom face of the breech ring and secure it by driving in the lock plate key. Insert the cotter pin in the key.

*f.* With the breech open, insert the extractor plungers (9) (fig. 7) in the holes in the breech face, small end of the plunger to the rear, followed by the extractor plunger springs. Screw plugs (5) in position.

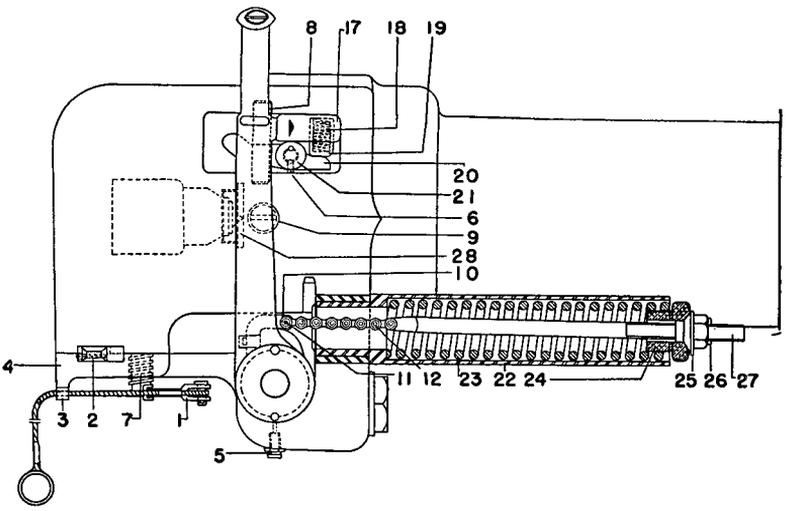


FIGURE 6.—Breech mechanism, 3-inch antiaircraft gun, M3, right side elevation.

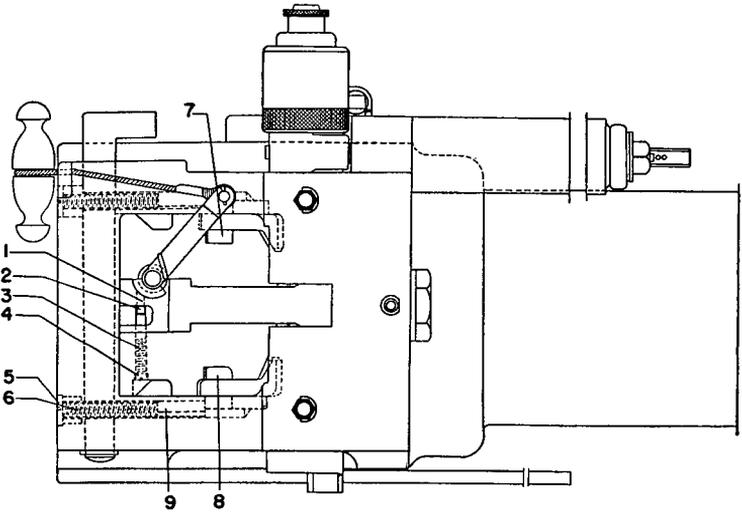


FIGURE 7.—Breech mechanism, 3-inch antiaircraft gun, M3, bottom elevation.

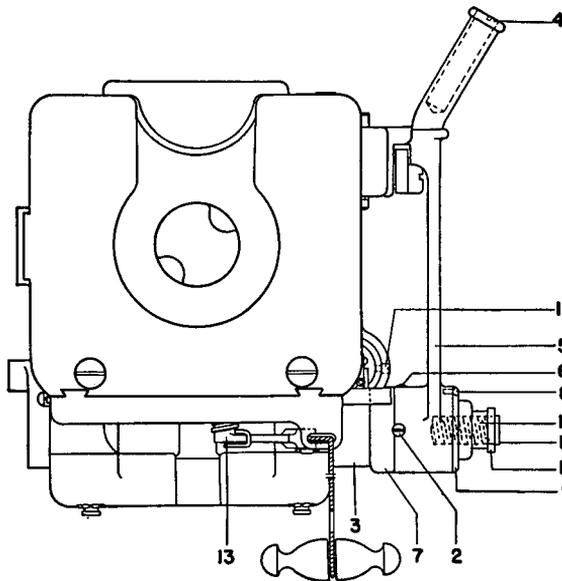


FIGURE 8.—Breech mechanism, 3-inch antiaircraft gun, M3, rear elevation.

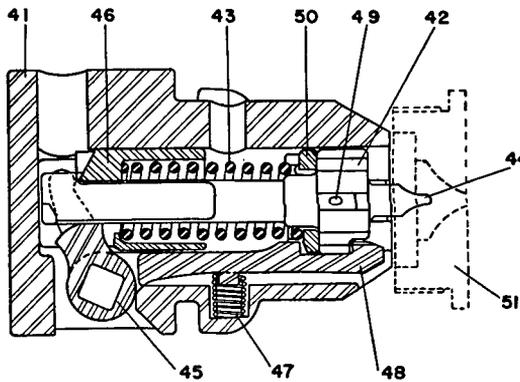


FIGURE 9.—Firing mechanism, 3-inch antiaircraft gun, M3, horizontal cross section.

*g.* Attach the chain terminal to the operating shaft. (In case the closing spring assembly has been disassembled, place the closing springs (23) (fig. 6) in the closing spring cylinder (22). Insert the spring piston rod (27) through the spring and spring cylinder from the rear end and attach the chain terminal to the operating shaft. Place the spring piston (24) on the rod and screw the piston rod nut (25) on the rod until the end protrudes through the nut about three-fourths of an inch.)

*h.* Close the breech and insert the trigger shaft (1) (fig. 6), first placing the spring (7) in position on the trigger shaft. Press the trigger shaft detent handle to the left to allow the trigger shaft to enter, and then allow the detent (1) (fig. 7) to move back into the annular groove in the shaft.

■ 50. **TO ASSEMBLE LATCH PLATE** (fig. 6).—Place the latch spring (18) into the spring cup (19), and hold the parts in position in latch plate (17). At the same time assemble the latch (20) in the plate by forcing the boss on the latch into its seat in the latch plate, holding it in position until the latch bolt (21) can be entered several threads. Screw the latch bolt (21) home and insert the latch bolt set screw (6). The disassembly of this mechanism is the reverse of the above procedure.

### SECTION III

#### CHECK AND REPLACEMENT OF OIL AND GAS IN RECUPERATOR AND EQUILIBRATORS

■ 51. **GENERAL.**—The personnel of the using service will check and reestablish the oil reserve in the recoil system. The purpose of the oil reserve is to move the floating piston from its seat and suspend it between the gas and the oil in the cylinder. An oil reserve must at all times be maintained; otherwise damage to the system will occur if the gun is fired. Leakage of a few drops of oil from the system will not hinder its operation.

■ 52. **TO CHECK AND ESTABLISH OIL RESERVE.**—With the gun in a horizontal position remove the oil filling plug (19) (fig. 10) at the lower left rear of the cradle. Insert the oil release tool, and screw it in until the oil filling valve is un-

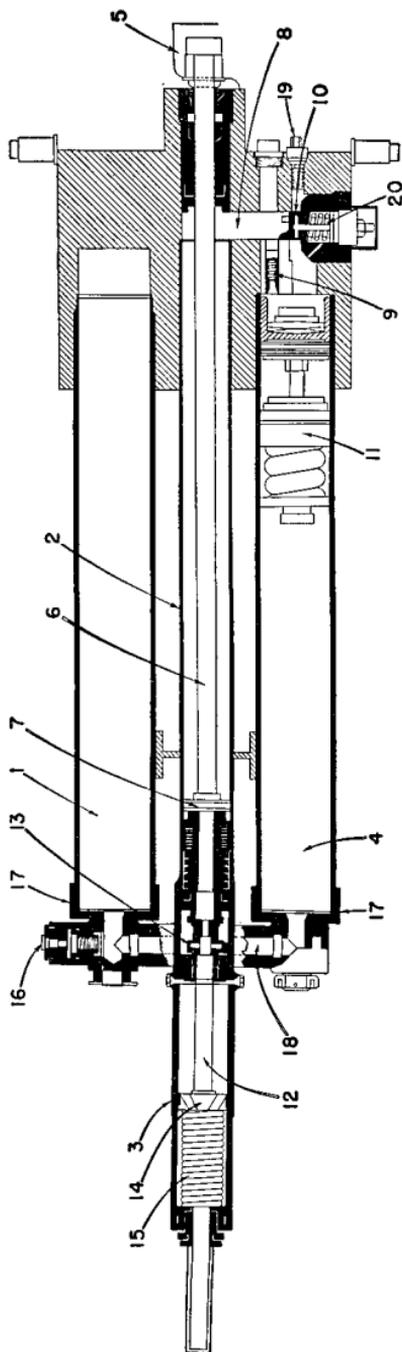
seated. If any reserve oil is in the system, it will be forced out through the oil release by the action of the gas on the floating piston. If no oil flows through the oil release, an oil reserve must be established by the injection of oil into the recuperator. Remove the plug from the oil filling hole located on the left side of the cradle (visible through a small hole in the top carriage), and pour in heavy recoil oil through a funnel until the cylinder is completely full. Replace the plug. The proper oil reserve is then established by injecting the contents of an oil screw filler full of oil twice, as explained in paragraphs 53 and 54.

■ 53. TO INJECT OIL WITH OIL SCREW FILLER.—*a.* Withdraw the piston of the oil screw filler and fill the body of the filler with recoil oil, preventing the loss of oil by holding a finger over the end of the tube. Replace piston and cap. Hold the filler with pipe up and turn the screw until a small amount of oil flows therefrom. This will expel the air from the filler.

*b.* Place the oil screw filler in the bracket provided at the rear left side of the cradle. Connect the tube of the filler to the oil filling inlet. Turn the handle of the oil screw filler, forcing the oil into the cylinder. When the handle has been completely turned down, remove the oil screw filler and repeat the operation. Then replace the oil filling plug. In case there is a leakage of oil around the piston rod stuffing box, adjustment should be made by ordnance personnel.

■ 54. TO FILL BUFFER.—Remove the oil filling plug at the top of the buffer and fill to overflowing with heavy recoil oil. Replace plug.

■ 55. TO CHECK GAS PRESSURE IN RECUPERATOR.—After establishing an oil reserve as explained above, the gas pressure is checked by means of the jacking device on the cradle just above the trunnion on the right side of the piece. With the gun still in a horizontal position, force the gun out of battery about 1 inch with the jacking device, using the wrench provided. Upon release of the jack, the gun should follow back into battery. Now elevate the gun to 1,450 mils and repeat the jacking operation. If the gun does not return to



- |                                   |  |
|-----------------------------------|--|
| 1. Gas reservoir cylinder         | 12. Counterrecoil buffer piston rod.           |
| 2. Recoil cylinder.               | 13. Guide for counterrecoil buffer piston rod. |
| 3. Counterrecoil buffer cylinder. | 14. Counterrecoil buffer piston.               |
| 4. Floating piston cylinder.      | 15. Counterrecoil buffer spring.               |
| 5. Brecc ring.                    | 16. Gas filling plug.                          |
| 6. Recoil piston rod.             | 17. Cylinder head.                             |
| 7. Recoil piston.                 | 18. Bypass connection.                         |
| 8. Oil passageway.                | 19. Oil filling valve and plug.                |
| 9. Counterrecoil valve.           | 20. Recoil valve spring.                       |
| 10. Counterrecoil valve.          |  |
| 11. Floating piston.              |  |

FIGURE 10.—Recoil system, 3-inch anti-aircraft mount, M2A1, (top elevation).

battery when the jack has been released, depress slowly and note the angle at which the gun does return to battery. If this angle is below 900 mils, the gas supply must be replenished.

■ 56. TO CHARGE RECUPERATOR AND EQUILIBRATORS WITH GAS.—Although this operation should be performed by ordnance personnel, it may be found necessary for the using service personnel to do so. The procedure is as follows: Remove the closing plug (16) (fig. 10) over the gas filling valve in the gas bypass at the front of the recuperator (or the plug over the valve at the lower end of the equilibrators) and attach the gas filling device with gage attached. Remove the cap (fig. 11) below the gage and attach the filling tube which is also connected to a gas bottle. Close the release valve and turn the handle of the plunger until the lifting of the closing valve from its seat can be felt. Then open the gas bottle valve a small amount, allowing the gas to flow into the recuperator (or equilibrators) very slowly. When charging the recuperator, close

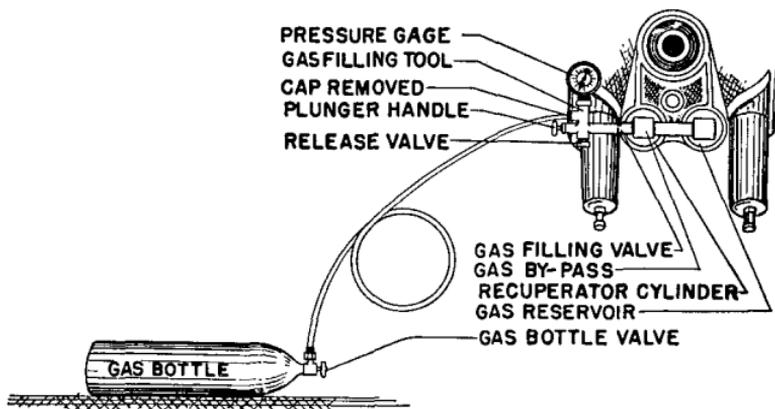


FIGURE 11.—Method of replenishing gas in recuperator cylinder.

the gas bottle valve when the pressure on the gage registers approximately 1,100 pounds per square inch. (When charging the equilibrators, close the gas bottle valve when the pressure on the gage registers approximately 600 pounds per square inch.) After the desired pressure has been reached, turn the plunger handle and allow the valve to seat. Dis-

connect the tube from the gas filling device and replace the cap. Again turn the plunger handle to open the valve and observe the pressure on the gage. If the pressure is above 1,040 pounds per square inch in the recuperator (or above 540 pounds per square inch in the equilibrators), open the release valve and allow a slow escape of the gas until the proper pressure is indicated. Then seat the valve by turning the plunger handle. Remove the filling device and replace the closing plug. (Further adjustment of the gas pressure in the equilibrators may be required until the gun can be elevated and depressed easily and with equal effort on the handwheels.)

■ 57. To ADJUST EQUILIBRATORS FOR TEMPERATURE.—To compensate for changes in temperature, the equilibrators may be adjusted by turning the squared shaft at the top of the mechanism which connects the middle of each equilibrator to the top carriage. This shaft should be turned until the pointer on the temperature scale indicates the proper temperature, or until the gun may be elevated or depressed easily at all angles.

#### SECTION IV

### INSTALLATION OF CHAIN CONNECTING FLOATS OF JACKS

■ 58. GENERAL.—*a.* The purpose of the chain connecting the floats of the two jacks is to keep the inner and outer screws of each jack in their proper relation when operating. If this chain becomes broken, a new chain must be installed. Before this is done, however, the proper relation between the inner and outer screws of each jack must be obtained. Operate the ratchet wrench to extend the outer screw several inches through the base of the pedestal. The threaded portion of the inner screw will be adjusted to extend below the lower face of the outer screw a distance equal to that which the threaded portion of the outer screw extends beyond the lower horizontal plate of the pedestal. The two floats thus set now can be connected with the chain.

*b.* In installing a new chain, sufficient slack will be provided so that the float of one jack can be raised about 10 inches higher than the float of the other, and so that, with

both floats at the same level, the float of one jack cannot be revolved more than one-quarter of a turn without bringing the chain taut.

## SECTION V

## LUBRICATION

■ 59. GENERAL.—*a.* The life of the gun and mount depends to a great extent on proper lubrication. Particular attention will be given to sliding and bearing surfaces, such as the sliding surfaces of the gun and cradle, roller bearings, ball bearings, elevating rack, traversing rack, and breech mechanism.

*b.* Industrial type grease fittings and oil plugs are provided on the gun and mount. The fittings are painted red and the oil holes are marked by a red ring.

*c.* No lubricants other than those prescribed will be used.

■ 60. LUBRICATING CHART.—The following chart gives the type and location of lubricator and lubricant and the frequency and method of application for the various lubricating points on the gun and mount.

*Lubricating chart*

Group	Part lubricated	Method of oiling	Lubricant*	Frequency
Breech mechanism.	All moving parts. Surfaces.	Fitting and oiler. Brush.	Grease. Oil, lubricating.	Daily when in use and after firing.
Cradle.	Cradle liner and gun guide—5 places.	Fitting.	Grease.	End of each day's firing.
Top carriage.	Ball thrust bearing.	Oil pipe in top carriage—2 places.	Grease.	Weekly.
	Spherical roller bearing, lower end of top carriage.	Fitting, lower end.	Grease.	Weekly.

\*In the chart, "Grease" refers to grease, lubricating, mineral, medium grade; "Oil, lubricating" refers to oil, lubricating, Class D, SAE 50 or SAE 20.

*Lubricating chart—Continued*

Group	Part lubricated	Method of oiling	Lubricant*	Frequency
Equilibrator.	Bearings on plunger head—2 places.	Fitting.	Grease.	Weekly.
	Trunnion ball bearings—4 places.	Remove covers and pack with grease.	Grease.	Weekly.
	Temporary adjustment worm shaft.	Drop oil on shaft and allow to run into bearing.	Oil, lubricating.	Weekly.
	Plunger.	Clean and grease.	Grease.	Weekly.
Traversing mechanism.	Worm, worm gear, ball bearing—1 place.	Remove pipe plug on top of case and pour in oil until it runs out at height plug on side.	Oil, lubricating.	Monthly.
	Instrument drive shaft and pinion.	Fitting.	Grease.	Weekly.
Elevating mechanism.	Worm, worm wheel, and ball bearing.	Remove plug and fill with oil until it flows out of overflow hole in side of case.	Oil, lubricating.	Monthly.
	Rack.	Clean and apply grease with brush.	Grease.	Weekly.
	Bearing (near handwheel).	Fitting.	Grease.	Weekly.
Elevating indicator.	Bearings for shaft to indicator—2 places.	Oiler.	Oil, lubricating.	Weekly.

\*In the chart, "Grease" refers to grease, lubricating, mineral, medium grade; "Oil, lubricating" refers to oil, lubricating, Class D, SAE 50 or SAE 20.

*Lubricating chart—Continued*

Group	Part lubricated	Method of oiling	Lubricant*	Frequency
Trunnion assembly.	Trunnion bearings.	Remove covers and pack with grease.	Grease.	Weekly.
Bogie, front (towing).	Pins, tie rod—4 places.	Fitting.	Grease.	Weekly or every 250 miles.
	End, drawbar.	Fitting.	Grease.	Weekly.
	Springs and shackles—6 places.	Fitting.	Grease.	Weekly or every 250 miles.
	Joint, steering rod, inner—2 places.	Fitting.	Grease.	Weekly.
	Joint, steering rod, outer—2 places.	Fitting.	Grease.	Weekly.
	Knuckle, steering—4 places.	Fitting.	Grease.	Weekly.
	Screws, clamping—4 places.	Clean and coat with grease.	Grease.	Weekly.
Wheels — bearings.	Hand pack.	Wheel-bearing grease.	Every 5,000 miles or every 6 months.	
Bogie, rear.	Springs and shackles—6 places.	Fitting.	Grease.	Weekly or every 250 miles.
	Screws, clamping—4 places.	Clean and grease with brush.	Grease.	Weekly.
	Wheels — bearings.	Hand pack. Pipe plugs.	Grease. Oil, lubricating.	Every 5,000 miles or every 6 months.
	Bearing, brake shaft, outer, left wheel—2 places.	Fitting.	Grease.	Weekly or every 250 miles.

\*In the chart, "Grease" refers to grease, lubricating, mineral, medium grade; "Oil lubricating" refers to oil, lubricating, Class D, SAE 50 or SAE 20.

*Lubricating chart—Continued*

Group	Part lubricated	Method of oiling	Lubricant*	Frequency
Bogie, rear— Continued.	Pintle—1 place.	Oiler.	Oil, lubricating.	Weekly or every 250 miles.
	Bearing, brake shaft, inner—2 places.	Fitting.	Grease.	Weekly.
Leveling mechanism.	Leveling screw thrust bearings—2 places.	Fitting.	Grease.	Weekly.
	Screws, leveling—2 places.	Apply grease with brush.	Grease.	Weekly.
	Leveling bearing, lower.	Fitting; fill until grease oozes out.	Grease.	Weekly.
	Sliding surface of guide, base plate, and housing.	Apply grease with brush.	Grease.	Weekly.
Jacks.	Screw—1 place. Pinion—2 places.	Fitting.	Grease.	Weekly.
		Fitting.	Grease.	Weekly.
Outriggers.	Screws, clamping—3 places each outrigger.	Clean and apply with brush.	Grease.	Weekly.
Traveling lock.	Stud—2 places.	Oiler.	Oil, lubricating.	Weekly.
Platform.	Latch and latch bolt.	Oiler.	Oil, lubricating.	Weekly.
	Sliding lock.	Brush.	Grease.	Weekly.

\*In the chart, "Grease" refers to grease, lubricating, mineral, medium grade; "Oil, lubricating" refers to oil, lubricating, Class D, SAE 50 or SAE 20.

*Lubricating chart—Continued*

Group	Part lubricated	Method of oiling	Lubricant*	Frequency
Fuze setter.	Hinge between body and case.	Oiler.	Light machine oil.	Weekly.
	Handle, setting.	Drop oil through two small holes provided.	Oil, lubricating.	Weekly.
	Rings, adjusting and setting.	Clean and grease the surfaces, except the pawls and their guides, which are lubricated with light machine oil.	Grease and light machine oil.	Daily when in use.

\*In the chart, "Grease" refers to grease, lubricating, mineral, medium grade; "Oil, lubricating" refers to oil, lubricating, Class D, SAE 50 or SAE 20.

## CHAPTER 9

### 3-INCH ANTI-AIRCRAFT GUNS ON FIXED MOUNTS

	Paragraphs
SECTION I. 3-inch anti-aircraft gun, M1917, on pedestal mount, M1917.....	61-66
II. 3-inch anti-aircraft gun, M4, on pedestal mount.....	67-69

#### SECTION I

#### 3-INCH ANTI-AIRCRAFT GUN, M1917, ON PEDESTAL MOUNT, M1917

■ 61. To DISASSEMBLE BREECH MECHANISM.—*a.* The trigger shaft detent pin is removed, followed by the trigger shaft. The *clutch* is screwed in, and the breechblock opened by the operating handle. The plunger plugs are then removed, followed by the extractor plungers and their springs. The lock plate key is taken out. A small clip similar to a pair of tweezers, held together by a bolt and nut, is placed over the spring piston rod just forward of its connection with the chain. The nut is screwed up so that it will clamp the clip tightly to the rod. The extractors are then tripped with an empty cartridge case put in rim first, and the breechblock is allowed to close slowly, the speed being regulated by the man operating the handle. As soon as the clip comes against the face of the cradle, the pull of the closing spring ceases and the block is closed by the operating handle. Consequently, the chain terminal is freed from its lug on the operating lever. The chain is then twisted upward and forward out of the way. The locking plate is next removed by pulling to the rear.

*b.* An eyebolt is screwed in the top of the breechblock and a rope attached thereto. The lock screw for retaining ring (fig. 12) is removed, and the retaining ring turned clockwise (forward) until the operating handle is free to be pulled off the operating lever. After the handle is removed, the breech-

block is raised. Meanwhile, another man takes a firm hold on both ends of the operating lever, and as the breechblock rises, pushes the operating lever as far to the rear as the breechblock will allow, thereby disengaging the T-shaped cam from its groove in the breechblock. The breechblock is pulled up as far as it will go and the operating lever removed from its seat. With two men below to catch it as it drops clear, the breechblock is lowered completely out of the breech recess.

c. To remove the operating cam, the cam cover latch plunger is pulled up and the operating cam cover is turned counterclockwise (forward and downward) until the cover latch plunger rests in a notch provided for it. The plunger will then be pointed forward and downward. With the plunger pulled out, the cam cover may be taken off by pulling straight away from its seat. By pushing on the end of the operating cam, now exposed, it may be pushed from its seat, the torsion spring with it. It will be necessary to twist the cam with the fingers into a position somewhat similar to that for hand operation before it can be pushed all the way out, due to the small amount of clearance between the gun and the cam slides.

■ 62. TO ASSEMBLE BREECH MECHANISM.—*a.* It is assumed that the clip is on the spring piston rod and an eyebolt on the breechblock as described above. The extractors are first covered with light oil and placed in position, with their outer lugs resting in the grooves cut for them in the jacket. The lugs being as far forward as possible, the oil causes the extractors to cling to the sides of the recess and prevents their falling out. The breechblock should be then placed directly under its proper position and lifted until the inner extractor lugs have entered their grooves in the breechblock. The breechblock should be pulled up until the inner extractor lugs are seated on their seats in the breechblock; the extractors are tripped by hand and the breechblock is pulled up to its highest position; the operating lever is then placed in its seat. The block is slowly dropped and, without removing the operating lever from its seat, the T-shaped cam on the lever is inserted in the slot on the breechblock, after which the breechblock is allowed to drop to its lowest position. To insert the operating cam, the torsion spring is

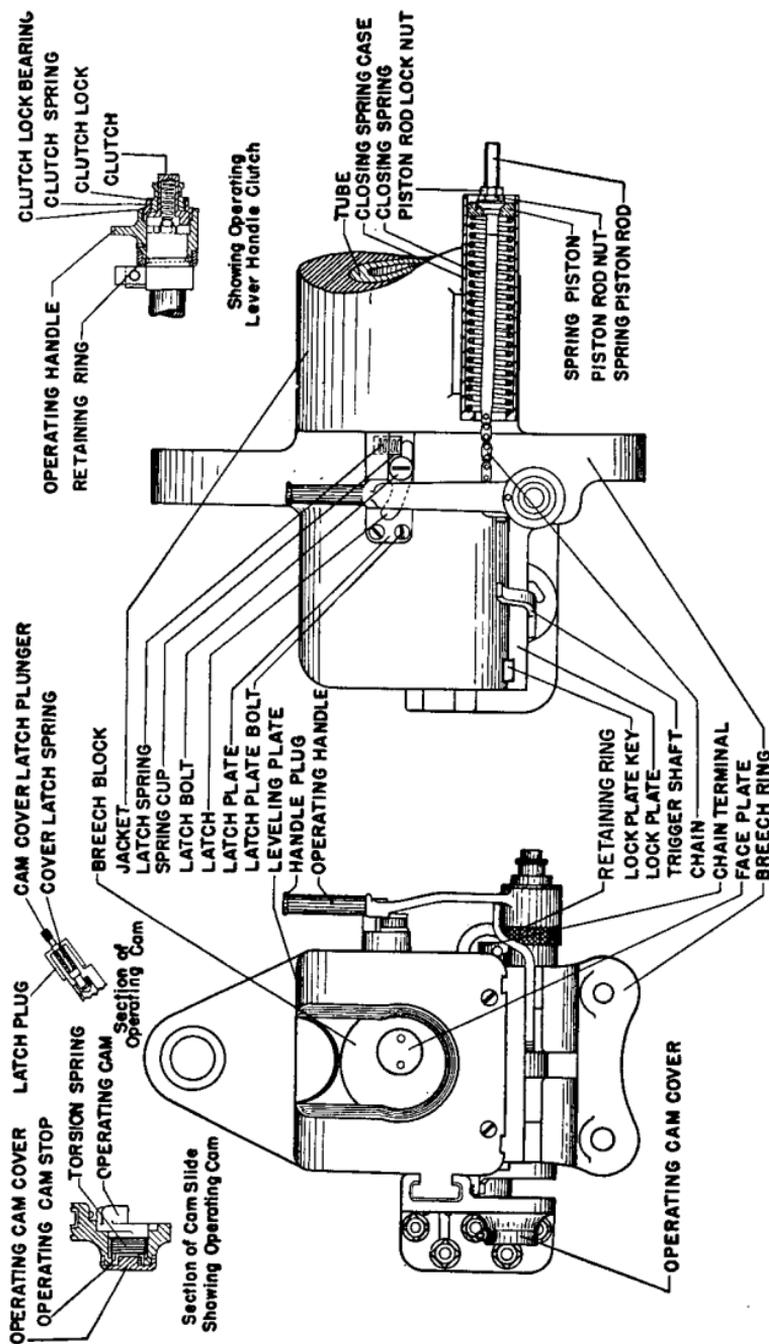


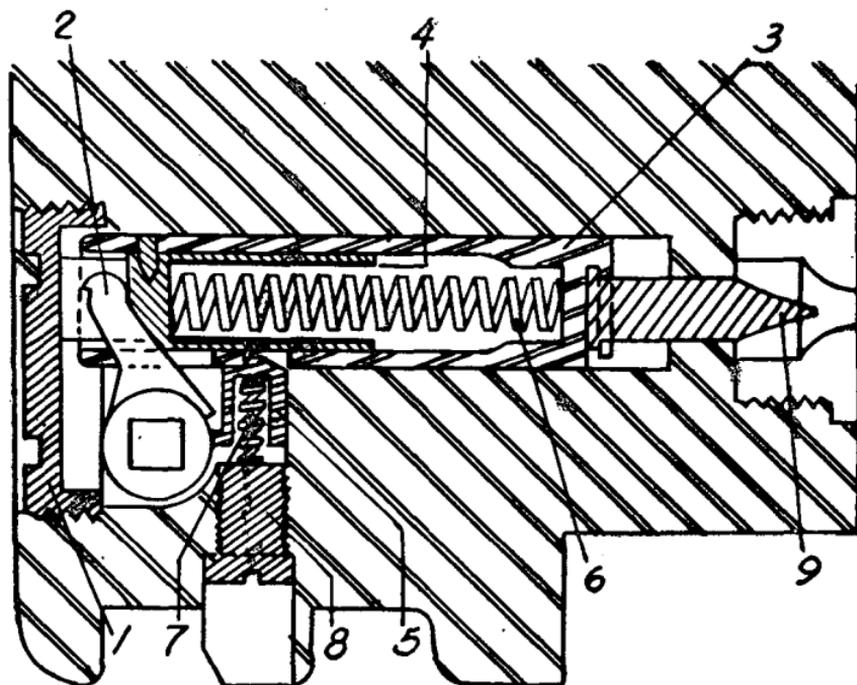
FIGURE 12.—Breech mechanism assembly, 3-inch anti-aircraft gun, M1917.

placed over the cam and sufficient twist is placed on it so that the eye in the end of the spring will enter the groove of the operating cam seat provided for it. The breechblock should be closed and the lock plate removed for this operation. The operating cam can then be inserted. Care must be taken that this cam is all the way in its seat. The operating cam cover is placed on in the same position as described for removing it. It is twisted clockwise to the position desired for automatic or hand operation. The operating cam is then ready for use. *Under no circumstances should the operating cam cover be left in the position for assembling or dismounting.* The lock plate is pushed into place and the lock plate key inserted. The operating handle should be put on the end of the operating lever and the retaining ring screwed up against the operating handle. The lock screw for retaining ring should be put in and the clutch screwed in. The chain should then be brought down into position and the breechblock slowly opened, so that the chain terminal will catch on the lug on the operating lever. The breechblock should then be pulled completely open, care being taken that the extractors seat. If they do not seat they should be pulled to the rear at the top by hand until they do. The tension of the closing spring is now off the clip and the clip can be removed; also the eyebolt can be removed from the breechblock. The extractor plungers and springs and the plunger plugs are then put in place. *It is advisable not to stand directly in rear of these plugs when putting them in or taking them out, as the plunger springs are likely to throw them to the rear with considerable force.*

b. The clutch should then be screwed out and the operating handle placed in a vertical position. The trigger shaft is inserted and held in position by the trigger shaft detent. The breech mechanism is then ready for use.

■ 63. TO DISASSEMBLE FIRING MECHANISM.—With the trigger shaft removed, unscrew the faceplate (1) (fig. 13) on the breechblock and draw out the firing pin holder assembly. If the ramp on the front of the sear (5) does not release the holder so that it may be pulled out with the fingers, insert a small screw driver between the trigger arm (2) and the firing

spring shoe (4) and draw to the rear. Remove the sear (5) and sear spring (7), drawing them into the firing pin hole. Separate the parts of the firing pin holder assembly by inserting the flat end of the trigger shaft in the slot of the firing spring shoe and pushing it down, turning the shoe to the left, or counterclockwise, to disengage the lug on the shoe from the slot in the firing pin holder (3); then allow the firing spring to push the shoe out.



- |                        |                      |
|------------------------|----------------------|
| 1. Faceplate.          | 6. Firing spring.    |
| 2. Trigger arm.        | 7. Sear spring.      |
| 3. Firing pin holder.  | 8. Sear spring seat. |
| 4. Firing spring shoe. | 9. Firing pin point. |
| 5. Sear.               |                      |

FIGURE 13.—Continuous pull firing mechanism (horizontal cross section), old type, used on 3-inch antiaircraft gun, M1917.

■ 64. TO ASSEMBLE FIRING PIN ASSEMBLY.—*a.* Assemble the firing spring (6) (fig. 13) into the firing pin holder (3) followed by the firing spring shoe (4). Compress the spring by

using the flat end of the trigger shaft, placing it in the slot in the firing spring shoe to force the shoe into the holder, and by guiding the projection on the shoe so that it enters the slot in the holder. Turn the shoe to the right or clockwise so that the shoe is locked in the holder. Insert the trigger arm (2) through the opening in the side of the shoe so that the rounded knob portion will bear against the shoe. Slide the firing pin (9) into its seat in the front end of the holder.

b. Insert the sear (5), containing the sear spring, into its seat in the block with the ramp or bevel of its inner end toward the muzzle. In doing this, the sear may be suspended on the end of a small screw driver forced between coils of the spring. With the small screw driver force the sear outward and insert the firing pin assembly (without the trigger arm) until the front end of the holder holds the sear in place; then take out the screw driver and push the firing pin assembly home, replacing and guiding the trigger arm into its seat in the block. Retain the parts in position by screwing in the faceplate. Put the trigger shaft in and prove the correctness of the assembly by pulling the lanyard several times and observing its functioning.

■ 65. TO DRAIN AND REFILL RECOIL CYLINDERS.—To drain the recoil cylinders, remove the filling and drain plugs and let the oil drain out. With the gun in a horizontal position and the drain plugs replaced tightly, fill the recoil cylinders with heavy recoil oil through the filling hole. Leave a void of not in excess of one-fourth of a pint of oil in the cylinder to allow for expansion of the oil as it becomes heated during firing. The recoil cylinders should be emptied and refilled at least once every 3 months, and should be thoroughly cleaned by ordnance personnel as often as conditions warrant. Once every 6 months is suggested as a minimum.

■ 66. LUBRICATION.—A regular schedule of lubrication should be maintained. All sliding contact surfaces should be kept clean and well lubricated, and proper precautions taken to prevent rust. Oil holes and grease fittings are provided for lubricating the various mechanisms.

## SECTION II

3-INCH ANTI-AIRCRAFT GUN, M4, ON PEDESTAL  
MOUNT

- 67. TO ASSEMBLE AND DISASSEMBLE BREECH MECHANISM.—The breech mechanism of this gun is very similar to that of the M3 gun on mobile mount, and the instructions relative to assembly and disassembly of the breech mechanism of the M3 gun may, in general, be followed by personnel manning the M4 gun. (See pars. 40 to 50, incl.)
- 68. TO DRAIN AND REFILL RECOIL CYLINDERS.—For instructions in filling and draining the recoil cylinders, see paragraph 65.
- 69. LUBRICATION.—A regular schedule of lubrication should be maintained. All sliding contact surfaces should be kept clean and well lubricated, and proper precautions taken to prevent rust. Oil holes and grease fittings are provided for lubricating the various mechanisms. (See pars. 27 to 32, incl.)

## CHAPTER 10

### M8 FUZE SETTER

	Paragraphs
SECTION I. General .....	70-72
II. Adjustments.....	73-75
III. Care and preservation.....	76

#### SECTION I

#### GENERAL

■ 70. DESCRIPTION.—*a.* The fuze setter consists principally of the fuze indicator, the adjusting mechanism, and the setting mechanism. The indicator and adjusting mechanisms are enclosed within the case (fig. 15) while the setting mechanism is housed within the body.

*b.* The *fuze indicator* is the electrical unit which positions the inner or electrical index on the scale of the fuze setter to the fuze setting indicated by the director.

*c.* The *adjusting mechanism* is that mechanism which causes the fuze to be set for the particular fuze setting desired. A handwheel (fig. 14) is geared both to the mechanical index on the scale and to an adjusting ring (fig. 15) whose function is to engage and hold fast the lug or slot on the setting element of the fuze on the projectile. By turning the handwheel the mechanical index is made to indicate a particular fuze setting, and the adjusting ring is revolved to such a position that its pawls will stop the setting element on the fuze at the same fuze setting that is indicated by the mechanical index.

*d.* The *setting mechanism*, driven by the setting crank (fig. 14), contains a setting ring (fig. 15) which engages the lug or slot on the body of the fuze and turns the projectile until the fuze body is properly positioned with respect to the setting element of the fuze.

■ 71. OPERATION DURING SETTING OF FUZE.—Briefly, the sequence of events in the setting of a fuze is as follows:

*a.* One turn of the setting crank causes the setting ring to make two revolutions. During the first revolution pawls on the setting ring arrive at and engage the slot in (or lug on) the body of the fuze and begin to rotate the round.

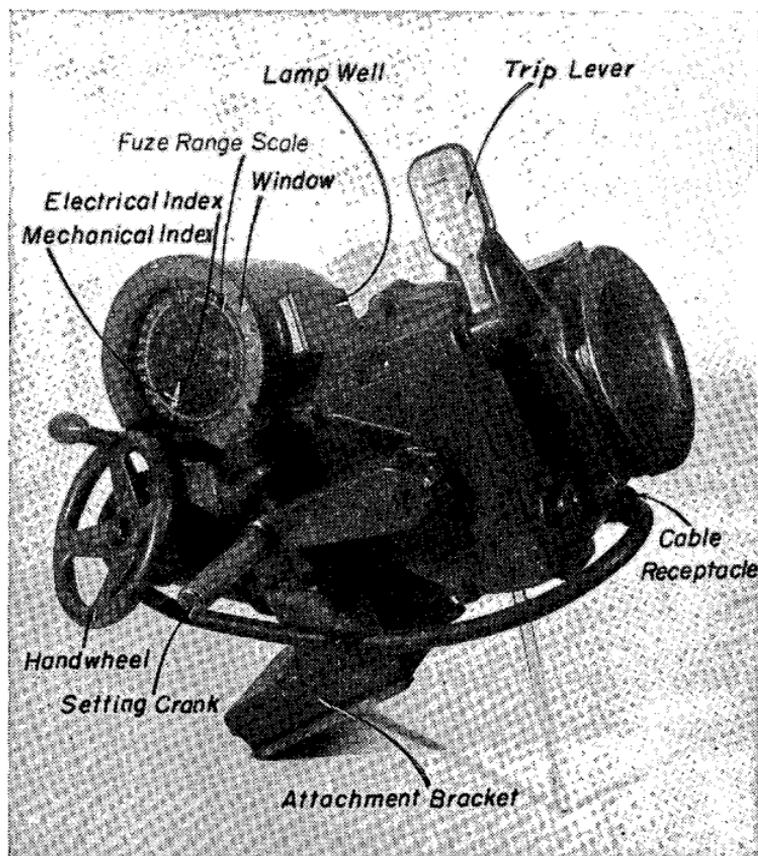


FIGURE 14.—M8 fuze setter.

*b.* The adjusting ring, meanwhile, has been positioned according to the fuze setting indicated by the director. During the second revolution of the setting ring the lug or slot in the setting element of the fuze will arrive at and be stopped by the pawls on the adjusting ring.

c. The setting ring continues to turn the projectile until the second revolution is completed, when a stop pawl terminates the movement. In this position the body of the fuze has been stopped at what might be called a *zero position*, while the setting element of the fuze has been stopped at a point the proper number of graduations away from the zero position, and the fuze is said to be "set".

■ 72. ADJUSTING AND SETTING RINGS.—The case and the body are hinged, and by loosening the wing nut holding the two

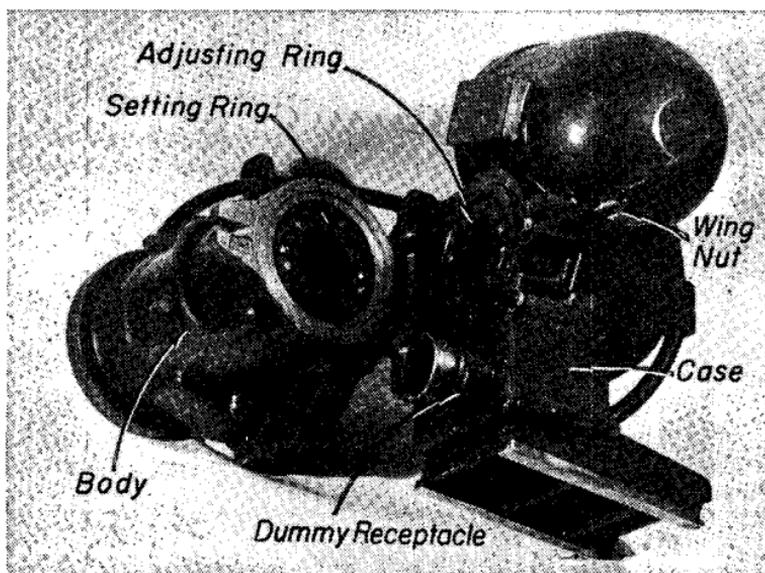


FIGURE 15.—M8 fuze setter opened for inspection.

together, it is possible to swing the body away from the case, giving access to the adjusting and setting rings. Three sets of rings are provided, one for the 21-second powder train fuze, one for the 30-second mechanical fuze, and one for use with dummy cartridges. The rings are easily changed, and cannot be assembled improperly because the screw holes in the rings are spaced differently. For the two different time fuzes different range scales for the face of the fuze indicator are provided.

## SECTION II

## ADJUSTMENTS

■ 73. To CHANGE RINGS IN FUZE SETTER.—*a.* Open the fuze setter as shown in figure 15, remove the screws and the lock washers in each ring already assembled in the fuze setter, and remove this set of rings. If the rings stick in place in the fuze setter after the fastening screws have been removed, insert the screws into the tapped holes in the rings and pull the rings loose. Select from the accessory chest the proper set of rings to be used; then assemble the adjusting ring to the adapter in the case or lower portion of the fuze setter, and the setting ring to the socket in the body or upper portion.

*b.* In case the fuze range scale on the fuze indicator does not correspond to the fuze to be used, the scale must be replaced with the proper one from the accessory chest. Carefully remove the window frame from the indicator face, so as not to injure the gasket. Next remove the six screws and the ring which clamp the scale in place. The scale should be removed and placed in the lid of the accessory chest. Place the new scale in place, replace the clamping ring, and insert the six retaining screws, leaving the ring just loose enough to allow the scale to be moved. Place a round in the fuze setter, set the fuze, and read the setting on the fuze as closely as possible. Insert a blunt point in the hole in the scale over the zero and slide the scale around under the ring until the value set on the fuze is opposite the indicating marks on the outer or mechanical index. Recheck at another fuze setting, then tighten the clamping ring screws evenly and firmly. Replace the window and its fastening screws.

■ 74. To SYNCHRONIZE MECHANICAL INDEX WITH FUZE RANGE SCALE ON FACE OF INDICATOR.—If the outer or mechanical index does not indicate on the fuze range scale the fuze setting to which the fuze setter actually sets the fuze, it will be necessary to adjust the fuze range scale as explained in paragraph 73. In this connection, before any changes are made, any calibration corrections which are to be or have

been made in fuze range must be taken into consideration. See FM 4-110 for application of calibration corrections.

■ 75. TO SYNCHRONIZE ELECTRICAL INDEX WITH DIRECTOR.—For synchronization of the electrical index with the fuze dial on the director see FM 4-110.

### SECTION III

#### CARE AND PRESERVATION

■ 76. GENERAL.—The following instructions should be carefully observed in the care and preservation of the fuze setter:

a. The adjusting and setting rings should be removed frequently from the fuze setter, cleaned thoroughly, lubricated, and then replaced. These rings should be handled carefully to prevent the bending of the thin metal sides adjacent to the pawls, because any interference with the action of these pawls may cause erroneous fuze settings. In lubricating the rings, the surfaces except the pawls and their guides should be greased with light grease to prevent rust. The pawls and their guides should be oiled with light machine oil.

b. The screws which fasten the adjusting and setting rings in place should be kept tight, with the lock washers under the screw heads to prevent the screws from loosening.

c. Rings which are not being used should be kept in the accessory chest.

d. Great care should be exercised in handling the scales and rings, especially when adjusting or changing them, as they are easily deformed or damaged. The alternate fuze range scale should be wrapped in tissue paper and kept in the recess in the block fastened in the lid of the accessory chest.

e. No provision has been made for lubricating in the field any of the internal moving parts, as the entire device should be torn down and serviced at regular intervals by ordnance maintenance personnel.

f. Care should be exercised, when handling the fuze setter, not to bump any part of the device. The wing nut on the eyebolt should be tight at all times, especially when the fuze setter is to be picked up. Always grasp the large main

castings when handling. The fuze setter should not be laid down; it should be placed in its support on the gun mount or in the traveling bracket.

*g.* The fuze setter should be kept covered with the canvas cover when it is not in use.

*h.* Whenever the cable receptacle (fig. 14) is not connected to the gun junction box, it should be stowed on the dummy receptacle with the cable wrapped around in front of the fuze indicator.

## CHAPTER 11

### DRILL TABLES

- TABLE** I. Drill for guns equipped with automatic data transmission system and M8 fuze setter.
- II. Emplacing M3 gun on M2A1 or M2A2 mobile mount.
- III. Placing M3 gun on M2A1 or M2A2 mobile mount in traveling position.

TABLE I

## Drill for guns equipped with automatic data transmission system and M8 fuze setter

Details	DETAILS, POSTS	(a) EXAMINE GUN (b) REPORT	TARGET	COMMENCE FIRING	(a) SUSPEND FIRING (b) CEASE FIRING
Gunner	The gunner procures a wiper of cotton waste and a can of oil; he places the wiper and oil in convenient place, removes the breech cover, assisted by No. 5, disposes of it at the designated place, and takes post to the right rear of the piece opposite and facing the breech.	(a) Assisted by No. 5, he examines, cleans, and oils the breechblock and breech mechanism, tests the firing mechanism, examines the chamber and bore and, if necessary, calls upon Nos. 1, 2, 3, and 5 for assistance in sponging and cleaning the chamber and bore. (b) He reports to the gun commander, "Breech in order," or reports any defects he is unable to remedy without delay.	He opens the breech by bearing down on the operating handle until the breechblock is locked open and immediately raises the operating handle to its vertical position. He assumes a position facing the breech convenient for loading yet clear of the recoil with his feet well braced and the lanyard grasped in his right hand.	As soon as the first round is placed in loading position by No. 5 he rams the cartridge as described in par. 16. As soon as the closing breech has knocked his left hand clear he fires the piece by pulling the lanyard with his right hand. He continues ramming and firing without shifting position or releasing the lanyard. In case of misfire he calls, "Misfire," to the gun commander and keeps all cannoneers clear of the breech while the prescribed safety precautions are taken.	(a) If an unfired round is in the gun, he unloads it by bearing down on the operating handle as soon as No. 5 is ready to receive the cartridge, and remains at his post. (b) Same as "Suspend firing."
Fuzerangsetter (fuze setter).	He takes post seated on the fuze setter's seat, facing the fuze setter.	(a) Assisted by No. 6, he examines, cleans, and oils (where necessary) the fuze setter, fuze range receiver, and connections thereto. Assisted by No. 4, he tests the operation by setting and checking a fuze at several values. (b) He reports to the gun commander, "Fuze setter in order," or reports such defects as he is unable to remedy without delay.	He turns the fuze range handwheel so as to match the mechanical pointer with the electrical pointer of the fuze range receiver and thereafter keeps them matched.	He continues to keep his pointers matched.	(a) He continues to keep his pointers matched. (b) He turns his mechanical pointer to "safe" and directs No. 4 to remove the round from the setter. He supervises the setting at "safe" of any other rounds necessary, checking each fuze as it is removed from his setter. Thereafter he remains at his post.
Azimuth setter	He takes post seated on the left side of the gun, facing the azimuth receiver.	(a) He examines the traversing mechanism and azimuth receiver and connections. (b) He reports to the gun commander, "Traversing in order," or reports any defects he is unable to remedy without delay.	He traverses the gun so as to match the mechanical pointers with the electrical pointers of the receiver and thereafter keeps those pointers matched.	He continues to keep his pointers matched.	(a) He continues to keep his pointers matched. (b) He stops matching his pointers but remains at his post.
Elevation setter	He takes post seated on the right side of the gun, facing the elevation receiver.	(a) He examines the elevating mechanism and elevation receiver and the connections thereto. Should a difficulty in elevating indicate the need of a temperature adjustment to the equilibrator, he reports that fact to the gun commander at once. (b) He reports to the gun commander, "Elevating in order," or reports any defects he is unable to remedy without delay.	He elevates or depresses the gun so as to match the mechanical pointers with the electrical pointers of the elevation receiver and thereafter keeps those pointers matched.	He continues to keep his pointers matched.	(a) He continues to keep his pointers matched. (b) He stops matching his pointers but remains at his post.
Ammunition handlers, Nos. 1, 2, 3, and 4.	No. 4 removes, then folds up the gun cover, assisted by No. 2, deposits it at the designated place, and takes post immediately in rear of the fuze setter, facing it, standing on the gunner's platform. No. 1, assisted by No. 3, uncovers the ammunition and takes post on the ground about 3 feet behind No. 4. No. 3 takes post at the stack of ammunition. No. 2 assists No. 4 in removing and folding up the gun cover and takes post to the rear of the gunner, standing on the ground and facing the breech, just clear of the gunner's platform.	(a) No. 4 inserts a round in the fuze setter, when called for by No. 6, for the purpose of testing the fuze setter, and examines the ammunition, assisted by Nos. 1 and 3. Nos. 1 and 3 assist No. 4 in inspecting and arranging the ammunition near the gun. If necessary, they assist the gunner in cleaning and sponging the bore. No. 2 assists the gunner, if necessary, in cleaning and sponging the bore, and examines the emplacement, removing and disposing of any obstructions and covering soft spots on the ground that might interfere with the smooth functioning of Nos. 1, 3, and 4. (b) No. 4 reports to the gun commander, "Ammunition in order," or reports any defects he is unable to remedy without delay.	No. 4 takes a round from No. 1 and inserts it in the fuze setter, presses down on the base end of the case with his right hand, brings his left hand over and strikes a quick slap against the release lever on top side of fuze setter. After No. 6 has completed one turn of the setting crank No. 4 removes his right hand pressure from the base of the projectile, turns to receive another round from No. 1, and stands ready to load the fuze setter again. No. 1 takes a round from No. 3 and passes it to No. 4. He repeats the operation. No. 3 takes a round from the stack and passes it to No. 1. He repeats the operation. No. 2 has no duties. (For details see par. 17. For target practice see note 1 below.)	No. 4 continues loading the fuze setter as fast as rounds are removed therefrom by No. 5, receiving the rounds from No. 1. Nos. 1 and 3 continue serving ammunition to No. 4. No. 2 clears the empty cases from the emplacement.	(a) If no round is in the fuze setter, No. 4 inserts one and stands ready to continue loading the fuze setter. Nos. 1 and 3 stand ready to serve ammunition to No. 4. No. 2, if an unfired round remains in the gun, receives it from No. 5, lays it aside, and continues clearing the empty cases from the emplacement. (b) Nos. 1, 3, and 4 procure and assist in setting at "safe" such rounds as have been set and remain unfired, return them to the stack, and remain at their posts. No. 2 continues clearing the empty cases from the emplacement. When the emplacement is cleared he remains at his post.
Relayer, No. 5	No. 5 procures the chamber and bore sponges and a wiper of cotton waste, disposes of the sponges in the designated place, assists the gunner in removing the breech cover, and takes post about 2 feet to the left and rear of the breech, facing the breech.	(a) He assists the gunner in examining, cleaning, and oiling the breech mechanism, firing mechanism, chamber, and bore of the gun. He is responsible that the breech operating cam plunger is set for automatic or hand operation of the breech as directed by the gun commander. (b) No duties.	He has no duties	He removes a round from the fuze setter and holds it in the loading position at the breech. As soon as the round is loaded (by the gunner) he repeats the operation. (For details see par. 17.)	(a) If an unfired round is in the gun, he places his right palm behind the breechblock at the signal of the gunner, catches the ejected round and passes it to No. 2, and remains at his post. (b) Same as "Suspend firing."
Fuze setter operator, No. 6.	No. 6 removes the muzzle cover and deposits it at the designated place. He takes post standing at the right rear of the fuze range setter, facing the fuze setter.	(a) He assists the fuze range setter in examining, cleaning, and oiling the fuze setting mechanism. (b) No duties.	He places his hand on the setting crank and as soon as a round has been inserted in the fuze setter he rotates the setting crank once until it brings up against the stop, turning the handle in a counterclockwise direction. (For target practice see note 1 below.)	He continues setting fuzes as quickly as projectiles are inserted in the fuze setter.	(a) He sets the fuze if an unset round is in the fuze setter or if a round is placed in the fuze setter after receipt of the command. (b) He remains at his post prepared to set such fuzes back to "safe" as may be necessary.
Ammunition squad, Nos. 7 to 13, inclusive. (See note 2.)	Nos. 7 to 13, inclusive, are posted by the chief of ammunition in such manner as to expedite the supply of ammunition and perform such other duties as may be directed.	(a) Nos. 7 to 13, inclusive, under the direction of the chief of ammunition, remove from the boxes or crates and prepare the necessary ammunition for the contemplated practice or action. If practice or action is imminent, they place an ammunition supply in a stack at the gun emplacement. (b) No duties.	Nos. 7 to 13, inclusive, stand ready to replenish the ammunition supply at the gun position.	They continue the supply of ammunition to the gun position.	(a) After collecting all empty cases and replenishing the ammunition supply at the gun, they remain at their posts unless otherwise directed. (b) Same as "Suspend firing."

## NOTES

- The service of the piece, as written, prescribes that the continuous fuze setter be loaded at the command TARGET. This is logical for all service firings; however, in target practice it is not desirable that the fuze setter be loaded and the fuze set until the target has reached approximately safe firing conditions. Therefore, for target practice, Nos. 4 and 6 should have no duties at the command TARGET, but the battery commander should give a warning command STAND BY as the safe field is approached, at which time No. 4 loads the fuze setter, No. 6 sets the fuze as prescribed herein, and No. 5 awaits the command COMMENCE FIRING before removing the round from the setter.
- See paragraphs 5 b and 6 b.

**TABLE II**  
*Emplacing M3 gun on M2A1 or M2A2 mobile mount*

Details	PREPARE FOR ACTION	JACKS DOWN	JACKS HALT	JACKS UP
Gunner.....	The gunner is in charge of the jack supporting channel, the rear bogie, and the right rear outrigger. Assisted by No. 5, he procures the jack supporting channel, puts it in place, and centers it under the jack floats.	He assists the elevation setter in raising the mount.	He takes post at the drawbar of the rear bogie and removes the bogie, assisted by the fuze range setter, the azimuth setter, elevation setter, and Nos. 3 and 4. Assisted by the fuze range setter and Nos. 3 and 4, he unfolds the rear outriggers. He then takes post at the outer section of the right rear outrigger and, assisted by No. 4, swings it out to its stop and maneuvers it to assist in the removal of the front bogie.	Assisted by No. 4, he maneuvers the right rear outrigger to maintain the mount level while it is being lowered. When the jack operators are clear, he unlocks the right rear section of the platform from the platform rest and lowers and locks it in its firing position. Assisted by No. 4, he fills dirt under the right rear outrigger if necessary.
Fuze range setter (fuze setter).	The fuze range setter is in charge of the left rear outrigger, the fuze setter bracket, and the fuze setter.	He takes post at the drawbar of the rear bogie.	He assists in removing the bogie. He assists in unfolding the rear outriggers. He then takes post at the outer section of the left rear outrigger and, assisted by No. 3, swings it out to its stop and maneuvers it to assist in the removal of the front bogie.	Assisted by No. 3, he maneuvers the left rear outrigger to maintain the mount level while it is being lowered. When the jack operators are clear, he unlocks the left rear section of the platform from the platform rest and lowers and locks it in its firing position. Assisted by No. 6, he removes the fuze setter bracket from its traveling position, installs it in its firing position, unfolds the fuze setter's seat, and installs the fuze setter on its bracket. Assisted by No. 3, he fills dirt under the left rear outrigger if necessary.
Azimuth setter.....	He is in charge of the left lifting jack and the azimuth seat. He runs the left lifting jack down by means of the fast motion handwheel until the float is in contact with the jack supporting channel and sets the jack lever ratchet for "jacks down."	Assisted by No. 5, he runs the left jack down by means of the jack lever, raising the mount.	He unlocks the azimuth seat from its traveling position and swings it out from the mount. He assists in the removal of the rear and front bogies.	He runs the left jack up until the mount is resting on the ground and continues the operation until the jack is fully retracted. He locks the azimuth seat in its firing position and operates one leveling handle as directed by the gun commander.
Elevation setter.....	He is in charge of the right lifting jack and the elevation seat. He runs the right lifting jack down by means of the fast motion handwheel until the float is in contact with the jack supporting channel (which has been put in place by the gunner and No. 5) and sets the jack lever ratchet for "jacks down."	Assisted by the gunner, he runs the right jack down by means of the jack lever, raising the mount.	He unlocks the elevation seat from its traveling position and swings it out from the mount. He assists in the removal of the rear and front bogies.	He runs the right jack up until the mount rests on the ground and continues the operation until the jack is fully retracted. He locks the elevation seat in its firing position and elevates the gun as necessary to free the muzzle from its clamp. He operates one leveling handle as directed by the gun commander.
Ammunition handler, No. 1.	No. 1 unlocks the 2 left-hand clamping screws of the front bogie and the left front outrigger clamping screws.	He takes post at the left wheel of the front bogie.	He assists in removing the bogie. He assists in unfolding the front outriggers. He inserts the wedges in the left front outrigger and assists No. 5 in swinging the outrigger to its stop.	He assists No. 5 in maneuvering the left front outrigger while the mount is being lowered to the ground. He assists No. 5 in filling dirt under the left front outrigger if necessary.
Ammunition handler, No. 2.	No. 2 unlocks the 2 right-hand clamping screws of the front bogie and the right front outrigger clamping screws.	He takes post at the right wheel of the front bogie.	He assists in removing the bogie. He assists in unfolding the front outriggers. He inserts the wedges in the right front outrigger and assists No. 6 in swinging the outrigger to its stop.	He assists No. 6 in maneuvering the right front outrigger while the mount is being lowered to the ground. He unlocks the muzzle clamp and directs the elevating setter to elevate the gun. He unlocks the muzzle rest and lays it out on the ground. He then assists No. 6 in filling dirt under the right front outrigger if necessary.
Ammunition handler, No. 3.	No. 3 unlocks the 2 left-hand clamping screws of the rear bogie and the left rear outrigger clamping screws.	He takes post at the left wheel of the rear bogie.	He assists in removing the bogie. He assists in unfolding the rear outriggers. He inserts the wedges in the left rear outrigger and assists the fuze range setter in swinging the outrigger to its stop and maneuvering it.	He assists the fuze range setter in maneuvering the left rear outrigger while the mount is being lowered to the ground. He then unlocks the platform rest and lays it out on the ground. He assists the fuze range setter in filling dirt under the left rear outrigger if necessary.
Ammunition handler, No. 4.	No. 4 unlocks the 2 right-hand clamping screws of the rear bogie and the right rear outrigger clamping screws.	He takes post at the right wheel of the rear bogie.	He assists in removing the bogie. He assists in unfolding the rear outriggers. He inserts the wedges in the right rear outrigger and assists the gunner in swinging the outrigger to its stop and maneuvering it.	He assists the gunner in maneuvering the right rear outrigger while the mount is being lowered to the ground. He then assists the gunner in filling dirt under the right rear outrigger if necessary.
Relayer, No. 5.....	No. 5 is in charge of the front bogie and the left front outrigger. He assists the gunner with the jack supporting channel.	He assists the azimuth setter in raising the mount.	He takes post at the drawbar of the front bogie and, after the rear bogie is removed, removes the front bogie, assisted by the azimuth setter, elevation setter, and Nos. 1, 2, and 6. Assisted by Nos. 1, 2, and 6, he unfolds the front outriggers. He then takes post at the outer section of the left front outrigger and, assisted by No. 1, swings it out to its stop.	Assisted by No. 1, he maneuvers the left front outrigger to maintain the mount level while it is being lowered. When the jack operators are clear, he unlocks the left front section of the platform from the muzzle rest and lowers and locks it in its firing position. Assisted by No. 1, he fills dirt under the left front outrigger if necessary.
Fuze setter operator, No. 6.	No. 6 is in charge of the right front outrigger.	He takes post at the drawbar of the front bogie.	He assists in removing the bogie. He assists in unfolding the front outriggers. He then takes post at the outer section of the right front outrigger and, assisted by No. 2, swings it out to its stop.	Assisted by No. 2, he maneuvers the right front outrigger to maintain the mount level while it is being lowered. When the jack operators are clear, he unlocks the right front section of the platform from the muzzle rest and lowers and locks it in its firing position. He assists the fuze range setter in installing the fuze setter bracket and the fuze setter. Assisted by No. 2, he fills dirt under the right front outrigger if necessary.
Ammunition squad, Nos. 7 to 13, inclusive. (See note 2.)	Nos. 7 to 13, inclusive, under the supervision of the chief of ammunition, unload and prepare ammunition for service and perform such other duties connected with the preparation of the emplacement as may be directed by the gun commander.			

NOTES.

1. The end of the mount equipped with the muzzle rest is considered the front of the mount.
2. See paragraphs 5b and 6b.

TABLE III

## Placing M3 gun on M2A1 or M2A2 mobile mount in traveling position

Details	MARCH ORDER	JACKS DOWN (1)	JACKS HALT (1)	JACKS DOWN (2)	JACKS HALT (2)	JACKS UP
Gunner.....	Assisted by No. 5 he places the breech cover over the breech. Assisted by the fuze range setter and Nos. 3 and 4, he folds the front sections of the platform and locks them in traveling position.	He assists the elevation setter in maneuvering the right lifting jack.	Assisted by the fuze range setter and 3 and 4, he drives the wedges out of the front outriggers, folds them, and clamps them in traveling position.	He assists the elevation setter in operating the right lifting jack.	He assists the azimuth setter, the fuze range setter, and Nos. 3 and 4 in maneuvering the front bogie.	After the rear bogie is replaced, he replaces the jack supporting channel in traveling position. No. 5 assists in the operation.
Fuze range setter (fuze setter).	Assisted by No. 6, he removes fuze setter and seat, placing them in traveling position. He assists the gunner and Nos. 3 and 4 to fold the front sections of the platform and to lock them in position.	He takes post by the front outriggers.	Assists the gunner and Nos. 3 and 4 in driving the wedges out of the front outriggers and in folding and clamping those outriggers in traveling position.	He takes post at the drawbar of the front bogie.	He assists the gunner, the azimuth setter, and Nos. 3 and 4 in maneuvering the front bogie.	With the aid of No. 4 he connects the air hose on the front bogie.
Azimuth setter.....	He traverses the gun until it is in position directly over the muzzle rest. He unlocks the azimuth seat from firing position.	Assisted by No. 5, he runs the left lifting jack down, as directed by the gun commander, until the outriggers are broken free of the ground.	No duties.....	Assisted by No. 5, he runs the left lifting jack down, as directed by the gun commander, until the front bogie may be replaced.	Assisted by the gunner, the fuze range setter, and Nos. 3 and 4, he replaces the front bogie and clamps it in position.	He runs the left lifting jack up as directed by the gun commander to permit the gun to settle on the rear bogie. After the bogie is locked in position, he runs the lifting jack up fully and locks it. He locks the azimuth seat in traveling position.
Elevation setter.....	He depresses the gun as it is traversed by the azimuth setter until the gun is in position to be clamped to the muzzle rest. He unlocks the elevation seat from firing position.	Assisted by the gunner, he runs the right lifting jack down, as directed by the gun commander, until the outriggers are broken free of the ground.	No duties.....	Assisted by the gunner, he runs the right lifting jack down, as directed by the gun commander, until the front bogie may be replaced.	No duties.....	He runs the right lifting jack up as directed by the gun commander to permit the gun to settle on the rear bogie. After the bogie is locked in position, he runs the lifting jack up fully and locks it. He locks the elevation seat in traveling position.
Ammunition handler, No. 1.	He places the platform rest in traveling position and, when gun is traversed and depressed properly, clamps the gun to the muzzle rest. Assists Nos. 2, 5, and 6 to fold the rear sections of the platform and to lock them in position.	No duties.....	Takes post at end of left rear outrigger.	Bears down on the end of left rear outrigger while the jacks are run down enough to replace the front bogie.	He assists Nos. 2, 5, and 6 with the rear outriggers and takes post at right wheel of rear bogie.	He assists Nos. 2, 5, and 6 to replace rear bogie; he replaces additional equipment at direction of the gun commander.
Ammunition handler, No. 2.	He assists Nos. 1, 5, and 6 to fold the rear sections of the platform and to lock them in position.	No duties.....	Takes post at end of right rear outrigger.	Bears down on the end of right rear outrigger while the jacks are run down enough to replace the front bogie.	He assists Nos. 5, 6, and 1 with the rear outriggers and takes post at the rear bogie.	He assists Nos. 1, 5, and 6 to replace rear bogie; he assists No. 3 in connecting the air hose on the rear bogie.
Ammunition handler, No. 3.	He assists the gunner, the fuze range setter, and No. 4 to fold the front sections of the platform and to lock them in position.	He takes post by the front outriggers.	Assists the gunner, the fuze range setter, and No. 4 in driving the wedges out of the front outriggers and in folding and clamping those outriggers in traveling position.	He takes post at the left wheel of the front bogie.	He assists the azimuth setter, gunner, the fuze range setter, and No. 4 in maneuvering the front bogie.	Assisted by No. 2, he connects the air hose on the rear bogie after the latter is locked in position.
Ammunition handler, No. 4.	He places the muzzle rest in traveling position. He assists the gunner, the fuze range setter, and No. 3 to fold the front sections of the platform and to lock them in position.	He takes post by the front outriggers.	Assists the gunner, the fuze range setter, and No. 3 in driving the wedges out of the front outriggers and in folding and clamping those outriggers in traveling position.	He takes post at the right wheel of the front bogie.	He assists the gunner, the fuze range setter, the azimuth setter, and No. 3 in maneuvering the front bogie.	He assists the fuze range setter in connecting the air hose on the front bogie.
Relayer, No. 5.....	He assists the gunner to place the breech cover over breech. Assisted by Nos. 1, 2, and 6, he folds the rear sections of the platform and locks them in traveling position.	He assists the azimuth setter in maneuvering the left lifting jack.	No duties.....	He assists the azimuth setter in maneuvering the left lifting jack.	After the front bogie is replaced, assisted by Nos. 1, 2, and 6, he removes the wedges in the rear outriggers and folds and clamps these outriggers in traveling position. He then takes post at the drawbar of rear bogie.	He puts the rear bogie in position under the gun, aided by Nos. 1, 2, and 6. He then assists the gunner to replace the jack supporting channel in traveling position.
Fuze setter operator, No. 6.	He replaces the muzzle cover, and assists the fuze range setter in handling the fuze setter and seat. He assists Nos. 1, 2, and 5 to fold the rear sections of the platform and to lock them in traveling position.	No duties.....	No duties.....	No duties.....	After front bogie is replaced, assisted by Nos. 1, 2, and 5, he removes the wedges in the rear outriggers, and folds and clamps these outriggers in traveling position. He then takes post at left wheel of rear bogie.	He assists Nos. 1, 2, and 5 to replace rear bogie; he replaces additional equipment at the direction of the gun commander.
Ammunition squad, Nos. 7 to 13, inclusive. (See note 2.)	Nos. 7 to 13, inclusive, under the supervision of the chief of ammunition, perform such duties in salvaging ammunition and quitting the emplacement as may be directed.					

## NOTES

1. The end of the mount equipped with the muzzle rest is considered the front of the mount.
2. See paragraphs 5b and 6b.

APPENDIX

LIST OF REFERENCES

Ammunition, general-----	TM 9-360 (now published in TR 1370-A).
Antiaircraft ammunition-----	TM 9-360 (now published in TR 1360-3A).
Care and maintenance of matériel-----	TM 9-360 (now published in TR 1395-A).
Coast artillery weapons and matériel-----	TM 4-210.
Drill ammunition-----	TM 9-360 (now published in TR 1370-D).
3-inch antiaircraft gun matériel, M1918---	TM 9-360 (now published in TR 1310-3B).
Field manuals-----	4-105, 4-110, 4-120, 4-150, and 4-155.
Safety precautions in firing-----	{ AR 750-10. TM 4-235 (now published as TM 2160-35).

