FM 4-61

WAR DEPARTMENT FIELD MANUAL

SERVICE OF THE PIECE
12-INCH GUN
CASEMATED

WAR DEPARTMENT • 14 DECEMBER 1944

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For explanation of symbols, see FM 21–6.

CONTENTS

CONTENTS—Contd.

CONTENTS—Contd.

SECTION I

GENERAL

1. SCOPE. **a.** This manual prescribes the service of the piece for the modified 12-inch casemated gun (fig. 1) on the M1917 carriage. Guns, carriages, and batteries differ in type, arrangement, and design, and for this reason the service of the piece as prescribed in this manual is intended only as a guide for the battery commander in the assignment of individuals and duties. Changes in the details of the service of the piece to meet local conditions may be made. Where the battery is lacking in all or some of the modifications mentioned in b below, the battery commander should refer to FM 4–60.

b. The modifications of the gun and carriage consist of the following:

(1) Air-pressure and gas-ejection system.
(2) Magneto-transformer firing system.
(3) Power rammer.
(4) Improved ammunition servicing equipment, such as trolley hoists and ammunition trucks suitable for casemated guns and for use with power rammers.
(5) Continuous data transmission system.
(6) Shield.

2. REFERENCES. The references listed in appendix I should be consulted, especially those pertaining to ammunition and to the operation, care, and maintenance of materiel.

Note. For definitions of military terms not contained in this manual, see TM 20–205.

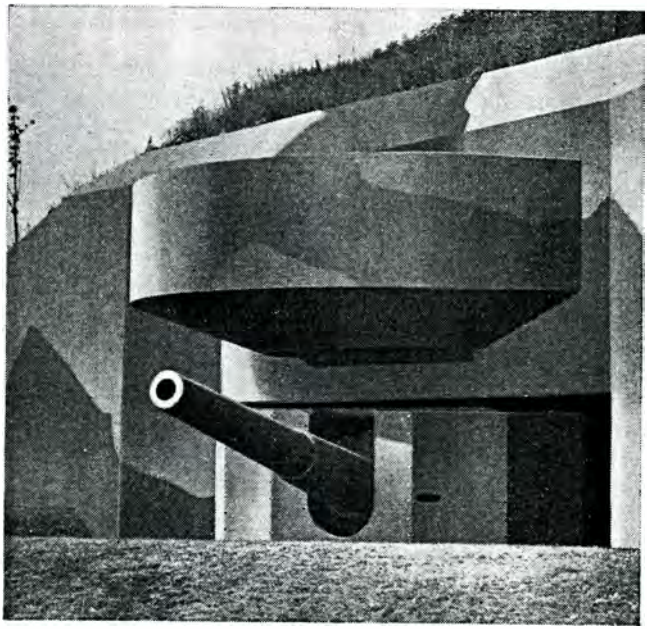


Figure 1. 12-inch casemated gun.

SECTION II

ORGANIZATION

3. GUN SECTION. Each gun emplacement is manned by a section, consisting of 48 enlisted men. The section is commanded by a chief of section and is divided into a gun squad of 13 men and an ammunition squad of 34 men.

4. GUN SQUAD. The gun squad consists of the gun commander, gun pointer, elevation setter, chief of breech, telephone operator, and 8 cannoneers numbered from 1 to 8. (Two additional men are needed when the elevating mechanism is operated by manual power.) Men are assigned to permanent positions according to their aptitudes, but will be interchanged frequently in drill positions in order to develop flexibility and facilitate replacement.

5. AMMUNITION SQUAD. The ammunition squad consists of the chief of ammunition and 33 cannoneers (ammunition handlers) numbered from 9 to 41 inclusive. This squad is divided by its chief into details for the service of powder and projectiles and for miscellaneous duties required by local conditions.

6. FORMATION. At the command GUN SECTION, FALL IN, each gun section assembles in two ranks at close interval, facing the chief of section. To form the section, the chief of section takes post three paces in front of and facing where the center of the section is to rest. From right to left, the front rank consists of the gun commander, gun pointer, chief of breech,

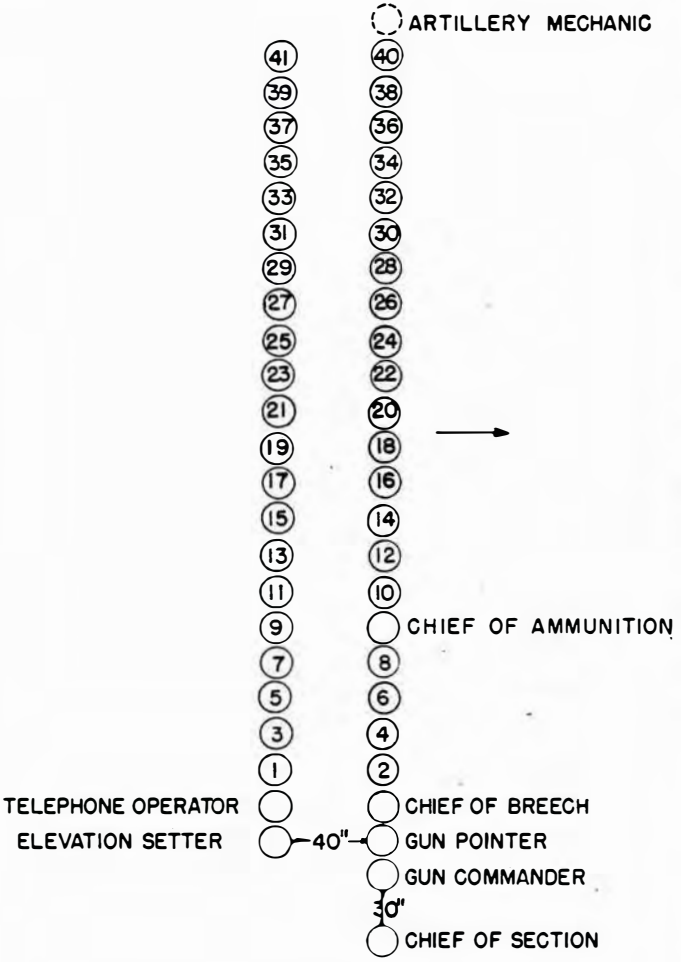


Figure 2. Formation of the gun section.

numbers 2, 4, 6, 8, chief of ammunition, and all the remaining even-numbered cannoneers. In the same order the rear rank forms as follows: elevation setter, telephone operator, and all odd-numbered cannoneers. After forming the gun section, the chief of section takes post in the front rank 30 inches to the right of the gun commander (fig. 2). When the artillery mechanic is present, he forms on the extreme left of the front rank.

SECTION III

DUTIES OF PERSONNEL

7. BATTERY EXECUTIVE. a. The battery executive commands the firing section of the battery and is in charge of the gun emplacements and accessories. He is responsible to the battery commander for the—

(1) Training and efficiency of the personnel of the firing section.

(2) Condition of the materiel and ammunition under his charge.

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

(4) Police of all emplacements.

(5) Camouflage of all emplacements.

(6) Technical handling of the guns.

(7) Selection of positions for and supervision of the emplacement and employment of the automatic weapons.

b. Twice daily, or as prescribed by the harbor defense commander, he inspects the materiel and ammunition under his charge and personally verifies the adjustment of all pointing devices and data transmission systems. He tests the operation of all elevating, traversing, air-pressure, and breech mechanisms. He checks the circuits, firing devices, and the safety features of all firing mechanisms. He checks the filling of the recoil cylinders and the air pressure in the air storage tanks. He sees that there is no obstruction to the operation of the gun in recoil or counterrecoil.

c. He receives the reports of the assistant battery executive, chiefs of section, or gun commanders and

reports to the battery commander, "Sir, guns in order," or reports defects which he is unable to remedy without delay.

d. During action, he exercises general supervision over the loading and pointing of the guns. When firing on the time interval bell, if for any reason he desires to hold fire for one firing interval, he commands: RE-LAY, and reports his action to the battery commander. Should circumstances, in his opinion, make it unsafe to fire he commands: CEASE FIRING, and reports his action to the battery commander.

e. At the conclusion of drill or firing, the battery executive commands: REPLACE EQUIPMENT, inspects the emplacement, and reports to the battery commander stating any deficiencies affecting the readiness of the battery for subsequent action. He supervises the cleaning and preparation of the guns for the next firing.

8. ASSISTANT BATTERY EXECUTIVE. The assistant battery executive performs the duties of the battery executive pertaining to the emplacement or emplacements to which he is assigned.

9. CHIEF OF SECTION. **a.** The chief of section (noncommissioned officer) is in charge of the gun section and emplacement. In the absence of the assistant battery executive, the chief of section performs his duties. In addition, he supervises the service of the piece and the service of ammunition. He personally directs the work of care and preservation at the emplacement to which his section is assigned. He is responsible to the officer in charge of the emplacement for the—

(1) Training and efficiency of the personnel of his section.

(2) Condition of materiel under his charge.

(3) Observance of all safety precautions at the emplacement.

(4) Police of the emplacement.

(5) Preparation of the piece for firing, including camouflage discipline and gas discipline when necessary.

b. His presence in no way relieves the gun commander of his responsibilities. However, as a means of expediting firing and insuring safety, the chief of section coordinates the actions of the gun squad and ammunition squad, making certain that the chief of ammunition receives all commands and necessary information. Also, when the gun commander is required to remain at his post during firing, the chief of section makes such checks of materiel, ammunition, and personnel as may be necessary to insure proper functioning and safety. In an emergency, he is prepared to assume command of the gun squad and to designate replacements wherever necessary.

c. When the command REPLACE EQUIPMENT has been given, he supervises the work of the gun squad and ammunition squad.

d. At the direction of the assistant battery executive or battery executive, he forms his gun section at the emplacement and orders the gun commander and chief of ammunition to post their details and examine gun and equipment. He sees that servicing equipment is kept convenient to the individual posts, so that it is necessary only for members of the gun section to check the items for presence and place them for use. He receives the reports of the gun commander and chief of ammunition and reports to the officer in charge of the emplacement, "Sir, No. _____ in order," or any defects which he is unable to remedy without delay.

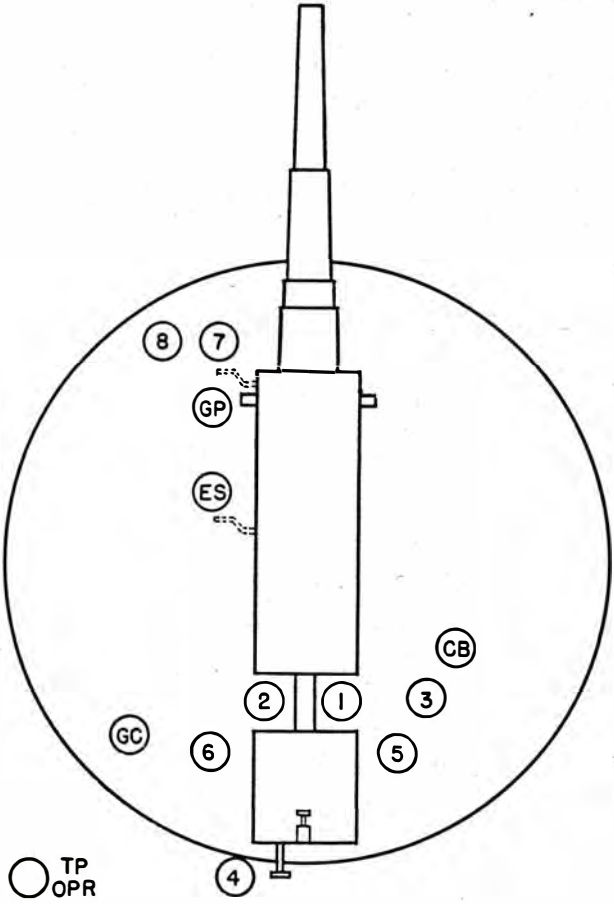


Figure 3. Posts of members of the gun squad at completion of the command DETAILS, POSTS.

Note. In case it is necessary to use manual power to operate the elevating mechanism of the gun, two additional men should be posted at the elevating crank.

10. GUN COMMANDER. **a.** The gun commander (noncommissioned officer) is in command of the gun squad. (For detailed duties of the gun commander, see drill table, app. III.) He is responsible to the chief of section for the—

(1) Training and efficiency of the personnel of his squad.

(2) Condition of the materiel under his charge.

(3) Preparation of the piece for firing, including camouflage discipline and gas discipline when necessary.

(4) Firing the piece.

(5) Observance of all safety precautions pertaining to the service of the piece.

(6) Police of the emplacement.

b. Having posted his detail (fig. 3) and given the command EXAMINE GUN, he personally makes an inspection of the gun, carriage, and other materiel, giving particular attention to the recoil and counter-recoil systems, firing mechanism, safety devices, and the oiling of all bearing surfaces.

c. He commands: REPORT, and receives the reports of the various details of the gun squad and reports to the chief of section, "No. _____ in order," or any defects he is unable to remedy without delay.

d. It is not necessary when going into action to go through the commands of DETAILS, POSTS or EXAMINE GUN. The sounding of the alert signal is sufficient to post the details. The gun commander verifies his detail, especially at night, by the command CALL OFF, at which the cannoneers call off their titles or numbers in succession, beginning with unnumbered members of the section, followed by the numbered members in order. He checks their readiness for action by the command REPORT. The command EXAMINE GUN is unnecessary since gun and servicing equipment are maintained constantly in a state of readiness.

e. When necessary during preparations for drill or action, the gun commander informs the chief of ammunition as to the projectile, fuze, and powder charge to be used.

f. At the command TARGET, he repeats the command and target designation. In case II firing, he assists the gun pointer in getting on the correct target. As soon as the gun pointer is on target (case II) or has his pointers matched (case III), the gun commander reports through the battery commander's telephone operator, "Sir, No. _____ on target."

g. At the command LOAD, he repeats the command, supervises the loading of the piece, and stands ready to fire the gun or give the command to fire.

h. At the command COMMENCE FIRING, the gun commander performs duties as follows:

(1) In case III firing, the gun commander fires the gun or gives the command FIRE on the next time interval, or, if the battery is using a gun data computer, as soon as the gun is ready. His procedure is determined by the following:

(*a*) If using the magneto-transformer system of electric power, he fires the gun by pressing the gun commander's push button after the elevation setter announces, "Elevation set."

(*b*) If the gun is fired by lanyard, he commands: FIRE, after the elevation setter announces, "Elevation set." No. 3 then fires the gun.

(2) In case II firing, when using the magneto-transformer system of electric power, the gun commander, after the elevation setter announces, "Elevation set," presses the gun commander's push-button switch and calls, "Ready." The gun pointer fires as soon as he is on the target.

(3) In case II firing, if the gun is fired by lanyard the gun commander calls, "Ready," after the elevation setter announces, "Elevation set." The gun pointer commands: FIRE, when he is on target. No. 3 fires the gun.

i. When firing on the time interval signal, he sees that the piece is fired immediately upon the proper signal, safety precautions permitting. He commands: RE-LAY, in case his gun is not ready to fire when the time interval sounds. He repeats the command RE-LAY, when it is given by the officer in charge of the emplacement.

j. During the firing, the gun commander pays particular attention to the action of the gun in recoil and counterrecoil in order that a loss of recoil liquid by leakage may be observed in time to be corrected.

k. He commands: CEASE FIRING, when the number of shots specified have been fired. He repeats the command CEASE FIRING, when it is received. At the conclusion of a series of shots, he reports through the battery commander's telephone operator, "Sir, No. _____ (so many) rounds fired." Should the gun be loaded at the command CEASE FIRING, he causes all personnel to keep away from the gun commander's push button and the gun pointer's firing key. If the gun is equipped with firing magnetos, he causes all personnel to keep away from them. If firing by lanyard, he causes the lanyard to be detached, or dropped if the gun is at such an elevation that the lanyard cannot be unhooked. Also, if CEASE TRACKING is given, the gun commander sees that the piece is pointed in a safe field of fire. Under the supervision of the battery executive, the gun may be unloaded by firing the projectile after the field of fire is clear. When dummy ammunition is used, he commands: UNLOAD, and supervises the unloading.

l. At the command SUSPEND FIRING, the gun commander repeats the command, and if the piece is unloaded, causes it to be loaded and holds fire until he receives the command RESUME FIRING.

m. In case of a misfire, he reports to the executive or assistant executive, "No. _____, misfire," and the cause of the misfire if known. He sees that the precautions described in paragraph 36 are observed.

n. At the command REPLACE EQUIPMENT, he repeats the command; supervises the replacing of all equipment; sees that the air compressor is stopped or placed on automatic operation if conditions warrant it; sees that all materiel is properly secured and the emplacement policed; and then, unless otherwise directed, forms his squad and reports to the chief of section.

o. He keeps a record of the number of rounds fired by his gun, showing the date and approximate time, in order that the emplacement book may be kept posted accurately and up to date.

11. GUN POINTER. The gun pointer is charged with the duty of pointing the piece in direction. He is responsible to the gun commander for the proper operation, care, and adjustment of the azimuth data indicator (fig. 20), traversing mechanism, and the telescope and telescope mount. For detailed duties of the gun pointer, see drill table, appendix III.

12. ELEVATION SETTER. The elevation setter is charged with the duty of setting the piece in elevation. He is responsible to the gun commander for the proper operation, care, and adjustment of the elevation data indicator (fig. 20) and the elevating mechanism. For detailed duties of the elevation setter, see drill table, appendix III.

13. CHIEF OF BREECH. The chief of breech is responsible to the gun commander for the—

a. Efficiency of the personnel of the breech and rammer detail.

b. Condition, serviceability, and operation of the firing mechanism (fig. 8), breech mechanism (figs. 4, 5, 6, and 7), and rammer (fig. 12).

c. Condition of the breech recess, powder chamber, and bore.

d. Observance of all safety precautions that pertain to his detail.

e. Proper loading of the piece. He pays particular attention to the seating of the projectile and sees that the igniter is on the rear end of the powder charge and so placed in the chamber that the mush-

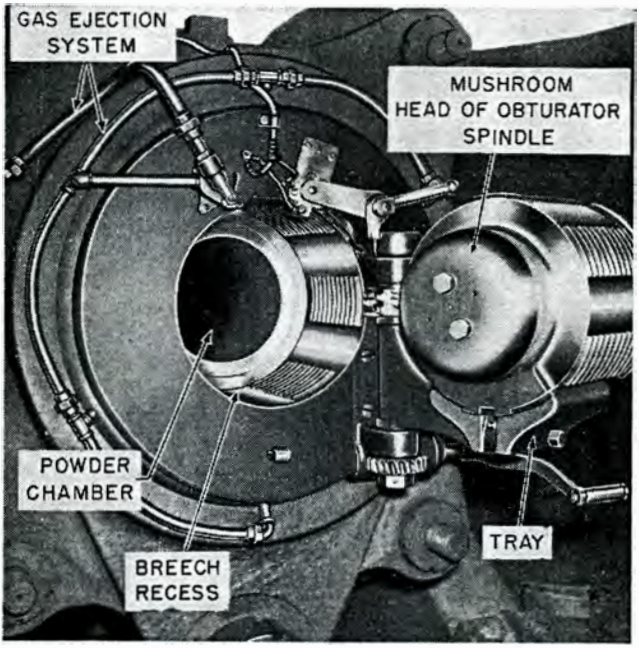


Figure 4. Breech of the gun, breechblock open.

room head of the closed breechblock will touch it. He listens for the explosion of the primer which may be audible if the powder charge fails to ignite.

f. For detailed duties of the chief of breech, see drill table, appendix III.

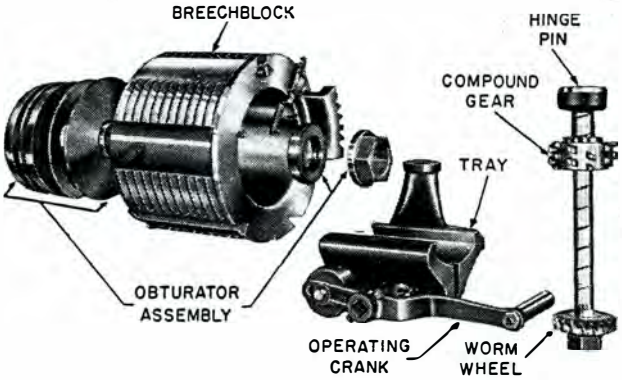


Figure 5. Breechblock, obturator, and parts of the breechblock-operating mechanism, disassembled.

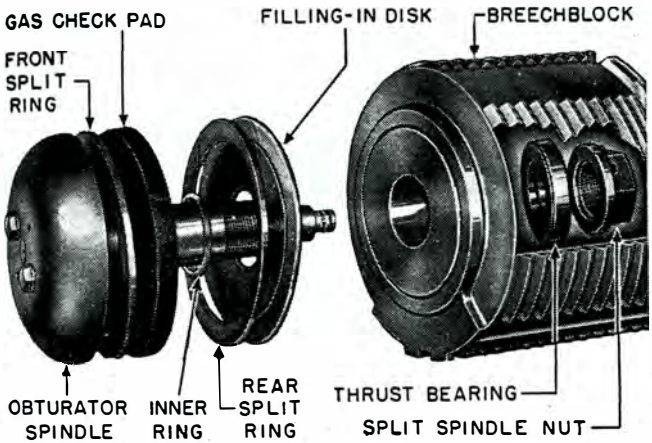


Figure 6. Parts of the obturator.

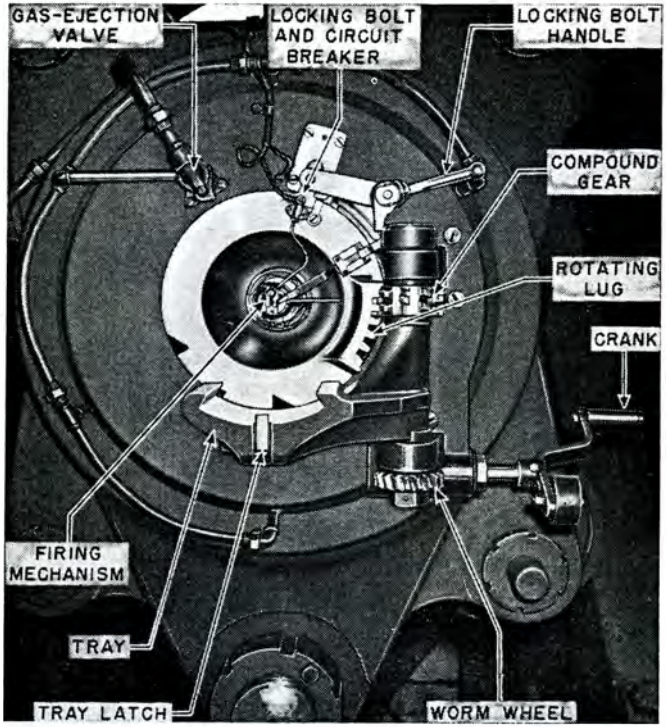


Figure 7. Breech of the gun, breechblock closed.

14. TELEPHONE OPERATOR. The telephone operator is charged with the duty of receiving and transmitting all messages passing between the battery commander and the officer or noncommissioned officer in charge of the emplacement, and the keeping of such records as may be directed. For detailed duties of the telephone operator, see drill table, appendix III.

15. CHIEF OF AMMUNITION. **a.** The chief of ammunition is responsible for the—

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

(2) Care and preservation of the equipment used in the handling of the ammunition.

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

(4) Security and careful handling of the ammunition and its protection against water, dampness, fire, and the direct rays of the sun.

(5) Police of projectile room, powder magazine, and the galleries.

b. He keeps a record of all ammunition (figs. 14, 15, 16, 17, and 18) received and ammunition used by his gun, exercising particular care that projectiles, primers, powder charges, and fuzes are listed under proper name, type, and lot number.

c. He keeps the chief of section informed regarding ammunition on hand, checks the weight of projectiles, and reports defects found in the ammunition.

d. He keeps a thermometer in a selected powder container and reports the temperature of the powder when required. Where powder has been stored for at least 2 weeks in a service magazine, the temperature of the magazine may be taken as the powder temperature. This temperature should be taken immediately upon opening the magazine.

e. Having posted his detail and given the command EXAMINE EQUIPMENT, he inspects the materiel under his charge, gives the necessary instructions for preparing ammunition and equipment for firing or drill, and reports to the chief of section, "Ammunition service in order," or reports any defects he cannot remedy without delay.

f. It is not necessary when going into action to go through the commands of DETAILS, POSTS or EXAMINE EQUIPMENT. The sounding of the alert signal is

sufficient to post the details. The chief of ammunition verifies his detail, especially at night, by the command CALL OFF, at which the cannoneers call off their numbers in succession. The command EXAMINE EQUIPMENT is unnecessary since equipment is maintained constantly in a state of readiness.

g. At the command REPLACE EQUIPMENT, he supervises the replacement of equipment, sees that the ammunition and materiel are properly secured, forms his squad, and reports to the chief of section.

h. For additional duties of the chief of ammunition, see drill table, appendix III.

16. BREECH DETAIL. The breech detail, Nos. 1 to 6, is charged with the duties of loading the gun. Each cannoneer is responsible to the chief of breech for the proper and precise execution of the duties outlined in the drill table, appendix III. Each cannoneer is responsible for the care, adjustment, and operation of the mechanism and equipment (figs. 4, 5, 6, 7, 8, and 12) with which he works.

17. AMMUNITION SQUAD. a. The ammunition squad, under the supervision of the chief of ammunition, is charged with the duty of supplying ammunition to the gun position. In addition to its duties in connection with the service of ammunition, the ammunition squad cleans, paints, and marks projectiles; cleans, oils, and paints dummy projectiles, ammunition trucks, shot tongs, overhead rails, and hoists; and polices the magazines and corridors.

b. At the command DETAILS, POSTS, members of the ammunition squad (Nos. 9 to 41 incl.) take posts in the magazine or gallery and prepare the equipment for firing or drill.

c. The ammunition squad is divided into groups with the following duties:

(1) No. 9 assists in loading projectiles (figs. 15 and 16) in shot tongs or on shot trucks.

(2) Nos. 10 to 25, working in pairs, assist No. 9 in loading the projectiles, deliver the loaded shot tongs or shot trucks to the gun, and return to the magazine or gallery with the empty tongs or trucks.

(3) Nos. 26 and 27 remove the powder charges (fig. 18) from the containers (one at a time as needed) and place the charges on the ammunition trucks.

(4) Nos. 28 to 41, working in pairs, obtain ammunition trucks and line up in the gallery. As necessary, each pair moves into the powder magazine, obtains a powder charge, delivers it to the gun, and returns for another.

d. At the command REPLACE EQUIPMENT, the ammunition squad secures all materiel.

e. For detailed duties of the ammunition squad, see drill table, appendix III.

18. ARTILLERY MECHANIC. a. The artillery mechanic is a member of the maintenance section of the battery. He makes minor repairs and adjustments, assisted by members of the gun section. The artillery mechanic is the custodian of the storeroom and supplies pertaining to the gun emplacements. 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 mechanic is responsible for the care and operation of the air compressor and associated mechanisms. He must be thoroughly trained and schooled. For information see appropriate War Department publications such as TM 9–451 and TM 9–452 (when published).

b. The artillery mechanic will perform daily the following duties:

(1) Check the amount of oil in the recoil cylinders, and with the assistance of Nos. 40 and 41 add more if necessary (par. 40).

(2) Examine all speed gears and their motors to see that they are operating properly.

(3) Check the air-pressure and the gas-ejection system.

19. POWER PLANT OPERATORS. **a.** The power plant operators are members of the power plant detail of the battery. They are responsible for the operation and maintenance of the power plant and all associated equipment.

b. The power plant operators will exercise the power plant daily and will keep a record of hours of operation, loads, fuel consumption, and all other records necessary.

SECTION IV

NOTES ON SERVICE OF THE PIECE

20. GENERAL. **a.** Conduct the service of the piece with dispatch and precision and with as few orders as possible. Except for the necessary orders, reports, and instructions, permit no talking. All cannoneers will change positions as rapidly as practicable. Give commands in the prescribed forms (FM 4–5). Substitute hand signals for commands whenever practicable (FM 4–20).

b. Carry out practice drill by simulating the full firing cycle; use dummy ammunition, dummy or fired service primers; and track a moving target or follow a simulated course.

c. When there is a lull in the firing or drill, each member of the gun section will inspect, clean, and place in the best condition possible, the materiel under his charge.

d. Power failures and damage or malfunctioning of parts of the piece should be anticipated. Instruct the personnel in the proper procedure in case of such failures. Conduct drills in which failures are simulated. Make preparations for the replacement of casualties for every position and simulate casualties during gun drills.

21. FIRING MECHANISM M1903. a. To assemble the mechanism (figs. 8 and 9) on the gun: (1) Place the hinged collar over the end of the obturator spindle with the two ribs of the collar engaging the corresponding grooves of the spindle and with the hinge at the top.

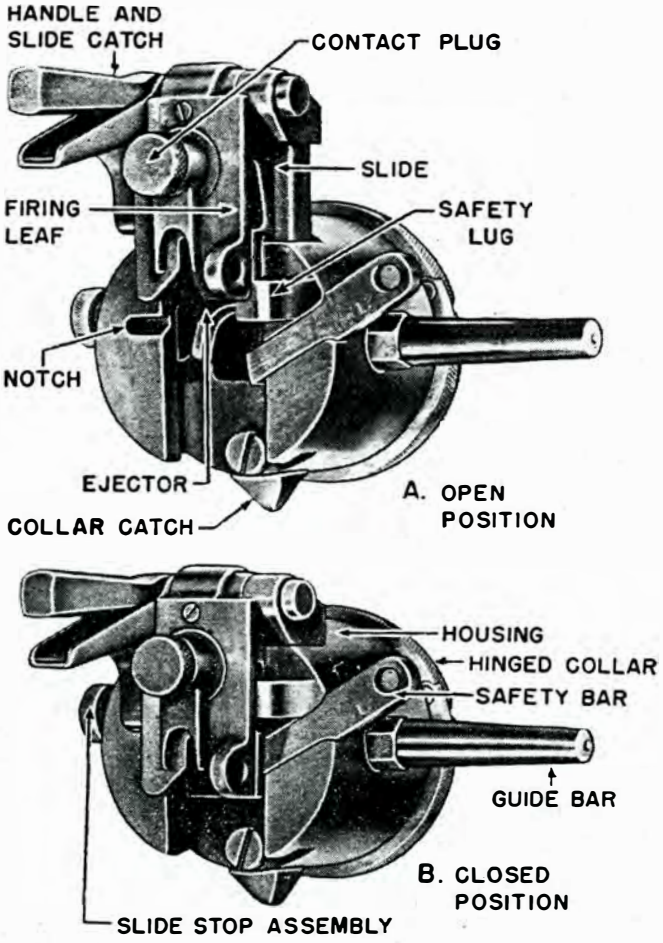


Figure 8. Firing mechanism M1903, assembled view, open and closed positions.

(2) Take the mechanism in the right hand, holding the collar with the left, and put the mechanism over the end of the collar. Turn the collar to the left until the collar catch on the under side of the mechanism engages and locks the mechanism in position. While doing this, see that the guide bar which projects from the right side of the mechanism enters the groove cut in the breechblock for it, and

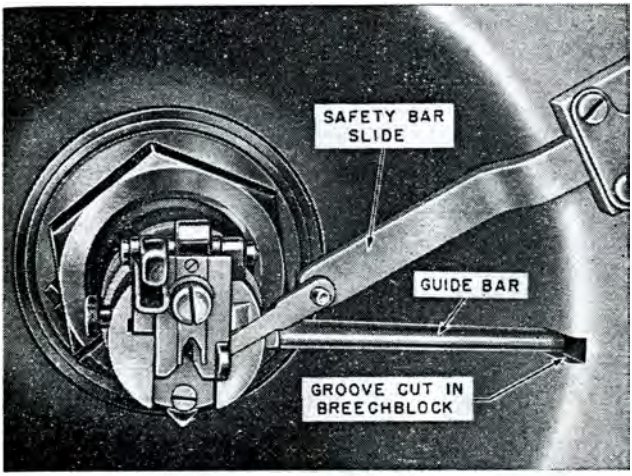


Figure 9. Firing mechanism M1903 on gun, without firing cable.

that the pin on the safety bar slide which is attached to the gun, enters the hole in the outer end of the safety bar of the mechanism. *Do not attempt to use the mechanism until it is absolutely certain that the collar has been screwed entirely home and locked.*

(3) After the primer has been inserted (fig. 10), lower the slide until the slide catch engages in the notch of the housing. *Be sure the slide is entirely down before attempting to fire the piece,* otherwise the primer may be blown to the rear and endanger members of the gun squad.

b. To remove mechanism from gun. Draw the collar catch to the rear and unscrew the hinged collar.

c. Safety features. (1) There is a safety lug (fig. 8) on the right side of the housing which prevents the firing leaf from being drawn back until the slide is all the way down.

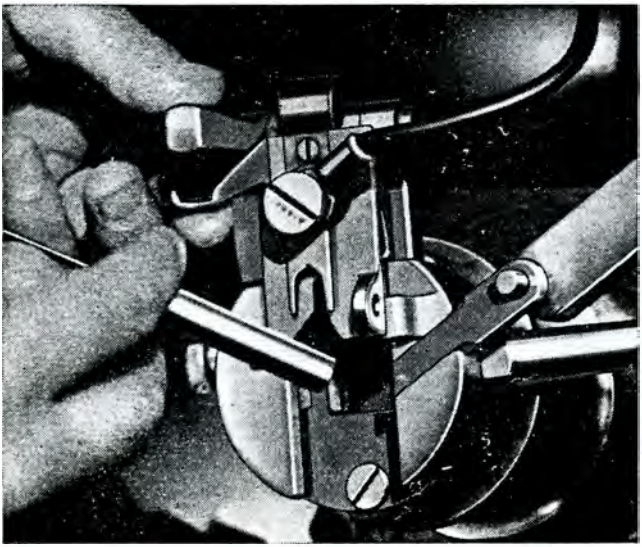


Figure 10. Inserting the primer, close-up view.

(2) When the firing mechanism slide is down (closed position) the inner end of the safety bar engages the firing leaf. The safety bar is actuated by the safety bar slide (fig. 9) which in turn is actuated by the rotation of the breechblock. Thus, the safety bar is withdrawn from the firing leaf only at the last part of the movement of the breechblock in closing.

(3) Also, only at the last part of the movement of the breechblock in closing, are the parts of the electric circuit breaker (one part on the block; the other on the breech of the gun) brought into contact (fig. 7).

Figure 11. Opening the breechblock.

22. OPERATION OF BREECH MECHANISM. a. To open the breech (fig. 11), the chief of breech unhooks the lanyard (when one is used) from the eye of the firing leaf. No. 1 unlocks the breechblock by pulling down on the locking bolt handle, and turns the crank continuously in a clockwise direction until the tray comes to rest against the hinge.

b. To close breech. No. 1 turns the crank in a counterclockwise direction until the breechblock is fully translated, rotated, and locked in the closed position.

c. Additional notes. It will be found convenient to fasten a wire around the piece in back of the elevating band. This wire should have a loop in it in which the safety lanyard (if one is used) may be hooked during the loading. The chief of breech, after unhooking the lanyard, swings it over the gear of the breech-operating mechanism, and hooks it in the loop of the wire. Thus, it is kept from being caught in the mechanism and is convenient to the chief of breech when the time comes to hook it again.

23. LOADING. a. General. To load, set the gun at the loading position. If the elevation of the gun is much above or below this elevation the spanner tray will not seat properly in the breech recess. Allow the rammer motor to run at full speed before attempting to ram the projectile. Start the motor by pressing the START button.

b. To ram the projectile. No. 4 moves the rammer control lever (figs. 12 and 13) up to the RAM position. For safety reasons he should grip the handle loosely or, even better, rest his hand on top of the rammer control lever. As the projectile nears the seated position, the unstroking device moves the hydraulic speed gear control and the control lever toward neutral. No. 4 follows the rammer control lever down with his hand, shoving the handle the last short distance to the neutral position. The unstroking device will not move the control lever completely to neutral because the device is adjusted to bring the rammer head to a stop after a seating stroke of 99½ inches which is a few inches longer than the stroke actually required to seat the projectile. Therefore, the control lever does not reach the neutral position and must be moved there by hand.

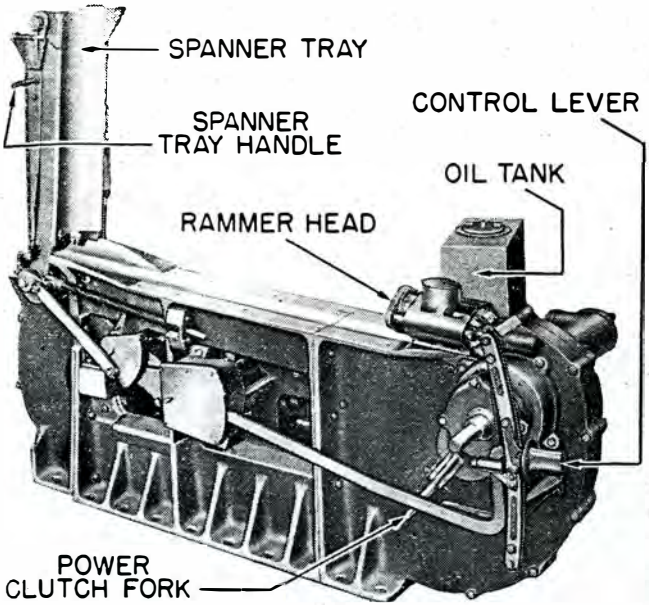


Figure 12. Rammer, left side.

c. To withdraw the rammer. No. 4 moves the rammer control lever downward to the WITHDRAW position and removes his hand from the rammer control lever. The unstroking device will bring the rammer head to a stop at the rearmost position and move the rammer control lever to neutral.

d. To place the powder. No. 4, controlling the speed of the rammer, moves the control lever slowly upward toward the RAM position. When half of the bags of the powder charge are in the loading trough, No. 4 moves them forward far enough so that the remainder of the powder bags may be placed in the loading trough. When the complete powder charge is in the loading trough, he moves the powder charge forward slowly, but not so far as to prevent

the mushroom head of the breechblock from imparting the last forward motion to the powder charge when the breech is closed. This will require training and the use of appropriate marks on the rammer chain. No. 4 takes care to see that the powder bags are not torn or deformed during the ramming operation.

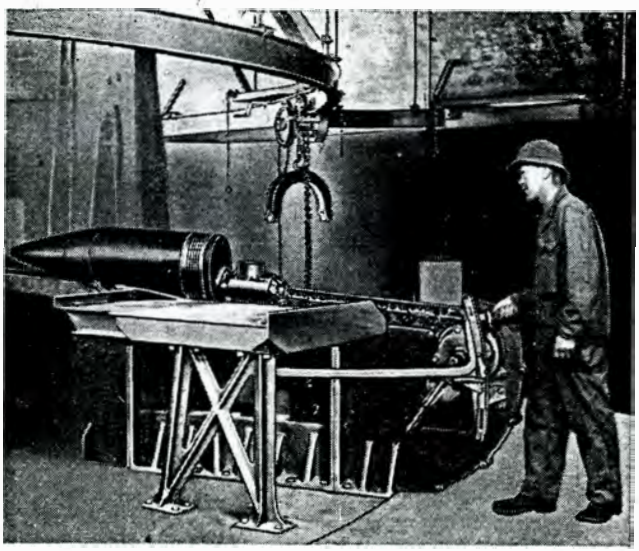


Figure 13. Operating the rammer.

e. In withdrawing the dummy projectile, slow up the projectile with the hand extractor and bring it to rest without striking the rammer head. If the projectile is given a great rearward velocity and allowed to slide down the loading trough without being checked until it is suddenly stopped by the head of the rammer chain, serious damage to the rammer head, rammer case, and other rammer mechanisms may occur.

f. When the rammer chain is run forward by power without a projectile or powder charge being rammed, No. 4 exercises great care to see that the rammer chain is not moving at a great speed when the unstroking device stops it. Failure to do this may damage the rammer chain, unstroking device, hydraulic speed gear, or other parts of the rammer mechanism. Also, he does not allow the rammer head to reach the rifled section of the bore at a great speed because the rifling may be damaged.

g. To ram the projectile by hand using the rammer, No. 4 first pins the power clutch fork (fig. 12) in the inner hole to disengage the rammer motor from the gearing. Next, the hand cranks are assembled to the crankshaft and the control lever placed in the neutral position. No. 4 then takes position at the left-hand crank with two other men and supervises the work of hand ramming. Three more men are needed on the other hand crank to obtain proper seating of the projectile. The speed of the cranks should be steadily increased so that maximum speed is obtained at the instant of the seating of the projectile. Care should be taken to see that no one is injured when the chain and cranks stop with a jerk at the instant the projectile is seated.

24. ELEVATING THE GUN. a. When using the elevation data indicator with continuous data, the elevation setter elevates the piece at the command or signal ELEVATE until the mechanical and electrical pointers are matched, and calls, "Elevation set." He keeps the mechanical and electrical pointers matched until the piece is fired, after which he depresses the gun to the loading position.

b. When the elevation data indicator is used without the data transmitter in the plotting room, that is, when the data are sent to the guns by telephone, the elevation setter elevates the piece until the mechanical pointer indicates the elevation received.

c. When bringing the gun to the proper elevation setting, the elevation setter always makes the final movement by depressing the gun. While this practice cannot be followed exactly when matching pointers to continuous data, careful drill will enable the elevation setter to approximate the system.

d. Elevating is accomplished in three ways:

(1) By turning the elevating handwheel (slow motion).

(2) By operating one of the elevating cranks located in the well of the emplacement (quick motion).

(3) By motor power.

e. To use the quick motion by operating one of the elevating cranks, the operating lever is set at IN on the clutch-stop plate. Two men will be needed to assist the elevation setter when operating the elevating mechanism by this method. For slow motion the operating lever is set at OUT. The elevation setter will use slow motion by turning the elevating handwheel when keeping the pointers matched or when making the final movement in setting elevation.

f. To operate by electric power, the elevation setter engages the power clutches by operating the treadle on the gun carriage platform. To operate the elevating mechanism, the elevation setter turns the elevating handwheel in the proper direction (DEPRESS or ELEVATE). To stop elevating by power, he moves the elevating handwheel so that the speed indicator reads 0.

25. TRAVERSING. **a.** When the azimuth data indicator is used with the data transmitter in the plotting room, the gun pointer traverses the piece until the electrical and mechanical pointers are matched. He keeps these pointers matched at all times.

b. When the azimuth data indicator is used without the data transmitter, the gun pointer traverses the piece until the mechanical pointer indicates the

azimuth received by the telephone and calls, "On target."

c. Traversing is accomplished in two ways:

(1) By turning the traversing handwheel (slow motion).

(2) By turning one of the traversing cranks located in the well of the emplacement (quick motion).

d. By means of the treadle on the gun carriage platform, the gun pointer throws the slow motion in or out. For large changes in azimuth the quick motion is used. For tracking or matching pointers the gun pointer uses the slow motion.

26. FIRING. a. Case III. (1) When firing case III, the gun pointer's firing key is unplugged and the gun commander fires the gun by pressing the push button at the gun commander's push-button station (par. 10h). The gun commander stands clear of the push-button station after the primer is inserted until Nos. 1, 2, and 3 are clear of the path of recoil.

(2) When using continuous data transmission, the gun pointer keeps the mechanical and electrical pointers on the azimuth data indicator matched at all times. After the elevation setter calls or signals, "Elevation set," the gun commander presses his push button. If the pointers on the azimuth data indicator are not matched or if the "ready" signal light is out when the elevation setter indicates that the elevation is set, the gun pointer commands: CEASE FIRING.

(3) When firing on a time interval signal (without continuous data transmission), the gun pointer and elevation setter set the data received from the plotting room and call, "On target" and "Elevation set" respectively.

(4) When using a lanyard to fire the gun, the gun commander commands: FIRE, instead of pressing the push button as in (1) preceding. No. 3 fires the gun by pulling the lanyard (par. 30).

b. Case II. The gun pointer sets on his sight the deflection received from the plotting room. The elevation setter sets the elevation (par. 24) and calls or signals, "Elevation set." The gun pointer traverses the gun to keep the vertical cross wire of his sight on the target. After the gun commander presses his push button and calls, "Ready" (par. 10h), the gun pointer presses his firing key when his sight is on the target. If the gun is being fired by lanyard, the gun pointer commands: FIRE, instead of pressing his firing key. No. 3 fires the gun.

SECTION V

SAFETY PRECAUTIONS

27. GENERAL. **a.** The following safety precautions are prescribed for training conditions. They also indicate the principles to be followed under combat conditions, but should be interpreted according to the circumstances existing at the time of emergency.

b. Further instructions concerning safety precautions to be followed will be found in AR 750–10 and FM 4–20.

28. THE COMMAND CEASE FIRING. Any individual in the military service will command or signal: CEASE FIRING, if he observes any condition which makes it unsafe to fire. At the command CEASE FIRING, the gun commander stands clear of the gun commander's push-button station and keeps all other personnel away. If firing electrically with a magneto, the person responsible for firing the gun keeps his hands and all personnel away from the firing magneto. If the lanyard is attached, the gun commander causes it to be detached, or dropped if the gun is at such an elevation that the lanyard cannot be unhooked.

29. PRIMERS. Precautions in the care and handling of primers (fig. 14) will be observed as follows:

a. Before firing, examine the primer pouch to make certain that it contains live primers only. Prior to firing, test all primers for fit in the firing mechanism and primer seat, and examine the primer seat for foreign particles which would interfere with the seating of the primer. Also, test each primer elec-

trically, on a primer tester, for resistance and continuity of circuit. Any primer having a resistance over 3.0 ohms should be destroyed. Should the electric current fail, use friction primers. No definite set of instructions for testing friction primers is prescribed.

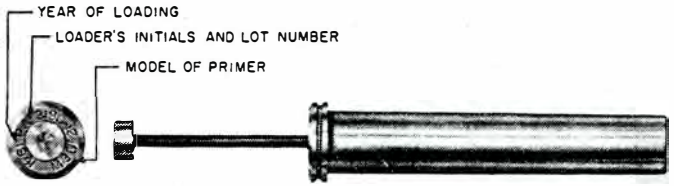
b. Take care not to drop primers.

c. Except when testing the safety devices, do not insert primers until after the breechblock has been completely closed and locked.

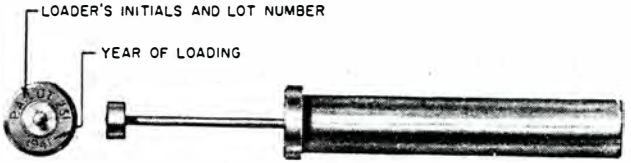
d. Exercise the greatest care in lowering the leaf of the firing mechanism.

e. Discard fired primers as soon as they are removed from the firing mechanism.

f. Handle with care and do not attempt to use primers that have misfired. Return these primers to ordnance for inspection.



A. ELECTRIC PRIMER



B. FRICTION PRIMER

Figure 14. Primers. (Note the distinguishing feature, a groove on the head of the body of the electric primer.)

30. LANYARD. Pull the lanyard with a quick, strong pull (do not jerk) from a position to the right of and as near the rear of the piece as conditions of safety will permit.

31. FIRING MECHANISM. **a.** Inspect and test the firing mechanism frequently and immediately before firing to insure proper operation and functioning of the safety features.

b. To test the safety features of the mechanism, insert a friction primer before the breechblock is rotated. Exert a strong pull on the lanyard while the block is being rotated to ascertain if it is possible to fire the primer before the breech is closed and

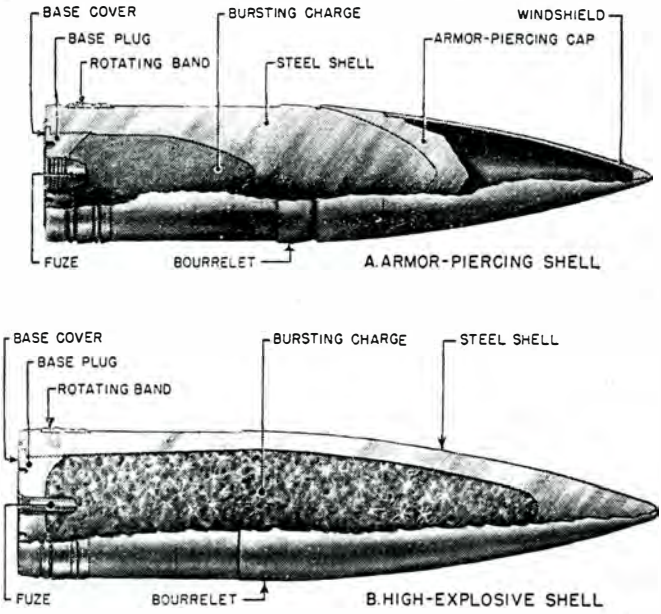


Figure 15. Projectiles.

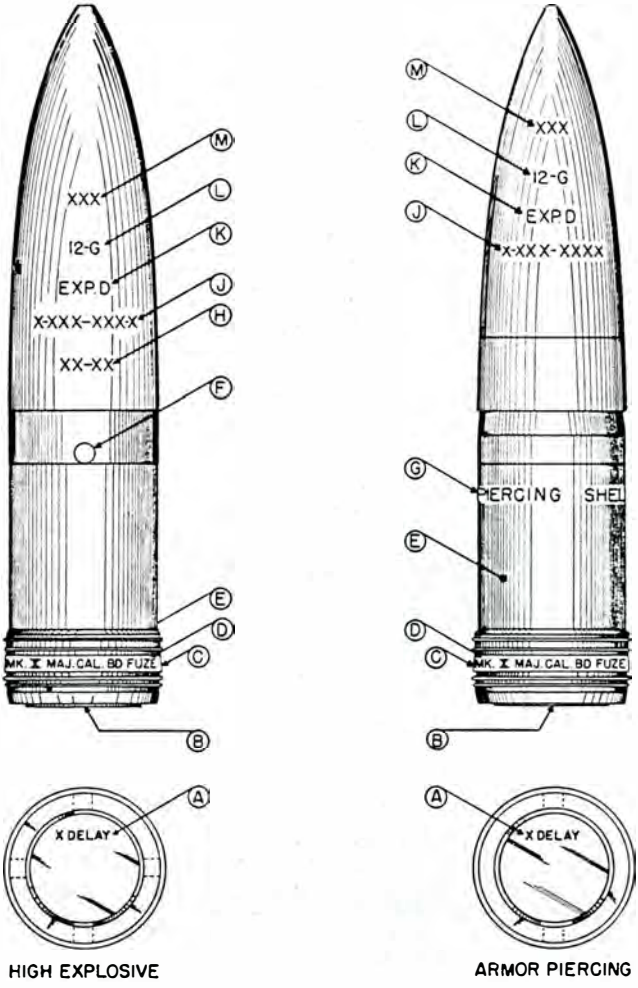


Figure 16. Markings on projectiles.

A. Base cover is stenciled with the amount of delay of fuze.

B. Four yellow stripes, 2 inches wide, indicate that the fuze has not been assembled in the projectile. These stripes are painted out with olive drab paint after fuze has been assembled.

C. The ammunition lot number, in addition to being painted on the projectile, is also stamped on the rotating band on the opposite side from fuze stamping.

D. Type of fuze assembled in projectile.

E. Caliber and type of cannon, mark number of projectile, lot number of unfilled projectile, initials or symbol of machining plant, and inspector's stamp (stamp on projectile, under paint).

F. Location of center of gravity of loaded and fuzed projectile.

G. Type of projectile. Location of this stenciling also indicates center of gravity of loaded and fuzed projectile.

H. Mark number of projectile.

J. Ammunition lot number of filled projectile.

K. Explosive filler.

L. Caliber and type of cannon.

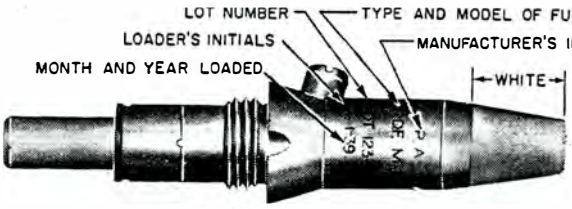
M. Weight of loaded and fuzed projectile (in pounds).

Note: High-explosive projectiles using point-detonating fuzes are marked the same as base-fuzed, high-explosive projectiles except that A, B, C, and D are omitted and K may be TNT, AM 50-50, or AM 80-20. High-explosive and armor-piercing shells are painted olive drab and stenciled in yellow.

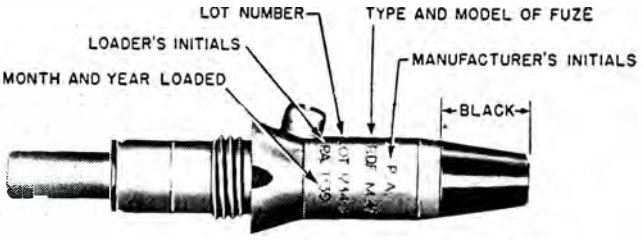
locked. Also test the mechanism in a similar manner with an electric primer, operating the gun commander's push button or the magneto continuously while the breechblock is being closed.

c. Previous to firing, insert all primers to be used in the obturator spindle in order to test for proper fit of each primer, and lower the firing leaf and slide to their firing position in order to insure that these parts will function properly with each primer.

32. FUZES. Projectiles (figs. 15 and 16) equipped with base-detonating fuzes normally will be received properly fuzed for firing. Projectiles equipped with point-detonating fuzes (fig. 17) normally will be re-



A. M46 FUZE



B. M47 FUZE

Figure 17. Point-detonating fuzes.

ceived unfuzed and will be fuzed, as they are required, in the following manner:

a. Unscrew the plug from the fuze socket.

b. Insert the fuze, being careful to see that it is fitted with its felt or rubber washer, and screw it home by hand.

c. Tighten the fuze with the fuze wrench, but without using any great force.

d. If there is any difficulty in tightening the fuze, remove it and insert another. If the same trouble is experienced with the second fuze, reject the shell.

e. Handle fuzes with the greatest care. For further instructions on the care and handling of fuzes, see FM 4–20 and appropriate Technical Manuals.

33. POWDER CHARGE. Do not bring the powder charge (fig. 18) for any given round near the breech until the preceding round has been fired, the powder chamber blown out with compressed air (or sponged), the face of the mushroom head sponged with clean water, and the bore announced clear. Keep all powder charges in the magazine in their containers except the charge which is to be served to the piece for the next succeeding round (FM 4–20).

34. POWDER CHAMBER. After firing, the gases are automatically blown out of the chamber and bore by compressed air when the breechblock is opened. No. 2 inspects the bore and chamber before reloading to see that the chamber is clear of smoldering fragments; by day he must be able to see daylight through the bore, and at night that the entire bore is clear of flame and luminous gas. He then closes the gas-ejection valve and calls, "Bore clear." In case of failure of the air supply, sponge the chamber with clean water after each round fired.

35. SAFETY POINTING. **a.** Employ a safety pointing observer in accordance with one of the two

methods given in FM 4–20, depending upon local conditions.

b. During target practice, stop firing at once if visibility becomes so poor as to endanger the target-towing vessel and shipping in the field of fire.

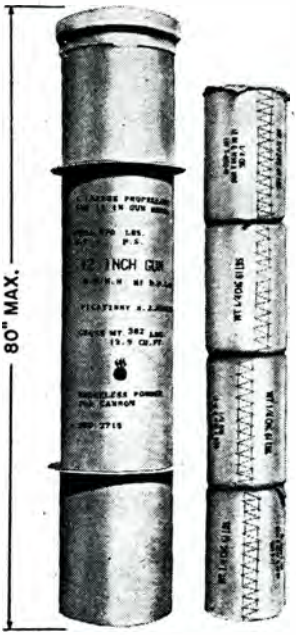


Figure 18. Powder charge and storage case.

36. MISFIRE. A misfire occurs if the piece fails to fire when desired. Make two attempts to fire the primer before it is removed. If upon examination it is found that the primer is not fired, insert a new primer and continue fire. If the primer has fired, allow a minimum of 60 seconds before opening the breech and removing the faulty charge. Store the faulty charge separately from other charges (FM 4–20).

SECTION VI

CARE AND ADJUSTMENT OF MATERIEL

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37. GENERAL. **a.** Officers will be held strictly responsible for the proper care and preservation of all artillery materiel in their charge.

b. All officers and others having materiel in their charge should be thoroughly acquainted with the methods prescribed in this manual and other War Department publications for the operation, care, and preservation of materiel (app. I).

c. Use cleaning and preserving materials in strict compliance with ordnance regulations and follow the *War Department Lubrication Orders* for the 12-inch gun and carriage.

d. Undertake such repairs as may be handled by the battery personnel only under the supervision of an officer or the artillery mechanic. In all cases where the nature of the repair or adjustment is beyond the scope of the enlisted personnel, ordnance will provide, upon request, trained ordnance personnel for the work.

e. Dirt and grit accumulated through exposure to the weather or from the blast of the piece in firing settle on the bearing surfaces and, in combination with the lubricant, form a cutting compound. Powder fouling attracts moisture and hastens the formation of rust. Therefore, the gun and carriage must be cleaned at frequent intervals, especially before and after firing. The procedure for cleaning is described in the following paragraphs, and in TM 9–451 (when published). The following cleaning

materials are issued by the Ordnance Department for use in the field:

(1) *Burlap,* which is used over the sponge for cleaning the bore.

(2) *Crocus cloth,* for removing rust or stains and for the polishing of the breech mechanism, the firing mechanism, and other finished metal surfaces.

(3) *Abrasive aluminum-oxide cloth,* for cleaning unfinished or nonbearing steel surfaces only. Do not use this material on the surfaces of the breech and the firing mechanism.

(4) *Cotton wiping cloth,* for cleaning all parts of the materiel except the gun bore.

(5) *Lens tissue paper,* for cleaning lenses of optical instruments. Take special care to keep the paper free from grit, dirt, or dust which might scratch the glass surface. Before using this paper, remove the dust from optical surfaces with a soft brush. Then moisten the surfaces with breath and clean with the paper. Avoid hard rubbing.

(6) *Soda ash,* for cleaning the bore as described in paragraph 45.

(7) *Dry-cleaning solvent.* Unless otherwise specified, use dry-cleaning solvent or Diesel fuel oil to clean or wash all metal parts whenever partial or total disassembly is undertaken, or when renewing the protective lubricant film on exposed metal surfaces. Dry all parts thoroughly before lubricating.

(8) *Natural or cellulose sponge,* which is used with water and very mild cleaning solutions for washing and rinsing.

(9) *Cotton waste,* for general cleaning purposes where lint will not interfere with the operating mechanisms of the weapon. Colored cotton waste may be used on the exterior parts of the equipment. Use white waste for cleaning all finished surfaces.

f. For further information on care and service of materiel, see FM 4–20.

38. FIRING MECHANISM M1903. a. General. (1) The parts of this mechanism (fig. 8) are very closely adjusted and the clearances are very small. Exercise great care, therefore, in keeping the mechanism well oiled and free from dust and dirt. Daily, and before and after firing, clean and oil all moving parts and exposed metal surfaces. Remove the firing mechanism from the gun when not in use, place it in the small box provided, and store it in the armament chest.

(2) Do not apply force under the firing leaf to raise it because force causes distortion of the firing leaf or battering of the safety bar seat in the side of the firing leaf.

b. Disassembly. (1) To remove the slide from the housing, draw the slide stop out to the left as far as it will go. Lift the slide from the housing.

(2) To remove the firing leaf and slide catch from the slide, start the split pin which passes through the leaf pivot by pressing upon it, and then draw it out. The pivot is now free to be removed. Remove it, thus freeing the leaf and slide catch from the slide.

(3) Remove the collar catch by unscrewing the screw at the lower edge of the housing.

(4) Remove the slide stop by unscrewing it from the housing with the wrench provided for that purpose. Do not remove the slide stop except when necessary to repair it or replace a broken spring.

c. Inspection and tests. (1) From time to time and *before firing,* inspect and test the firing mechanisms as explained in paragraph 31. Replace any firing leaf that is damaged to the extent that firing the gun is possible before the breechblock is closed and locked, or any spring found too weak to keep the firing leaf pressed against the slide.

(2) When a firing mechanism has been tried and is known to function satisfactorily in a particular gun, stamp the firing mechanism with the serial

number of that gun and use it with that gun in order to insure proper functioning.

39. BREECHBLOCK. a. Care and maintenance. The mushroom head, obturator spindle, and the split rings (figs. 5 and 6) require continual care to prevent rusting and pitting. When removed from the gun to be placed in storage, enclose and seal the gas check pad in the container provided to preserve it from deformation or contact with moisture. To prevent possible injury to the pad, always open the gas check pad container with the ordnance tool provided. To clean the gas check pad, remove it from the obturator spindle, wipe it clean with a dry cloth, and then oil *lightly* with a clean cloth dampened with engine oil (SAE 30 above +32° F. or SAE 10 below +32° F.). Never clean the gas check pad with dry-cleaning solvent or any other type of cleaning solution.

b. Assembly and adjustment. Assemble the split rings, inner ring, gas check pad, and filling-in disk to the obturator spindle, taking special care that the front and rear split rings are not interchanged. With the breechblock in the open position (fig. 4), insert the spindle into the breechblock. Put the thrust (ball) bearing (fig. 6) in place upon the rear end of the spindle projecting through the block, and secure the spindle by tightening the split spindle nut by hand. Then translate and rotate the breechblock halfway into the firing position. Tighten the split nut to maximum tightness with the wrenches provided for that purpose and lock in place by the clamping screw. The spindle will be properly adjusted if, while it has no play longitudinally, it can be turned around freely by taking hold of the mushroom head with both hands.

c. If, after firing a few rounds, the spindle is found to have longitudinal play, repeat the adjusting operation described in b preceding.

d. The proper adjustment of the obturator is of great importance. Do not make adjustment with the breechblock open as this may cause injury to the gas check pad.

e. Do not remove the obturator spindle nut from the end of the spindle when the breechblock is locked. If the nut is removed when the breechblock is locked, an attempt to open the breechblock will jam the gas check pad and injure the split rings.

f. Daily, and before and after firing, clean and oil all moving parts and exposed metal surfaces of the breech, breech recess, and breechblock.

40. FILLING RECOIL CYLINDERS. **a.** When filling the recoil cylinders, allow time for any air that may be present in the cylinders to escape.

b. No. 40 removes the filling plugs and attaches the pipe and funnel. No. 41 pours oil through the funnel until the cylinder is full. No. 40 reports to the gun commander that the cylinder is ready for inspection. After the inspection by the gun commander, No. 40 replaces and tightens the plugs.

41. CARE OF CARRIAGE. **a.** Traverse the carriage and elevate and depress the gun throughout their entire allowed movements at least twice a month. From time to time change the azimuth at which the carriage stands to prevent uneven settling of the platform.

b. Keep all parts of the carriage free from rust at all times. If rust is found, remove it immediately. Its removal from all bearing parts, especially piston rods, requires particular attention in order that clearances will not be unduly increased. The use of emery cloth for this purpose by battery personnel is forbidden. Use nothing more abrasive than crocus cloth.

c. When not in use, set the guns at an elevation of 5°.

d. If any leakage occurs from the hydraulic recoil system, remedy it immediately. If necessary, call upon ordnance personnel for assistance.

e. Remove the packing in the stuffing boxes of the recoil cylinder once every 6 months and remove all corrosion on the piston rod. Install new packing around the piston rod. Perform this work under the supervision of ordnance personnel.

f. Empty and refill recoil cylinders at least once every 3 months and clean thoroughly every 6 months. Follow the instructions given in appropriate War Department publications (app. I).

g. Before exercising or firing the gun, clean and oil the exposed surface of the elevating screw. Once every month, clean and oil the traversing pinion. Protect the teeth of the elevating screw and traversing pinion from grit (par. 37e).

h. Once every 3 months, scrub the rollers, rack, and racer of the traversing mechanism while the gun is being traversed. Use a brush dipped in dry-cleaning solvent and scrub until all dirt and sediment are removed from the surfaces and oil distributing grooves. When thoroughly dry, lubricate as specified in *War Department Lubrication Order*. Traverse the gun while lubricating the parts.

i. Clean and oil electric motor bearings, clutch and control linkage, and handwheel and crank handles in accordance with *War Department Lubrication Order*.

j. Clean out oil holes frequently to keep them free from sand and grit, and, except in the act of oiling, keep them closed by the screw plugs or screws provided. Before lubricating at any oil hole, carefully wipe off any dirt or grit near the opening that might be carried by the oil down into the bearing.

k. Paint all grease and oil cups red. Encircle gear case oil or grease openings and industrial-type oil fittings with a red ring.

42. POWER RAMMER. a. General. Keep the power rammer well oiled and free from dirt, the rammer head cylinder filled with liquid at all times, and the stuffing boxes of the rammer head packed to prevent leakage. Report evidence of leakage to ordnance for correction.

b. To oil the rammer chain, open the breechblock and lower the loading trough. Run the rammer chain out on the loading trough until the rammer head comes to the rear end of the gun. With a small oil can, squirt oil on the inside of the chain rollers between the roller and the link, and, at the same time, revolve each roller by hand to work the oil around the roller and its pin. Oil all the rollers that can be reached with the chain in this position. Move the chain ahead and oil the links and rollers as far back as they can be reached. Repeat this operation until all the rollers have been oiled.

c. To fill the rammer head cylinder, remove the rammer head cylinder cover, on top of the rammer head, and the filling plug from the expansion box. Fill the cylinder to overflowing with a glycerin and water mixture. Replace the filling plug and cover. The mixture used should conform to the following:

(1) Glycerin, grade A, USP, 60 parts by volume.

(2) Distilled water, 40 parts by volume.

(3) One ounce of sodium hydroxide (CP NaOH), sticks or pellets, to each 3 gallons of the mixture, or 1 pound of sodium hydroxide to 48 gallons of mixture.

d. To adjust the unstroking device. (1) *General.* To adjust the unstroking device, first check the withdrawal cut-off point to see that it automatically stops the rammer just before the rammer head contacts the stop pins. To do this, run the rammer, under power, part way forward onto the loading trough and then, controlling the speed, *slowly* withdraw it until the unstroking device stops the rearward movement. If adjustment is necessary, loosen the setscrew (fig. 19) on the worm coupling in the unstroking

device shaft near the unstroking mechanism, and rotate the worm in the proper direction until the correct setting is obtained. It will be necessary to move the rammer head forward, under power, and then withdraw it to determine that the correct setting has been made. It should be remembered that any adjustment of the cut-off point on withdrawal varies the ram cut-off point by the same amount.

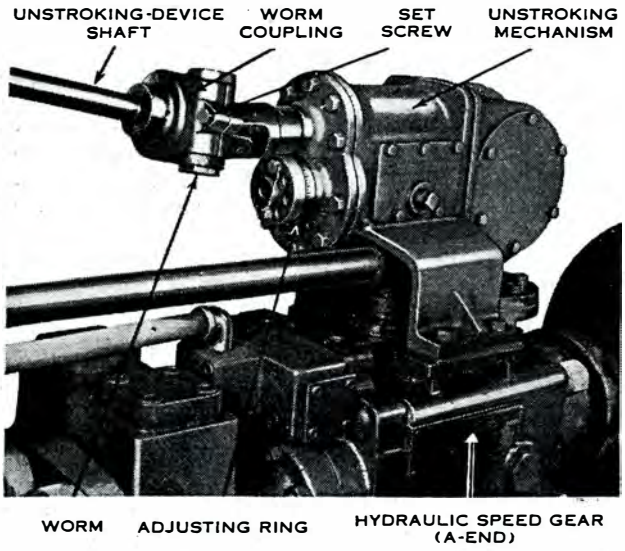

Figure 19. Unstroking mechanism.

(2) *Adjustment of the ram cut-off point.* This adjustment is made through the adjusting ring (fig. 19) on the rear end of the unstroking mechanism beneath the worm coupling. First, ram a dummy projectile into the chamber of the gun, seeing that it is properly seated. Next, move the rammer head into the chamber until it rests against the base of the projectile. At some convenient point make marks that

coincide on the rammer chain and rammer trough. Remove the dummy projectile and make a mark on the rammer loading trough 10 inches forward of the first mark. With power, *slowly* move the rammer head into the gun until the unstroking device stops the forward movement. If the mark on the chain does not come within an inch of the second mark made on the loading trough, the unstroking device must be adjusted as follows:

(*a*) Remove the locking wire and the two bolts holding the adjusting ring.

(*b*) Turn the adjusting ring to the proper setting and replace the bolts in their holes. A scale on the adjusting ring is provided to assist in the setting. When the adjusting ring is rotated to the next hole, it moves the ram cut-off point about 1 inch. Adjustment of the ram cut-off point will not affect the withdrawal cut-off point; however, both the withdrawal and the ram cut-off points should be checked after any adjustment is made.

43. HYDRAULIC SPEED GEAR. To replenish or refill the elevating, traversing, or rammer hydraulic speed gear, use nothing but the special oil issued by the Ordnance Department for hydraulic speed gears. No other oil is authorized. Remove the cover of the oil tank (for example, see rammer, fig. 12) to be filled and slowly pour oil into it until the tank is one-half full. Operate the speed gear for a period of 5 minutes to allow air to escape from the oil. Stop the mechanism and add more oil, if needed, to bring it up to half-full level in the oil tank. Replace the oil tank cover. Check the oil level monthly. Drain and refill once every 6 months.

44. SPONGING SOLUTION. In case of failure of the gas-ejection system, use plain water to sponge the powder chamber after each round is fired. If subfreezing temperatures prevail during firing, alco-

hol available for radiator antifreeze may be added to prevent freezing of the sponging solution in the breech and breechblock.

45. CARE OF THE BORE. **a.** Clean, dry, and oil the bore of the gun as soon as possible after any period of firing and every day thereafter until all "sweating" has stopped. The cleaning solution is made by dissolving ½ pound of soda ash in each gallon of boiling water. Wash the bore with this solution using a bore sponge wrapped with burlap. Exercise care to prevent entry of the soda ash solution to parts of the breech mechanism not easily accessible for cleaning. Wash the bore with clean water to remove all solution. Wipe the bore thoroughly dry with new burlap. Finally, if the piece is not to be used for a considerable time, coat the bore with medium or heavy rust-preventive compound, depending on local conditions. If the battery is on a defense status which requires that it be ready to fire within 24 hours, apply a light coat of oil.

b. Exercise care to prevent the staves of sponges, slush brushes, and cleaning brushes from rubbing against the lower portion of the bore as excessive wear of the lands will result from such practice.

46. AZIMUTH AND ELEVATION INDICATORS. **a. General.** The azimuth data indicator is used to indicate the azimuth at which the gun is set and also the azimuth at which to set the piece as directed by the off-carriage fire control instruments. The elevation data indicator is used to indicate the elevation at which the gun is set and also the elevation at which to set the gun as directed from the off-carriage fire control system. For a detailed account of the data transmission system (fig. 20) see FM 4–32.

b. Orientation. (1) To orient the azimuth and elevation data indicators, first set the gun at a known azimuth and elevation. This can be done, in azimuth,

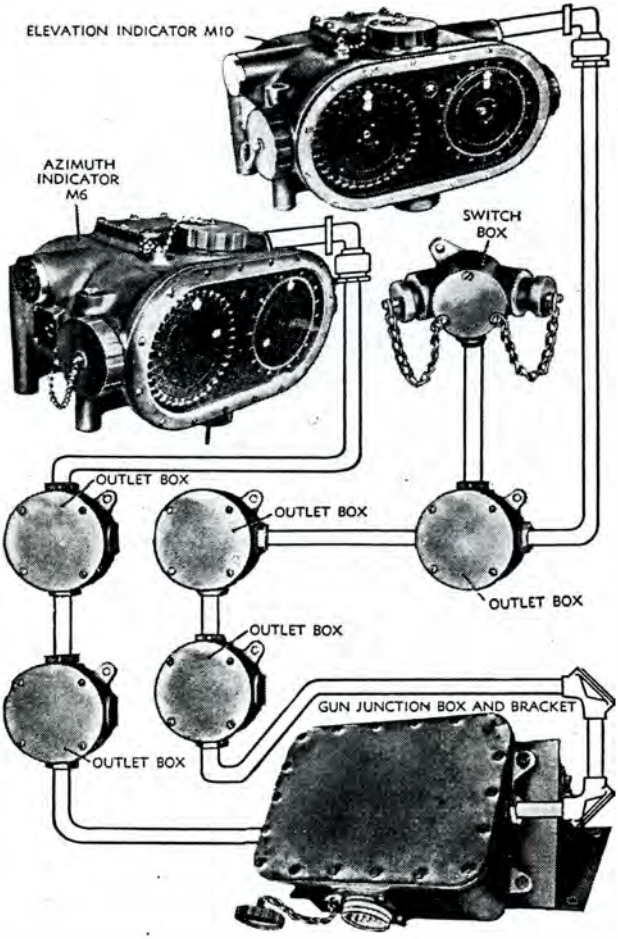

Figure 20. Data transmission system, on-carriage parts.

in two ways: by boresighting on a known point, or setting the gun from the azimuth scale of the gun provided it has been adjusted previously. Elevation may be set with the use of a gunner's quadrant or a clinometer.

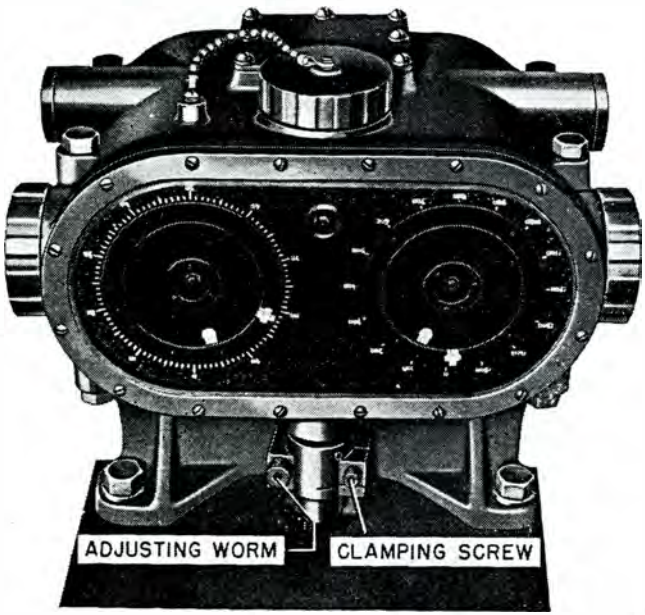

Figure 21. Indicator with adjustable coupling in drive shaft.

(2) An adjustable coupling is located in the indicator drive shaft for the purpose of making this adjustment. Loosen the clamping screw (fig. 21) on the adjustable coupling.

(3) Turn the adjusting worm on the adjusting device until the fine and coarse dials on the azimuth (or elevation) indicator read the exact azimuth (or elevation) at which the gun is set.

(4) Tighten the clamping screw when the correct azimuth (or elevation) is set, making sure that the setting does not change while tightening.

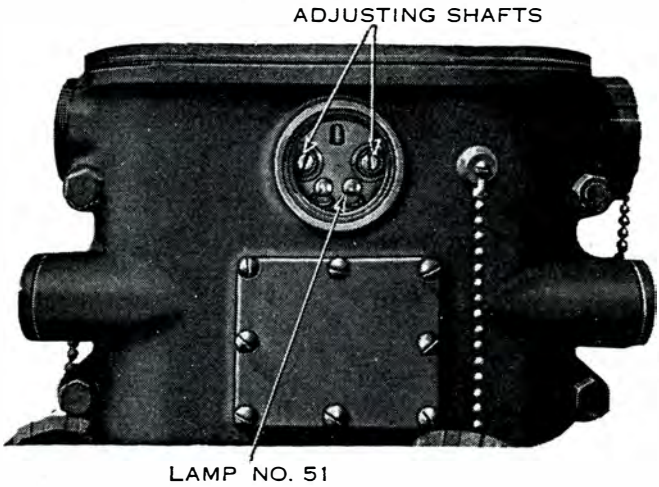

Figure 22. Indicator, synchronizing adjusting shafts.

c. Synchronization. (1) Synchronization is the setting of the electrical dials which receive the azimuth (or elevation) so that they indicate the same data that are set on transmitters in the plotting room.

(2) Energize the system. This is usually done from the plotting room.

(3) Set the transmitter at a known value and check to see that the receiver indicates the same value. If it does not, adjust the indicator as in (4) below.

(4) Remove the signal lamp well cover and turn the slotted adjusting shafts (fig. 22) until the dials are properly set. The adjusting shafts should not be forced against their stops. If sufficient adjustment cannot be made in this manner, or if there is a large

error (often in a multiple of 60°) which indicates that there is a wiring fault, notify ordnance.

(5) Check synchronism at several points on the dial. Replace the signal lamp well cover.

d. Care and preservation. (1) Access to all lamps on the indicator is obtained through lamp well covers. There are two lamps under each cover. One is sufficient for the illumination if the other lamp burns out. The burned-out lamps must be replaced with Mazda No. 51 type lamps (1 c.p., 6-8 volts, 0.2 ampere, G3-½ bulb).

(2) Should any repeater (receiver) start to run as a motor at a high rate of speed, cut off the power immediately and then reapply power after the repeater comes to rest. Repeaters are most likely to do this at the instant power is applied.

(3) Should a repeater on either gun bind or stick during operation, turn off the power to that repeater by means of the switch in the main junction box.

SECTION VII

DEMOLITION OF EQUIPMENT

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47. GENERAL PRINCIPLES. **a.** Tactical situations may arise when, due to limitations of time or transportation, it will become impossible to evacuate all equipment. In such situations it is imperative that all materiel which cannot be evacuated be destroyed to prevent:

(1) Its capture intact by the enemy.

(2) Its use by the enemy, if captured, against our own or allied troops.

(3) Its assembly by the enemy into complete units from salvaged parts.

b. The working principles to be followed are:

(1) Methods for the destruction of materiel subject to capture or abandonment in the combat zone must be adequate, uniform, and easily followed in the field.

(2) Destruction must be as complete as the available time, equipment, and personnel will permit. If thorough destruction of all parts cannot be completed, the parts essential to the operation or use of the materiel, particularly those which cannot be easily duplicated, should be destroyed or removed. *The same essential parts must be destroyed on all like units to prevent the enemy's constructing one complete unit from several damaged ones.*

(3) The destruction of materiel, subject to capture or abandonment in the combat zone, *will be undertaken only when ordered by the harbor defense (or higher) commander.*

c. To accomplish adequate and uniform destruction of materiel, it is essential that:

(1) All echelons prepare plans for the destruction of materiel in the event of imminent capture. Such plans must be flexible enough to make allowance for variations in available time, equipment, and personnel.

(2) All echelons be trained to effect the desired destruction of materiel issued to them. *Training will not involve the actual destruction of materiel.*

d. Certain of the methods outlined require special tools and materials, such as TNT and incendiary grenades, which normally may not be items of issue. The issue of such special tools and materials, materiel to be destroyed, and the conditions under which destruction will be effected are command decisions in each case, depending on the tactical situation.

48. PRIORITY OF DESTRUCTION. a. Destruction should be accomplished in the following priority:

(1) Tube, breech, and recoil mechanism.
(2) Power equipment.
(3) Carriage.
(4) Telescope and observation instruments.
(5) Plotting room equipment.
(6) Ammunition.
(7) Fire control and observation stations; magazines.

b. In the event of imminent capture, everything that can be of possible use to the enemy should be destroyed. If evacuation is probable, all telescopes, optical instruments, and other valuable small items should be evacuated.

49. TUBE. a. General. The selection of a method of demolition will depend on the tactical situation and the materials available. The methods for the destruction of the tube are presented in the order of their effectiveness.

b. Demolition by TNT blocks. For instructions on the wiring and firing of TNT, see FM 5–25.

(1) Drain the recoil cylinder by removing the recoil draining valves.

(2) Insert 120 ½-pound TNT blocks in the chamber. Close the breechblock and plug the muzzle tightly to a distance of about three calibers (3 feet for this gun). Detonate the TNT charges by means of a detonating cord routed through the primer vent.

(3) Take cover when firing the charge. The danger space is about 500 yards.

c. Demolition by TNT blocks and shell. Drain the recoil cylinder as in b above. Ram a shell (without base fuze) into the forcing cone, place 120 ½-pound TNT blocks in the chamber, and close the breechblock. Detonate the TNT with a detonating cord routed through the primer vent. Use a sufficient length of fuze to permit personnel to reach cover.

d. Demolition by incendiary grenades. If evacuation is imminent and it is desired to accomplish demolition without telltale explosions this method should be used. Place 15 to 25 *unfuzed* M14 incendiary grenades in the chamber. They should be placed on their sides and stacked one on top of another. Close the breech. Equip another incendiary grenade with a 15-second Bickford fuze, ignite it, and throw it in the muzzle. Elevate the tube quickly to its maximum elevation.

50. BREECH. Any of the above methods for destroying the gun should also destroy the breech, but if the method selected does not destroy the breech, use a heavy sledge to render it useless.

51. RECOIL MECHANISM AND CARRIAGE. If either of the methods given in paragraphs 49b and c is used for destroying the tube, the resulting damage to the recoil mechanism and carriage should be effective in rendering them useless.

52. POWER EQUIPMENT. **a.** The power equipment of a 12-inch battery which will require destruction in the event of capture or evacuation includes:

(1) Elevating, traversing, and power rammer motors.

(2) Motor-driven air compressor.

(3) The auxiliary power plant.

b. Electric motors and generators can be most effectively and easily put out of operation by injuring the field or armature windings. If time is available, break the motor shell with a sledge and ruin the coils with a crowbar. If time is short, fire a small-arms bullet into the coils through the air vents of either end bell, but take care to keep personnel from the path of a ricochet. Completely smash with an ax or sledge the main switch panels in the power plant and all sockets, plugs, and fuse and circuit breaker panels.

53. TELESCOPES AND OBSERVATION INSTRUMENTS. Evacuate telescopes and observation instruments if possible. If they cannot be evacuated, smash them thoroughly.

54. PLOTTING ROOM EQUIPMENT. Smash all boards and instruments and burn if possible. Smash data transmitters and all communication equipment. Destroy the gun data computer in accordance with instructions given in FM 4–30.

55. AMMUNITION. **a. Projectiles.** Stack horizontally separate-loading projectiles with ogive ends pointing in the same direction. Remove the fuze from the center shell in the top row of each pile. Pack a detonating cap, with a detonating cord attached, next to the booster in each center shell and detonate. The danger zone is at least 200 yards. Shells standing on their bases cannot be satisfactorily destroyed by sympathetic detonation.

b. Powder. Separate-loading propelling charges can best be destroyed by burning. This is most effectively accomplished when they are out of their containers or when the containers are split.

56. FIRE CONTROL AND OBSERVATION STATIONS; MAGAZINES. a. These installations can best be destroyed by demolition with TNT.

b. See FM 5–25 for details of demolition planning and execution.

APPENDIX I

LIST OF REFERENCES

Ammunition

Coast Artillery Ammunition .....TM 4–205
Ammunition, General .....TM 9–1900

Care and Maintenance

Firing Preparations, Safety Precautions, Care and Service of Materiel .....FM 4–20
Service of the Piece, 12-inch Gun (Barbette Carriage) .....FM 4–60
Preservation and Care of Seacoast Defense Materiel .....TM 4–245
12-inch Gun M1895A2, M1895M1A1, and M1895M1A3; Barbette Carriage M1917 (when published) ..TM 9–451
12-inch Gun Seacoast Materiel: Power Plant and Auxiliary Equipment for Barbette Carriage (when published) .....TM 9–452
Cleaning, Preserving, Lubricating and Welding Materials and Similar Items Issued by the Ordnance Department .....TM 9–850
War Department Lubrication Orders .....Nos. 73 and 73A
War Department Recoil Fluid Guide .....No. 59

Commands

Tactics .....FM 4–5

Firing Preparations, Safety Precautions, Care and Service of Materiel .....FM 4–20

Defensive Measures

Tactics .....FM 4–5

Firing Preparations, Safety Precautions, Care and Service of Materiel .....FM 4–20

Camouflage, Basic Principles .....FM 5–20

Camouflage of Antiaircraft Artillery .....FM 5–20F

Camouflage of Rear Areas and Fixed Fortifications .....FM 5–20G

Defense Against Chemical Attack .FM 21–40

Decontamination .....TM 3–220

Protective Concealment for Seacoast Fortifications .....TM 5–265

Camouflage .....TM 5–267

Demolition

Explosives and Demolitions .....FM 5–25

Dictionary

Dictionary of United States Army Terms .....TM 20–205

Examinations

Examinations for Gunners .....FM 4–19

Fire Control and Position Finding

Fire Control and Position Finding..FM 4–15

Firing Tables

Firing Tables for 12-inch S.C. Gun, Models of 1895 and 1895M1 Mounted on 12-inch Barbette Carriage, Model of 1917 Firing 900 lb. A.P. Shell ..... FT 12–E–2

Firing Tables for Gun, 12-inch, Seacoast, M1895 and M1895M1 Firing 1,070-lb. A.P., Projectile (Shot) With Fuze, B.D., Mk. X ..... FT 12–K–2

Firing Tables for 12-inch Guns M1895, M1895M1, M1895A1 and M1895M1A2 Firing Projectile A.P. and C.I. 870-lb. (Navy) (Army Modified Rotating Band) ..... FT 12–L–4

Firing Tables for Gun, 12-inch, Seacoast M1888 and M1895 Firing Projectile (Shot), A.P., 975-lb. With Fuze, B.D., Mk. X ..... FT 12–F–3

Firing Tables for Gun, 12-inch, Seacoast M1895 and M1895M1, Firing Shell, H.E., 700-lb., Mk. VI Shell, H.E., 700-lb. Mk. X ..... FT 12–N–2

Gun Data Transmission and Computer Systems

Service of Gun Data Computer M1 ..... FM 4–30

Service of the Base-end Data and Gun Data Transmission Systems ..... FM 4–32

Gunnery

Gunnery ..... FM 4–10

Materiel

Seacoast Weapons ..... TM 4–210

Organization of Battery

Tactics ..... FM 4–5

Coast Artillery Battery, Gun, Harbor Defense ..... T/O & E 4–67

Safety Precautions

Firing Preparations, Safety Precautions, Care and Service of Materiel ..... FM 4–20

Range Regulations for Firing Ammunition for Training and Target Practice ..... AR 750–10

Target Practice

Seacoast Artillery Target Practice ..... TM 4–235

APPENDIX II

STATISTICAL DATA

12-inch Gun M1895 and M1895M1 on Barbette Carriage M1917

Total weight of gun and carriage without shield, rammer, etc. ..... 416,700 lbs.
Weight of gun ..... 114,700 lbs.
Weight of carriage ..... 302,000 lbs.
Over-all length of barrel .... 36.9 ft.
Character of rifling (M1895):
Original ..... increasing, 1 in 50 to 1 in 25
Relined ..... uniform, 1 in 25
Character of rifling (M1895M1) ..... uniform, 1 in 25
Number of grooves (M1895):
Original 72
Relined 108
Number of grooves (M1895M1) 120
Muzzle velocity, 1,050-pound projectile ..... 2,250 ft. per sec.
Depression, maximum ..... 0°
Elevation, maximum ..... 35°
Maximum range, 1,070-pound projectile ..... 26,800 yds.
Maximum range, 900-pound projectile ..... 28,200 yds.

Maximum range, 975-pound projectile .....30,100 yds.

Maximum powder pressure ..38,000 lbs. per sq. in.

Projectiles fired ...A.P. Shells: 1,070 lbs., 900 lbs., and 870 lbs.
A.P. Shots: 1,070 lbs. and 975 lbs.
H.E. Shell: 700 lbs.

Powder charge .....270 lbs.
(220 lbs. with 700-lb. projectile; 248 lbs. with 870-lb. projectile)

Firing mechanism .....seacoast M1903

Recoil:
Distance .....30 in.
Type .....hydraulic (grooves)
Number of cylinders 1

Counterrecoil:
Type .....spring
Number of cylinders 4

Buffer .....hydraulic plug type

APPENDIX III

DRILL TABLE

Service of the piece, 12-inch gun, casemated

Details	DETAILS, POSTS [1]	(*a*) EXAMINE GUN [2] (*b*) REPORT
Gun commander.....	Gives command when necessary. Sees that the air compressor is started, set for continuous operation, and working properly. Takes post at gun commander's push button, alert to the supervision of his detail.	(*a*) Gives command when necessary. Inspects the gun, carriage, and other materiel, giving particular attention to the recoil and counterrecoil systems, firing mechanism, safety devices, and the oiling of various bearings. (*b*) Gives the command REPORT and receives all reports from the gun squad. Reports to the chief of section, "No..... in order," or any defects he is unable to remedy without delay.
Gun pointer.....	Takes post at traversing handwheel, facing the azimuth data indicator. If sight is to be used, gets the telescopic sight, places it on the sight standard, and takes position at the sight facing it.	(*a*) Checks the adjustment, orientation, and serviceability of the azimuth data indicator and telescope mount if so equipped; tests the traversing mechanism; and checks the communication to the plotting room. Examines electric firing circuit. (*b*) Reports to the gun commander, "Traversing mechanism and firing circuit in order," or any defects he is unable to remedy without delay.

[1] All men will take their posts on the alert signal. A verbal order is not necessary.

[2] The command EXAMINE GUN (EQUIPMENT) is not necessary when preparing for combat since the gun and equipment are maintained constantly in a state of readiness.

(*a*) TARGET (DESIGNATION) (*b*) (AMMUNITION) LOAD	COMMENCE FIRING (RESUME FIRING)	(*a*) CEASE FIRING (*b*) SUSPEND FIRING
(*a*) Repeats command and target designation. In case II firing, assists the gun pointer in getting on the correct target. Reports through the battery commander's telephone operator, "Sir, No..... on target." [3] (*b*) As soon as the ammunition to be used is indicated, relays this information to the chief of ammunition. Repeats the command LOAD and supervises the work of the squad.	In case III firing with continuous data transmission, fires the gun after the elevation setter calls, "Elevation set." Without continuous data transmission, fires the gun on the proper time interval after the gun pointer and elevation setter call, "On target" and "Elevation set" respectively. In case II firing, presses the gun commander's push button and calls, "Ready." [4]	(*a*) Repeats command and supervises the duties of the gun squad. Holds the gun squad ready to continue firing until the command REPLACE EQUIPMENT is given.[5] (*b*) Repeats command. If the gun is unloaded, causes it to be loaded and holds fire until he receives the command RESUME FIRING. (*a*) and (*b*) If the gun is loaded, causes all personnel to keep away from the gun commander's push button. If firing by lanyard, causes lanyard to be detached, or dropped if the gun is at such an elevation that the lanyard cannot be unhooked.
(*a*) In case III pointing with continuous data transmission, traverses the piece until the pointers are matched, calls or signals, "On target." Without continuous data transmission, sets azimuths as ordered and calls or signals, "On target." In case II firing gets on target with telescope; sets deflection as soon as available; calls or signals, "On target," and tracks target. (*b*) In case III firing, continues to match pointers or to set azimuths. In case II firing, continues to track target.	In case III firing, keeps the pointers matched at all times. In case II pointing, fires the gun or gives the command: FIRE, when he is on target and after the gun commander calls, "Ready." [6]	(*a*) and (*b*) Continues to keep the pointers matched or the gun on target until CEASE TRACKING is given.

[3], [4], and [6]. See pars. 10 and 26.

[5] Gun commander sees that the air compressor is stopped or placed on automatic operation on the command REPLACE EQUIPMENT.

Details	DETAILS, POSTS [1]	(*a*) EXAMINE GUN [2] (*b*) REPORT
Elevation setter.....	Starts elevating gear motor and takes post facing elevation data indicator.	(*a*) Checks the adjustment, orientation, and serviceability of of the elevation data indicator; checks both the hand and power elevating mechanisms; and checks the communication to the plotting room. (*b*) Reports to the gun commander, "Elevating mechanism in order," or any defects he is unable to remedy without delay.
Telephone operator.....	Procures head and chest set, and connects it to the field telephone. Takes post at battery commander's telephone station and tests communications.	(*a*) Checks and cleans equipment. (*b*) Reports to the gun commander, "Telephone in order," or any defects he is unable to remedy without delay.
Chief of breech.....	Posts his detail after assuring himself that each man has procured the necessary cleaning material and equipment. Takes post outside the right side frame, near the breech, facing to the rear.	(*a*) Supervises the examination and servicing of the breech mechanism, firing mechanism, breech recess, chamber, bore, and rammer (paying special attention to the safety devices) and assists where he can; checks to insure that everything is in proper working order. (*b*) Reports to the gun commander, "Breech in order," or any defects he is unable to remedy without delay.
No. 1 (Breech detail)...	Procures cotton waste, operating crank for breech mechanism, and a can of lubricating oil. Assisted by No. 2, removes the breech cover; takes post at right rear of the breech, facing to the rear.	(*a*) Examines, cleans, and oils the breechblock and breech mechanism; assists in cleaning and oiling the bore and chamber when necessary. (*b*) No duties.

(*a*) TARGET (DESIGNATION) (*b*) (AMMUNITION) LOAD	COMMENCE FIRING (RESUME FIRING)	(*a*) CEASE FIRING (*b*) SUSPEND FIRING
(*a*) Brings the gun to the load position. (*b*) After the gun has been loaded, the breech closed, and when the chief of breech commands: ELEVATE, sets elevation by elevation data indicator or by matching pointers. Calls or signals, "Elevation set."	After the piece has been fired, depresses the gun to the loading position as rapidly as possible.	(*a*) If gun is not loaded, brings it to the load position and remains at post. If gun is loaded continues to match pointers or set elevations until CEASE TRACKING is given. (*b*) Brings the gun to load position if chamber is empty. When gun is loaded, continues to match pointers or to set elevations.
(*a*) and (*b*) Transmits the command.	Transmits the command....	(*a*) and (*b*) Transmits all commands.
(*a*) Sees that the breech of the gun is open and prepared for loading. (*b*) Supervises the details of loading. After the breech block has been closed, he hooks the lanyard (if used) to the firing leaf before the primer is inserted. As soon as the primer has been inserted and all personnel are clear of the breech of the gun, commands: ELEVATE.	After the piece is fired, he unhooks the lanyard and repeats the duties listed under the command LOAD.	(*a*) If a round is in the chamber, notifies the gun commander. (The executive officer will supervise the unloading by firing the gun when the field of fire is safe.) Supervises the duties of his detail and remains at post. (*b*) If the chamber of the gun is empty, supervises the loading and commands: ELEVATE, as soon as all personnel are clear of the breech.
(*a*) Opens the breech and holds the breechblock back. (*b*) After the projectile is rammed, the powder charge in place, and the spanner tray withdrawn, closes the breechblock and stands clear of the path of recoil.	After the gun has been fired and returned to the load position, opens the breechblock. Wipes off the mushroom head while the piece is being loaded.	(*a*) If a round is in the chamber, remains clear of the breech, with no duties. If piece is unloaded, wipes off the mushroom head and breechblock, and remains at post. (*b*) If chamber is empty, performs duties relative to loading.

Details	DETAILS, POSTS [1]	(*a*) EXAMINE GUN [2] (*b*) REPORT
No. 2 (Breech detail)...	Procures cotton waste; assists No. 1 in removing breech cover; takes post on left rear of the breech, facing to the rear.	(*a*) Cleans and oils breech recess and gas check seat. Checks the gas-ejection system. (*b*) No duties.
No. 3 (Breech detail)...	Procures firing mechanism (lanyard if used), primers, primer pouch, drill, reamer, and cotton waste; takes post just outside the right side frame, facing to the rear.	(*a*) Examines, cleans, and oils the firing mechanism; checks electrical circuit; cleans the vent and primer seat; places the firing mechanism in position; coils the lanyard (if one is used) and places it in a convenient place. (*b*) No duties.
No. 4 (Rammer detail)..	Starts rammer gear motor and takes post at the left rear of the ammunition parking table facing the rammer control lever.	(*a*) Examines, cleans, and checks adjustment of the rammer and spanner tray. Lubricates spanner tray chain and sprocket. (*b*) Reports to the gun commander, "Rammer in order," or any defects he is unable to remedy without delay.

(*a*) TARGET (DESIGNATION) (*b*) (AMMUNITION) LOAD	COMMENCE FIRING (RESUME FIRING)	(*a*) CEASE FIRING (*b*) SUSPEND FIRING
(*a*) Lowers the spanner tray into the breech recess. (*b*) After the projectile is rammed and the powder charge is in place, raises the spanner tray and stands clear of the path of recoil.	After the gun has been fired and the breech opened, looks through the bore of the gun and if daylight can be seen, and if the flame has disappeared, closes the gas-ejection valve and calls, "Bore clear." Lowers the spanner tray.	(*a*) If a round is in the chamber, remains clear of breech with no duties. If piece is unloaded, lowers the spanner tray into place and remains at post. (*b*) If the chamber is empty, proceeds as under the command LOAD.
(*a*) No duties. (*b*) Inserts a primer after the breechblock has been closed and rotated, and the lanyard (if one is used) hooked; lowers the firing leaf of the firing device completely; and steps back to the right rear. If firing is by lanyard, he uncoils the lanyard.	Fires the gun on gun commander's order, when it is necessary to use lanyard. As soon as breech is opened after firing, removes old primer, clears vent, and cleans primer seat.	(*a*) If round is in the chamber, remains clear of breech, with no duties. If chamber is empty, inspects and wipes off firing mechanism with cotton waste. Takes post outside right side frame. (*b*) When gun is reloaded, inserts primer and stands clear of breech.
(*a*) No duties. (*b*) Moves the rammer control lever to the RAM position; rams the projectile into the chamber of the gun; withdraws the rammer. When half of the powder charge is in the loading trough, moves it forward out of the way; withdraws the rammer. When the other half of the powder charge is in place, shoves the powder into the chamber of the gun[7] and withdraws the rammer.	Repeats the duties listed under the command LOAD.	(*a*) Remains at post. When CEASE TRACKING is given, sees that the rammer gear motor is turned off. (*b*) Rams the projectile and powder into the gun if the chamber is empty.

[7] See par. 23d.

Details	DETAILS, POSTS [1]	(*a*) EXAMINE GUN [2] (*b*) REPORT
No. 5 (Projectile serving detail).	Removes the muzzle cover, assisted by No. 6, and takes post at the right of the ammunition parking table, facing to the rear.	(*a*) When needed, procures the bore-greasing device, rope, and other bore-cleaning equipment. Cleans and replaces equipment after using. (*b*) No duties.
No. 6 (Ammunition serving detail).	Assists No. 5 in removing the muzzle cover and takes post at left of ammunition parking table, facing to the rear.	(*a*) Assists where necessary. (*b*) No duties.
Nos. 7 and 8 (Traversing detail).	Procure the traversing cranks; place one of them on the shaft on the same side as the gun pointer; and take posts at the crank facing to the rear.	(*a*) Remove the drip pans and examine, test, clean, and oil the traversing mechanism under the supervision of the gun pointer. (*b*) No duties.
Chief of ammunition....	Gives command when necessary and takes post where he can most conveniently direct the ammunition squad.	(*a*) Gives command when necessary. Supervises and assists in the examination of the ammunition and ammunition handling equipment. Ascertains that sufficient equipment to maintain continuous service of ammunition to the gun is in proper working order. (*b*) Reports to the chief of section, "Ammunition service in order," or any defects he is unable to remedy without delay.

12-inch gun, casemated—(Continued)

(*a*) TARGET (DESIGNATION) (*b*) (AMMUNITION) LOAD	COMMENCE FIRING (RESUME FIRING)	(*a*) CEASE FIRING (*b*) SUSPEND FIRING
(*a*) No duties. (*b*) Assists the ammunition detail in the placing of the projectiles on the ammunition parking table (one in the loading trough). Rolls the second projectile into the loading trough as soon as the ramming of the first round is complete.	Sees that there is a projectile in the loading trough.	(*a*) Remains at post. (*b*) Feeds projectile into the loading trough when necessary.
(*a*) No duties. (*b*) Assists the ammunition detail in placing the powder charge on the parking table. After the projectile has been rammed and the rammer withdrawn, rolls the powder charge into the loading trough.	Sees that the powder charge is not brought up near the gun until after No. 2 calls, "Bore clear."	(*a*) Remains at post. (*b*) Serves powder into the loading trough when necessary.
(*a*) Traverse the piece under the direction of the gun pointer. (*b*) Traverse the piece if necessary.	Traverse the piece if necessary.	(*a*) and (*b*) Traverse the piece if necessary.
(*a*) No duties. (*b*) Repeats name and type of projectile, fuze, and powder charge called for by gun commander. Supervises the service of ammunition to the gun position.	Supervises the service of ammunition to the gun position.	(*a*) Sees that all powder is taken away from the gun position and put in containers. Sees that members of the ammunition detail remain at posts. (*b*) Supervises the service of ammunition to the gun position.

Details	DETAILS, POSTS [1]	(*a*) EXAMINE GUN [2] (*b*) REPORT
Nos. 9 thru 41 (Ammunition detail).	Open the powder magazines and projectile rooms and stand by positions as posted by the chief of ammunition.[3]	(*a*) Examine and prepare the ammunition and the ammunition handling equipment for service or drill. (*b*) No duties.

[3] See par. 17 for duties of ammunition squad.

12-inch gun, casemated—(Continued)

(*a*) TARGET (DESIGNATION) (*b*) (AMMUNITION) LOAD	COMMENCE FIRING (RESUME FIRING)	(*a*) CEASE FIRING (*b*) SUSPEND FIRING
(*a*) No duties. (*b*) Serve ammunition to the gun position.	Continue to serve ammunition to the gun position.	(*a*) Return all powder charges to containers and close the containers. Remain at posts. (*b*) Continue to serve ammunition, if needed, to the gun position.

32.3 Fort Monroe—12-9-44—9,600